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SYNOPSIS
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A SYNOPSIS
OF
OBSTETRICS
INCLUDING ECTOPIC GESTATION

FOR THE AID OF STUDENTS AND
PRACTITIONERS OF MEDICINE AS
A BASIS FOR NOTES UPON THEIR
WORK IN CLASS ROOM AND CLINIC

BY

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THIRD EDITION, REVISED AND ENLARGED

FOR SALE BY
JAMES T. DOUGHERTY
409-411 West 59th Street
NEW YORK

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PREFACE TO THE THIRD EDITION.

IN the preparation of the third edition of this book, the previous edition has been subjected to a most careful revision. A number of additions have been made to the text, and an effort made to keep abreast with the latest teaching in obstetrics.

The arrangement has been changed to some extent, in order to obtain a more logical sequence. The index has been made more complete, and a table of contents added.

The original plan of the book has not been lost sight of, namely, to make it a complete but brief outline of the art of obstetrics, for ready reference by both student and practitioner, and as a basis for further notes in the lecture room and clinic.

NEW YORK, September, 1911.

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PREFACE TO THE SECOND EDITION.

IN the present edition several changes have been made, consisting mainly in additions to the text. A number of typographical errors have been corrected, and an attempt made to change a few sentences whose clearness seemed somewhat sacrificed for brevity.

Some notable changes have been made in the section on milk modification, especially the change to seven and ten per cent. milk from the original Chapin formulæ; this that the work may agree with the teaching of Professor L. Emmett Holt.

The index has also been revised and enlarged to make it of more service in hasty reference.

The ready acceptance of the first edition and the many kind words in its praise have been greatly appreciated and seem to indicate the need for a work of this kind.

NEW YORK, October, 1904.

PREFACE TO THE FIRST EDITION.

THIS volume may be born to fill a long-felt want — and it may not. It is the outcome of a suggestion made some time ago to publish a uniform series of notes upon medical school work, covering, if possible, most of the departments. This is the first-born of the family.

Every student recognizes the importance of well kept notes on his college work, and as he enters into his clinical work and practice his notes become of still greater value to him. Many students express regret that they are unable to record their lectures satisfactorily, missing many, even, of the more important items in their work. This outline, it is hoped, will serve as a basis upon which an intelligent report can be built, and at the same time be of convenient size and sufficient attractiveness to deserve, when corrected and enlarged by the student himself, a place upon his book-shelves.

But, fellow students, this booklet is only the baby placed in your hands. Be a father to it; clothe it as you may see fit; correct it freely, if it goes astray; instill into its blank pages your own maturer wisdom. Then if Baby Number One brightens and helps your school work and turns out to be a good office assistant by-and-by, the publishers will be glad, and hurry the rest of the infant series into the world.

NEW YORK, October, 1902.

TABLE OF CONTENTS

I. THE FEMALE GENERATIVE ORGANS.

I. ANATOMY OF THE EXTERNAL ORGANS	9
The Vulva or Pudendum	9
II. ANATOMY OF THE INTERNAL GENITALS	12
The Vagina	12
The Uterus	14
The Uterine Ligaments	16
The Vessels and Nerves of Uterus	17
The Fallopian Tubes	19
The Ovaries	20
Graafian Follicles	21
The Mammary Glands	21
III. PHYSIOLOGY OF THE FEMALE GENERATIVE ORGANS	23
Menstruation	23
Ovulation	26
Insemination	28

II. PHYSIOLOGY, DIAGNOSIS AND MANAGEMENT OF PREGNANCY.

IV. PHYSIOLOGY OF PREGNANCY	31
Development of Impregnated Ovum	31
Development of Embryo and Fetus	38
Changes in Maternal Body During Pregnancy	46
V. DIAGNOSIS OF PREGNANCY	48
Signs and Symptoms of Pregnancy	48
Diagnostic Signs of Pregnancy	51
Differential Diagnosis of Pregnancy	55
VI. HYGIENE AND MANAGEMENT OF PREGNANCY	57
History of Pregnant Women	57
Management of Pregnant Women	58

III. PATHOLOGY OF PREGNANCY.

VII. DISEASES OF THE PREGNANT WOMAN	61
General Systemic Diseases	61
Diseases of the Genitalia	64
Infectious Diseases	68
VIII. ANOMALIES AND DISEASES OF THE FETAL APPENDAGES	70
Diseases of the Amnion	70
Diseases of the Chorion	71
Diseases of the Decidua	72
Diseases of the Placenta	73
Malformation- and Anomalies of the Placenta	75
Diseases and Anomalies of the Chord	76
IX. ABORTION AND PREMATURE LABOR	78
X. ECTOPIC GESTATION	82

IV. PHYSIOLOGY AND MANAGEMENT OF LABOR.

XI. FORCES INVOLVED IN MECHANISM OF LABOR	93
Resisting Forces—Canal or Passage	93
Resisting Forces—Passenger or Fetus	96
Expulsive Forces—Uterus and Abdomen	97
Course and Duration of Labor	98
XII. MECHANISM OF LABOR	99
Presentation and Position	99
Mechanism of L. O. A. Position	100
Mechanism of R. O. A. Position	103
Mechanism of R. O. P. Position	103
Mechanism of L. O. P. Position	104
XIII. MANAGEMENT OF LABOR	104
Before Onset of Labor	104
First Stage of Labor	107
Second Stage of Labor	108
Third Stage of Labor	109

V. PATHOLOGY OF LABOR.

XIV. DYSTOCIA FROM MATERNAL CAUSES	113
Anomalies in Expulsive Forces	113
Anomalies in Resisting Forces	115
Diseases and Deformities of Bony Structures	116
Results of Bony Deformity	123
Diseases and Anomalies of Soft Parts	125

CONTENTS

vii

XV. DYSTOCIA FROM FETAL CAUSES	129.
Breech Presentation	129
Face Presentation	132
Brow Presentation	134
Transverse Presentation	135
Complex Presentation	136
Multiple Pregnancy	137
Anomalies of Fetal Appendages	139
Anomalies in Fetal Development	139
XVI. ACCIDENTS AND DISEASES CAUSING DYSTOCIA	141
Prolapse of Cord	141
Premature Rupture of Membranes	142
Hemorrhage	143
Hemorrhage Before Onset of Labor	143
Hemorrhage During Labor	147
Hemorrhage After Labor	149
Inversion of the Uterus	150
Toxemia of Pregnancy	153
Pernicious Vomiting	154
Eclampsia	154
XVII. REPAIR OF LACERATIONS	159
Perineum and Cervix	159
XVIII. NON-CUTTING OPERATIONS FOR DYSTOCIA	160
Induction of Labor	160
Forceps	163
Version	168
XIX. CUTTING OPERATIONS FOR DYSTOCIA	171
Embryotomy	171
Cesarean Section	172
Vaginal Cesarean Section	174
Symphysiotomy	175
VI. PUERPERIUM.	
XX. MANAGEMENT OF THE PUERPERIUM	177
Care of the New-Born Baby	177
Care of the Mother	179
XXI. PATHOLOGY OF THE PUERPERIUM	181
Mastitis	181
Puerperal Sepsis	182
Other Puerperal Infections	187
Anomalies in Involution of Uterus	189

VII. THE NEW-BORN BABY.	
XXII. THE BABY'S FOOD	191
The Mother's Milk	191
Substitutes for Mother's Milk	194
Cow's Milk	196
Modification of Cow's Milk	197
Feeding of Baby	202
Evidences of Agreement of Milk	203
XXIII. PATHOLOGY OF THE NEW-BORN BABY	204
INDEX	209

SYNOPSIS OF OBSTETRICS

THE FEMALE GENERATIVE ORGANS

I. ANATOMY OF THE EXTERNAL GENITALS.

The Vulva or Pudendum.

The term *vulva*, or *pudendum*, as generally applied, includes all the external organs of generation. The structures entering into its formation are homologues of most of the structures of the male genitals.

MONS VENERIS, or *anterior commissure*, a cushion of adipose tissue over the pubes, thickly beset with stiff, curled hairs, and containing many *sebaceous* and sweat glands. The skin is pigmented after puberty.

LABIA MAJORA, or *large lips*, are two prominent, longitudinal, cutaneous folds, 7 by 2 by 1 cm., meeting in front at the mons veneris as the *anterior commissure*; behind merging into the neighboring integument, or sometimes being united by the *posterior commissure*—a slight transverse fold in front of the anus. Homologues of male scrotum. Covered on outer side by pigmented skin, hairs, *sebaceous* glands, etc.; on inner side by smooth, moist skin, with a gradual transition into mucous membrane at nymphæ. Space between labia is called the *pudendal slit*, or common uro-genital opening. In the normal position of body, and with well-formed vagina and genitals, the labia majora completely cover and hide the nymphæ. The *nerves* supplying the anterior portion are branches of the ilio-inguinal; the posterior portion, branches of the internal pudic and perineal branches of the small sciatic. The *blood supply* is derived from the superficial external pudic arteries, and from perineal branches of the internal pudic arteries. The *lymphatics* drain into the superficial inguinal and internal iliac lymph-nodes.

PERINEAL BODY, or *obstetric perineum*, is the posterior or sacral segment of the pelvic floor, and is situated between the vaginal slit in front and the anus behind. It is triangular on

sagittal section, the base being below. Its base, or skin surface, measures about 2.6 cm., while the perpendicular measurement is between 30 and 36 cm. The body is made up of strong bundles of fibro-elastic tissue and involuntary muscle fibres, and is traversed by the muscles which join in the common tendinous perineal center.

LABIA MINORA, or *nymphae*, are two smaller longitudinal mucous or delicate skin folds, starting in front as two folds which embrace the clitoris, the anterior fold forming the *praeputium clitoridis*, the posterior forming the *frenulum clitoridis*. Extending backward from the clitoris the nymphæ gradually join the labia majora at the junction of the posterior and middle thirds, where, in the young, they are usually united by a transverse fold the *fourchette* or *frenulum*. The cleft between the nymphæ is called the *vestibule*. They are abundantly supplied with nerves, erectile tissue and sebaceous glands, but contain no adipose tissue. They may become enormously hypertrophied (*Hottentot's apron*).

VESTIBULE.—The triangular area bounded anteriorly (apex) by the clitoris, laterally by the nymphæ, and posteriorly (base) by the fourchette. In its floor are located the urinary meatus in front; the vaginal opening posteriorly; and the openings of the ducts of Bartholin's glands between the hymen and nymphæ. The space between the fourchette and hymen is called the *fossa navicularis*.

CLITORIS.—The homologue of the male penis, is a curved, erectile structure, 2 or 3 cm. in length, situated beneath the mons veneris and partially hidden by the anterior extremities of the nymphæ which divide to form its *prepuce* and *frenulum*. The prepuce may be adherent and retain *smegma*. The *body* is composed of two *corpora cavernosa clitoridis*, but is not traversed by the urethra; the body tapers to the apex, which is surmounted by the *glans clitoridis*, which is about the size of a pea. The *blood supply* is by the deep artery of the clitoris and the dorsal artery of the clitoris, branches of the internal pudic. The *nerve supply* is by the dorsal nerve of the clitoris, the internal pudic, and from the hypogastric sympathetic plexus.

VAGINAL BULBS, or *bulbi vestibuli*.—The homologues of the bulb portions of the corpus spongiosum of the male. They are two almond or leech-shaped venous plexuses, lying underneath

the vestibule, and uniting in front with the erectile tissue of the glans clitoridis. They are bounded by the nymphæ, clitoris and fourchette, and measure 3 by 1 by 0.5 cm. They are covered externally and below by the *bulbo-cavernosi* muscles, whose contraction, during coitus, compresses the veins and causes erection. *Blood supply* is by the arteria bulbi vestibuli, a branch of the internal pudic artery: The *nerve supply* is by branches of the hypogastric sympathetic plexus.

URINARY MEATUS AND URETHRA. — The external orifice of the urethra is situated in the floor of the vestibule immediately in front of the vaginal opening and about one inch behind the glans clitoridis. The meatus may be the seat of painful *urethral caruncles*. The *urethra* is a small vertical slit about 4 cm. long, lined with mucous membrane which is slightly drawn up about the meatus so that the latter can scarcely be seen. It has two muscular coats, an external circular and an internal longitudinal. The urethra may become enormously dilated, cases of *coitus per urethram* having been reported where the hymen remained imperforate.

SKENE'S TUBULES, thought to be relics of the obliterated Wolffian and Gartner's ducts, are blind pouches 10 to 20 mm. in length, opening just within the meatus (3 or 4 mm. above). They may harbor gonococci, and when dilated may arrest catheters. To pass catheter, clean well and introduce *by sight*.

HYMEN. — A circular semilunar or crescentic fold of mucous and fibrous tissue situated on the posterior wall of the vaginal entrance, and partially or completely closing the orifice. The *opening* is usually crescentic, but may be bi-labial or cleft, septate, annular, cribriform, cordiform, or crenelated; or it may be *imperforate* when a complete septum stretches across the vaginal outlet. The hymen is usually torn during first coitus, and may give rise to sharp hemorrhage (the sign of virginity exhibited on the hymenial couch in medieval times). The hymen may stretch, however, hence its presence is no evidence of chastity, nor is its laceration an evidence of unchastity, as it may have been ruptured by masturbation or by gynecological examinations. In women who have borne children the ruptured hymen remains as irregular papillary elevations, the *carunculae myrtiformes*.

GLANDS OF BARTHOLIN, *Glands of Duverney, or vulvo-vaginal glands*, the homologues of Cowper's glands in the male, are about 1 cm. in diameter, and lie on either side of the lower part of the vagina. They are muco-serous racemose glands, and empty by means of long slender *ducts* immediately external to the hymen, in the grooves between it and the nymphæ. They furnish a *lubricating secretion* for the vulva. These glands may harbor gonorrheal infection and may become abscessed, bulging into the vagina.

ANUS AND RECTUM.—The anus is situated just posterior to the vaginal opening, being separated from it by the perineal body. It is usually the seat of *hemorrhoids* during pregnancy, and these may become very troublesome during labor and the puerperium. That portion of the *rectum* below the reflection of peritoneum, is of importance to the obstetrician, as being occasionally the seat of lacerations. It is lined with mucous membrane having both transverse (*valves of Houston*) and longitudinal folds (*columns of Morgagni*). Its *sphincters* are internal, an aggregation of involuntary muscles in the wall of the gut; and external, voluntary muscles. It is of great importance to preserve the external sphincter intact during labor, as otherwise incontinence of feces will result.

II. ANATOMY OF THE INTERNAL GENITALS.

The Vagina

The *vagina* extends from the vulva to the uterus. It is a musculo-membranous slit in the pelvic floor, larger above and smaller at the external opening. It is surrounded by the rectovesical fascia. The *anterior wall* is about 6.5 cm. (2.5 in.) long, the *posterior wall* about 6 cm. (3.5 in.) long. The anterior and posterior walls normally lie in contact, a cross section showing an H or }-} shape. The *axis* of the vagina is directed from above downward and forward, and describes a slight curve, convexity forward, following the curve of the urethra in front and rectum behind.

RELATIONS.—In its *posterior* upper third the vagina is covered with peritoneum, the *pouch of Douglas*, while its posterior middle third is in close relation with the rectum; in its lower third it is separated from the rectum by the perineal

body. The *anterior* upper two-thirds is in close relation with the bladder and urethra; while in the lower third the urethra is in still closer relation, being imbedded firmly in the tissue of the anterior vaginal wall. Its sides are inclosed between the levatores ani muscles. *Laterally* it is in relation with the ureters near their termination, and just above the vaginal orifice it passes through the triangular ligament and is in relation laterally with the vaginal bulbs, glands of Bartholin and bulbo-cavernosus muscle.

VAGINAL FORNIX. — The space, larger behind and smaller in front, formed by that portion of the vagina above the external os. Divided arbitrarily into four portions—*anterior*, *posterior*, and two *lateral*. In the *anterior fornix* the body of the uterus may be palpated; in the *lateral fornices*, by pressure, the ovaries and enlarged tubes may be palpated, unless woman be fat; in the *posterior fornix* the rectum and contents may be palpated. The posterior fornix is followed by the *pouch of Douglas* for about 2.5 cm. (1 in.); at this point the peritoneum may be opened for drainage through the vagina.

MUCOUS MEMBRANE. — Continuous above with that lining uterus. Is covered with stratified, squamous *epithelium*. A few *glands* are present in upper portion, being transitions from glands of cervix. Two medium longitudinal ridges or raphe on the anterior and posterior walls are called the *rugous columns of the vagina*. Extending transversely outward from these are numerous ridges, the *rugae vaginales*. These rugae are again subdivided, giving the mucous membrane the appearance, especially marked just inside the opening, of being studded with conical projections. These become more or less smoothed out after parturition. The *submucous tissue* is loose and contains an *erectile tissue* composed of a plexus of large veins.

MUSCULAR COAT. — Consists of an outer, longitudinal, and much stronger layer, the fibres of which are continuous with the superficial muscle fibres of the uterus. More or less interwoven with this is the *internal* circular layer, while near the orifice the canal is surrounded by voluntary muscle fibres, the *sphincter vaginae*.

VAGINAL SECRETIONS, if any, are acid, and come through the

walls from the blood and lymph vessels. The *acid reaction* of the vaginal mucus is due to the action of *bacteria* which are normally present in the vagina.

INTEGUMENT is continuous with the skin outside, and, with the hymen and labia, is richly supplied with vessels and nerves.

NERVE AND VASCULAR SUPPLY. — The *arteries* are branches of the vesico-vaginal, vaginal branch of the uterine, and branches of internal pudic and middle hemorrhoidal. The *veins* pass to the internal iliac. The *lymphatics* form an extensive network, those from the upper part passing to the external iliac glands; from the middle third, to the internal iliac; and those from the lower third, to the glands at the promontory of the sacrum, or to the lateral sacral glands. The *nerves* come from the third and fourth sacral, and from the utero-vaginal and vesical plexuses of the sympathetic.

The Uterus.

The *uterus* is a hollow, pear-shaped muscular organ, apex down, somewhat anteflexed, and normally resting entirely below brim of pelvis. The base, or *fundus*, is directed upward and slightly forward, forming normally a right angle with the vagina, and is movable with respiration and distention of bladder. It is flattened from before backward; the *anterior surface* is nearly flat, the base, *posterior surface* and *lateral borders* being convex. The middle of the uterine wall is constricted (*isthmus*), dividing the organ into the *body* and *cervix*. The cervix is divided into the *supra-vaginal* and *infra-vaginal portions*—above and below the attachment of vaginal walls.

MEASUREMENTS.—The adult virgin uterus measures 7.5 cm. in length, 4 cm. in breadth, and 2.5 cm. in thickness. "One-two-three inches."

CAVITY. — That of the *body* is quite small, and is triangular, with base up, flattened antero-posteriorly. The sides are convex. At each upper angle is a funnel-shaped cavity and a minute opening, the internal orifice of the Fallopian tube. The cavity of the *cervix* is tubular or fusiform. The two cavities are separated by the *internal os*, the external, or vaginal, opening being the *external os*. The latter is the larger, is generally

circular, but may be oval or linear in shape, and in the virgin is quite smooth. After parturition the opening is transverse and the margins irregular.

PERITONEAL COAT. — The peritoneum is reflected from the bladder in front of the isthmus, and then up over the fundus, forming the *utero-vesical pouch*. From the fundus it passes down the posterior wall to the attachment of the vagina, continuing about 2.5 cm. (1 in.) down the posterior vaginal wall, where, being reflected upward over the rectum and sacrum, it forms the *cul-de-sac of Douglas*, or *recto-vaginal*, *recto-uterine* or *utero-sacral pouch*. The serous coat is loosely attached to the lower one-fourth of the posterior surface; elsewhere it is firmly adherent. At the lateral margins it passes on to the broad ligaments.

MUSCULAR COAT. — The walls of the uterus are thick and dense, and consist very largely of bundles of unstriated muscle fibres, which are disposed in three layers. These different layers are difficult to distinguish in the non-pregnant uterus. As demonstrated in the pregnant uterus they are: The *external layer*, thin and closely connected with the peritoneum; it is made up of longitudinal and circular fibres, the former predominating. The *middle layer* is the thickest, and contains most of the blood vessels; its fibres run in all directions about the vessels, and by their sphincteric action hemorrhage is controlled. The fibres surrounding the internal os form a distinct sphincter, and those around the orifices of the Fallopian tubes are arranged as two hollow cones. The *internal layer* is thin, and is composed of longitudinal and circular fibres; the circular predominate, especially around the internal os. The *cervix* has a relatively small amount of muscle tissue, but derives fibres from all three layers of uterus; it is composed mainly of connective and fibrous tissue, and hence is stiffer and harder than the body.

MUCOUS MEMBRANE OF UTERUS. — Thin, smooth, and closely connected with the internal muscular layer. It is continuous through the fimbriated extremity of the Fallopian tubes with the peritoneum, and through the internal os and cervix with that of the vagina. It is covered with simple, columnar, ciliated *epithelium*, with wave motion toward the os. The *chor-*

ium is peculiar, consisting of embryonic nucliated and highly cellular connective tissue, containing many large lymphatics. In it are numerous tubular glands, the *uterine* or *utricular glands*, their inner third being straight, middle third crooked, and terminals forked and abutting on the muscular layer, penetrating the muscle only in cases of carcinoma. The glands are lined with secreting epithelium, which becomes ciliated toward the orifices.

MUCOUS MEMBRANE OF CERVIX. — Irregular and thrown into numerous folds. Medium longitudinal ridges or raphe, exist on the anterior and posterior walls, and diverging from these are transverse ridges, forming the *plicae palmatae* or *arbor vitae*. The longitudinal ridges are somewhat spirally arranged, this tending to lock them when in contact. The *epithelium* in the upper two-thirds is ciliated columnar; in the lower third, stratified squamous, similar to that covering the vaginal portion of the cervix. The glands in the upper two-thirds are similar to those of the uterus; and extending throughout the entire length are a variable number of racemose glands which secrete a glairy, alkaline mucus, this forming a plug in the cervix during pregnancy. By occlusion these racemose glands form retention cysts, the *ovules of Naboth* or *Nabothian follicles*.

The Uterine Ligaments.

The *uterus* is supported mainly by the pelvic floor and by folds and ligaments extending from its musculo-fibrous parts. There are six ligaments arranged in three pairs, and two unpaired peritoneal folds of unimportance.

ROUND LIGAMENTS, or *ligamentum teres*, are round musculo-fibrous cords between four and five inches long, arising at the cornua of the uterus. They extend obliquely downward and forward below and in front of the Fallopian tubes and between the layers of the broad ligament, entering the inguinal canal where they are sometimes accompanied by a process of peritoneum, the *canal of Nuck*. At the external ring they divide into *three portions*, one being attached in the canal, one to the spine of the pubes, and one being lost in the labium majus.

BROAD LIGAMENTS, or *lateral ligaments*, are two peritoneal

folds which pass from the sides of the uterus to the lateral walls of the pelvis as high as the external iliac veins. They divide the uterus into two equal parts, anterior and posterior. Together with the uterus they form a *transverse septum* across the pelvis, dividing it into two parts, in the anterior of which is the bladder, urethra and vagina, and in the posterior, the rectum. Each broad ligament has a ridge on its anterior surface formed by the round ligament, and another at its upper free margin, formed by the Fallopian tube. A short posterior ridge is formed by the *utero-ovarian ligament* (or *ligamentum transverso-colli*). A portion between the fimbriated extremity of the tube and the pelvic wall is called the *infundibulo-pelvic ligament*. The ovary is attached to its posterior surface, its pedicle being the *mesovarium* or *suspensory ligament of the ovary*. The *fimbria ovarica*, or *tubo-ovarian ligament*, is one of the fimbria extending to the ovary.

Contents of Broad Ligament. — Between its peritoneal layers are the ligaments forming the ridges; nerves, and blood and lymph vessels (more important); the ovary and its ligament; *parovarium* or *organ of Rosenmüller*, formed from the Wolffian duct and body which are developed from external ridge in embryo and become epididymis in male; *Gartner's duct*, the horizontal tube of parovarium, which, by occlusion, may form cysts; unstriped muscle fibre; and loose connective tissue, the *parametrium*.

UTERO-SACRAL LIGAMENTS, *suspensory ligaments*, *tubo-ovarian* or *utero-ovarian*, attach the uterus to the second sacral vertebra, keeping cervix back and vagina up. Sometimes called the *muscular retractors*, as they extend from the upper part of cervix and have tendency to throw fundus forward. The *utero-vesical* and *recto-vaginal folds* are not of importance. They are folds of peritoneum containing no muscle fibres. The former extends from the upper part of cervix to bladder, forming the *utero-vesical pouch*; the latter is the reflexion from the upper fourth of vagina to rectum, and forms the *recto-vaginal*, or *Douglas' pouch*.

Vessels and Nerves of Uterus.

The uterus receives an abundant blood supply, which is derived from two main sources. The vessels are remarkable for

their tortuous course and frequent anastomosis.

UTERINE ARTERY. — From anterior division of internal iliac. Runs down side of pelvis, between folds of broad ligament, passing in front of ureters to reach the side of uterus, where it sends branches downward. It then arches upward and anastomoses with its fellow by numerous branches which cross anterior and posterior to uterus. At the isthmus a large branch forms the *circular artery of uterus*. At the cornu, the uterine anastomoses with the ovarian artery. It can be felt by finger in lateral fornix, and is much enlarged during pregnancy. The uterine gives off a small *cervical* branch which descends to supply cervix and sends *cervico-vaginal* branches to vagina.

OVARIAN ARTERY. — Arises from the abdominal aorta below the ilium, passes through folds of broad ligament and runs parallel with tube. It sends branches to the tube and ovary and anastomoses with uterine. It supplies a branch to the utero-ovarian ligament.

VEINS. — Are of large size and correspond with the arteries. In the base of broad ligament is a plexus of veins, *uterine plexus*, corresponding with uterine artery. On the right side this plexus empties into inferior vena cava; on the left, into renal vein. Hence, blood has more indirect course on left side and this plexus is more subject to dilatation, as is also noted in corresponding plexus of the male — varicocele occurring principally upon the left side. In the impregnated uterus the enlarged veins in its walls constitute the *uterine sinuses*.

LYMPHATICS. — Originate from three abundant networks, in musculature, peritoneum and stroma. The trunks from these unite and form another network beneath the peritoneum, that of the cervix and body being continuous. The collecting trunks from the *body* terminate in the pre-aortic, external iliac and inguinal glands. Those from the *cervix* terminate in the external iliac, internal iliac, lateral sacral glands, and glands of the promontory. Owing to the extensive meshwork, infection from the uterus may be easily carried to all parts of the pelvis.

NERVES. — Both spinal and sympathetic nerves supply the generative organs. The *sympathetic* system is derived from the hypogastric plexus, opposite sacrum at division of aorta;

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and from the inferior hypogastric, or pelvic, plexuses, which extend from the hypogastric down either side of rectum, vagina and bladder, supplying the pelvic organs. The *spinal* nerves are branches from the second, third and fourth sacral, which accompany each leg of the sympathetic. The sympathetic supply is chiefly concerned in sexual processes.

The Fallopian Tubes.

The *fallopian tubes*, or *oviducts*, are two tubular structures of varying diameter and from 10 to 12 cm. in length, extending from the cornua of uterus outward and upward, then downward and backward to end in the *fimbriated extremities* at the ovaries. They convey the ova from the ovaries to the cavity of the uterus.

DIVISIONS. — Each tube is divided into four portions: 1. *Interstitial portion*, extending through wall of uterus. 2. *Isthmus*, the inner, narrowest portion. 3. *Ampulla*, or convoluted portion, the outer dilated portion comprising about two-thirds of the length, this part curving over the ovary. 4. *Infundibulum*, the outer funnel-shaped expansion of the tube, having at its bottom the small *abdominal orifice*, *ostium abdominale*, or *pavilion*, about 2 mm. in diameter when dilated, and rendered irregular by numerous processes, the *fimbriae*. This outer end is called the *fimbriated extremity*, and has attached to it one or more pediculated vesicles, the *hydatids of Morgagni*, representing portions of the Wolffian duct:

LUMEN increases in size from without in, except at fimbriated extremity, where it narrows slightly; average, 2 to 4 mm.

PERITONEAL COVERING. — The tube is closely invested with peritoneum except a narrow line along base at attachment of broad ligament, and at fimbriated extremity (the *ostium abdominale*). Beneath the serous coat lies the *tunica adrentitia*, composed of lax connective tissue.

MUSCULAR COATS. — There are two, an *outer longitudinal* layer (scant), and an *inner circular* layer (well defined), continuous with the muscle fibres of the uterus.

MUCOUS MEMBRANE. — Is thrown into numerous *longitudinal folds*, more extensive in the ampulla, and continuous at

the outer extremity with the fimbriae. Lined with simple columnar ciliated *epithelium*, with wave motion toward uterus.

VESSELS AND NERVES. — The chief *artery* is the tubal branch of the uterine; it also receives branches from the ovaries. *Veins* empty into uterine and ovarian veins. *Lymphatics* join those from uterus and ovary and empty into juxta-aortic glands. *Nerves* are the same as supply uterus and ovary.

The Ovaries.

The *ovaries*, or *testes muliebres of Galen*, are two almond-shaped bodies, depending from the posterior surface of the broad ligament by means of the *mesovarium*, a reflexion of peritoneum from the posterior layer. They are attached at the *hilum* to the anterior layer of the broad ligament, but protrude through the posterior layer. They are analogous to the *testes* in the male.

Position. — Varies greatly, depending on position of uterus and of woman's body. Usually lie on the lateral pelvic wall and vertically when in the erect posture. Are *very movable*, and have been found in inguinal hernias.

Diameters. — About 1.5 cm. thick, 2 cm. broad, and 3.5 cm. long. **Weight**, from 4 to 8 gms.

Borders. — Upper straight border; lower curved border; outer rounded edge or border; inner drawn-out edge or border, running into utero-ovarian ligament. A groove on the anterior attached border is called the *hilum*, through which the vessels and nerves enter the ovary.

Surfaces. — Either upper and lower, or anterior and posterior, respectively, depending upon the position of ovary.

Covering. — The *serous covering* is a continuation of the peritoneum at the hilum, but differs from it in being an epithelial structure consisting of a single layer of columnar epithelial cells. This is called the *germinal epithelium of Waldeyer*, and gives to the ovary a dull gray appearance.

PARENCHYMA. — The *stroma* consists for the most part of a peculiar soft, vascular tissue, made up largely of spindle-shaped cells and a small amount of connective tissue. It has one outer, less vascular zone, and two inner, more vascular zones. The middle zone contains the *Graafian follicles*.

VESSELS AND NERVES.— *Arteries* are the ovarian, from the aorta, anastomosing about the hilum with branches of the uterine. *Veins* follow course of arteries, and form near the ovary the *pampiniform plexus*, corresponding to a like structure near the male testicle. The *lymphatics* join those from the fundus and tube and empty into glands at the side of the aorta. The *nerves* are from the ovarian plexus, a continuation of the renal plexus, and from the aortic plexus.

Graafian Follicles.

The *graafian follicles*, or *vesicles*, or *ovisacs*, are contained in the middle or cortical layer of the ovarian stroma, and are formed from large primordial cells which are developed in the germinal epithelium. These cells become thickened (*genital ridge*), and by indenture they enter the parenchyma and become detached. This indenture is called the *egg column*, *egg tube*, or *Pfluger's plug*. At puberty the ovaries enlarge, the Graafian follicles are developed in greater number and the ova are capable of fecundation.

Structure.— A section through the ovary, including a Graafian follicle and ovum, shows, in order from without inward:

Germinal epithelium	} Peripheral tunic of ovary.		
Tunica albuginea			
Medulia containing			
Tunica fibrosa			
Tunica media	} Tunica propria	} Theca folliculi, or tunica vasculosa	} Graafian follicle and contents.
Tunica interna			
Membrana propria of Waldeyer			
Membrana granulosa			
Liquor folliculi			
Cells of discus proligerus	} Cells of discus proligerus, or germinal hill		
Corona radiata			
Zona radiata, or pellucida			
Perivitelline space			
Clear outer zone	} Vitellus (yolk)	} Ovum proper	
Protoplasmic zone			
Deutoplasmic zone			
Germinal vesicle (nucleus)			
Germinal spot (nucleolus)			

The Mammary Glands.

The *mammary glands*, *breasts* or *mammæ*, are accessory glands of the generative system. Each breast lies over a por-

tion of the pectoralis major muscle, and is a roughly circular hemispherical prominence surmounted by the conical *nipple*. They are composed of glandular, fibrous and fatty tissue, and covered with skin which becomes striated with child-bearing.

NIPPLES. — Covered by tough, pigmented skin, with no hairs, sweat or sebaceous glands. They contain many *sensation papillae* and *openings of gland ducts*. The nipples vary considerably in height and shape. The apex is rendered rough by fissures, and the circumference is thrown into crescentic ridges.

AREOLA. — A tender, pigmented area around nipple, containing hairs and sweat glands; the latter, probably rudimentary portions of the mammary gland, are called *glands of Montgomery*. Both nipple and areola have circular and longitudinal muscle fibres, whose action is to cause a projection of the nipple by a sort of erection.

GLANDS. — The breasts may be regarded as highly specialized sebaceous glands. Each mamma is made up of fifteen to twenty *lobes*, which consist of *lobules* and these again of *alveoli*. When the glands are stimulated to action by pregnancy the lobulations can be felt.

DUCTS. — Each lobe empties by a *lactiferous duct* upon the surface of the nipple; these may open on the areola. The ducts are fifteen to twenty in number, corresponding to number of lobes; they have an enlargement, *ampulla*, near the nipple, and are again constricted at the external orifices.

SECRETION. — Fluid may be present in the nipples of a non-pregnant woman; it may result from tumors of uterus, menstruation, etc. At the commencement of lactation the cells in the center of an alveolus undergo fatty degeneration, and are eliminated in the first milk as *colostrum-corpuscles*; this is Nature's laxative. The remaining peripheral cells of the alveolus undergo granular and fatty changes; the end nearest the alveolus breaks down and liberates its contents, collectively known as *milk*, while the remaining end of the cell forms new cytoplasm. The cells also secrete water and salts.

VESSELS AND NERVES. — *Arteries*, from perforating branches of internal mammary, long thoracic branches of axillary, and branches from intercostals. *Veins* anastomose around base of

nipple as *circular venosis*, and empty into axillary and internal mammary. *Lymphatics* are cutaneous and glandular, and empty into the axillary, subclavian and internal mammary nodes. *Nerves* are from the fourth, fifth and sixth intercostals, and sympathetic filaments from the dorsal cord.

III. PHYSIOLOGY OF FEMALE GENERATIVE ORGANS.

Menstruation.

Menstruation is the periodic discharge of a sanguinous fluid from the cavity of the uterus and Fallopian tubes during the period of woman's sexual activity, from puberty until the menopause. It *occurs* at regular intervals during health, except during pregnancy and lactation. It is marked by local and general symptoms, the discharge of blood being the most important.

CAUSE.—Unknown, but probably corresponds to rut of lower animals, the flow of blood being due to pelvic congestion from upright posture. It is a diapedesis of blood through congested new thin-walled capillaries, the efferent vessels being inadequate for the afferent flow.

CHARACTER OF FLOW.—Menstrual blood differs from arterial blood in being darker, not clotting, etc. It is alkaline, and has a peculiar, penetrating odor from admixture with glandular secretion. It contains epithelial cells and mucus which normally prevent its clotting.

SOURCE OF FLOW.—Mainly from mucous membrane of body and fundus of uterus, and possibly from Fallopian tubes, the cervix taking little part.

DURATION OF FLOW.—Varies within normal from two to seven days, average four to five. Greatest amount of blood is lost during first few days; after this, discharge gradually grows less, and may be followed by leukorrhœa for a day or two.

QUANTITY OF FLOW.—Average amount of blood lost is 4 to 6 oz. If a woman is obliged to change her napkins more than three or four times daily during the height of flow, or wear more than twenty during the period, the amount is excessive.

MENSTRUAL MOLIMINA.—The local and general symptoms of

menstruation. There is a feeling of weight in pelvis; nervous excitement; breasts, tonsils and thyroid enlarge; blood tension and temperature increased; skin is congested and more pigmented.

STAGES.—The complete menstrual cycle may be divided into three stages and a period of rest covering about twenty-eight days, as follows:

1. Tumefaction of mucosa.....about 5 days
 2. Menstruation properabout 4 days
 3. Restoration to normal.....about 7 days
- Period of rest.....12 to 16 days

Total time of cycle.....about 28 to 32 days

First Stage.—Cells of surface modify, mucosa hypertrophies, becoming thick, soft and dark red. The glandular openings are greatly enlarged and are visible to unaided eye. Capillaries are enlarged.

Second Stage.—There is a diffusion of blood, by diapedesis, beneath and through the epithelium; then follows disintegration of epithelium, rupture of capillaries and veins and a pronounced flow from entire inner surface of uterus.

Third Stage.—Escape of blood in tissues is partly absorbed but is mainly cast off; the tissues subside and are regenerated, the epithelium arching around the openings of glands. Superficial layer of mucosa has been cast off, and restoration takes place by multiplication of cells in deeper layers and glands.

PERIODICITY.—Eighty-six percent. of cases are regular in occurrence. The 28-day type is most common, the 30-day type next, the 20-day type next, and the irregular type least common of all.

AGE OF ONSET.—Ordinarily menstruation marks the change from girlhood to womanhood. The age varies with *race*, girls of Jewish and dark-skinned races menstruating youngest; *climate*, in warm earlier than in cold; *environment*, high-tension city life, association with the opposite sex, and sexual temptations; *genital sense*, occurring earlier in girls with strong sexual feeling; and lastly, *heredity* is an important factor. The *average age* is thirteen to fourteen years, although it has occurred in infants of one or two years and has continued even to the eightieth year. A study of 120 cases shows onset

to be as follows (Cragin) :

10th year.....	1	14th year.....	28
11th year.....	5	15th year.....	14
12th year.....	27	16th year.....	8
13th year.....	28	17th year.....	9

MENOPAUSE, or *climacteric*, is the physiological cessation of menstruation. It occurs as a rule at about the 45th year of age, from the 13th to the 45th year being the average child-bearing period. Later onset usually means earlier cessation, and *vice versa*. The flows becomes progressively less for several years preceding its final cessation, and may be accompanied by obscure *nervous phenomena* — hot flashes, mental aberrations, etc. There is a tendency to take on flesh after the cessation of flow.

MENSTRUATION DURING PREGNANCY.—A monthly discharge may occur until the decidua reflexa meets the decidua vera, which occurs in the fifth month. Thereafter any flow must come from mucous membrane of cervix or from villi of chorion; it cannot be true menstruation. Some women have a regular flow during lactation.

RELATION TO OVULATION.—The prime cause of menstrual onset is the presence of ovaries or ovary capable of producing Graafian follicles. It may go on independently after once started. Menstrual life usually begins with first ovulation, but may not begin until after the first confinement. There is a common center in the lumbar cord whose stimulation causes dilatation of blood vessels, rupture of Graafian follicles when ripe, and flow of blood from uterus. Pfluger holds that development of follicle stimulates a congestion of uterine mucous membrane by a reflex irritation, with a consequent bloody discharge.

Proofs of Independence.—1. It is not uncommon for a woman to become pregnant before she has started to menstruate, although ovulation has necessarily taken place. 2. Impregnation may occur during lactation, when menstruation is suspended. 3. An ovary, with tube, removed seven years after cessation of menstruation, showed fresh corpus luteum, hence Graafian follicle (Cragin). 4. Both ovaries with tubes have been removed and yet menstruation has continued. This is very rare, and usually means that some part of the ovary has

been left, or that there is a third, or accessory, ovary.

CHANGES IN BODY AT PUBERTY.—The beginning of menstrual life is co-incident with a general rounding out of the body; the breasts develop, hair appears on *mons veneris*, the hips broaden and the girl's whole disposition changes. It is important to impress on the mother the necessity of telling her daughter just what is going to occur, that she may not be frightened at its onset. This is the *mother's duty*, and its neglect has resulted in many sad disasters.

HYGIENE AT PUBERTY.—A girl, to develop properly at this time, must have plenty of good food, fresh air, outdoor exercise, and in fact everything that will tend to *enrich her blood*. During the period it is best for her to lie down during the first few days so that the uterus may have a chance to fully develop; otherwise it may remain small and anteflexed, resulting in dysmenorrhea and often sterility.

PATHOLOGY OF ONSET.—Evidences that a girl needs medical attention are pains in the back, headache, dark eyes, tender breasts, and a feeling of onset of flow without the appearance of blood. Such a girl should be given plenty of rest, fresh air, good food, etc., and in short, be "turned out to grass." It is best to keep such girls out of school for a few years at the time of puberty.

Ovulation.

Ovulation means the development and discharge of the mature ovum and its transmigration to the uterine cavity, and the changes occurring in the Graafian follicle before and after its rupture. The entire number of primitive ova is estimated at about 70,000.

DEVELOPMENT OF OVUM.—Derived from a *primordial cell* of the Graafian follicle, which latter is formed from a detached portion of an indenture of the germinal epithelium of ovary. The primitive cell is without a cell-wall, but has cell-contents, called the *yolk*, nucleus called *germinal vesicle*, and nucleus called *germinal spot*.

MATURATION OF OVUM.—As the ovum matures it acquires a cell-wall with three layers, the *zona pelucida*, *vitelline membrane*, and *internal cell-membrane*. The human ovum is hollo-blastic and completely segments; it contains more protoplasm

(germ-yolk) than deutoplasm (food-yolk). In its preparation for impregnation it undergoes several important changes. The nucleus approaches the periphery (*karyokinesis*), loses its membrane and, by means of the centrosome, becomes spindle-shaped, with a nuclear spindle and fine radiating lines in the protoplasm. It then assumes a dumb-bell or double star-shaped formation (the *amphiaster stage*), and one portion, the *polar body*, is extruded from the ovular surface and disappears. This process is then repeated, at each extrusion the chromatin of the nucleus dividing into sixteen *chromosomes* for the polar globule and the same number for the ovum. The chromosomes are reduced in number one-half, so that when they unite with those of the male cell (which undergoes similar changes in development), the number, sixteen, characteristic of the human species, is maintained. The discarded portions are the *male elements* of the cell, their extrusion being Nature's method of preventing parthenogenesis, or the closest kind of inbreeding. The ovum is now ready for fertilization, and measures about 0.2 mm. in diameter.

MIGRATION OF OVUM.—After rupture of the Graafian follicle the ovum escapes with the liquor folliculi onto the surface of the ovary. It may escape to other regions of the abdominal cavity and undergo absorption, or be carried along by currents formed in the peritoneal fluid by the ciliated epithelium of the fimbriae, and so on down the tube and uterus, where it may become impregnated or escape with the menstrual flow.

CORPUS LUTEUM.—After rupture of the Graafian follicle and escape of contents, the cavity fills with blood from the torn vessels in its walls. A clot forms, and the wall of the sac, *membrana granulosa*, becomes greatly thickened and is thrown into folds. Spindle and large hexagonal cells develop, enclosing and absorbing the clot, which becomes pink or yellow; the larger cells, *lutein cells*, are supposed to secrete a yellow substance, *lutein*, which, being absorbed, influences the nutrition of uterus and other sexual organs. The only difference between the true and false corpus luteum is in development; both are formed from blood clot.

Corpus Luteum of Menstruation, or false, reaches its highest development in from ten to thirty days (average, two weeks). A week later it has almost entirely disappeared, leav-

ing only a small depression in surface of ovary.

Corpus Luteum of Pregnancy, or *true*, develops for about four months and becomes a cicatrix about three months after parturition. It is always difficult to distinguish the false from the true, as the former may be overdeveloped and the latter underdeveloped.

Insemination.

SEMINAL FLUID.—A thick, yellowish-white, tenacious fluid, varying in quantity at each emission from 1 to 8 cc. Has a peculiar *odor* and is neutral or alkaline in *reaction*. *Contains* water, salts, protein, fats, albumose, nuclein, lecithin, guanin, hypoxanthin, cholesterolin, and spermatin; and solid elements, spermin crystals, seminal cells and *spermatozoa*. The living cells are formed in the testicles, while the fluid portion (which carries and nourishes the living cells), is secreted mainly by the seminal ducts and vesicles, the prostate and Cowper's glands.

GERM CELL.—Minute, thread-like cells, about 1/500 inch in length, and possessing *power of motion*. They usually begin to appear in the seminal discharge at the fifteenth to sixteenth year, and disappear at about the sixty-fifth year; there are wide variations, however. They were discovered in 1677, by von Hanmen, a medical student in Leeuwenhock, Germany. Each cell consists of a flattened *head*, derived from the nucleus of the spermatid; a cylindrical *body*, middle piece or intermediate segment, and an elongated filament or *tail*, whose terminal part, or *end-piece*, is very slender and is capable of rapid motion.

Vitality is marked; they have lived for several days in the uterus, and have been found in the Fallopian tubes 3½ weeks after copulation. Heat, cold, acid solutions, lack of water, and the mineral poisons destroy them, while an alkaline medium is favorable.

Formation.—The seminiferous tubules are lined by: 1. *Sustentacular cells*, or Sertoli's columns; large supporting cells. 2. *Spermatogenic cells*, smaller, lying between the sustentacular cells; these undergo division several times, forming: 3. Mother cells; and these divide into four: 4. Daughter cells, or *spermatoblasts*, whose nuclei form the heads



of *spermatozoa*. The spermatid cells, or spermatozoa, are set free in the tubules with a small amount of fluid. The average number of cells secreted is over 200,000,000 per week.

Maturation.—In the development of the mature male cell the chromatin is halved and the polar bodies are thrown off similarly to the process in formation of female ovum; this is to prevent self-fertilization.

Motion.—Due to vibratory motion of tail and end-piece, and also rotary motion of 90° about long axis. It is estimated that they can move their own length, 1/500 in., in one second, or from the hymen to neck of womb in three hours.

COPULATION, or *coitus*, has for its physiological object the transference of the male element to the female generative organs, where it can meet and fertilize the female element. Is divided into several acts:

Erection.—Due to a relaxation and filling of blood spaces of corpora cavernosa and corpus spongiosum, then a constriction of the venous return by the contraction of muscles. This engorgement and turgescence makes *penetration* possible. Probably a *reflex act*, with center in lumbar cord. May be stimulated from genitals, or mentally.

Orgasm.—Culmination of act. Penetration may or may not be accompanied by corresponding erection of vulva. Some women do not have erection, hence experience no orgasm or excitement. The synchronous orgasm of both male and female is most favorable to impregnation.

Ejaculation.—Accompanies orgasm, and is a *reflex muscular act*, due to rhythmic contractions of seminal vesicles and prostate, which force seminal fluid into penile urethra, whence it is ejaculated with some force by the contractions of the penile and anal muscles. No discharge occurs in female as in male; the vagina is lubricated by secretion of vulvo-vaginal, or Bartholin's glands, opening into vagina by slender ducts, 3/4 in. long, just back of hymen.

MEANS OF RECEPTION.—Uterus approaches vulva during orgasm with intermittent motion, due to contractions of round ligaments; this motion produces a sort of intermittent suction (like an animal gasping for breath), and tends to draw semen into the uterus. This is most favorable when the fluid is depos-

ited in the vaginal vault (*seminal lacuna*). Spermatozoa may also reach uterus by means of their own motion, even when deposited on vulva, being impelled onward by acid vaginal mucus. Once within the uterus they easily travel upward, due to stimulation of their terminal filaments by the motion of cilia of uterus. Hence male cell is active; female cell is passive, being forced downward by ciliary wave and vermicular motion of tube.

POINT OF UNION OF CELLS.—Normally somewhere in Fallopian tube. One week is thought to be the time required for ovum to travel from ovary to uterus; hence impregnation after this time must occur in uterus. When ovum cannot escape through tube it may be fertilized anywhere along its course, resulting in ectopic gestation.

FERTILIZATION OF OVUM.—The union of chromatin of male cell with chromatin of female cell. When the two cells meet the protoplasm of female cell sends up a projection; the male cell meets this, enters, leaving tail outside, and blends, forming the *male pronucleus*; the pronucleus of female cell meets this, each being surrounded by a clear zone with radiating lines. These, combined, form *segmentation nucleus*, near center of ovum. When more than one male cell enters the ovum each is met and joined by a projection of the female pronucleus and multiple fetation results. The fertilized cell thus has elements of both father and mother, hence characteristics of both parents in the offspring. Impregnation takes place at the moment of this union, and from it dates the life of the future embryo, fetus and infant.

II. THE PHYSIOLOGY, DIAGNOSIS AND MANAGEMENT OF PREGNANCY.

IV. PHYSIOLOGY OF PREGNANCY.

Development of Impregnated Ovum.

SEGMENTATION.—The meeting and fusion of male and female pronuclei results in the formation of the new *segmentation nucleus*, whose appearance institutes the process of cell division which eventually leads to the production of the *blastoderm*. The ovum divides equally into two cells, then four, eight, etc. (*blastomeres*), becoming differentiated after the third or fourth cleavage into large and small cells. The small cells increase in number more rapidly, enclosing the large cells, which form a group, the *morula* or *mulberry-mass*. The two masses of cells are later separated by the formation of a cavity filled with a clear, albuminous fluid (the *segmentation cavity*), remaining attached at one point, the *embryonal area*. As this fluid increases in amount the inner cells became flattened out on the interior like a watch glass. This stage is called the *blastodermic vesicle*. As development progresses the inner layer (*primitive entoderm*), in turn becomes similarly subdivided into an outer and an inner layer, the primitive ectoderm proper, or *true ectoderm*, and the primitive, or *true entoderm*.

Primitive ectoderm, the original outer layer of cells (Rauher's cells), is a temporary membrane and disappears, taking no part in the formation of the permanent structures.

Primitive entoderm, the inner of the original two layers of cells, subdivides to form the *true ectoderm* and *true entoderm*. Between these a third layer is developed, the *mesoderm*.

True Ectoderm, the outer layer of cells, forms: 1. Skin and adnexa (hair, nails, teeth, glands of skin, etc.). 2. Nervous system. 3. Organs of special sense. 4. Epithelium of mouth, nose, ears and anus.

Mesoderm, the middle layer, forms: 1. Muscles. 2. Bones.

3. Blood vessels and blood. 4. Spleen. 5. Genito-urinary system and reproductive organs. 6. Connective tissue. 7. Corium of skin.

True Entoderm, the inner layer, forms: 1. Epithelium of alimentary and respiratory systems. 2. Bladder. 3. Urethra (in female). 4. Liver, pancreas and salivary glands. 5. Thymus and thyroid.

PRIMITIVE EMBRYONAL STRUCTURES.—The further development of the ovum results in the differentiation of the various embryonal structures (fetal appendages, etc.).

Germinal Area, or *embryonal area*, an oval area of greater density on one side of the blastodermic vesicle, is the part concerned in embryonal formation. It is characterized by color—the *area pellucida* in center, surrounded by *area opaca*. It overlies the developing embryo.

Primitive Streak, a linear opacity developing at the smaller, or posterior, end of germinal area, is the first indication of embryo. This becomes deepened into the *primitive groove*, on posterior surface, and lies in direction of long axis of spinal column. It is not permanent, but is probably remains of some lower order of life.

Medullary Groove, the first indication of a permanent fetal structure, forms at second week, in front of primitive streak; it is formed and bounded laterally by two ridges, the *neural* or *medullary folds*, which diverge posteriorly to embrace the anterior extremity of primitive streak. By the thickening and approximation of the summits of these folds the *medullary* or *neural canal* is formed, union taking place first near the cephalic end. The canal remains as the ventricles of the brain and passages between them, and central canal of cord, the enclosed ectoderm forming the *central nervous system*.

Notochord, or *chorda dorsalis*, is formed similarly to neural canal by a thickening or backward infolding of the entoderm. It lies in the long axis of the embryo, anterior to the neural canal, and is a slender cylinder extending from the cephalic to the caudal pole. It is the early representative of the spinal axis, and remains in the adult as the centers of the vertebral bodies.

Somatopleure.—The mesoderm is divided longitudinally by

the infoldings of the neural canal posteriorly and the notochord anteriorly into two great lateral wings, each with a *paraxial band* next the mid-line, and a *lateral plate* which blends away laterally. The lateral plates undergo cleavage into an outer and inner lamina, and the outer, uniting with the ectoderm, forms the *somatopleure*, which later arches over and unites in front to form the *skeleton*.

Splanchnopleure.—The inner layer of the lateral plate of mesoderm unites with the entoderm to form the *splanchnopleure*. This also arches over and unites in front, inside the somatopleure, forming the alimentary canal, bladder, etc.

Primitive Body Cavity, or celom, is the space included between the two leaves of the cleft lateral mesoderm. It develops into the pleuræ, peritoneal cavity, etc.

Somites, or prevertebrae, are formed by a number of transverse divisions of the paraxial band of mesoderm—that portion which does not undergo cleavage. These divisions begin at the cephalic extremity at about the thirtieth day, and extend caudad. They do not directly take part in the formation of the vertebrae (which later develop in the same region), but are converted into flattened bands from which proceed the development of the *voluntary muscle systems* of trunk and limbs.

FETAL MEMBRANES AND APPENDAGES.—Formed coincidentally with above structures, are the envelopes for the protection and further nutrition of embryo, which, together with the maternal structures, are the membranes thrown off at birth.

Amnion appears early as folds or duplicatures of somatopleure completely surrounding the embryo and growing toward the back. They appear about the eighth day in the chick, and were developed in the earliest human ovum found. As these folds rise the embryo sinks into the cavity formed, and is finally completely enclosed by the fusion of the folds at the back (*amniotic suture*). The space enclosed is the *true amniotic sac*, and is lined with ectoderm. The membrane thus formed is composed of an internal and external layer, formed from ectoderm, and two mesial layers of mesoderm, with a space between which is continuous in front with the celom, or primitive body cavity, being its extra-embryonal portion. This space is lined with mesoderm and constitutes the *false amniotic*

sac. The true, or inner sac, then secretes *amniotic fluid*, is pushed against the outer envelope, and as it distends the sides are pushed forward to approximate in front of the fetus, reducing the fetal attachment to the narrow *umbilical stalk*. The fetus now floats free in the amniotic cavity. The *mature amnion* is a thin, tough and elastic membrane, its inner layer formed of endothelial cells (ectoderm of embryo), the outer of fibrous tissue.

False Amnion, or serous membrane.—The outer layer of amniotic folds after their fusion, composed of mesoderm internally and ectoderm externally, and enclosing the false amniotic sac. It forms the *chorion*.

True Amnion.—The inner layer of somatopleure surrounding fetus, composed of ectoderm internally and mesoderm externally. It secretes and contains the *amniotic fluid*, in which the fetus floats.

Chorion.—The false amnion after it has received vascular supply. The equator of ovum becomes surrounded by a fringe of simple and compound villi, at first formed only of the ectoderm of false amnion, and later some of them receiving projections of mesoderm. These villi develop and spread all over the ovum. The rapidly growing *allantoic tissue* spreads over and unites with the inner surface of the false amnion, the combined membranes forming the *chorion*. With the allantoic tissue blood vessels are carried to some of the villi, and these go on developing; all others atrophy and disappear, leaving a part of the ovum smooth (*chorion laeve*). The permanent fringe of villi (*chorion frondosum*), becomes attached to the decidua serotina, and aids in the formation of the *placenta*.

Allantois.—An outgrowth from the hind-gut after the primitive digestive tube has become partially closed. It is a projection of entoderm, surrounded by mesoderm, which pushes out between true and false amnion, and carries blood vessels to the inside of chorion to form placenta. Its primary function is to act as receptacle for effete matter excreted by Wolffian bodies. Its lower part forms the bladder, and upper part forms urachus.

Umbilical Vesicle, or yolk sac.—A projection from the mid-gut, containing the vitellus or yolk by which the ovum is



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nourished before its maternal attachment is effected. Of more importance in lower animals. Is connected to mid-gut by *yolk-stalk, vitello-intestinal* or *ompholo-mesenteric duct*, which occasionally persists as *Meckel's diverticulum*. Duct and sac extend for greater or less distance in umbilical cord.

Umbilical Stalk.—The primitive attachment of the embryo to chorion, and the early representative of the cord. Is an extension of the embryonic body cavity, containing the vitelline sac and duct with vessels, and allantoic diverticulum, and covered by somatopleuric folds.

AMNIOTIC FLUID, or *liquor amnii*, is not a true secretion of the amnion, but is filtered through its walls from the uterus; the fetus also contributes to its formation. Average sp. gr., 1007; maximum amount, about 1 to 1.5 kg. (2.2 to 3.3 lbs.), at middle of pregnancy, less in early and late stages. It is a white, opalescent, alkaline fluid, 99 percent. water, and contains inorganic salts, albumen, urea and vernix caseosa (excretion from fetal skin). A green or brown color (from meconium) means that child is asphyxiated, while the presence of blood indicates the rupture of vessels. Its physiological functions are several: 1. Furnishes moisture to fetus. 2. Maintains constant temperature. 3. Protects fetus from trauma, etc. 4. Nutrition of fetus (?). 5. Allows freedom of motion. 6. In labor, acts as a fluid wedge—nothing equals it as a cervical dilator.

MATERNAL STRUCTURES.—The structures derived from the mother, and contributing to the formation of the fetal appendages and membranes, are developed from the lining membrane of the uterus. These constitute the *deciduae*, and are divided into several parts, depending upon their relation to the ovum.

Decidua of Menstruation, or *decidua menstrualis*, is the more or less thickened uterine lining which is cast off, usually in small pieces, in cases of membranous dysmenorrhœa.

Decidua of Pregnancy.—Beginning with the fertilization of ovum, the lining of uterus becomes thickened from edema and congestion. After the third week the development of decidual cells begins, the process increasing until membrane is thrown into folds, most marked on anterior and posterior

walls and least at cornua and fundus (does not extend into cervix). This membrane receives lodgment of ovum, and is not cast off until labor. Is richly supplied with blood.

Decidua Vera, or *uterine decidua*, is the name applied to decidua of pregnancy before lodgment of ovum.

Decidua Serotina, basal or *placental decidua*, is that portion to which the chorion frondosum is attached, and later aiding in the formation of placenta.

Decidua Reflexa, *ovular* or *epichoral decidua*, is that portion which arches over and encloses the ovum.

Mature Decidua.—As the ovum develops the decidua reflexa approaches the decidua vera of opposite side of uterus, meeting it at about the fifth month, and closing off the cavity of uterus; the compression causes atrophy of opposing epithelium and blood vessels, and the two layers unite. At the time of labor the decidua separates into two layers; one, the non-cellulour, or compact, coming away with the membranes of birth, the other, cellular, remaining in the uterus to form a nucleus for a new mucous membrane which forms soon after labor.

BAG OF WATERS.—The liquor amnii is contained in a thin, membranous bag (*membranes* or *caul*) composed of the amnion internally and the chorion and decidua externally. The decidua is fleshy and is not transparent; the amnion and chorion are very thin and transparent and are easily separated. The amnion lines the inner (smooth) surface of placenta and is reflected off at edges on to uterus; external to it is the chorion, and closely adherent to this the decidua, which is thick over whole of uterus except at site of placenta where it has largely disappeared. The placenta is composed chiefly of chorion and villi; a few villi are attached to decidua.

PLACENTA, or *after-birth*.—Formed from both embryonal and maternal structures, and dates from the third month. Large vascular spaces are formed by absorption in the decidua serotina, and into them extend villi of chorion carrying loops of capillaries; these villi being at first covered by two layers of cells, the inner large, nucleated and with cell walls (*Langhans' layer*), and the outer composed of nuclei imbedded in a band of protoplasm (the *cyncytium*). There is a gradual

atrophy of decidual and chorional epithelium (Langhans' layer) until the villous loops, with walls of endothelium and syncytium only, are bathed directly in lacunae of maternal blood.

Shape and Number.—The placenta is a disc-shaped organ, usually circular in *shape*, but may be irregular (crescentic, oval, or horseshoe), and in rare cases may extend entirely around the ovum (*placenta membranacea*). The average *diameter* is 18 cm., and *thickness*, 2 cm., the thickness varying in inverse ratio to its extent; it may be abnormally large and thick, or small. The *number* is usually one, but may vary (duplex, tripartita, multifoba), and there may be one or more small accessory placentae (*placentae succenturiatae*) which are called *placentae spuriae* when they do not communicate with maternal blood.

Attachment of Cord is usually at or near center of fetal surface, but may be eccentric, marginal (*battledore*) or even outside in membranes (*velamentous attachment*).

Maternal Surface, next to uterus, is generally smooth and velvety, and is "beefy" in character. The surface is divided by numerous crypts into *cotyledons*.

Fetal Surface, or *amniotic surface*, covered by amnion, is smooth and glistening, and gray in color. Veins and arteries stand out prominently, the arteries being smaller and more superficial.

Placental Circulation.—The blood vessels of the placenta enter from the cord, divide on its surface and dip down into its substance, forming several terraces; this allows long axis of vessels to be parallel with course of maternal blood, thus favoring osmosis and interchange of nutriment and waste products. These vessels divide extensively, and at their termination dip down into the villi and end in veins. The villi project into blood spaces, or lakes, of maternal structures, formed by absorption of tissues—the epithelium of endometrium being first absorbed, then endothelium of the walls of blood spaces, when the maternal blood directly surrounds the villi (the epithelium of villi also disappears, leaving only thin vessel walls between fetal and maternal blood). Hence blood from divided cord does not come from the mother, but is fetal blood retained

in the placenta. The *circular sinus*, at circumference of placenta, is not a continuous vessel, but is a space largely devoid of villi.

UMBILICAL CORD, or funis.—Formed from allantoic stalk and its vessels, and sometimes remains of umbilical vesicle and vitelline duct, which with their covering of somatopleure constitute the primitive umbilical stalk. Cord is not surrounded by amnion, but is closed in by a projection of somatopleure which grows out toward placenta, pushing amnion before it. Contains blood vessels, which are surrounded by a gelatinous embryonal tissue (*Wharton's jelly*), derived from outer layers of amnion and allantois. Contains no nerves, lymphatics or nutrient vessels beyond a short distance from fetus. For 1 cm. from umbilicus cord is covered with skin. Tissue of cord is all derived from somatopleure.

Blood Vessels.—At first the cord carries two arteries and two veins; later, one vein disappears. Both arteries and vein have walls of equal thickness, and all are supplied with semi-lunar valves. Calibre of vein is largest, about 2 to 4 mm.

Twists and Irregularities.—Twists are usually from left to right; they are normally not due to turning of fetus in utero, but to unequal development of vessels—the vessels grow faster than rest of cord, hence become tortuous. The torsion may be exaggerated. The cord has an irregular or knotted appearance, due to unequal deposit of Wharton's jelly.

Measurements.—At term the cord is normally about 0.9 to 1.3 cm. ($\frac{1}{3}$ to $\frac{1}{2}$ in.) in diameter, and about 50.8 cm. (20 in.) in length (variation, 15 to 160 cm.). The normal length is such that if delivery take place while in erect position the impact of infant upon ground is broken by resistance of cord, and the tearing of cord by fall serves to close the lumina of vessels and prevent hemorrhage.

Development of Embryo and Fetus.

HEART.—The first evidence of embryonal heart is the formation of two parallel tubes, hollowed out of the splanchnic mesoderm, and running longitudinally to long axis of fetal body at either side of mid line. With approximation of visceral layers in formation of gut-tube these heart-tubes are approximated and unite to form one tube at end of first month. This



single tube later makes an S-shaped bend and its walls thicken. The auricles then develop, later the valves, and then division into right and left chambers takes place. The heart becomes functionally active at about the third week.

ARTERIES AND VEINS.—From anterior end of *truncus arteriosus* (fused primitive trunks), five pairs of *aortic arches* develop around primitive pharynx; these undergo many changes, the fourth left persisting as arch of aorta. These converge posteriorly into two *primitive aortae*, which later fuse (*dorsal aorta*) and give off branches to various parts of system. The *veins* are formed from three primitive systems, their further development in general corresponding to arterial systems.

DIGESTIVE TRACT.—Formed from a closed-off portion of yolk-sac and from forward growth of splanchnopleure. Has three primitive divisions: *Fore-gut*, forms pharynx, oesophagus and stomach; *mid-gut*, gives rise to all of small and most of large intestine, the liver and pancreas appearing as outgrowths from upper portion; *hind-gut*, forming lower part of large intestine.

RESPIRATORY TRACT.—Formed by direct invagination from ventral wall of lower portion of primitive pharynx.

NERVOUS SYSTEM.—Formed from posterior longitudinal infolding of ectoderm. The anterior end becomes dilated, forming three *primary brain-vesicles*, these later subdividing to form brain and ventricles; posterior portion forms spinal cord. *Nerve-fibres* are outgrowths from nerve-cells—the motor nerves from cells within the cord, sensory nerves from cells of spinal ganglia.

ORGANS OF SPECIAL SENSE.—*Eyes* are formed very early (beginning at fifteenth day) as two ectodermic epithelial pouches, surrounded by mesoderm (sclera, lens, etc.), these being joined by outgrowths (*optic vesicles*) from the anterior primary brain-vesicle; each vesicle enters globe, becomes invaginated, and forms retina and optic tracts. The *ears* are formed from three structures, the external from the first outer visceral furrow; the middle from an expansion of first pharyngeal pouch; the inner from the oldest ectodermic infolding, the *otic pits and vesicles*.

INTERNAL GENITALS.—The *Wolffian ducts* appear on each side of median line as long rods in the outer of two folds on the posterior wall of primitive abdominal cavity; these later become tubular. From the top end of these ducts shorter rods (*Wolffian bodies*) develop at right angles into *Wolffian tubules* (progenitors of kidneys). Below, the ducts open into the *cloaca*, the common alimentary-uro-genital opening. Behind, and parallel to these, two other rods form, which also later develop into tubes (*Müller's ducts*). The *sexual glands* are developed from the inner of the two ridges, and the ovaries (or testicles) are formed from these. From the Wolffian duct and body, in the male, are formed the vas deferens and vassa efferentia—Müller's duct remaining unimportant. From Müller's ducts, in female, are developed the Fallopian tubes, uterus and vagina—the Wolffian duct remaining unimportant.

DEVELOPMENT OF INTERNAL GENITALS.

Germinal epithelium and stroma } Male —Testicle.
 } Female —Ovary.

Wolffian ducts } Male { Vassa efferentia.
 } Female { Vas deferens.
 } { Ducts of Gärtner.
 } { Paroöphoron.

Wolffian body } Male { Epididymis (from upper part).
 } Female { Paradidymis (organ of Giraldes).
 } { Vas aberrans.
 } { Parovarium.
 } { Organ of Rosenmüller.

Müller's ducts } Male { Uterus masculinus (sinus pocularis).
 } Female { Hydatid of Morgagni (sessile hydatid).
 } { Tubes (oviducts).
 } { Uterus.
 } { Vagina.

EXTERNAL GENITALS.—The external genitals remain sexually undifferentiated up to ninth or tenth week—a common external opening (the *cloaca*) with urinary passages and alimentary canal opening into it up to sixth week. Anterior to cloaca is developed the *genital tubercle* (forming penis or clitoris), and behind it the *genital groove*, while at each side are developed two longitudinal folds, the *genital folds* or *labia*. At the

end of the sixth week the genital groove is separated into genito-urinary passage anteriorly and rectum posteriorly by the downward growth of the perineal body.

DEVELOPMENT OF EXTERNAL GENITALS.

Genital eminence - - -	{	Male - -	- Penis.
		Female - -	- Clitoris.
Genital ridge - - - -	{	Male - -	- Scrotum.
		Female - -	- Labia majora.
Genital folds - - - -	{	Male - -	{ Spongy body.
			{ Skin of penis.
			{ Nymphæ.
		Female - -	{ Bulbs of vestibule.
Urogenital sinus - - -	{	Male - -	{ Prostatic urethra.
			{ Membranous urethra.
			{ Prostate gland.
			{ Cowper's glands.
		Female - -	{ Urethra.
			{ Bartholin's glands.
			{ Vulvar orifice.

Development in Male.—After tenth week the genital tubercle lengthens, the inner labia fuse, and together they form the penile urethra and pendulous portion of penis. The outer folds fuse and form the scrotum.

Development in Female.—There is very little change from the indifferent condition. A transverse septum (the perineal body) forms in cloaca, separating genito-urinary opening from rectum. The genital folds enlarge, forming labia majora and minora. Genital tubercle, with general development, forms clitoris. Genital groove forms vestibule and lower end of vagina. These changes occur about third month, and sexes can then be differentiated.

CHARACTER OF EMBRYO AT VARIOUS MONTHS.—The developmental progress of embryo at end of various periods is of practical value in determining date of impregnation from the nature of cast-off ovum, and in explaining nature of deformities, etc.

First Month.—At end of *first week* ovum is about 1 mm. in diameter, and is almost entirely occupied by yolk-sac; the allantois is not developed, and chorion has thin and simple villi. At end of *second week* fetus is attached to membranes by allantoic stalk, and medullary groove and canal and their cephalic expansion are developed; embryo is straight or has slight dorsal curve. *Third week* marks increased constriction

of yolk-sac; optic visicles and auditory sacs are differentiated, there is marked ventral curving (the cephalic and caudal ends overlapping) and buds of limbs are formed (arms better developed than legs—important); the visceral arches have begun to develop. During *fourth week* human species can be distinguished; there is slight unbending of fetus, cephalic and neck bends remaining marked; visceral arches are fully developed, liver and kidneys have begun to form, heart is S-shaped and has valves, and brain and intestinal tract are closed over. At end of month ovum is size of pigeon's egg, embryo being about 8 mm. long.

Second Month.—Early in month visceral arches fuse (failure of upper portion of first results in hare-lip); body still less curved, and umbilical ring almost closed (failure results in umbilical hernia or exomphalos); digital divisions beginning in buds of limbs, better marked in arms; elbows are flexed and arms held up, and feet are turned in; external genitals begin to form. At end of month ovum is size of hen's egg, fetus 2.5 cm. in length.

Third Month.—Ribs and palate formed, and eyelids and lips beginning to form; external genitals distinct and sex determined by presence of uterus; arms are held toward face, and soles are still turned in; toward end of month placental development has begun (common period of abortion), and there are many evidences of human fetus. At end of month ovum attains size of goose's egg (9.5 to 11 cm.) and fetus is 7 to 9 cm. long.

Fourth Month.—Head of fetus is one-fourth total length, and eyelids, mouth and lips are well formed; generative organs well developed and distinct, and sex is easily determined; lanugo appears on skin and a few hairs on scalp; limbs may be freely moved, intestine contains meconium, and fetus if born may live as long as four hours. At end of month fetus is 10 to 17 cm. long and weighs about 55 gm.

Fifth Month.—Head relatively large, eyelids begin to open, and face is wrinkled and looks senile; finger nails are well developed, skin is covered with lanugo and vernix caseosa, and liver is secreting bile; fetal movements are felt and heart sounds heard, and baby if born makes efforts to cry and may

live several hours. At end of month length is 18 to 27 cm., and weight about 273 gm.

Sixth Month.—Skin contains fat, and hairs of scalp are longer; eyebrows and eyelashes are distinct; umbilical cord is inserted in middle third of fetus, and testicles in boys are near inguinal rings; baby if born may live for two weeks, but dies from underdevelopment. At end of month length is 28 to 34 cm., and weight about 676 gm.

Seventh Month.—Whole body, except palms and soles, covered with lanugo, intestines contain considerable meconium, and pupillary membrane disappears; child if born usually dies. At end of month length is 35 to 38 cm., and weight about 1170 gm.

Eighth Month.—Nails nearly reach tips of fingers; hair on scalp more abundant; down on face disappearing; testicles (especially left) to or within canals. Child, if born, often lives. At end of month length is 39 to 41 cm., weight about 1571 gm.

Ninth Month.—Marked increase in subcutaneous fat; hair increased, lanugo diminished, and nails better developed; child is better developed all around, and if born will surely live. At end of month length is 42 to 44 cm., weight 1942 to 2400 gm.

Tenth Month.—(Term). All evidences of mature baby. Nails are long; testicles descended; lanugo gone; labia majora in contact; hair long and pigmented, and umbilicus is in middle of body. Average length at term, 50 cm.; weight, 3175 to 3402 gm.

ESTIMATION OF FETAL AGE.—In estimating age of premature child, the development of genitals, nails and eyes are most important guides; while *Haase's rule* will indicate age from length of fetus: Square of month (lunar) up to, and including, fifth month, gives length in cm.; after fifth month, multiply by 5.

WEIGHT OF BABY.—Depends largely on factors in mother: 1. Her age, the weight of babies increasing up to thirty-fifth year. 2. Her weight and size (size of father also has influence). Average weight at term, 3,175 gm. (7 lbs.) for female, 3,402 gm. (7½ lbs.) for male. Largest at Sloane Maternity, in 11,000 cases, 5,443 gm. (12 lbs.); 4,536 gm. (10 lbs.) not common.

DETERMINATION AND DIAGNOSIS OF SEX.—Number of males born exceeds females (106 to 100) but at puberty sexes are about equal. Law that governs production of sex is not known; many theories have been advanced, but none are proved (age of parents, time of conception, deformities of pelvis, season, climate and altitude, nutrition or sexual vigor of parents, etc.). It seems plausible that the parent with greatest physical decadence (and hence greatest sexual vigor) at time of impregnation tends to reproduce its sex, as no other theory explains the numerical equality. *Diagnosis of sex* is probably impossible, although it has been claimed that an unusually vigorous fetus with heart-beat of 140 or less indicates a male, while a quicker heart-beat indicates a female child.

FETAL CIRCULATION.—After purification in placenta, blood from *umbilical vein* passes by two routes into inferior vena cava—the smaller portion passing through *ductus venosus* direct, greater portion through liver. After reaching right ventricle it is deflected by *Eustachian valve* across right ventricle through *foramen ovale* into left ventricle. Joining the small amount of venous blood from lungs it enters left ventricle and passes into aorta, large amount being delivered to head and upper extremities (hence their relatively large size). The venous blood from upper extremities and head passes into right auricle through superior vena cava, to right ventricle, and then to pulmonary artery, from which the greater portion is deflected around the lungs directly to aorta by means of the *ductus arteriosus*. From descending aorta part of blood again passes through liver by means of hepatic artery and portal vein, a part returns to inferior vena cava to join arterial blood from ductus venosus, and the greater portion is returned to placenta through hypogastric arteries. With the division of cord the placental circulation is obliterated; the adult type of circulation is instituted, the lungs expand, the pulmonary circulation is established, and there is a consequent obliteration of the fetal structures.

Ductus Venosus disappears in three or four days, and becomes impervious in a week after birth. It persists as the *ligament of the ductus venosus* of liver.

Umbilical Vein is generally closed at the end of a week. It is represented by the *round ligament* of the liver.



Hypogastric Arteries.—Their umbilical ends become impervious in three or four days after birth; the part from summit of bladder to umbilicus persisting as a fibrous cord (the *obliterated hypogastric artery*), the remainder as the *superior vesical artery*.

Ductus Arteriosus usually closes in a few days and is completely impervious by the third week. It persists as a fibrous cord, the *ligamentum arteriosum*.

Foramen Ovale may persist pervious for a month, and it may be two or three months before permanent closure occurs; it is represented as a depression in the interauricular septum, the *fossa ovalis*. If the balancing of hemic pressure in right and left hearts fails to allow closure of valve of foramen ovale, sudden embarrassment of breathing and a lowering of temperature occurs, resulting in cyanosis (*blue babies*). This may result from foramen not remaining closed, or from its never having been closed. (Lack of development of lungs also causes blue babies.)

NUTRITION OF FETUS.—Most of nutrition—food, salts, etc.—comes through placenta, by osmosis, from maternal blood. Liquor amnii is 99 percent. water, hence cannot be of much, if any, importance as a supply of nutriment.

Source of Oxygen.—From maternal blood by osmosis. *Proofs:* 1. In sheep, shown to be more O₂ in umbilical vein than in arteries. 2. Constriction of cord causes asphyxia. 3. Fetus makes no effort to breathe until placenta is separated.

FETAL SKULL.—At term the fetal skull is divided, for obstetrical purposes, into the cranium, or *compressible portion*, and the face and base of skull, the *incompressible portion*.

Base, or non-yielding portion, is composed of petrous portion of temporals, basilar portion of occipital, sphenoidals, ethmoidals, and orbital portions of maxillæ.

Vault, or yielding portion, is composed of parietals, squamous portion of temporals, occipitals and frontals. Spaces between bones (*sutures* and *fontanelles*) are filled in by yielding bands of fibrous tissue.

Fontanelles.—Fibrous spaces where three or more bones meet. *Posterior* (smaller), at junction of parietals and occipital, has three points, and should normally be felt presenting.

Anterior (larger) formed at junction of parietals and two halves of frontal, has four angles. A third pair, the *lateral fontanelles*, not always present, may exist behind the ears at junction of parietal, occipital and temporal bones.

Sutures.—*Frontal* (between frontal bones); *coronal* (between parietals and frontals); *sagittal* (between parietals), and *lambdoidal* (between parietals and occipital). Super-numerary sutures may exist.

Changes in Maternal Body During Pregnancy.

UTERUS.—All organs of body undergo changes in sympathy with developing uterus, changes being most striking in genital organs; the woman's whole disposition also changes. At third month uterus is pyriform; at fifth month it is more globular, and from fifth month on, enlargement is mainly in an upward direction.

Broad Ligaments become shortened with growth of uterus. *Ovaries* approach nearer to uterus.

Muscles of Uterus.—The muscle fibres are all greatly enlarged and elongated, from both hypertrophy and hyperplasia. The *elastic and connective tissue* is also greatly increased.

Endometrium.—Menstrual tumefaction period is continued. The lining membrane becomes divided into the different deciduæ.

Peritoneal Covering becomes greatly hypertrophied to keep pace with growth of uterus.

Vessels are all greatly enlarged and are still tortuous, the uterine body becoming one vast venous plexus. The uterine artery may be felt pulsating in lateral fornix.

Nerves are increased, especially by a development in the neurolemma; there is some new development of nerve-tissue.

Lymphatics.—Increased and greatly enlarged; hence pregnant woman is much more susceptible to spread of infection from uterus than nullipara.

Uterine Growth.—Enlargement of uterus begins in lower part of body and extends chiefly laterally. In first few months uterus sinks in pelvis, due to its increased weight; in later months the antero-posterior enlargement makes uterus appear flattened from side to side. Up to fifth month the enlargement

is due mainly to growth of uterus, whether fetus be present or not; after fifth month enlargement is due to both growth and distention. Growth of uterus causes various pressure symptoms in pelvis—frequent urination and irritability of bladder from pressure on that organ; constipation and hemorrhoids, from pressure on rectum; venous distention of limbs, and varicose veins of legs and vulva from pressure on pelvic veins.

Position of Fundus at Various Months.—In early months uterus sinks in pelvis; at *fourth* (calendar) month the fundus is just above symphysis; at *fifth* month, midway between symphysis and umbilicus; at *sixth* month, on level with umbilicus; at *seventh* month, one-third distance between umbilicus and ensiform; at *eighth* month, two-thirds distance between umbilicus and ensiform; at *eight-and-a-half* months the fundus has reached ensiform, and later it sinks somewhat.

CERVIX.—There is little increase in cervical tissue; there is a separation of fibres and an increase in fluid, hence softening. At fourth month lips of cervix are softened, and later the whole cervix is softened. The cervix appears shorter, due to softness and the lessening of space in fornices from thickening of vaginal walls. In last fortnight cervix is actually shortened, due to contraction of its longitudinal fibres, drawing it up into lower uterine segment.

VAGINA.—Vessels are increased, mucosa softened and ridges obliterated. It has a violet hue, due to venous congestion.

VULVA.—Enlarged, due to softening and thickening. Vessels are congested; glands are increased, with increased discharge; veins are enlarged.

PELVIC JOINTS are loosened, and there is often formed a small synovial sac in symphysis pubis—this change tending to facilitate passage of child.

BREASTS.—Enlarged and distended, and stand out prominently. Blood vessels are distended, and there is a development of gland tissue and beginning of milk secretion.

ABDOMINAL WALL.—Distention of abdomen from growth of uterus causes stretching and separation of connective tissue fibres in skin, resulting in formation of *brownish* or *bluish*

striae; seen especially in flanks. After labor these become white (*silvery striae*), from formation of scar tissue. In multiparæ both silvery and brown-blue striae are present at same time.

V. DIAGNOSIS OF PREGNANCY.

Signs and Symptoms of Pregnancy.

BREASTS.—Symptoms begin at third month. Breasts become large and firm. Later striae may form, surface veins are enlarged and tortuous, the nipple becomes more prominent and is surrounded by increased pigment zones—the *areolae*. Glands of Montgomery are enlarged and often project conspicuously.

Areolae thicken, broaden and become darker. Montgomery's glands become as large as buckshot. At sixth month a mottled band appears around the *primary areola*, and is called the *secondary areola*; this pigmentation is most marked in brunettes, least in blonds, while Montgomery's glands are more prominent in blonds.

Nipples.—On stimulating the nipples they become elevated and corrugated, due to contraction of circular muscles of areola.

Vessels.—There is an increase in vascularity; the veins are markedly enlarged and prominent. Occurs from third month on to term.

Fluid in Breasts.—Ordinarily after the third month a little fluid, mainly colostrum, can be expressed. Not a positive sign—it may occur in cases of abdominal cysts, tumors, etc., or persist for several years after confinement.

PIGMENTATION is increased in almost entire skin surface, but is especially marked in *linea alba* (becomes *linea nigra*); face (called *chloasmata*, and forming the *mask of pregnancy*); eyes (dark circles underneath); and vulva. Cicatrices on abdomen become pigmented. Pigmentation follows cicatrices from the normally pigmented areas, hence on incising breast abscesses avoid extending incision from areola to white skin outside. Pigmentation remains until after confinement and is not amenable to treatment.

ABDOMEN.—There is a gradual enlargement of abdomen from growth of uterus. Its *shape* depends on position of fetus, which may be above or below, or on either side.

Striae.—Due to rupture and separation of deeper structures, thus stretching skin. This is due merely to distention of abdomen, hence may occur with tumors, ascites or obesity, in both females and males. They are not confined to abdomen, but may occur on thighs, from edema, etc.; on flanks (most commonly occur here); and may also occur on breasts. New striae are reddish, becoming brownish or blue; old striae are silvery-white (cicatrices), and may begin to form in latter part of same pregnancy.

FETAL MOVEMENTS.—On palpation and inspection, abdomen is found to alter in shape, due to active motion of fetus. May be elicited by pushing fetus about in uterus, or placing a cold hand on woman's abdomen.

UTERINE SOUNDS, heard with aid of stethoscope, are among the positive signs of pregnancy.

Fetal Heart Sounds.—Heard by placing the stethoscope on woman's abdominal wall over back of fetus. Heard as early as fifth month, but may not always be audible. Fetal heart beats at rate of 120 to 160 per minute, like faint ticking of watch under pillow.

Uterine Souffle is synchronous with maternal heart beat. Is not positive. Caused by some pressure on or kinking of uterine artery.

Umbilical Bruit, or *funic souffle*.—Synchronous with fetal heart-beat. Caused by obstruction to funic arteries. Positive, but rarely heard.

VULVA AND VAGINA.—The bluish-violet color, tumefaction and increased secretion are good evidences of pregnancy.

GENERAL SYMPTOMS.—Constipation, and pains in thighs and lower part of abdomen are results of pressure in pelvis.

Blood.—Pregnant women were formerly supposed to be plethoric, and bleeding was practiced. As a matter of fact, there is an excess of white cells, fluid and excrementitious matter, with a diminution in red cells and albumin. The fibrin-making elements are markedly increased. There is therefore a physiologic leucocytosis, a hydremia, and an anemia.

Heart is increased in size and force, from hypertrophy due to increased work performed. Numerous pregnancies result in a permanent enlargement of heart. Palpitation is common, due to pressure on heart by change in shape of thorax.

Nervous System.—Balance of control is very hard to maintain. Disposition is generally upset, hence must make allowances for mental peculiarities in pregnant woman. Surround the woman with all the pleasing things possible, for good of both mother and child.

Liver and Spleen.—Both are commonly enlarged. Resolution results in fatty degeneration.

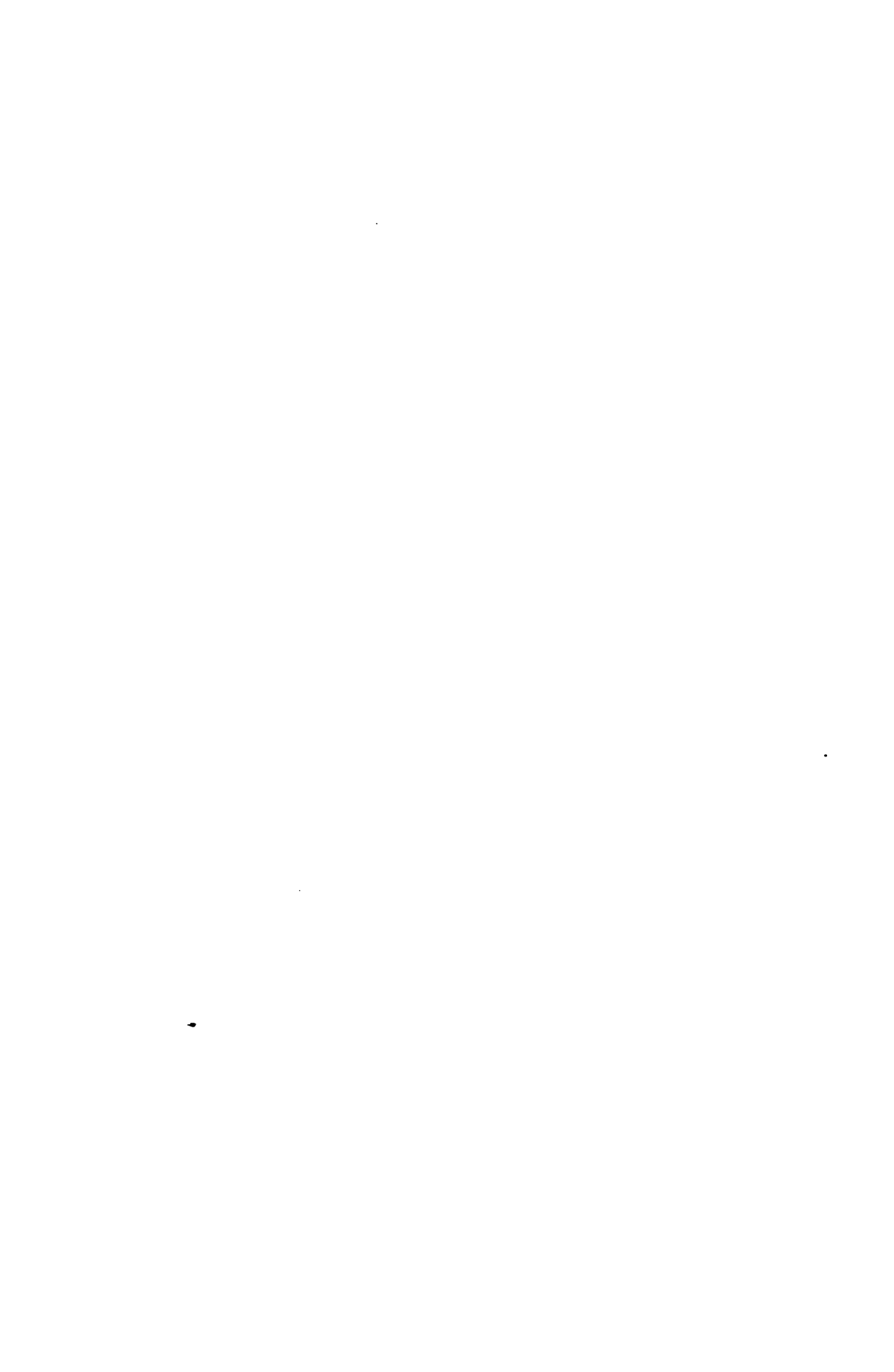
Thyroid becomes enlarged in about 80 percent. of pregnant women, especially if there is any tendency to goitre. Repeated pregnancies cause permanent enlargement.

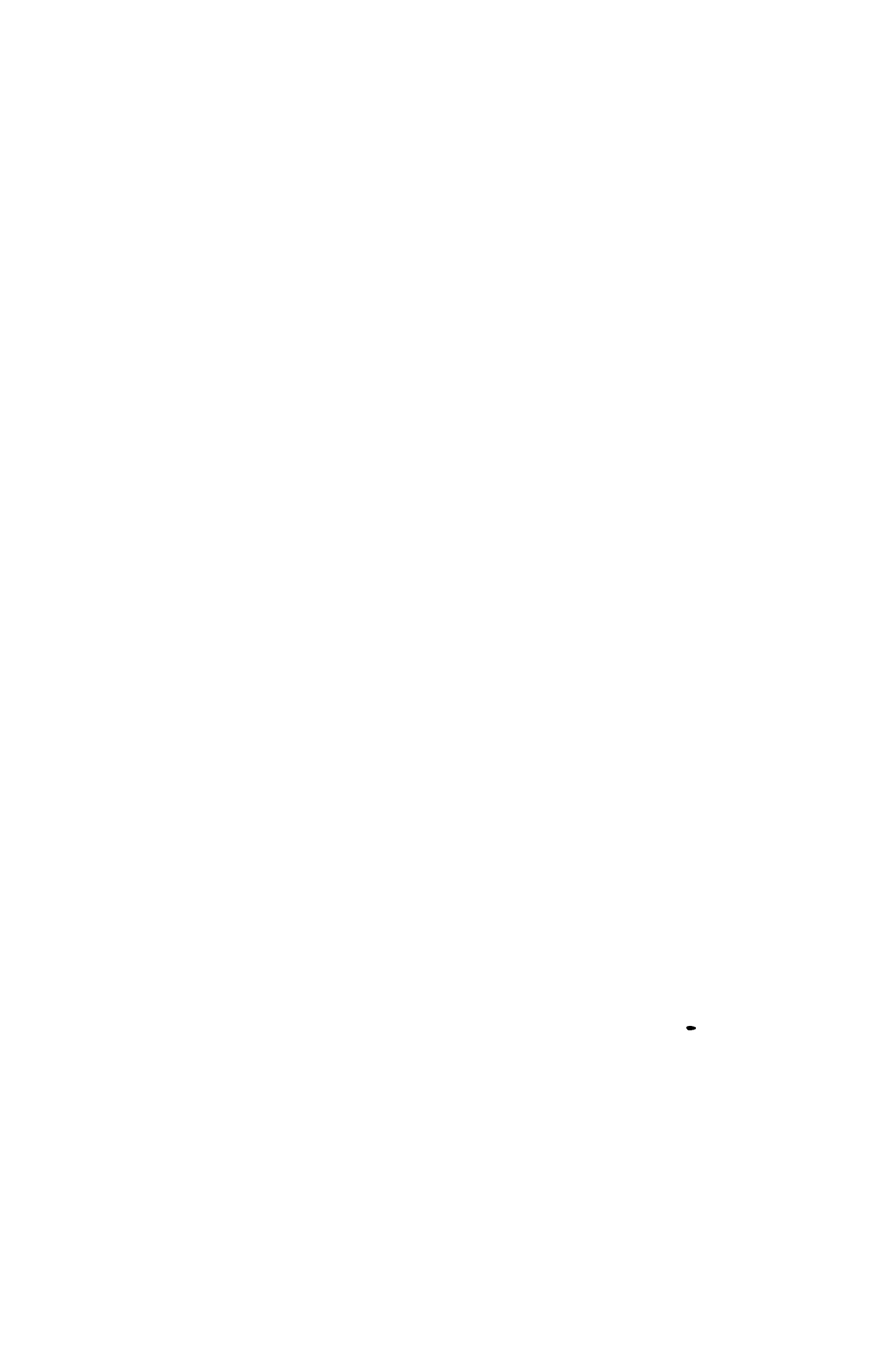
Respiration.—The mother breathes for two, hence respiration is increased. Fainting is frequent in crowded halls, etc.

Digestion.—The mother digests for two, hence the appetite is increased, and digestion is often upset from gastric congestion or reflex irritation, or from toxemia. Nausea and vomiting, especially in morning, is very common between sixth week and third month.

Gait of Woman.—Shoulders and head are thrown back in an effort to counterbalance body. The skirt is shorter in front, due to enlargement of abdomen and to throwing backward of shoulders.

Urine.—Amount is increased but specific gravity is decreased (average 1014). The watery element and chlorides are increased, while the phosphates and sulphates are decreased. Urea remains about normal; ammonia and kreatinin are increased; urea nitrogen is decreased, and total output of nitrogen is below normal. In later months urobilin is much increased, and acetone is frequently present. There should be no albumin.





Diagnostic Signs of Pregnancy.

DURING FIRST THREE MONTHS.

SUBJECTIVE.	OBJECTIVE.
Cessation of menstruation.	Softening of Cervix.
Morning sickness.	Hegar's sign.
Bladder symptoms.	Violet color of { Vulva. Vagina. Cervix.
Salivation.	
Toothache.	
	Johnson's sign.
	Mammary changes.
	Flattened abdomen.

SIGNS OF PREGNANCY DURING FIRST THREE MONTHS.—This is the period before formation of placenta. None of the symptoms are positive of pregnancy.

Cessation of Menstruation.—May be due to other causes, as phthisis, change of climate, etc. Dread of pregnancy may cause amenorrhea until fears are relieved; this is most frequent in unmarried women. On the other hand, women may menstruate during pregnancy up to the fifth month. *General Rule:* In healthy, married women between fifteen and forty-five years of age, cessation of menstruation means pregnancy. Ascertain if insemination occurred before or after last menstruation in order to compute date of impregnation.

Morning Sickness.—Occurs in about 50 percent. of cases, and may start immediately after impregnation. Generally occurs just after arising; with some women, occurs just after breakfast. Sometimes induced by brushing teeth. In early morning vomitus is a thin, glairy mucus. In first three months, cause is purely reflex, or due to pressure on stomach from enlarging uterus; but in later months it may mean an entirely different thing, e. g., toxemia due to kidney inefficiency. Usually does not begin till after sixth week, and as a rule does not continue after the fourth month.

Bladder Symptoms.—Frequent urination is due to pressure on the bladder from enlarged uterus, causing irritability.

Salivation.—Commences after nausea begins, and generally persists after nausea stops. Said to be due to some change in mucus secretion, or to derangement of secretory nerves.

Toothache.—Probably due to an absorption of earthy phosphates from tissues of mother (Brunton). May also be

due to increased dental caries of pregnant woman. Give syrup of lactophosphate of lime with meals, and alkaline mouth-wash.

Softening of Cervix.—Cervix is broader and softer, lying near thickened walls of vagina; hence it appears shorter. The softening is due to pronounced congestion and increased vascularity; hence anything producing marked congestion will cause softening and violet hue. It may be caused by a metritis set up by a dirty sound, etc.

Hegai's Sign.—Observed about the sixth week. The compressibility of lower uterine segment as distinguished from upper segment; elicited by bimanual examination, or by fore-finger in rectum and thumb in vagina, while the other hand, applied to abdominal wall, depresses fundus. In first three months uterus is pyriform; later it is a sphere-on-cylinder, due to softening and thinning of lower segment, and thickening and hardening of upper segment.

Violet Color of vulva, vagina and cervix from venous congestion (*Chadwick's sign*). Is only presumptive evidence.

Johnson's Sign.—Intermittent softening of cervix, being first appearance of later intermittent uterine contractions. Elicited by prolonged vaginal examination (ten minutes).

Mammary Changes.—At end of third month there is presence of colostrum, increase in pigmentation, and the areolæ are enlarged and thickened. May be sense of weight or pricking in breasts. At sixth month secondary areolæ are developed. A tumor in pelvis, however, may stimulate flow of colostrum.

Flattened Abdomen.—Due to sinking down of uterus into pelvis from increased weight.

SIGNS DURING LAST SIX MONTHS.

SUBJECTIVE.	OBJECTIVE.
Fetal movements (quickenings). (May also be objective.)	Increase in size of abdomen. Ballotement (positive). Fetal movements (positive). Uterine Souffle. Fetal heart sounds (positive). Umbilical Souffle. Intermittent uterine contractions.

SIGNS OF PREGNANCY DURING LAST SIX MONTHS.—The symptoms during the last six months of pregnancy are more or less positive.

Fetal Movements, or *quickening*, begin usually at about four and a half months, but may sometimes be heard or felt before or later (third to ninth month, and in rare cases not at all). May be simulated by movement of intestines, or be absent if child is dead. Time of quickening is of value in diagnosing stage of pregnancy, as in the case of lactating woman becoming pregnant (menstruation being absent). It is a positive sign when detected by physician, by inspection, palpation, and auscultation (as a faint tapping against abdominal wall). Movements are especially strong after the seventh month.

Increase in Size of Abdomen.—The abdomen gradually increases in size as pregnancy advances; the uterus is felt to be pyriform, with small end downward. The uterus is altered in shape with abnormal positions of fetus, multiple pregnancy, or with displacements or tumors of uterus, while tumors, collections of fluid or excessive fat may cause abdominal enlargement.

Umbilicus.—Up to the fifth month the umbilicus is depressed below surface; at sixth month it is flush with skin, and at seventh month it protrudes.

Ballottement.—A positive sign. It is the feeling of a solid body floating in fluid. Elicited externally by abdominal palpation, and internally by vaginal palpation. Child must not be too large, and fluid must be sufficient in amount. It may be confused with: 1. Stone in bladder filled with urine; hence have bladder empty before making examination. 2. Fibroid with a long pedicle.

Uterine Souffle.—It is not a placental souffle, as it may be heard in a non-pregnant uterus, as in case of fibroid. It is due to blood rushing through the uterine sinuses, and may be at any location where the sinuses are enlarged. It is synchronous with the mother's heart-beat, and is a blowing murmur, most frequently heard in the lower part of uterus.

Fetal Heart Sounds.—A double sound, the first being more distinct; much more rapid than maternal heart-beat. *Frequency*, about 120 to 160 per minute, the rate being supposed to indicate sex—120 to 130 indicating male, 140 to 160 indicating female sex. (Unreliable. "Make a guess as to sex, and have another one ready."—*Voorhees*.) Sounds are most fre-

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Uterine Souffle.—It is not a placental souffle, as it can be heard in a non-pregnant uterus, as in case of fibroid, due to blood rushing through the uterine sinuses, and can be heard at any location where the sinuses are enlarged, as in case of tumor with the mother's heart beat, and as a rule is heard in the lower part of uterus.

Fetal Heart Sounds.—A double sound, the first is weak and distinct; much more rapid than maternal heart, frequency, about 120 to 160 per minute (the latter being supposed to indicate sex—120 to 130 indicating male, 130 to 160 indicating female sex). (Frenchie, "A clever guess as to sex is made another one ready,"—see above.) Sounds alternate with

quently and best heard in lower uterine segment, through back of fetus. Its *location* indicates presentation and position. If heard best below umbilicus, head is presenting; if above umbilicus, breech is presenting; if heard best in front, shows back of fetus is in front; if behind in flank, shows back of fetus to be behind—the side upon which it is most distinctly heard corresponding to location of fetal back, except in case of face presentation, where it is heard loudest through the fetal chest. The fetal heart beats more rapidly during labor pains, and slower during intervals between pains. If heart sounds are excessively rapid or slow, it indicates danger from pressure on fetus, cord or placenta. *Absence of sounds* does not exclude existence of pregnancy; may be due to dead fetus, excessive liquor amnii, thick abdominal wall, loud uterine souffle, etc. Beat of maternal aorta, with reduplication of sound, has been mistaken for fetal heart sounds.

Umbilical Souffle, or funic souffle, is like a systolic heart murmur. It is a blowing sound, synchronous with the fetal heart beat, and is a blowing first-sound. The cause is not clear, but it is probably due to some impediment to circulation in the cord; as from pressure of fetal head on cord or placenta, or from cord being looped around an extremity. It is not of much importance unless it is constant or interferes with fetal circulation.

Barton-Hicks' Sign.—The intermittent contractions of the uterus, as observed by prolonged abdominal palpation. Is not a positive sign, as it may be caused also by any foreign body in the uterus, as a tumor, placenta, membranes, blood clot, etc. They somewhat resemble the rhythmical contractions of uterus during labor, but are much less in extent and frequency.

Three Positive Symptoms in last six months are: 1. Passive movements of fetus (ballotement). 2. Active movements of fetus. 3. Fetal heart sounds.

EVIDENCES OF FETAL DEATH.—Usually the first evidence of a dead fetus is a subsidence of the symptoms of pregnancy, or a lack of their steady advancement. After a time the woman loses her general health, her appetite is poor, she has a sallow complexion and feels generally run down. The temperature



may not rise as long as the dead fetus remains aseptic. The first symptom may be an effort of the uterus to expel the fetus. If the membranes have been ruptured and uterine contents infected, the skull may be macerated and feel like a bag of loose bones in the cervix. A dead fetus may sometimes be carried for years without giving trouble, and, with exception of bones, may become entirely absorbed; or it may become calcified (*lithopedion*) and be carried in uterus for years.

Diagnosis and Treatment.— Only safe rule is to “watch and wait.” If the temperature does not rise, the case is safe. A couple of weeks’ watching will show fetal movements if life be present. Many things may interfere with hearing heart sounds; hence make many trials before concluding that fetus is dead.

DURATION OF PREGNANCY.— The average duration of pregnancy is about 280 days, nine calendar months, or ten lunar months of twenty-eight days. The time may be prolonged as much as a month, but exact duration cannot be ascertained with certainty, as the male and female cells may not come together for some days after coitus.

Prediction of Date of Labor.— Naegele’s rule: Take first day of last menstruation, count back three months (or forward nine months), and add seven days (in April and September, six days; in December and January, five days; and in February, four days, to be exact). Ascertain if insemination occurred before or after last menstruation, as time may vary as much as three weeks either way (that is, the fruitful insemination may precede or follow the fruitful ovulation). Later on the progress of pregnancy may determine the date of impregnation: 1. Quickening is usually first felt at middle of pregnancy. 2. Each month is usually marked by an increase in the normal rhythmical uterine contractions, indicating the normal menstrual periods. 3. Height of fundus roughly indicates the stage of pregnancy.

Differential Diagnosis of Pregnancy.

Cases of enormously enlarged abdomen from obesity, abdominal hernia, tumor in upper abdomen, very large ovarian cysts, ascites or large myomata, are as a rule easily differentiated from pregnancy; while cases of small fibromyomata and

metritis, are much more difficult. Small ovarian cysts, tympanites and distended bladder may also be mistaken for pregnancy.

SUBINVOLUTION, OR METRITIS.—Usually not difficult to diagnose, the accompanying menorrhagia being an important sign.

PREGNANCY	VS. SUBINVOLUTION, OR METRITIS.
Menorrhagia.	Amenorrhœa.
Uterine body firmer	Uterine body soft.
Cervix may be soft	Cervix soft.
Uterus less jug-shape.	Uterus more jug-shape

FIBROMYOMATA.—When centrally situated and of rapid growth, early differentiation may be very difficult or impossible, and only time will tell.

PREGNANCY.	VS. FIBROMYOMATA.
Uterine body soft.	Stony, hard.
Rapid growth.	Slow growth.
More symmetrical.	More nodular.
Amenorrhœa.	Menorrhagia.
Cervix soft.	Cervix firm.
Positive symptoms present.	Positive symptoms of pregnancy absent.

TUMOR COMPLICATING PREGNANCY.—If tumor and pregnancy co-exist the problem is more difficult. The enlargement of abdomen is much more rapid than with either pregnancy or tumor alone. Menstruation is stopped if pregnancy exists. A few months' careful watch will usually suffice to make a diagnosis.

PREGNANCY	VS. OVARIAN TUMOR.
Amenorrhœa.	Menstruation continues.
Tumor more central.	Tumor more lateral.
Breast signs present.	Usually absent; rarely present.
Positive symptoms present.	Positive symptoms of pregnancy absent.

ASCITES.—Fluctuation is not distinct in pregnancy unless the liquor amnii be great in amount; it is always present in ascites.

PREGNANCY	VS. ASCITES.
Fluctuation not distinct.	Fluctuation distinct.
Percussion more dull in front.	Resonant in front.
Amenorrhœa.	Menstruation continues.
Positive symptoms present.	Positive symptoms of pregnancy absent.

PSEUDOCYESIS.—*Spurious or false pregnancy.* One phase of

pseudocyesis occurs about time of menopause when abdominal fat causes the "tumor," and indigestion and intestinal flatulence cause the "labor pains." Another form occurs in hysterical women whose intestines have become distended and paralyzed.

PREGNANCY	VS.	PSEUDOCYESIS.
Positive symptoms present.		Positive symptoms absent.
Cervix soft.		Cervix hard.
Uterus enlarged.		Uterus small.
Tumor does not disappear on pressure.	on	Tumor disappears on steady pressure or under anæsthesia.

PELVIC OR PERITONEAL EXUDATE.—The diagnosis of pregnancy co-existing with pelvic exudate may be very difficult or impossible, owing to its interference in eliciting normal signs; the vaginal vault is firm and unyielding, and the cervix projects into it like a nipple.

HYDROMETRA OR HEMATOMETRA.—Retained menses may give rise to a suspicion of pregnancy owing to the enlarged abdomen. It is characterized by cramp-like pains at regular menstrual periods; a longer duration than of pregnancy; the impossibility of impregnation, and on examination the congenital or acquired atresia of cervix or vagina.

VI. HYGIENE AND MANAGEMENT OF PREGNANCY.

History of Pregnant Woman.

CLINICAL HISTORY OF CASE.—When first consulted by the pregnant woman it is important to get a comprehensive history of the case to serve as a basis for subsequent management and treatment. Ascertain especially if patient is a primipara or multipara, and nature of previous confinements, if any. The following outline will be found convenient:

HISTORY FACTS.

1. Name.
2. Age.
3. Health before puberty (to ascertain condition of pelvis, whether rachitic or not).
4. Menstrual history (important).
5. Primigravida or multigravida (past experiences tell what may be expected in the future).
6. Condition during previous pregnancy, if any.
7. Character and result of previous confinements, if any.
8. Present existence of infective inflammation (important to ascer-

tain if previously infected, and if so to guard against reinfection).

9. Malarial history.
10. Physical examination (breasts, vulva, uterus, etc.).
11. Pelvic measurements.

DETERMINATION OF PREVIOUS PREGNANCIES.—This has an important bearing on subsequent confinements, and may be of medico-legal importance. It is determined from vaginal and external examination.

PRIMIGRAVIDA	VS.	MULTIGRAVIDA.
Abdominal wall firm and tense, recti in apposition.		Abdominal wall lax and wrinkled, recti separated.
Projecting parts of fetus not as distinct.		Projecting parts of fetus more distinct.
Striæ on abdomen, thighs and nates appear late; color, reddish-brown or slaty.		Besides striæ as in primigravida, there are present shiny, silvery-white striæ.
Breasts feel firm and tense.		Breasts are flabby and pendulous, with silvery striæ.
Labia in apposition.		Vulva gaping; violet color.
Vagina narrow; the transverse ridges are distinct.		Vagina smooth; ridges largely obliterated.
Hymen fissured, but back is frequently attached to introitus.		Carunculae myrtiformes alone remain as vestiges of hymen.
Os externum closed until late in pregnancy.		Os externum is patulous, and admits finger tip.
Cervical canal small and spindle-shaped.		Cervical canal large and conical.
Old lacerations of cervix absent.		Old lacerations of cervix present.
Pelvic floor firm.		Pelvic floor relaxed.
Perineum intact.		May be scars from old lacerations.

PELVIC MEASUREMENTS.—It is of the greatest importance to ascertain at the first opportunity the patient's general physical condition and especially her pelvic capacity. A thorough physical examination should be made and a record kept of the findings. If any abnormality exists in the pelvic measurements it should be carefully noted and provision made for subsequent operative interference if indicated.

Management of Pregnant Women.

The patient should be watched very carefully from the time the physician is engaged. She should be cautioned against indiscretions in eating, etc., and a careful watch of her urine should be kept. A single instance of over-exposure or over-eating may precipitate an attack of eclampsia.

EXERCISE.—Moderate exercise should be encouraged; vio-

lent exercise prohibited. Bicycle riding, golf and tennis are debatable. Avoid stair-climbing and lifting. The sewing-machine is a "labor-saving machine." Dress comfortably while exercising. Walking, and riding over smooth roads, are the best forms of exercise; stop just short of fatigue when beginning walking exercise, gradually increasing the distance up to one or two miles. Continue systematic exercise until a fortnight before labor.

DRESS.—Should be loose, and made adjustable to fit the growing body. A corset-waist should be worn to support skirts and stockings; no corsets. Avoid circular garters on account of varicosities.

FOOD.—There is a loss of appetite in early pregnancy, hence take food frequently and in small amounts, such as milk, broth or eggs every six hours. From third to eighth month appetite is usually good. During last months, patient will be more comfortable if easily digested food is taken frequently and in small amounts. If kidneys are normal, let patient make her own selection of food. Meat should not be eaten more than once a day, red meat three or four times a week. A ravenous appetite should not be fully gratified, as there is danger of overgrowth of fetus.

TONICS.—May be indicated in failure of appetite, if there is not a normal gain in weight or if the hydremia of pregnancy is exaggerated. Strychnin has a beneficial effect upon labor and favors involution.

DRINK.—Exclude alcohol; it may irritate the kidneys and derange digestion.

BATHING.—Follow ordinary habits. Frequent bathing, either hot or cold, should be allowed if patient is accustomed to it. Avoid shock of cold spray. Well to give at least one or two warm baths per week to favor elimination from skin.

TEETH.—The rapid decay of the teeth which frequently occurs during pregnancy should be prevented by the administration of syrup of the lactophosphate of lime, combined with a mouth-wash of milk of magnesia to correct acidity of buccal secretions and prevent development of *leptothrix buccalis*.

EXPOSURE.—Avoid exposure to cold and wet; sitting in a draft while over-heated may precipitate an attack of acute ne-

phritis or eclampsia.

COITUS.—Is the most frequent cause of miscarriage in young and newly married women. Should be entirely interdicted in early months, nor permitted more than twice a week in later months; should be avoided altogether during times which would be the normal menstrual periods, owing to natural tendency to abort at such times; and during the last month of pregnancy, to avoid infection of vagina (the vagina is naturally sterile, the penis never is).

CONSTIPATION.—The bowels are never active during pregnancy, owing to pressure on rectum of gravid uterus. Avoid drugs as much as possible; regulate bowels by diet and hygienic measures—coarse food, fruit, plenty of water, and regular hours for stools. Two or three glasses of water in early morning may cause movement after breakfast; it also favors elimination through kidneys and skin. Avoid breaking regular habits.

LAXATIVES.—If drugs must be given to keep the bowels open, use cascara sagrada, in tablets (each representing 3 to 5 m. of the fl. ext.); take two or three tablets at night. Or the aloin, belladonna and strychnin compound (A. B. S. pill), in proportions of 1/6, 1/12 and 1/120 gr., is also good. Any laxative mineral water taken in the morning may suffice; also warm water enemata, or gluten or glycerin suppositories may relieve. Use anything to obtain one movement a day.

URINE.—*Don't neglect to examine the urine at least once a month in the first months, and every two weeks in the middle of pregnancy.* Ordinarily the routine examination will suffice. If albumin is present, examine once a week, or even once a day, using a twenty-four-hour specimen, and noting total elimination of nitrogen in its various forms, microscopic elements, etc. Have specimen sent to office on regular stated days, and insist on having clean bottles and plenty of urine. Make records of findings.

BREASTS AND NIPPLES.—Have clothing loose to allow breasts plenty of room to develop; undeveloped breasts may be given gentle massage in later months. Do not permit wearing of tight corsets, which drive *nipples* inward; such nipples must be manipulated in later (not early) months. Have patient anoint nipples at night with abolene (solid or liquid), or cocoa butter, then wash in the morning with warm water and a good soap; this softens and removes any crusts. To toughen the nipples they may be given applications of glycerol of tannin and water, equal parts, twice a day during the last month of pregnancy.



III. PATHOLOGY OF PREGNANCY

VII. DISEASES OF PREGNANT WOMAN.

General Systemic Diseases.

MORNING SICKNESS.—A certain amount of nausea during pregnancy is physiological, but it may easily become abnormal and hence it must be watched; it may become very serious. Ordinary morning sickness is a very simple affair; the patient may lose her breakfast, or there may be only a slight loss of mucus when brushing the teeth.

Causes.—Predisposing—the excessive excitability of the nervous system; some exciting cause, as misplaced uterus, etc. The nausea and vomiting of later months generally means toxemia. If severe (*hyperemesis gravidarum*), condition will require active treatment.

Treatment.—Find the cause, if possible, and correct it; look for retroversion, which is most common in multigravidæ, and in girls with lack of development from poor hygiene and insufficient care at time of puberty. Some drugs may help, but they generally fail; try cerium oxalate, bismuth subnitrate, sodium bicarbonate, tincture of nux vomica, carbolic acid, or small doses of cocain—the first four are most commonly used, but they may all fail. If vomiting persists, give a small amount of food before rising in the morning. If all drugs fail, then rest the stomach, and feed by rectum. Nerve sedatives by rectum may relieve—chloral, with or without bromides or opium, or all three drugs may be given with nutrient enemata. Wash out rectum daily with normal salt solution, letting intestine absorb the fluid if it will. If pulse becomes rapid and feeble, purpuric spots appear, and the temperature becomes subnormal or perhaps elevated, don't hesitate to empty the uterus and *don't wait too long*.

Rectal Feeding.—Some patients may be saved by rectal feeding, but don't continue longer than a week, as the patient may become too weak for operation.

Subsequent Feeding.—After rectal feeding it is best to be-

gin with matzoon or koumiss, in teaspoonful doses: or milk and lime water, two teaspoonfuls at a time; or milk with 10 gr. each of sodium bicarbonate and cerium oxalate, a few teaspoonfuls at a time. Iced champagne may be retained at the start, but best to give some preparation of milk in small amounts at frequent intervals.

Surgical Treatment.—Copeman suggests dilatation of cervix; this may be sufficient without rupturing the membranes. The dilatation of a poorly developed cervix may check vomiting without terminating pregnancy.

SALIVATION.—A nervous disturbance, commonly occurring with nausea and vomiting. It may be very marked, pints of saliva being secreted daily.

Treatment. There is little that will relieve the condition; atropin may help, but as the disease is of nervous origin, nerve sedatives—bromides, opium, etc.—work best. Iron and arsenic are of service in toning up the general system.

HERPES. A skin eruption, nervous in origin. The whole surface of body may be affected—arms, legs, face, etc. As a rule it appears early in pregnancy, but may not develop until after labor. The itching and general discomfort may undermine the general health.

Treatment. Borated vaseline or resorcin ointment may relieve the symptoms in the first stage; after vesicles are developed, use a drying powder—starch or borated powder being good. Carbolic ointment will relieve the itching.

MATERNAL IMPRESSIONS.—The relation between mental shock or strong emotions and fetal malformations is considered more than a coincidence. Sudden death or mental maldevelopment of fetus may be the result of sudden emotions. Shock seems to disturb circulation of the mother and cause deformity of fetus. Two factors are prominent: 1. Suddenness of shock. 2. Impression of object is usually obtained through sight.

CHOREA. This is one of the most important diseases influenced by pregnancy, and the prognosis depends upon its severity. Uterus may be affected same as voluntary muscles, and if the disease begins early and has a tendency to increase in severity, the prognosis is bad for both mother and child, the mortality being high. Chorea is rare in women over twenty

unless pregnancy exists.

Prognosis.—The disease is apt to be followed by mania, paralysis or nervousness; the temperature is usually elevated, and mania may develop during pregnancy or puerperium. Prognosis for child is good if the disease develops late in pregnancy. If it comes on early in pregnancy, abortion is usually necessary or spontaneous; it is more apt to occur in primigravidæ, owing to the tenseness of abdominal and uterine walls; multiparæ may abort during first attack of the disease.

Treatment consists principally in administration of bromides, arsenic and iron. As the disease usually occurs in ill-nourished women, the first indication is to build up the constitution. If the disease does not improve under tonics, then empty the uterus unless near at term, in which case let go to term; it does not usually last long after delivery. The injury to the mother may be permanent.

DIABETES.—A rare disease in pregnancy, and must be distinguished from the glycosuria occurring in pregnancy and lactation. If the sugar and the amount of urine steadily increase, accompanied by a loss of flesh, watch the patient carefully. Polyhydramnios usually accompanies the disease, the liquor amnii containing sugar.

Prognosis.—Very bad for both mother and child. Mortality of twenty cases was four percent. of mothers. Mode of death is not that usually seen in the non-pregnant; the patients go into collapse and die suddenly. The disease may continue for a long time after birth of child.

Treatment.—In a marked case of diabetes it is best to disregard life of child and empty uterus.

ANEMIA.—During pregnancy the blood is physiologically anemic, having relatively fewer red cells and more watery element. This condition may become extreme and pathological, in which case it is best to induce abortion, as this is Nature's method of curing.

Pernicious Anemia should be treated with arsenic, iron, etc., before operative interference is undertaken; the hemorrhage may be intense and should be prepared for.

EDEMA OF LEGS.—When not due to kidney disease, it is the result of pelvic pressure. Exclude kidneys by examination of urine, and relieve pressure on veins.

Diseases of the Genitalia.

DISPLACEMENTS OF UTERUS.—The pregnant uterus may be displaced forward, backward, downward or to either side, or may be part of hernial contents; it may also be the seat of flexures—forward, backward or laterally—or be twisted on its long axis at the thinned isthmus. The most common displacement is retroversion, which in most cases exists to some extent before pregnancy. It may be due to distention of bladder, falls on the back, etc.

Course of Pregnancy depends on whether uterus is fixed or movable. It may correct itself, but the duty of the physician is to correct it.

Signs and Symptoms.—Absence of the body in front, and its presence behind. There is severe constipation, disturbances of bladder, frequent micturition, and constant pains in back from pressure on nerves.

Treatment.—If fundus is movable, put woman on side, or in knee-chest position, and replace the uterus. After fourth month it will remain in place. After replacing, support with pessary.

Common Results.—If adhesions are present, fixing fundus firmly under promontory, Nature may stretch them and free uterus; if too firmly adherent, she will empty the uterus.

Uncommon Results.—The uterus goes on developing, cervix is thrown upward, fundus enlarges in pelvis, and the posterior vaginal wall is pressed forward, resulting in *incarcerated uterus*. Symptoms are pains in back, and severe bladder symptoms; from distention of bladder, sloughing may occur in bladder-walls, resulting in rupture, peritonitis or uremia, and death.

Treatment.—Attempt to correct at earliest possible moment. If it cannot be corrected per vaginam, open abdomen and correct, and perhaps empty the uterus. It *must* be corrected.

PROLAPSE OF UTERUS.—Downward displacement of the uterus, from relaxation of uterine ligaments or pelvic floor, results in prolapse (*procedentia uteri*). The fetus usually remains above the pelvic inlet, the cervix only being prolapsed. The exposed surface of cervix may be eroded or excoriated.

Treatment.—Put the woman in the knee-chest position, and

replace uterus with the hands; keep patient in bed till uterus is firmly fixed in normal position. Best not pack vagina, but give vaginal douches.

SACCUATION OF UTERUS.—When posterior wall is adherent and uterus remains incarcerated, the anterior wall may enlarge upward. The child may be born through cervix, or Cesarean section may be necessary. Sacculatation may also be the result of gynaecology—a ventro-fixation for retroversion, the anterior wall of uterus having been too firmly fixed to abdominal wall. The anterior wall is thickened and forms a fleshy tumor filling vagina; the posterior wall is distended and thinned. This is not the usual result, however, if primary union has occurred after fixation.

Treatment.—Cesarean section is the only solution, as the cervix cannot be liberated. In doing a ventro-fixation, make sutures *below fundus*.

FIBROID TUMORS OF UTERUS.—Fibroids are a common complication of pregnancy; however, impregnation is not so apt to occur if tumor is present. The symptoms depend on size and location of tumor.

Submucous Fibroids.—Almost always associated with endometritis; the discharge is a handicap to pregnancy, and miscarriage is likely to occur. A tumor in lower uterine segment may obstruct passage and have to be removed before labor can proceed.

Interstitial or Mural Fibroids.—May be one or a number. Usually accompanied by endometritis, which may handicap pregnancy and induce miscarriage. Braxton-Hicks' sign may be present, with painful contractions. After labor, postpartum hemorrhage is liable.

Subserous Fibroids.—Trouble caused depends on the size and location of tumor; they may give no trouble and may not be found until fundus is felt during labor. May be numerous, and may cause no pain, especially if they are small, high up and do not press on endometrium. If they are in lower zone of uterus and large, they may obstruct labor.

Management of Obstructed Labor.—Try to push tumor out of way; if impossible, treatment depends on size of tumor. If small, perform version, or forceps may suffice; if larger, crani-

otomy may be performed, or, if the surroundings warrant, a Cesarean section, as tumor will have to be removed anyway. Uterus may spontaneously retract fibroid and allow normal labor to proceed.

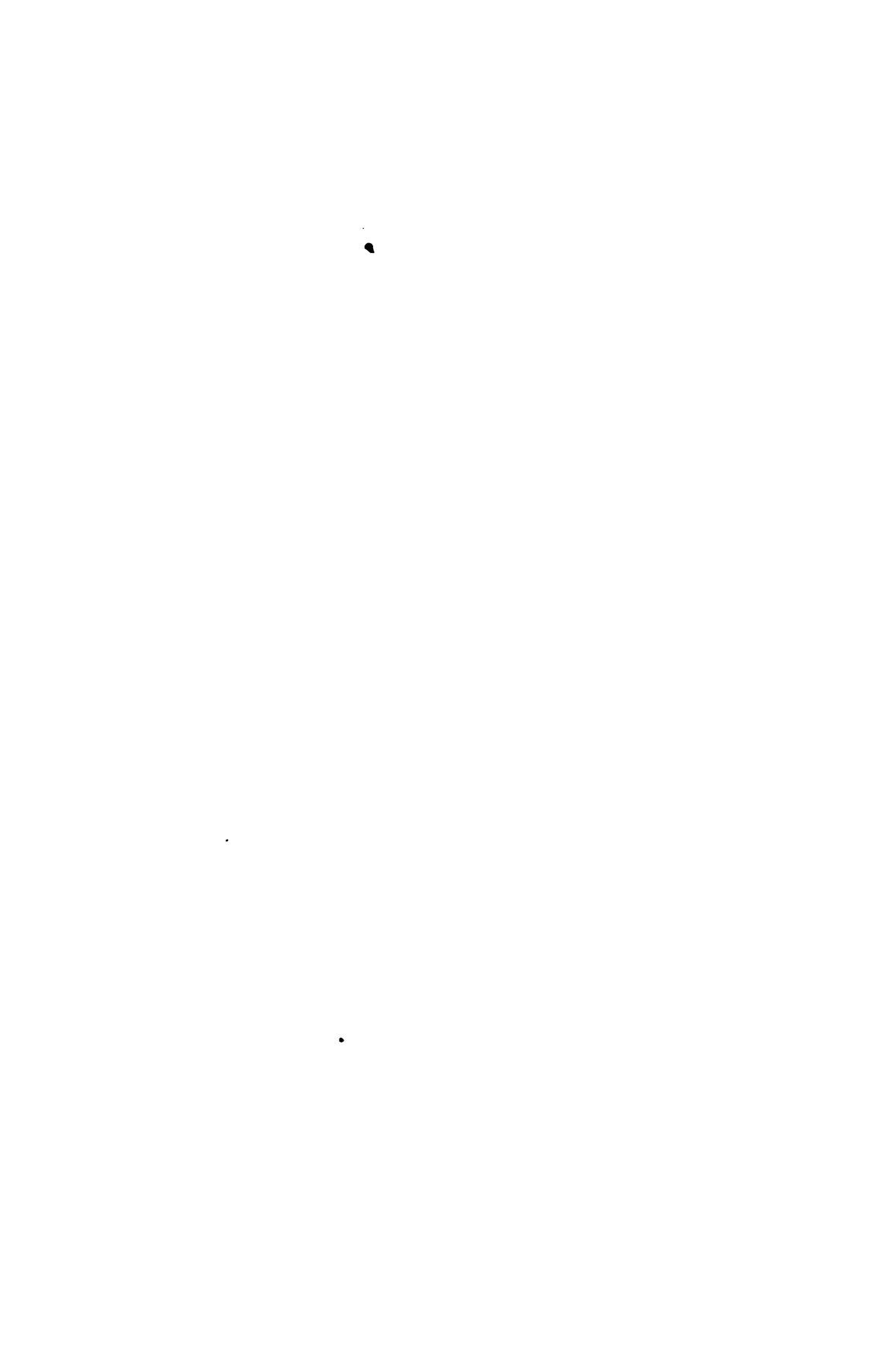
Advice to Pregnant Woman with Obstructed Fibroid.—Always consult wishes of parents when giving advice. The advice in second or third month depends on: 1. Whether family are very desirous of having child, and are willing to submit to danger of Cesarean. The mortality is low, hence this advice can well be given, providing the child is alive at term. 2. If patient is not willing to undergo Cesarean, may (a) empty uterus and leave fibroid, which will then cease to grow; or (b) tumor may be so situated that a myotomy may be done, leaving uterus and perhaps sparing child.

Changes Occurring in Tumor During Pregnancy.—The tumor may undergo coagulation necrosis in center from impaired circulation and necessitate immediate removal. On the other hand, a fibroid may be cured by pregnancy.

CANCER OF CERVIX.—This is a most unfortunate condition; it makes the cervical tissue inelastic, and lacerations and hemorrhage are inevitable. Life of the child is not to be considered, but remove the disease, if possible, early or late—better in early pregnancy. Even if near full term, the chances of child living are very poor, as its vitality will be low no matter how delivered. General rule is to perform Cesarean section, and at same time remove uterus and cancer, if possible. In mild cases of cancer, the cervix may dilate normally, and hemorrhage can be controlled by packing. The mortality for child is high, due to low vitality.

OVARIAN CYSTS.—Cysts of the ovary or parovarium, in the peritoneum or broad ligament, may obstruct labor. If small (size of an English walnut), they may be disregarded until after labor. If large (size of fist), it is best to remove the tumor at once; pregnancy may continue, but even if miscarriage does occur the action is justified—this applies to either form of cyst.

Obstructed Passage.—If pregnancy is at term and the passage is obstructed by a tumor, try to: 1. Push tumor out of the way; if impossible, then, 2. Tap, especially if cyst is inter-





ligamentous, as the fluid is thin and enucleation is dangerous; it may fill again, but relief is absolute for the time being. Peritoneal cysts may also be tapped. In case of gelatinous or dermoid type of cyst, do not tap, as it will do no good and will probably prove dangerous; best to perform laparotomy, removing both the tumor and child, as uterine contractions may rupture the stump if child be left.

VAGINAL LEUKORRHEA.—A muco-purulent vaginal discharge due to the extra congestion of the pelvic organs, common in the later months of pregnancy; may also be due to granular vaginitis, or to venereal warts or condylomata.

Treatment.—If the discharge is excessive, treatment is necessary, any local cause of irritation first being removed. There is danger of infection from douche nozzle, or from force of stream; hence use a small, clean nozzle, and do not raise the bag higher than length of women's arm as she lies in bed. Use borax water—two teaspoonfuls of borax to a quart of water—temperature about 100° to 105° F. Or make single application of 30 percent. solution of carbolic acid in glycerin, or a 20 gr. to the ounce solution of silver nitrate, making the application through a wire speculum.

PRURITIS VULVAE.—May be a neurosis and may result from glycosuria, but most common cause is irritation from leukorrhoeal discharge, and to congestion and lack of cleanliness of vulva. *Causes* are: 1. Constitutional—gouty diathesis; less commonly, diabetes mellitus. 2. Local—more commonly result of uncleanliness. It may be slight, not keeping patient awake; or may be excessive, reducing the general health.

Treatment.—Find general cause (e. g. urine), and treat it. Locally use: 1. Borax douche, plain; or add ½ teaspoonful zinc sulphate, ½ teaspoonful alum, and 1 teaspoonful borax to a quart of water. 2. Applications of silver nitrate in 2 percent. solution. 3. An ointment containing menthol. 4. An ointment containing *resinal* (tar, zinc and stearin).

VARICOSITIES OF VULVA AND EXTREMITIES are more common in the multipara. Caused by any obstruction to venous return, as corsets, garters, constipation, or retroversion or retroflexion of uterus. Most common in lower limbs and need treatment. May become inflamed, and may rupture from fall

or blow or straining during labor, forming hematomata.

Treatment.—Put patient to bed and apply ice bag to veins. Relieve pressure of clothing and garters, and examine condition of uterus and bowels. If veins should rupture, let patient lie down and apply clean pressure—a cloth or the thumb; quiet the fears of the woman.

Infectious Diseases.

Owing to the increased vascularity during pregnancy, susceptibility is increased and infection readily occurs, while the course of disease is more severe and the mortality higher. Treat the disease and disregard the pregnancy.

GONORRHEA.—When a virulent discharge is present, with burning during micturition, suspect gonorrhoea. Latent gonorrhoea may become active during pregnancy. *Dangers* on part of mother: Infection may travel up the urethra to bladder, or up tubes to peritoneum; on part of child: Ophthalmia neonatorum, from vaginal discharge during labor.

Treatment consists in thorough disinfection—douching is not sufficient. Scrub parts with bichlorid solution and keep dry; treat same as in non-pregnant, only more actively.

SYPHILIS in pregnancy may run the same course as in the non-pregnant woman, but it is apt to be more severe; the tissues break down more readily, and the lesions are more active and more extensive. It is invariably associated with ordinary infectious germs which make it worse.

Prognosis.—If either parent is actively syphilitic before impregnation occurs, the child will almost surely be syphilitic. A non-syphilitic woman becoming pregnant by a diseased husband may indirectly receive a mild infection from the child which received its infection directly from the father. A diseased woman becoming pregnant is almost sure to lose her child; while a pregnant woman becoming syphilitic is less apt to abort. If syphilis is contracted during the first three months of pregnancy, the majority of the children will be diseased; during the second three months, about 50 percent.; and during the last three months, less than 50 percent.

Treatment is that for the non-pregnant; but owing to the presence of other germs and to sloughing, local disinfection



must be more active; mercury bichlorid wash and calomel dusting powder is probably the best local treatment.

TYPHOID FEVER is occasionally met with in pregnancy. In about 75 percent. of cases abortion results: 1. From high temperature—105° F. usually aborts. 2. Typhoid fever is apt to be associated with hemorrhage into the membranes. 3. Embarrassment and enfeeblement of uterine circulation. There may be firm uterine contractions from efforts to expel the fetus. Sixty-five percent. of cases abort, while many of the babies born at term are idiotic.

Treatment.—Bathing is not contraindicated, hence treat as in non-pregnant. Stimulate the patient, and let pregnancy go on. If the temperature remains near 105° F. very long abortion will probably occur. If hemorrhage from the bowels occurs there may be also one from placenta. Ice bag over fundus may relieve contractions.

ERYSIPELAS.—The danger to the pregnant woman from erysipelas is *very great*; hence do not attend the two cases together, but interchange cases with neighboring physician. If necessary to attend both, employ rubber gloves and use every precaution.

MEASLES.—Not commonly met with, as it is a rare disease in adults. Prognosis depends on severity of disease—high temperature or bronchitis favors miscarriage. It may be transmitted to child in utero.

SCARLATINA is not uncommon. It may be transmitted to fetus. It is more serious during pregnancy owing to complications from pus germs; hence greater tendency to puerperal fever.

SMALL-POX.—If severe, it is almost sure to cause death of both mother and child; if mild, it is likely to kill child but spare mother; a child may recover same time as mother. See that patient is vaccinated as soon as exposed, as the disease is not then so severe.

PNEUMONIA.—A serious complication, as respiration is already taxed from pregnancy. Respiration is greatly embarrassed; hence miscarriage is very common, owing to poor blood, poor circulation, and high temperature. Give oxygen. If near term and respiration is much embarrassed, may induce labor,

but even here it is better to let pregnancy proceed as the puerperium and pneumonia is a bad combination. The shock from induction, unless on the verge of labor, is much greater than under normal conditions.

VIII. ANOMALIES AND DISEASES OF FETAL APPENDAGES.

Diseases of the Amnion.

- A. Polyhydramnios (an excess of liquor amnii) { 1. Acute.
2. Chronic.
- B. Oligohydramnios (a deficiency in liquor amnii).

Four pints of liquor amnii is the dividing line between an excess and a deficiency. The abnormalities are usually considered as faults of the amnion, but they may be due to an abnormal fetal circulation. In twin pregnancy, they are apt to be associated with but one of the children.

POLYHYDRAMNIOS.—Occurs in two forms: 1. Acute; it may develop in a single night, with pain, rise of temperature and vomiting. 2. Chronic; requires a longer time to develop.

Symptoms.—Abdominal tumor is too large for the stage of pregnancy. Fetal heart sounds are weak. Fetus is more movable than normal, and maternal respiration is embarrassed from pressure of over-distended uterus.

Results.—1. To mother: (a) Embarrassed heart, respiration and digestion; (b) labor is usually premature, due to over-distention of uterus; (c) labor pains are usually deficient, from uterine inertia; (d) sudden emptying of uterus is apt to cause postpartum hemorrhage. 2. To child: (a) Prematurity; (b) malposition, due to sudden gush of fluid; (c) prolapse of cord from abnormal presentation.

Treatment.—As a rule no treatment is required, as the cases are usually chronic. In the acute form, it is best to induce abortion; this form is rare.

OLIGOHYDRAMNIOS.—With deficiency in fluid, the amnion is apt to fall in against fetus and form bands of adhesions; these bands may contract and cause malformations from constriction of limbs and malnutrition of fetus. The fetal movements are more distinctly felt than normally.

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Diseases of the Chorion.

- A. Cystic degeneration of the chorion villi (vesicular mole).
- B. Fibromyxomatous degeneration of the chorion.
- C. Rupture of the chorion.

VESICULAR MOLE.—*Hydatidiform or cystic degeneration.* A form of myxoma. Resembles a bunch of Malaga grapes; the vesicles are usually attached by separate stems, but may be attached to each other. Begins usually in early months of pregnancy, but may occur in later months. Its presence always means pregnancy.

Etiology.— Present view, that it is strictly a disease of the chorion, as it may occur in one of twins, or even be present when live child is born; if present in one of twins, normal baby usually dies from impaired circulation. Cause is endometritis.

Pathology.—The disease starts in connective tissue of villi; the spaces become distended and filled with fluid; the framework of villus atrophies and disappears, leaving a single sack covered with epithelium. The degenerated villi adhere to and penetrate walls of uterus and may cause perforations.

Symptoms.— 1. Abnormally rapid increase in the size of abdomen. 2. Bloody or watery discharge from uterus. 3. A boggy feeling of the uterus, with absence of fetal heart sounds and movements. 4. Finding of expelled vesicles.

Diagnosis.—As a rule, several of the above symptoms are necessary to establish a diagnosis; the finding of the vesicles is positive.

Treatment.— Disregard fetus; there is only one treatment—empty the uterus as soon as the diagnosis is made. Use great caution, and do not scrape too hard, as the vesicles may penetrate the uterine wall. Be prepared to deal with the hemorrhage; after washing out the uterine cavity pack it with gauze.

FIBROMYXOMATOUS DEGENERATION.— The intercellular spaces of the degenerated villi contain a solid, more fibrous element, and the mass becomes solid instead of cystic.

RUPTURE OF THE CHORION.— Both the amnion and the chorion may rupture without terminating pregnancy, the fetus continuing its development in direct contact with the decidua (extra-membranous development).

Diseases of the Decidua.

- | | | | | |
|---------------|---|------------|---|---------------------------|
| A. Deciduitis | } | 1. Acute | { | (a) Exanthematous. |
| | | | | (b) Hemorrhagic. |
| | | | | (c) Purulent. |
| | } | 2. Chronic | { | (a) Diffuse hyperplastic. |
| | | | | (b) Polypoid. |
| | | | | (c) Cystic. |
| | | | | (d) Catarrhal. |
| | | | | (e) Tuberculous. |
- B. Hemorrhage into decidua (decidual apoplexy).
 C. Atrophy of decidua.
 D. New growths of decidua.

ACUTE DECIDUITIS.—A comparatively rare disease. It may result from cholera and other infectious diseases; from unsuccessful attempts to induce abortion, or from external injuries.

Exanthematous Deciduitis.—Results from the occurrence of an exanthem upon the uterine mucous membrane as a part of an eruptive skin disease, e. g., measles. The eruption is very irritating in its action and results in miscarriage.

Hemorrhagic Deciduitis.—An uncommon form; is the result of Asiatic cholera, typhus fever, etc. The chronic form is more common.

Purulent Deciduitis.—Also a rare type. Is a microbic decidual endometritis, usually the result of malpractice.

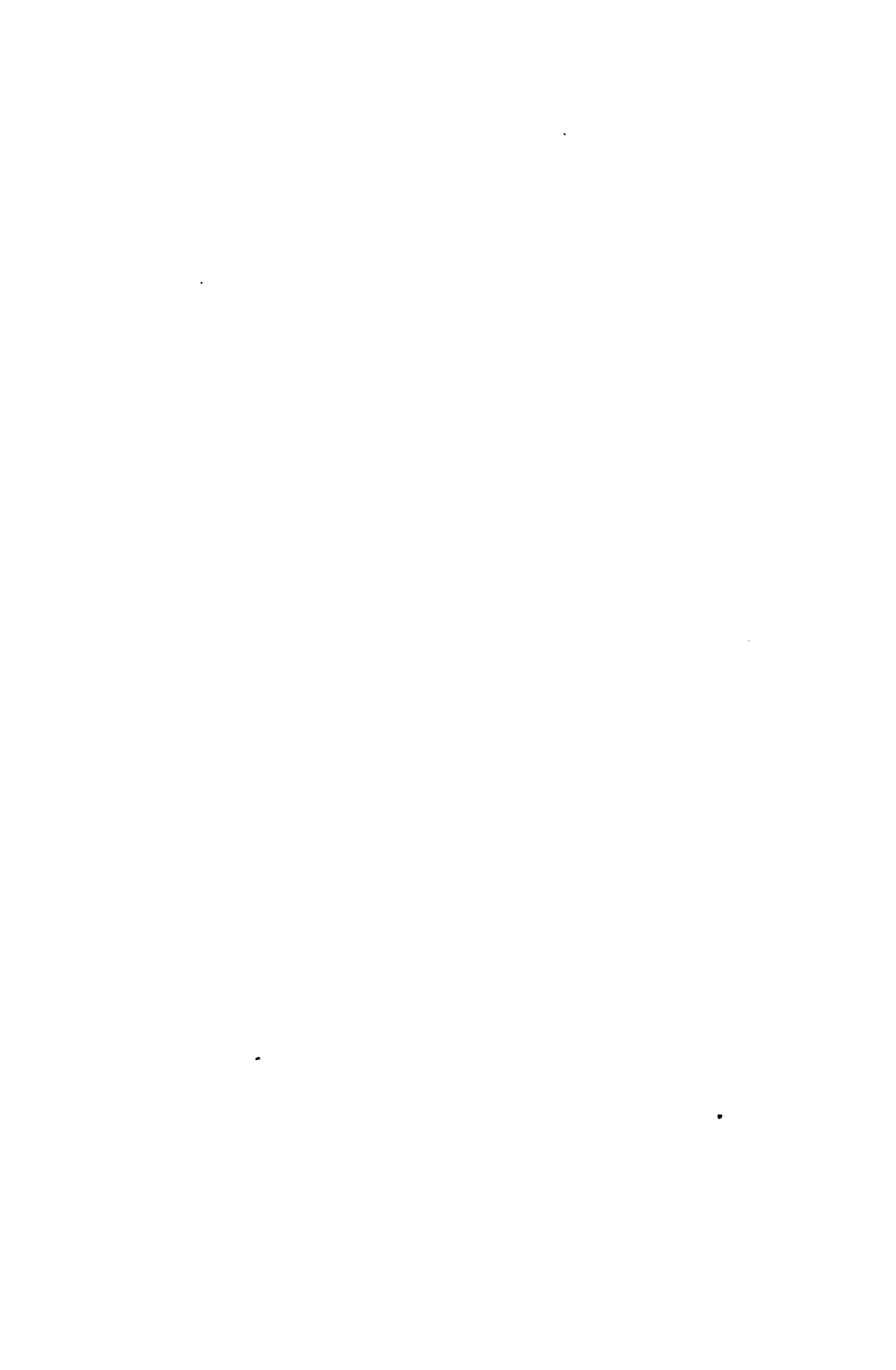
CHRONIC DECIDUITIS.—These are much more common than the acute types of deciduitis.

Diffuse Hyperplastic Deciduitis.—A natural result of chronic endometritis. All ingredients of tissues are hypertrophied. The polypoid, cystic, and catarrhal forms are only continuations of this process in local areas.

Polypoid Deciduitis.—Consists of local spots of hyperplasia, usually on opposite side from attachment of ovum; they may be on anterior wall. Villous-like projections stand out from the mucous membrane to height of half an inch or more. Result of syphilis, or previous endometritis.

Cystic Deciduitis.—Due to an involvement of the utricular glands. There is a hypersecretion which, from closure of the ducts, is retained, forming cysts.

Catarrhal Deciduitis.—This is a more general condition of the cystic form. It constitutes one form of *hydrorrhœa gravidarum*. The fluid may be retained above the ovum by adhesions of decidua reflexa and vera of opposite wall, and by rup-



ture of adhesions come away with a gush. Hydrorrhœa gravidarum must be differentiated from the discharge of liquor amnii:

HYDRORRHEA GRAVIDARUM VS. DISCHARGE OF LIQUOR AMNII.	
Discharge occurs days and weeks before labor.	Discharge immediately precedes labor.
Usually no premonitory symptoms.	Usually preceded by labor pains.
Discharge usually occurs at intervals.	Discharge usually but once.
Os closed.	Os patulous.
Ballotement possible.	Ballotement impossible.
Fluid is highly albuminous and contains mucin.	Fluid has only trace of albumin; considerable urea and urates.

Tuberculous Deciduitis.—A rare condition. Pregnancy may go on to term.

HEMORRHAGE INTO DECIDUA.—*Decidual apoplexy.* This is a rare affection *per se*, and is the result of Asiatic cholera, etc. It is common as a premonitory symptom of abortion.

ATROPHY OF DECIDUA.—The decidua may not form a firm lodging place for ovum, owing to an atrophic condition; the ovum falls to cervix, lodges and develops, the result being cervical pregnancy.

NEW GROWTHS OF DECIDUA.—*Deciduoma malignum*, or *deciduo-sarcoma*, may follow pregnancy, developing at the placental site. *Carcinoma syncytiale*, or *syncytial cancer*, also develops at placental site, and is perhaps more common than sarcoma.

Diseases of the Placenta.

- A. Placentitis { 1. Acute.
- 2. Chronic { (a) Simple.
- (b) Syphilitic.
- (c) Tuberculous.
- B. Hemorrhage into and behind placenta (placental apoplexy).
- C. Edema of placenta.
- D. Degeneration of placental villi { (a) Fibrous.
- (b) Fatty.
- (c) Caseous.
- (d) Calcareous.
- (e) Myxomatous.
- (f) Syphilitic.
- E. Cysts of placenta.
- F. Tumors of placenta.

ACUTE PLACENTITIS.—A rare affection; is generally the result of dirty instruments.

CHRONIC PLACENTITIS.—This is the more common form of placentitis. There are three types:

Simple Placentitis.— This is generally secondary to a deciduitis.

Syphilitic Placentitis.— The result of syphilis in either the father or mother. If from disease of father, the chorionic villi are affected, the vessels being closed; if from disease in the mother, the maternal structures are involved.

Tuberculous Placentitis.— This is not a common form. Miliary tubercles may develop in placenta.

HEMORRHAGE OF PLACENTA.— In the early months hemorrhage into or behind the placenta is generally due to rupture of new, thin-walled blood vessels (placental apoplexy). Later, it is usually the result of thrombosis in the sinuses, or laceration of blood vessels in upper layer of decidua serotina. The amount of escaped blood may be small, and confined to small areas; or it may be great in amount, separating the whole placenta from uterus.

Causes.— *Predisposing:* Pelvic congestion and albuminuria; slow-moving blood stream and excess of fibrin predisposing to thrombosis; diseased condition of placental villi. *Active:* Sudden powerful heart action; syncope (favoring thrombosis); trauma, such as excessive coitus, a blow or fall, etc.; acute inflammation (the most common cause).

Results.— Principally to fetus, and depend upon amount of blood lost. If quantity is large, as a rule the ovum is expelled early, forming the *bloody mole*; or it may be retained longer, forming the *fleshy mole*; while if retained still longer, lime salts may be deposited in the ovum, when it becomes the *calcareous mole*. The condition is also known as *blighty ovum*, or *moler pregnancy*.

EDEMA OF PLACENTA.— This may be simply an accumulation of serum under the placenta, due to a constriction of the umbilical vein in the fetus; or it may be confined to small areas, resulting from pressure on small vessels in placenta. The whole placenta may be infiltrated in case of a dead and macerated fetus, or in cases of general anasarca of fetus.

DEGENERATION OF PLACENTA.— The placental villi may undergo fibrous (*placental infarcts*), fatty, caseous (*phthisical placenta*), calcareous and myxomatous degenerations; or a syphilitic degeneration, resulting in a large, pale placenta.

CYSTS OF PLACENTA.—Usually result from hyperplasia and later liquefaction of cells of Langhan's layer. May also be due to circumscribed myxomata, or to changes in extravasated blood.

TUMORS.—May be fibromyxomata, localized hypertrophies, angiomata, or organized thromboses; or the placental site may be the seat of malignant growths (*malignant placental polyps*). Symptoms of the latter are foul, bloody discharge, perhaps containing neoplastic tissue, continuing for an indefinite time after abortion or term delivery, and a large, soft uterus with patulous os. Treatment is hysterectomy.

Malformation and Anomalies of Placenta.

- | | |
|----------------------------------|--|
| A. Size | { 1. Large { (a) Thin (placentae membranacea).
(b) Thick.
2. Small. |
| B. Shape | |
| C. Number | { 1. Double (placenta bipartita, or duplex).
2. Triple (placenta tripartita, or multiloba).
3. Accessory (placenta succenturiata). |
| D. Position (placenta
previa) | { 1. Complete (central).
2. Incomplete { (a) Lateral.
(b) Marginal.
(c) Partial |

ANOMALIES IN SIZE.—The placenta may be excessively *large and thin*, due to persistence of all of chorion frondosum (*placenta membranacea*); it may cover the whole interior surface of uterus. On the other hand, the placenta may be abnormally *large and thick*, due to hypertrophy from a chronically inflamed endometrium. It may be abnormally *small*, from ill-development of child, or from atrophy. The placenta may vary considerably in size; its thickness is in inverse ratio to its extent, and the younger the ovum the greater the relative size of the placenta.

ANOMALIES IN SHAPE.—The placenta is normally round or oval, and disc-shaped; it may present many variations in shape.

Horseshoe Placenta.—When it surrounds os; or in twin pregnancy, from union of two placenta.

Placenta Marginata.—Consists in a fragment of placenta at margin of a normal organ; it must be either crescentic or

circular. Of importance, as may remain in uterus and be overlooked after labor.

Battledore Placenta.—Not an uncommon form; the cord is attached to, or near, the placental margin.

Annular Placenta.—*Band or ring placenta.* A narrow zone of placenta, attached around the whole circumference of uterus.

Fenestrated Placenta.—*Placenta fenestrata,* results from failure of chorion frondosum to develop in certain areas.

ANOMALIES IN NUMBER.—There may be two (*placenta bipartita*), three (*placenta tripartita*), or more placentæ, or any number of small accessory placentæ (*placentæ succenturiatæ*). *Placentæ spuriae* are small accessory formations whose villi have no direct connection with maternal blood.

ANOMALIES IN POSITION.—The placenta should normally be attached to the upper uterine segment (*fundus*); when it is attached to the lower segment (the part which expands during labor) it constitutes *placenta prævia*. The varieties are named from relative position of placenta to os: *Complete* or *central*, when the os is entirely covered; *incomplete*, when os is not entirely covered. The latter may be *lateral*, when the edge of placenta does not come to os; *marginal*, when the edge is even with os; or *partial*, when the os is partially overlapped.

Diseases and Anomalies of the Cord.

- | | | | | | | |
|----------------------|---|-----------------------|---|----------------------------|--|------------|
| A. Diseases of cord | { | 1. Of vessels | { | (a) Stenosis. | | |
| | | | | (b) Varicosities. | | |
| | | | { | (c) Hypertrophy of valves. | | |
| | | | | (a) Cysts. | | |
| | | 2. Of substance | { | (b) Calcareous degenerat'n | | |
| | | | | (c) Tumors. | | |
| B. Anomalies of cord | { | 1. Knotting | { | (a) True. | | |
| | | | | (b) False. | | |
| | | 2. Excessive torsion. | | 3. Coiling. | | (a) Short. |
| | | | | | | (b) Long. |
| | | 4. Of length | { | | | (a) Large. |
| | | | | | | (b) Small. |
| 5. Of size | { | | | (a) Large. | | |
| | | | | (b) Small. | | |
| 6. Of vessels. | | | | | | |

DISEASES OF CORD.—The diseases of the umbilical cord have to do principally with the vessels.

Stenosis of Vessels.—A common condition, and is usually due to syphilis. When the vein is obstructed there is a damming back of blood in placenta; while stenosis of arteries causes stasis in fetus.

Varicosities.—This is rather an anomaly than a disease. If small, they form cysts; if large, they may *rupture* and cause death of fetus.

Hypertrophy of Valves.—Usually caused by syphilis; small knots, which can be felt, are produced in vessels.

Cysts of Cord.—These are produced by obstructions to the vessels and effusions into Wharton's jelly. Child usually lives but is apt to be feeble.

Calcareous Degeneration.—Usually associated with syphilis. Lime may be deposited in vessel walls or in substance of cord.

Tumors of Cord.—May be large, localized hypertrophies of mucous tissue, hematomata, a *fetus amorphus*, and telangulation; while if cord be long, the knots usually remain loose and cause no damage. *False knots* are due to collections of mucous tissue.

ANOMALIES OF CORD.—These result both from abnormalities in development, and from abnormal fetal movements.

Knotting of Cord.—Most common in multipara, when a freely movable child passes through a loop in the cord. If the cord be short, the knot may be drawn tight and result in strangulation; while if cord be long, the knots usually remain loose and cause no damage. *False knots* are due to collections of mucous tissue.

Excessive Torsion of Cord.—Probably always a postmortem change, resulting from great movability of a fetus dying from the fifth to seventh month. It may cause obliteration of the vessels.

Coiling of Cord.—The cord may become coiled about the neck or extremities of fetus; there may be one to eight or more turns about the neck, which may cause malposition or abnormal attitude from extension of head. The cord may be so shortened from coiling as to cause malposition, or premature separation of placenta. If coils be tight, they may cause malformation or amputation of part surrounded, by obstructing the circulation.

Anomalies of Length.—The cord may be excessively long—even nine feet; or abnormally short—one-half inch being the shortest noted, two inches the next; these are very rare.

Anomalies of Thickness.—The cord may be abnormally large and thick, from cysts, or collections of Wharton's jelly; or abnormally small and thin, from excessive torsion.

Vascular Anomalies.—The cord may have two arteries and one vein (normal), or two veins and one artery; or there may be one of each or two of each.

IX. ABORTION AND PREMATURE LABOR.

DEFINITION.—*Abortion* is the arrest of gestation and expulsion of the ovum before the seventh month (before viability of child); but always use the word “miscarriage” in the presence of patient, as the term “abortion” implies criminal intent to the lay mind. After the seventh month, the term *premature labor* is used. Some authors call expulsion of ovum up to third month, *abortion*; from third month to viability of child, *miscarriage*; from viability to term, *premature delivery*.

ETIOLOGY.—Abortion may be the result of a number of different causes. More than one-half of the patients will give a history of previous miscarriage. It is especially common in early married life, probably owing to trauma from too frequent coitus.

Traumatic Causes.—Any severe violence or trauma may produce abortion: 1. Blows and falls. 2. Excessive action of abdominal muscles; as from coughing, sneezing, straining at stool, etc. 3. The introduction of instruments, causing hemorrhage into membranes. 4. Frequent coitus.

Maternal Causes.—The maternal causes of abortion may act through several different channels: 1. Through the *blood*—from syphilis, excessive temperature (above 105° F.), malaria, drug poisoning, and poisoning from noxious gases; the condition of the blood itself being anemic. 2. Through the *nervous system*—from mental shock, reflex irritation of nipple from nursing, and from mental diseases, such as chorea, epilepsy, and convulsions. 3. Through *local causes* (something in uterus)—from inflammation of lining (endometritis), displacements with fixations in malpositions, lacerations of cervix, tu-

mors, placenta previa, and over-distention of uterus as from polyhydramnios or multiple fetation.

Fetal Causes.—Anything causing death of the fetus may be classed as a fetal cause of abortion.

Paternal Causes.—The paternal causes of abortion are: 1. Syphilis. 2. Any constitutional exhaustion; as from excesses of any kind, and especially sexual excesses (unhealthy sperm).

VARIETIES OF ABORTION.—Abortion is divided according to the symptoms into *threatened* and *inevitable*; and according to degree into *complete* and *incomplete*.

Threatened Abortion.—When the symptoms of abortion are severe, and yet pregnancy continues. The embryo may die, the symptoms abate, and the ovum be retained for an indefinite time; this is termed *missed abortion*.

Inevitable Abortion.—When the symptoms (pain and hemorrhage), are combined with dilatation of the cervix, abortion is inevitable.

Complete Abortion.—When the entire ovum is expelled; this does not usually occur after second or third week.

Incomplete Abortion.—When a part of ovum (membranes, etc.), is retained in uterus; usual result after third or fourth month, as membranes rupture. If a young ovum is passed soon after separation, forming a fresh blood clot, it constitutes the *bloody mole*; if retained until clot organizes, the *fleshy mole*.

SYMPTOMS.—If abortion occurs within the first two or three weeks after impregnation, the symptoms do not differ from those of menstruation excepting in degree—there is more pain, a greater flow, and more irritation of bladder; hence it may be mistaken for delayed menstruation. If abortion occurs from the second to third month, it presents a different picture: The *prodromal symptoms* are pain in the back, bladder irritability, and a mucous discharge; the *active symptoms* are pronounced pain, dilatation of cervix, and hemorrhage, the hemorrhage being either into or between the membranes.

TREATMENT.—The treatment of abortion is both *prophylactic* and *active*.

Prophylaxis.—The prophylactic treatment of abortion consists mainly in the proper education of the public: 1. Moral and physical responsibility should be impressed upon the pa-

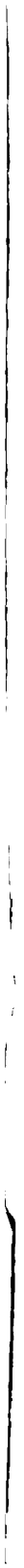
tient. 2. Need of care if the accident threatens—many ill results are liable if proper rest is not taken.

Treatment of Threatened Abortion.—Look for and, if possible, remove the cause; make sure that uterus is in correct position. Upon the appearance of prodromal symptoms, put patient to bed, keep her quiet and cool, and give morphin hypodermatically to quiet uterine contractions and keep nervous symptoms under control. After a few days, substitute codein (gr. $\frac{1}{2}$ every 4 hrs.); and later, fluid extract of viburnum (Hayden's compound, dr. 1 every 3 to 4 hrs.).

Treatment of Inevitable Abortion.—If cervix is rigid and woman is losing considerable blood, pack cervical canal and vagina; this stimulates contractions, dilates the cervix, and checks the hemorrhage. When the gauze is withdrawn it may contain or be followed by the ovum. After cervix has dilated, the treatment is to control the hemorrhage and empty the uterus. *If advancing well:* If cervix is dilated, do not interfere. After ovum is born float it in water to see if it is complete; if no part is missing, the woman may safely be let alone, with the exception of surgical cleanliness. It is unusual to have a complete abortion after the third month; hence, if any doubt exist, anaesthetize the patient and examine uterine cavity. *If not advancing well,* and woman is in pains, control the hemorrhage by packing vagina with gauze, which helps to control hemorrhage by damming back the blood; at the end of 12 hours (or before if cervix is soft and dilatible), give anaesthetic, dilate cervix with fingers (or instruments if necessary), and empty the uterus. Contractions may be stimulated with ergot (fl. ex. m. 30 every 4 hrs.), strychnia (gr. $\frac{1}{30}$ every 4 hrs.), or quinin (gr. 5 every 4 hrs.).

Dilatation of Cervix.—Hold down perineum (with a Sims' speculum), steady cervix, and dilate gradually in all directions; first using glove-stretcher dilator, then one finger, then two, etc.

Emptying of Uterus.—1. Best to use *finger*, as by tactile sense it shows presence or absence of placenta; to explore fundus, use two fingers, depressing fundus with external hand. 2. *Curette*—disadvantageous, as it gives no tactile sense and placenta may be left; hence best to examine with finger after



currettage. Break up membranes, etc., with fingers, then *douche* out debris; if curette must be used, remove debris with looped-end *sponge holder* (one blade may be used as a curette). Use great care not to puncture the uterine wall, especially if uterus is diseased. The curette should have a firm shank, and should not be sharp but should have one surface flat; *don't use a sharp curette*. Use force in *coming out* with curette, but *none going in*.

After-treatment of Abortion.— If uterus remains ballooned up and bleeding from retained secundines, disregard bleeding and go ahead until empty; then *douche* with hot salt solution, or hot bichlorid, 1:5000. If bleeding is excessive, pack the uterus with gauze (from tube) until fairly full; this is not necessary for drainage, however. A sponge holder may be used to pack uterus. The uterus is subinvolved and patient should stay in bed for nine days. Two weeks should be devoted to getting over the miscarriage.

Dangers from Miscarriage.— 1. Acute anemia may result from excessive bleeding. 2. The greatest danger in neglected abortion is from infection, which may set up septic metritis, salpingitis, or peritonitis. 3. Malpositions, etc., of uterus are liable to result, hence need of quiet and rest afterwards to prevent subinvolution.

SUBSEQUENT MISCARRIAGE.— One abortion renders a woman more liable to another attack; a second renders her liable to habitual abortion from: 1. Subinvolution (the most common cause). 2. Endometritis.

HABITUAL ABORTION.— This is most commonly the result of subinvolution, from a second impregnation having occurred before involution has been completed. The best treatment is to have separate beds for parents, or advise a six months' trip abroad for one. To prevent subsequent abortion, keep the woman in bed for one week during the usual menstrual periods until after the fourth month; or constantly if the symptoms persist. Avoid coitus entirely, or specially near the time of menstrual periods. If any indication of miscarriage should occur, institute treatment for threatened abortion—it may not be necessary to keep patient in bed, but keep her off her feet; after the third month she may be let go about, and may take

rides over smooth roads, etc.

MISSED ABORTION.—A miniature abortion with death of embryo, the ovum being retained. There is danger of septic infection, hence best to empty the uterus. Fetus may be retained for several years, the skeleton only remaining unabsorbed. If the membranes are intact, fetus may mummify and remain an indefinite time; or it may be absorbed, or form a polypus, the fetus remaining aseptic. These cases are rare.

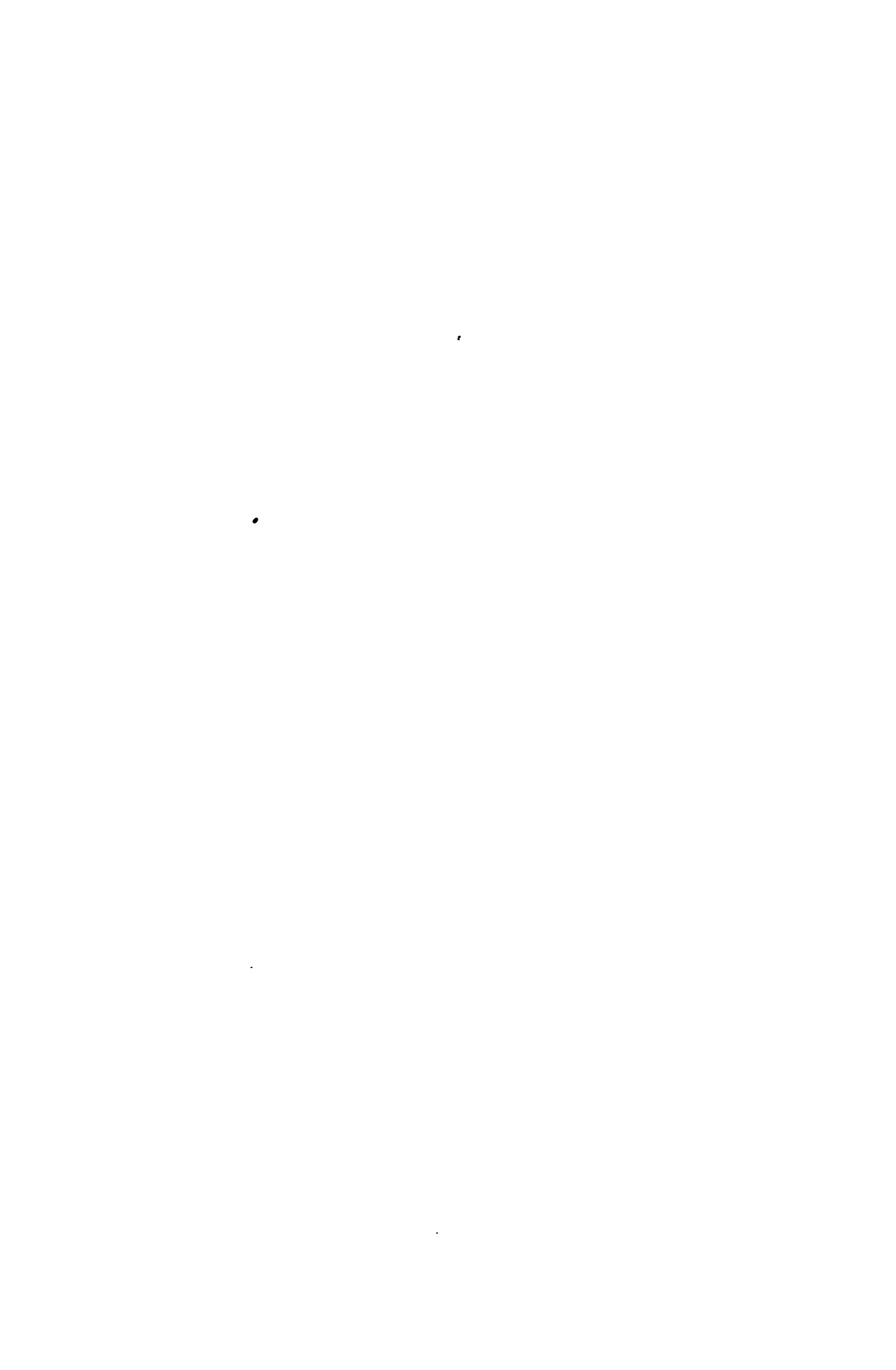
X. ECTOPIC GESTATION.

DEFINITION.—Means *gestation out of place*. Not necessarily out of uterus, as may be in interstitial portion of tube; hence “extra-uterine” is a bad term.

HISTORY.—Was first noted in eleventh century—a case with fetus working its way through the abdominal wall. Was described in sixteenth century, and in seventeenth century a distinction was made between primary and secondary abdominal pregnancy—one case was autopsied, the woman having died from rupture of tube. In 1752 Boehmer made about the same classification as is used today—tubal, ovarian, and abdominal. Schmidt, in 1801, described interstitial pregnancy.

FREQUENCY.—According to different authorities, from 1 in 500 to 1 in 20,000 pregnancies; was formerly thought to be very rare. In 1883 Lawson Tait performed first successful operation; Cragin operated thirty-five cases (five vaginal and thirty abdominal sections), in 500 pelvic operations.

SITUATION OF DEVELOPING OVUM.—The impregnated ovum may become fixed and develop primarily in any portion of tube (*interstitial, true tubal*), or be attached to the tubo-ovarian fimbria (*tubo-ovarian*); it may develop while still in the Graafian follicle (*ovarian*), or become attached primarily to any part of the peritoneum (*abdominal*). It may become lodged secondarily and develop in any portion of the abdomen from rupture of the ovary (*ovario-abdominal*), or tube (*tubo-abdominal*), or it may be normally situated and escape by rupture of the uterus (*utero-abdominal*), the placenta remaining fixed in the uterus. A downward rupture of the tube may deposit the ovum secondarily between the folds of the broad ligament



(*ligamentous*), where the ovum develops extra-peritoneally.

CLASSIFICATION BASED ON SITUATION OF OVUM.

- | | | |
|---------------|---|---|
| A. Primary | { 1. Tubal
2. Ovarian.
3. Abdominal (peritoneal). | { (a) Tubo-uterine (interstitial). |
| | | { (b) True tubal. |
| | | { (c) Tubo-ovarian. |
| B. Secondary. | { 1. Abdominal
2. Ligamentous (tubo-ligamentous). | { (a) Ovario-abdominal. |
| | | { (b) Tubo-abdominal.
(c) Utero-abdominal. |

ETIOLOGY.—The *normal site of impregnation of ovum* is somewhere in Fallopian tube: 1. Experiments on lower animals show that in them impregnation occurs in tube. 2. Spermatozoa have been found in abdomen around ovary in from three to twenty hours after insemination. 3. In one case, of a girl murdered sixteen hours after coitus, spermatozoa were found in fimbriated end of tube. Hence, ectopic pregnancy is the *result of some hindrance to the passage of a normally impregnated ovum* to the uterus. This may be: 1. Something in the lumen of tube delaying the migration of developing ovum: (a) Polypus of mucous membrane; (b) stricture; (c) disease of mucous membrane and damage to the cilia; (d) diverticula of the tube—funnel-shaped depressions due to congenital malformations. 2. Something in the wall of tube, e. g., thickening, as a result of disease, interfering with vermicular action. 3. Causes outside of tube: (a) Pressure on tube from tumors; (b) tractions on tube from adhesions (probably one of the most common causes). 4. Some fault with the ovum itself: (a) Increase in normal size, as from twin impregnation; (b) delay in passage to uterus from abnormal distance to be traveled; as from abnormally long tube, or from external migration of ovum (e. g., when one tube and opposite ovary have been removed, or when one tube is blocked and the corresponding ovary is functioning).

MULTIPLE ECTOPIC PREGNANCY.—1. May be double impregnation in one tube at same time. 2. May be co-existing ectopic and uterine pregnancy. 3. May be successive impregnation in same tube, the first ovum being dead. 3. May be one impregnated ovum in each tube.

TIME OF OCCURRENCE.—Rarely occurs soon after marriage

—only three out of forty-three cases occurred in first impregnation. It usually follows a long period of sterility, especially when means have been taken to prevent conception (probably owing to a low grade of endometritis).

CHANGES IN UTERUS.—About same changes occur as in normal pregnancy, but they are less marked. The uterus increases in size, but less rapidly than with uterine pregnancy. The venous hue of cervix is not so marked, but the nearer ovum is to uterus the deeper the hue.

Deciduae.—The decidua vera is formed, but serotina and reflexa are absent. The decidua is usually cast off at the seventh or eighth week, accompanied by more or less metrorrhagia; it may come away in shreds or as a complete cast of uterus and tubes. The decidua is smooth toward uterine cavity, and shaggy toward the wall; it is composed of large cells with nuclei at the centers, and but little intracellular substance (important in diagnosis); there are no chorionic villi.

CHANGES IN TUBE.—A decidua is formed. It is rare to have a tubal decidua in normal uterine pregnancy, but may be a few cells formed; also rare to have a decidua in normal tube with tubal pregnancy. Hence, formation of decidua in tube is probably due to local reaction from lodgment of ovum. When lodgment of ovum is between fimbria and uterus, the ostium abdominale closes in eighth week; if ovum lodges in fimbriated end, the ostium remains open.

DEVELOPMENT OF OVUM.—For a certain time the development and growth is the same as in normal pregnancy.

Amnion and Chorion.—Develop same as in uterus. Amount of decidua varies greatly, the amount determining the perfection of placental development. Chorionic villi are easily separated owing to poor attachment, and the escaped blood usually kills the fetus, resulting in the *tubal mole*; the dead ovum may: 1. Remain in tube. 2. May be absorbed. 3. May be deposited in abdomen, from rupture of tube.

Tubal Mole.—Important to differentiate it from blood clot. On section, shows a smooth cavity (amnion) containing more or less of fetus. The most important feature is presence of chorionic villi; these are little finger-like projections, covered with two layers of cells—an inner layer composed of single

large nucleated cells arranged side by side with cell walls (Langhan's layer), and an outer layer of protoplasm in which are embedded nuclei at irregular intervals (syncytium); in center of villi is a small amount of connective tissue and blood vessels.

SYMPTOMS OF ECTOPIC GESTATION.—Symptoms are not always distinct, but must be kept well in mind.

Menstruation.—Usually a disturbance in menstruation, but may not be, as when abortion occurs just previous to period next following impregnation.

Symptoms of Pregnancy.—Not of much value, as they are absent if rupture occurs early; are most pronounced after eighth week.

Pain.—If a married woman have sharp pelvic pain with symptoms of internal hemorrhage (faintness, etc.), always think of ectopic pregnancy; if a mass is felt in abdomen at side of pelvis the diagnosis is confirmed.

Passage of Decidua.—Occurs about time of abortion; is an important aid to diagnosis if found, but membranes of menstruation may confuse, hence get history.

History of Sterility.—There is usually a history of previous sterility, but ectopic pregnancy may occur as early as two to five months after marriage.

SYMPTOMS AT DIFFERENT PERIODS.—The symptoms of ectopic pregnancy in the different periods are best considered separately.

Symptoms Before Rupture or Tubal Abortion Occurs.—Often no symptoms besides: 1. Signs of normal pregnancy. Gynecologist may find: 2. Large tube at side of uterus, and in and about tube: 3. Vessels seem to pulsate more than normally. As a rule ectopic pregnancy is not diagnosed before rupture.

Symptoms at Time of Rupture.—1. Disturbance of menstrual periods. 2. Symptoms of pregnancy, followed by: 3. Sudden, sharp pains without fainting, and: 4. Passing of shreds from uterus. 5. Usually history of a long period of sterility. 6. May find, as a cause of rupture or abortion, something increasing the tension of sac, as (a) straining at stool; (b) heavy lifting; (c) coitus; (d) gynecological examination. 7.

Symptoms of shock and hemorrhage: (*a*) Blanching of skin; (*b*) rapid pulse; (*c*) pallor of lips; (*d*) dry tongue; (*e*) sub-normal temperature.

PHYSICAL SIGNS.—Signs vary with the course and direction of escaped blood—it may go in two main directions from tube: 1. If into peritoneal cavity (tubal abortion or rupture), signs may be absent; but may note (*a*) free blood or fluid in abdomen (not easily made out), and (*b*) tenderness of abdomen. 2. If into folds of broad ligament, (*a*) a tumor is felt; (*b*) uterus is pushed upward, forward and to side opposite hemorrhage; (*c*) there may be bulging downward into vagina.

Signs and Symptoms After Rupture.—A tumor is generally felt whether blood has gone upward or downward. 1. If bleeding has been into abdominal cavity the clot may be roofed in by adhesive peritonitis, and it then feels like a large tube surrounded by a mass of blood clot. The mass on compression between the fingers gives the sensation of a soft snowball. 2. If hemorrhage is into the broad ligament, the tumor is firmer. On examining per rectum, the tumor is found to be in the broad ligament, and uterus is displaced upward and to the opposite side; it feels like a stricture of the rectum.

DIFFERENTIAL DIAGNOSIS.—It is very important to differentiate ectopic gestation from other pelvic conditions. The hemorrhage may quickly cause death, but usually not before ten or twelve hours. If any doubt exists as to diagnosis, it is justifiable to make a small opening in the posterior fornix to ascertain if hemorrhage has occurred. The diagnosis is apt to be confused with miscarriage of normal uterine pregnancy, as both cause pain, etc. From ovarian cyst complicating normal pregnancy the differentiation is not important, as both require abdominal section. A fibroid on side of uterus may be very confusing.

ECTOPIC GESTATION	VS.	MISCARRIAGE.
Hemorrhage and pain.		Hemorrhage and pain with something from uterus.
Only decidua is discharged from uterus, with no villi (these remain in the tube or abdomen); decidua may be cast of uterus.		Chorion is expelled, and perhaps some of ovum.
Usually find a mass at side of uterus before and after rupture.		No mass is felt at side of uterus.

escapes into peritoneal cavity, often in amounts sufficient to cause death; blood clot makes a tumor in pelvis, and may be gradually absorbed. 2. *Tubal rupture*: (a) Ovum in ampulla, and rupture in upper wall of tube: Hemorrhage increases tension and causes rupture; the ovum may plug up the rent in tube, when there will be attacks of pain and syncope followed by temporary recovery as the bleeding is checked — this may be repeated several times, but finally a big hemorrhage occurs and the woman dies, the blood escaping unchecked and in unlimited amount into the abdominal cavity; the rent may be plugged by clotting of blood, and adhesion may form. (b) When blood escapes downward into broad ligament, the amount may be checked by the limitations of the space.

Fate of Ovum.— Separation from walls of tube usually kills the ovum, whether it escapes in an upward or downward direction. At times the separation may be so gradual that the membranes are not ruptured, and the ovum is displaced intact from walls of tube to peritoneum, where it becomes attached and undergoes further development (secondary abdominal pregnancy — rare).

PROGNOSIS.— If untreated, about two-thirds of the patients die immediately after rupture of tube; of those who do not die directly, a large number remain invalids, while many die from complications at later periods. Treated by operation, the mortality is about 5 percent. or less.

TREATMENT OF ECTOPIC GESTATION.— The old method of killing fetus by electricity or by injections of morphin, etc., is not now practiced, as it is dangerous from: 1. Rupture of sac at time of operation, from the manipulations. 2. Danger of subsequent rupture of tube up to two years after death of fetus.

Treatment Before Rupture of Tube.— As soon as the diagnosis is made, prepare the woman for laparotomy. Abdominal section is much simpler and safer than vaginal operation as: 1. There are few adhesions above. 2. The field of operation is aseptic.

Preparation of Abdomen should be same as for Cesarean section. Direct nurse to apply a gauze dressing soaked in strong soap suds, or tincture of green soap (1 in 10), and leave

on for six hours (over night) ; this softens superficial layer of skin, but be on guard for irritation. In the morning, scrub off abdomen and apply a wet bichlorid dressing, to be left on till operation. Shaving may be done after soap dressing is removed, but best to leave it until patient is under anaesthetic to avoid nervous shock. When patient is on table, shave, and scrub again with soap suds, alcohol or ether, and bichlorid. Advantages of extra precaution: 1. Avoids infection of blood clots. 2. Permits immediate closure of abdomen.

Operation is performed in three steps: 1. Tie off ovarian artery on pregnant side (uterine artery is not ligated). 2. Tie off tube close to uterus. 3. Remove pregnant tube and treat the stump.

Treatment at Time of Rupture.—Woman may mistake rupture for miscarriage; it may occur while at stool, in bed, anywhere. Make the diagnosis early, and if woman is faint from loss of blood, give infusion; death may occur as early as two hours after rupture, hence act at once. *Scrub thoroughly*, especially umbilicus, with soapsuds, alcohol, ether and bichlorid, and surround field of operation with sterile towels. *Open abdomen* in middle line below umbilicus. A mass may not be felt, the only guides being symptoms of hemorrhage, restlessness, dry mouth, rapid pulse, and point of tenderness; but when peritoneum is reached, the dark color of old blood underneath will be seen. When *peritoneum is opened*, blood may gush from wound, but *don't stop to mop it out* — go down to side thought to be at fault, grasp tube with one hand and draw it up into abdominal wound; then proceed to ligate ovarian artery in infundibulo-pelvic ligament, and tie off the tube close to horn of the uterus. Now take time to *clean out blood and clots*; best way is to flush out with salt solution. Not necessary to remove all of fluid but best to get most of it out; it does good if absorbed. Drainage is not necessary as a rule, as any blood or salt solution remaining will be absorbed. If the hemorrhage is down between folds of broad ligament, ligate in sections all of ligament involved; the blood may extend to bottom of ligament and even much deeper. *After the operation*, woman may be in a state of collapse and very white; give strychnin, and saline infusions.

Treatment After Rupture.—1. From seven to ten days after tubal abortion: If the tube is getting smaller and the products are being absorbed, leave to Nature; however, exceptional cases may need treatment. 2. When two or three ruptures have occurred: If tubal mass is large and still sensitive, best to remove pregnant tube as it probably still contains the fetus and a fatal hemorrhage may occur at any moment.

Treatment of Rupture Into Broad Ligament.—1. If in one or two weeks after rupture the woman is improving and the mass is growing smaller, best to leave alone (same as in tubal abortion). 2. If there have been successive hemorrhages and the mass is growing larger, go in through abdomen and tie off ligament (impossible to reach the bleeding point through vagina if it is high up). 3. Infection may have occurred from the rectum (colon bacillus), with the sac breaking down into pus; make a large opening through posterior fornix, break up septa and evacuate pus.

ECTOPIC PREGNANCY WITH LIVING CHILD.—The exit of ovum from tube may be so gradual that life of fetus continues. Is seen most commonly in cases of primary abdominal pregnancy.

Diagnosis.—May be difficult to tell at third or fourth month whether child is alive or dead. If at sixth month, and woman thinks she is normally pregnant: 1. Get careful history; at some time prior to twelfth week there may have been sharp pain, symptoms of internal hemorrhage, and passage of decidua. "If such a history is obtained, look out for what woman has in her pelvis." 2. May feel mass to be at one side of uterus. 3. If certain enough to use probe, uterus may be found empty; but do not attempt it until ready to operate. 4. Fetal movements are more distinct than in normal pregnancy. 5. Placental souffle is perhaps more distinct than normal. 6. Child is felt distinctly through abdominal wall (only tissues of wall between child and examining hand).

Management.—Sloane Maternity has had four cases, with two of the children living five months or longer. The child is more apt to be deformed than if pregnancy were normal; but best to give child a chance. If nature of pregnancy is discovered before sixth month, best to remove child; if not until

sixth month or after, best to leave alone, as convalescence of mother from laparotomy near term will be as good as if the child is removed earlier.

Time to Operate.—Best time is about two weeks before term, to prevent *spurious labor*, which may cause: 1. Pressure on fetal skull due to lack of liquor amnii. 2. Pressure may kill child. 3. Pressure may rupture sac.

Incision.—Most common situation of the ovum in advanced cases is in broad ligament; the peritoneum is stripped from back and sides of uterus. Hence make incision low down, as stripping up of peritoneum may allow an extra-peritoneal incision. Select part of sac which is least vascular, incise, and remove fetus.

Management of Placenta.—May be adherent to a large surface of abdomen, covering intestines, ureters, iliac vessels, etc., and hence be very dangerous to remove. After incising sac, ascertain if it is possible to ligate arteries supplying placenta; if supplied by ovarian artery it can be easily removed. Unless vessels can be ligated, best to leave placenta in situ; stitch the sac to opening in abdominal wall, and pack with gauze. Within a week placenta may be gradually separated from day to day; keep sac well washed out, and drained with gauze. After placenta is removed, keep sac packed with gauze, and let heal from the bottom by granulations.

Treatment After Death of Child.—Watch carefully for any evidences of infection; if no signs appear, wait two or three weeks. Uterine souffle has then ceased, and operation is safer, as circulation has stopped and placenta is easily shelled out.

OVARIAN PREGNANCY.—Rare; only six cases in history. Due to impregnation and development of the ovum while still in Graafian follicle. History of case up to rupture is same as in tubal pregnancy; the development may go on an indefinite time before rupture occurs.

ABDOMINAL PREGNANCY.—1. *Primary:* The impregnation takes place in abdominal cavity on first lodgment of ovum. Only a few cases on record; in one case fetus and placenta were up near spleen, while the uterus and both tubes were normal; in another case the uterus had been removed, leaving ovaries, and insemination had occurred through a sinus left in

vault of vagina. 2. *Secondary*: When initial lodgment of ovum has been in some other place, and it has escaped into abdomen after impregnation has taken place; not a rare condition. If point of rupture of tube is between folds of broad ligament, escape of ovum may be gradual and life continue; a secondary rupture may then take place, the child escaping into abdominal cavity. Most cases of full term ectopic have thus developed in broad ligament (*intraligamentous pregnancy*). There may be a secondary abdominal hemorrhage from the rupture of broad ligament, which may cause death of woman.

PREGNANCY IN UTERUS BICORNIS.— If cavity of horn is not too much separated from cavity of uterus, the pregnancy will progress normally. If pregnant horn is separated by a narrow canal, result is practically a tubal pregnancy. If found early, abortion may be performed; if not discovered and treated early, the horn may rupture, with same symptoms, and requiring same treatment, as tubal rupture.

important: The anterior, strong, has deep and superficial set of fibres. Inferior, important in symphysiotomy, is very strong, and until cut, pubes will not separate. All joints are amphiarthrodial (limited motion); all have small synovial sacs. Posterior ligaments of sacrum allow some motion, which is desirable; but they may become stretched, causing great pain, difficulty in walking, etc.

Position of Pelvis.—With body in standing position, plane of brim makes an angle of 55° with the horizon. Promontory of sacrum is 9 cm. above pubes. Tip of coccyx is 2 cm. above apex of pubic arch. Plane of pelvic outlet passing through tuberosities and coccyx, makes an angle of 11° with horizon.

Pelvic Brim.—Cordiform, due to projection forward of the sacrum; the shape varies in different races, being circular in Australians, and oval antero-posteriorly in Africans. Brim divides true and false pelves.

Plane of Contraction.—Passes through the tip of the sacrum, spines of the ischium, to lower border of the pubes. Its measurements are about 12 cm. in all directions.

Pelvic Axes.—*Axis of inlet*, strikes coccyx and umbilicus; *axis of outlet*, is a line from middle of promontory to a point midway between tuberosities. The pelvic canal is a curve to which the axes are tangent; called *curve of birth canal*, or *curve of Carus*.

PELVIC SOFT PARTS.—The bony canal is cushioned by soft parts—flattened muscles and fascia—while in the bays on either side of the promontory lie the important pelvic vessels and nerve trunks, where they are guarded from pressure; on the left side also lies the rectum, which reduces somewhat the corresponding oblique diameter.

Muscles.—Ilio-pectineus muscles, on each side of false pelvis. True pelvis—sides and anteriorly, obturator muscles; back, pyriformis muscles from the second, third and fourth sacral vertebræ.

Pelvic Diaphragm.—Skin below, peritoneum above, and important muscles and fascia between. From without inward: 1. Skin; superficial and deep fascia, two layers each. The deep layers of superficial fascia are attached to the rami and surround the transversus muscles. 2. Muscles—compressor vaginae



(or bulbo-cavernosi); transversus perinæi; ischio-cavernosi; sphincter ani; and levatores ani. 3. Vagina—"a mucous slit in pelvic floor"; in front is anterior segment of pelvic floor, which is pulled up in labor; behind is posterior segment, which is pushed down in labor. 4. Levatores ani and coccygeus. Levator is most important; it is a paired muscle, arises on posterior surface of rami, and "white line" of pubes; runs downward and backward, some fibres uniting in raphe in front of and behind rectum, others are attached to coccyx; function is to support perineum, and raise it up after defecation or parturition.

PELVIC SHAPE.—The *false pelvis* is a shallow basin formed by the ilia, and is separated from the *true pelvis* by the *pelvic brim*. The brim is cordiform, the notched base being formed by the sacrum, and the rounded apex by the pubes. The true pelvis is roughly a truncated cylinder, with different shapes and measurements at different levels. It is important to consider the shape and measurements of the pelvis in its relation to the passenger or fetus.

DIAMETERS OF PELVIS.—For taking pelvic measurements, the fingers, a tape-measure, and a pelvimeter are employed.

External Measurements.—Taken at the following points: *Average between anterior superior spines*; distance between crests; *oblique* (the right as a rule being longer), measured from posterior superior spine of one side to anterior superior spine opposite side; *external conjugate*, measured from tip of last lumbar vertebra to upper border of symphysis.

Between spines	26 cm.
Between crests	28 cm.
External oblique	22 cm.
External conjugate	20 cm.

Measurements at Brim.—*Conjugate*, or antero-posterior diameter, measured from promontory of sacrum to symphysis; *right and left oblique*, from ilio-pectineal eminence to sacro-iliac synchondrosis of opposite side; *transverse*, at greatest width. The largest transverse diameter (13.5 cm.), is so far posterior that the promontory of sacrum prevents the long diameter of fetal head occupying it.

Internal conjugate (antero-posterior).....	11 cm.
Transverse	13.50 cm.
Obliques (right a little longer than left)...	12.75 cm.

Diameters at Outlet.—*Transverse*, from one to other tuberosity of ischium; *obliques*, from tuberosity to opposite spine; *conjugate*, from lower edge of symphysis to tip of sacrum (with movable coccyx). The first two only are of importance.

Transverse at outlet.....	11	cm.
Conjugate.....	9.5 to 11.5	cm.
Obliques	11	cm.

Diameters of Cavity.—The diameters of the pelvic cavity measure practically the same in all directions.

Cavity (pelvic contraction).....	12	cm.
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PARTURIENT CANAL.—Divided into three portions: 1. *Supra-pelvic portion*, formed of uterine muscle, psoas and iliacus. 2. *Pelvic portion*, the most important, as difficulty always lies here when present; formed entirely of bone. A *bony ridge*, extending from ilio-pectineal eminence to spine of ischium, serves to start rotation of head; two grooves are formed by this ridge, the anterior (*anterior inclined plane*), directed forward and downward; the posterior (*posterior inclined plane*), directed downward and backward. "The ball or head is directed down the anterior or posterior inclined plane to the 'floor' or 'gutter,' and then forward"—(Cragin). 3. *Infrapelvic*, or hood portion, serving to hold passenger up against pubes, composed of perineum.

CHARACTERISTICS OF FEMALE PELVIS.—The female pelvis differs from the male principally in its broader, flatter shape, and lighter weight.

FEMALE	VS.	MALE PELVIS.
Bones more delicate.		Bones heavier.
Points of muscle attachment less marked.		Surface rough and uneven.
Crests more flaring.		False pelvis more funnel-shaped.
Symphysis shallower.		Symphysis deeper.
Pubic angle, 90°.		Pubic angle, 70° to 75°.
Tuberosities farther apart.		Tuberosities closer together.
Sacral promontory less projecting.		Sacral promontory more projecting.
Sacrum and coccyx less curved; sacrum broader.		Sacrum is narrower and more curved.
Brim is more cordiform.		Brim is less cordiform.

Resisting Forces—Passenger or Fetus.

FETAL MEASUREMENTS.—The average measurements of the head and shoulders of a normal term fetus are as follows:

Suboccipito-bregmatic diameter (S. O. B.).....	9.50 cm.
Suboccipito-frontal diameter (S. O. F.).....	10.50 cm.
Occipito-frontal diameter (O. F.).....	11.50 cm.
Occipito-mental diameter (O. M.).....	13.25 cm.
Fronto-mental diameter (F. M.).....	8.25 cm.
Biparietal diameter (B. P.).....	9.50 cm.
Bitemporal diameter (B. T.).....	8.25 cm.
Shoulders, or bisacromial diameter (S.).....	12.25 cm.
Occipito-frontal circumference (O. F.).....	34.50 cm.
Suboccipito-bregmatic circumference (S. O. B.).....	30.00 cm.
Occipito-mental circumference (O. M.).....	37.00 cm.

FETAL TRUNK.—The long diameter is transverse, but it will stand much lateral compression, even until long diameter is antero-posterior; the condition is the reverse in head, the short diameter being transverse.

ACTION OF FETAL HEAD IN LABOR.—Long diameter of head comes down in the long diameter of pelvis. At pelvic inlet the long diameter of head is either in oblique or transverse diameter of pelvis; at outlet, it is in conjugate or oblique; hence rotation of head in canal is necessary for its passage. If head is well flexed it makes practically a ball, 9.50 cm. by 9.50 cm., and rotation is easy; hence good flexion is desirable.

ROTATION OF HEAD.—Rotation occurs mainly at the atlanto-axoidean articulation, some in cervical vertebrae. The head can turn to a right angle, the face looking over the shoulder.

Expulsive Forces—Uterus and Abdomen.

LABOR PAINS.—The uterine contractions are called "pains" in all languages, because of the suffering associated with them. The cause of this suffering is the compression of the uterine nerves during the contraction of the muscle fibres, the stretching of lower uterine segment and ligaments, and the pressure of the fetal head on the nerves of pelvic tissues. The uterine pains are appreciable by sight and palpation, and also by auscultation. During each contraction the uterus becomes harder and more spherical, the antero-posterior diameter increasing. The contractions are rhythmical, intermittent, and involuntary. It is the regular onset and disappearance of the pains that shows labor is commencing. Inhibition of pains may result from emotion, or from distention of bladder or rectum.

Adjuncts to Uterine Pains.—Contraction of the abdominal muscles, at first voluntary and later involuntary, assist in

emptying uterus; the thorax and pelvis are fixed and the abdominal walls narrowed, compressing parts below; this causes congestion of organs, especially of cervix and lower uterine segment; dilatation is thus favored by the softening.

Force of Pains.— It has been estimated that uterine muscle exerts a pressure of from 10 to 100 pounds.

Effect of Pains on Uterus.— Lower segment: The fibres are loosely connected and passive, hence this segment thins. Upper segment: Muscle is active and tends to thicken at expense of lower segment (contraction and retraction). This explains danger in manipulation after labor is advanced—the lower segment is thin and easily ruptured, while upper segment rides above baby “like a cap.” The *ring of Bandl* is the thickened lower edge of the upper uterine segment (contractile portion), after labor has been going on for some time. It shows that the lower segment (relaxed, attenuated portion), is thin and that manipulations are dangerous.

Effect of Pains on Fetus.— During each contraction the fetal heart-beat becomes slower (bradycardia), due to stimulation of the cardio-inhibitory center from the compression.

Course and Duration of Labor.

CAUSE OF ONSET OF LABOR.— There are many theories as to the cause of onset of labor, but none are conclusive. The most plausible explanation is that it is due to an over-distention of uterus at a normal menstrual period.

STAGES OF LABOR.— The premonitory symptoms of labor are usually intermittent contractions of uterus, with pain, at regular intervals. There is an increase in muco-purulent discharge, and increased irritability of the bladder.

First Stage of Labor.— Begins with first true pain and ends with complete dilatation of cervix; the pains are irregular, about every twenty minutes to one-half hour, and gradually increased in force and frequency. True labor pains begin in the back and radiate to the abdomen.

Second Stage of Labor.— Begins with dilatation of the cervix and ends with expulsion of child. Perineum bulges with each pain. Pains in back and elsewhere (“bearing-down” pains).

PRESENTATION.— That part of fetal ovoid which first offers at the superior strait.

Cephalic Presentation.— Occurs in 97 percent. of cases. Due to: 1. Gravity, head of fetus being heavier. 2. Adaptation of fetus to shape of uterus. Vertex is the only normal presentation, breech being semi-normal.

POSITION.

Occiput to	{	1. Left (L. O.)	{	(a) Anterior (L. O. A.)
		2. Left and		(b) Posterior (L. O. P.)
		3. Right (R. O.)	{	(a) Anterior (R. O. A.)
		4. Right and		(b) Posterior (R. O. P.)

POSITION.— The relation of presenting part to certain fixed landmarks of pelvis.

Relative Frequency of Different Positions.— The most frequent position is L. O. A., occurring in 70 percent. of cases; R. O. P. occurs in 20 percent. of cases; R. O. A. and L. O. P. together in 10 percent. The combined anterior and posterior occiput positions make up the majority of cases, while the cephalic positions make up 97 percent. of all labors. Positions other than occiput are anomalous.

Explanation of Frequency.— The right is the longer of the two oblique diameters: 1. Right oblique is 22+ cm. as against 22 cm. of left. 2. Rectum reduces left oblique diameter. The long diameter of head seeks long diameter (right) of pelvis.

Mechanism of L. O. A. Position.

DEFINITION.— Occiput faces left acetabulum of mother, sinciput faces right sacro-iliac synchondrosis; antero-posterior diameter of fetal head is in right oblique diameter of mother's pelvis.

DIAGNOSIS OF L. O. A.— Diagnosis of presentation and position is made by external inspection, auscultation, and palpation; and by internal manipulation.

Palpation.— In L. O. A., note: 1. Long axis of fetal body is longitudinal. 2. Hard mass of head is felt below, with a distinct prominence of forehead on right side, due to flexion. 3. Soft mass (buttocks) is felt above. 4. Broad, smooth back is

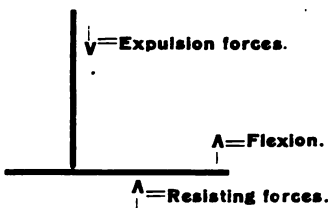
felt in front and to left. 5. Movements felt more plainly on side to which child is facing (right).

Auscultation.—Fetal heart is heard to left, between umbilicus and anterior superior spine (one inch below and to left).

Vaginal Examination.—Have hands sterile; separate labia with one hand to avoid carrying bacteria from vulva into vagina; pass fingers of other hand directly into vagina. The right parietal bone should be felt in L. O. A., with posterior fontanelle to left; anterior fontanelle should not be felt.

MECHANISM OF L. O. A.—The mechanism of L. O. A. can be taken as a type for all positions, with certain modifications for each. The *steps before onset of labor* are:

1. *Flexion.*—Begins with the onset of labor and continues



representing the spinal column, due to the fact that a line of action of head on spinal column representing the head (*flexion*) under symphysis. *Cause:* Lever until the nape of the neck comes (*expulsive forces*) intersects a line

posterior to its center (*resisting forces*). *Advantage:* Substitutes a short diameter (suboccipito-bregmatic, 9.5 cm.), for a long diameter (occipito-frontal, 11.5 cm.).

2. *Lateral Inclination.*—*Cause:* Posterior parietal bone catches on promontory of sacrum and head swings backward. *Advantage:* Brings long axis of head perpendicular to plane of brim, and in the axis of canal.

3. *Dilatation of Cervix.*—*Causes:* 1. Infiltration. 2. Pull of longitudinal fibres. 3. Bag of waters forming a wedge. 4. Pressure of fetal head. *Advantage:* Allows head to descend.

4. *Descent.*—*Time:* During last two weeks of pregnancy. *Cause:* 1. Extension of fetal spine. 2. Growth of head. 3. Gravity. 4. The expulsive forces. *Advantage:* Brings head in position for moulding.

5. *Moulding.*—*Causes:* 1. Growth of head after being caught in pelvis. 2. Adaptation of soft bones (vault) of fetal skull to shape and size of pelvis. *Advantage:* Permits large head to come through small passage, and avoids undue pressure on soft tissues of head and pelvis.

The *steps during labor*, besides a continuation and completion of the foregoing, are:

6. *Internal Anterior Rotation*.—Through 45°. Indicates attempt of shoulders to engage. Necessary owing to the reverse measurements of pelvic inlet and outlet. *Causes*: 1. Groove in wall of pelvis which engages presenting part and starts rotation. 2. Soft parts of pelvic floor, levatores ani being main element (found from experiment that after soft parts are stretched the head does not rotate). 3. Inclination of pelvis. 4. Inclination and shape of head. The occiput, or any part first striking the anterior inclined plane, is carried downward, forward and inward under the pubes. *Advantage*: To accommodate long presenting diameter of head to long diameter of pelvic outlet.

7. *Birth of Head by Extension*.—*Causes*: 1. Pelvic floor resisting head. 2. Absence of resistance in front. 3. A continuance of expulsive forces. *Advantage*: Causes least pressure on perineum by allowing suboccipito-bregmatic and then suboccipito-frontal diameters to come through vulva instead of occipito-frontal or occipito-mental diameters. During the last two steps the shoulders are engaged in the left oblique diameter.

8. *Restitution*.—The rotation of occiput through 45° to maternal left. *Cause*: Recoil of tissues of neck, the head assuming the normal relation to the shoulders.

9. *External Rotation*.—Occiput rotates through 45° to maternal left, due to rotation of shoulders in birth canal. *Cause*: The anterior, or right, shoulder being lower, first strikes the pelvic floor and is directed downward, forward and inward under the pubic arch, the left shoulder rotating posteriorly. The occiput has now rotated to the left through 90°. *Advantage*: To accommodate bisacromial (long diameter of chest) to long (antero-posterior) diameter of obstetrical outlet.

10. *Birth of Shoulders by Lateral Flexion*.—The mechanism varies, depending on whether: 1. Left to Nature, or assisted. 2. Primipara or multipara. In primipara, the anterior shoulder is best born first, as tissues of brachium are more easily compressed under symphysis than are tissues of achromion. *Cause*: Catching of anterior shoulder under pubic arch, the shoulders and body being delivered by right lateral flexion. *Advantage*: Puts less pressure on perineum.

Mechanism of R. O. A. Position.

DEFINITION.—Occiput toward right acetabulum of mother, sinciput toward left sacro-iliac synchondrosis. Long diameter of fetal head in left oblique diameter.

DIAGNOSIS.—About the same as L. O. A., except for frequency and reverse positions.

External Examination.—1. The fetal heart is heard to right of and below umbilicus. 2. Prominence of forehead is felt to left. 3. Back of fetus is felt to right.

Vaginal Examination.—1. Left parietal should be first felt. 2. Small fontanelle to right. 3. Sagittal suture in left oblique.

MECHANISM.—Practically the same as L. O. A., except for reverse directions of movements.

Mechanism of R. O. P. Position.

DEFINITION.—The long diameter of fetal head engages in right oblique diameter of pelvis, the occiput pointing toward right sacro-iliac synchondrosis and sinciput toward left acetabulum.

DIAGNOSIS.—The most important points in diagnosis are the presence of small parts in front, and fetal heart in right flank. Pains are not as effective as normally, and there is slow advance.

External Examination.—1. Small parts in front. 2. Fetal heart is heard in right flank. 3. Forehead is felt in front.

Vaginal Examination.—The anterior fontanelle is felt, owing to extension of head (which is very bad).

MECHANISM OF R. O. P.—The most difficult to grasp of all positions. Practically the same as R. O. A., as in 96 percent. of cases the occiput rotates to the front; in 4 percent. it rotates to rear (*persistent occiput posterior*). Steps before onset of labor:

1. *Flexion* is poor, because biparietal diameter is not in true left oblique, but is in a shorter diameter of pelvis.

2. *Lateral Inclination* is poor, and 3. *Dilatation of Cervix* is late in occurring and very slowly accomplished.

4. *Descent*, and 5. *Moulding* are absent, because the head is not engaged and rides high. Therefore the first stage of labor

is prolonged in order that uterine contractions may complete the first five steps. *After onset of labor:*

6. *Internal Rotation.*—Depends on: 1. Strong pains. 2. Extreme flexion. 3. Good resistance of pelvic floor. There is extreme flexion which renders the head almost circular; hence the occiput may go either forward (96 percent.) or backward (4 percent.), depending upon which side of the bony ridge it first strikes. In the majority of cases the occiput is forced forward by the resistance of soft parts. The rotation (anterior) is extreme, the occiput passing through three-eighths of a circle (135°), to be born O. A. The remaining steps are as in R. O. A.

PERSISTENT OCCIPUT POSTERIOR.—In 4 percent. of cases the head is extended; the occiput goes down and back to pelvic floor, as it does in flexion, but rotation is prevented by impinging of head against spines of ischium, and presentation is O. P. There is tardy flexion, the nose being caught under the pubic arch till occiput escapes. Lacerations are common, hence it is customary to change to O. A. if possible; there is extreme moulding of head, and child is apt to be born asphyxiated. Forceps delivery is frequently indicated.

Mechanism of L. O. P. Position.

DEFINITION.—The long diameter of head is in left oblique, with occiput pointing to left sacro-iliac synchondrosis, and sinciput to right of acetabulum. It is the most unfavorable of all occiput positions.

DIAGNOSIS.—As in R. O. P., except for reversed positions. The fetal heart is heard in left flank.

MECHANISM.—Practically the same as in R. O. P., except for reversed directions. Strong pains are necessary, labor is prolonged and tedious, and there is much pain and exhaustion.

XIII. MANAGEMENT OF LABOR.

Before Onset of Labor.

DURING PREGNANCY, every effort should be made to become familiar with the woman's condition. The measurements should be made early and any abnormalities noted. Examine the urine every two weeks, and the patient every four weeks.





Instruct the patient not to eat red meat more than once a day, and none at all if urine is abnormal. She should drink plenty of water, about six glasses daily.

OBSTETRICAL BAG.— A dress suit case answers the purpose best as it does not expose the nature of its contents, is easily carried, and is well adapted to hold trays with square corners.

Contents of Bag.— Trays (telescopic), etc., should be made to fit into bag neatly and compactly. The following list of instruments, etc., will be found to answer in most cases. As soon as arriving at home of patient, put instruments in small tray with water and soda and put on stove to boil.

SUPPLIED BY PHYSICIAN.

1. Metal trays { (a) Short tray for scissors, etc. (to telescope larger).
(b) Long tray for forceps.
2. Instruments { (a) Looped-end sponge holder.
(b) Thumb forceps.
(c) Needles and needle-clamp.
(d) Artery clamps (four).
(e) Scissors.
3. Nickel bottle cases containing { (a) Chloroform.
(b) Protargol or argyrol sol.
(c) Tincture of green soap.
(d) Lysol.
(e) Acetic acid solution.
(f) Tablets of mercury bichlorid.
(g) Ergotol.
4. Tubes containing { (a) Sterilized catgut.
(b) Sterilized tape.
(c) Sterilized silkworm gut.
5. Delivery forceps.
6. Sterilized supplies (use own sterilizer) { (a) Gauze.
(b) Absorbent cotton.
(c) Vulva pads.
(d) Catheter (best, glass).
7. Dropping bottle for chloroform.
8. Esmarch's inhaler for chloroform.
9. Bag for dilating cervix, with a Davidson syringe for distending it.
10. Sterile fountain syringe.
11. Sterile douche nozzle.
12. Tube of sterile gauze for packing uterus.
13. Sterile nail brush (in bag).
14. Box of carbonate of soda, for sterilizing instruments.
15. Stethoscope.
16. Dress { (a) Sterile gown.
(b) Sterile rubber apron.
17. Leg holder.
18. Kelly pad.

INSTRUCTIONS TO MOTHER.— Instruct patient to have ready a list of articles similar to the following. They can be obtained

cleansed, sterilized, and neatly packed, "like a Christmas box," from Van Horn & Co. (Suggested by Dr. E. B. Cragin.)

SUPPLIED BY PATIENT.

1. Two sterilized bed pads (30 in. square).
2. Two dozen sterilized vulva pads (one side non-absorbent).
3. Two sterilized mull binders (18 in. wide).
4. Six sterilized towels.
5. Ten yards sterilized gauze.
6. Two and one-half pounds sterilized absorbent cotton.
7. Rubber sheet (1 yd. square).
8. Rubber sheet (1½ x 2 yds.).
9. Four-quart sterilized douche bag, with a glass nozzle.
10. Douche pan.
11. Sterilized nail brush.
12. Two agateware basins.
13. Safety pins.
14. Tube lubrichondrin.
15. Two tubes sterilized white vaselin.
16. Boric acid powder.
17. Chloroform (Squibb's, 100 gms.).
18. Ergotol.
19. Tincture of green soap.
20. Tablets of mercury bichlorid.
21. Lysol.
22. Tube sterilized tape.
23. Sterilized soft rubber catheter.
24. Sterilized glass catheter.
25. Stocking drawers.
26. Borated talcum powder.
27. Pattern of breast binder (Murphy's).
28. Bath thermometer.

THE LABOR BED.—Instruct patient to have a high, firm, preferably metal bedstead, about height of ordinary table. A table will answer the purpose, being high and hard; or a board can be placed under mattress of a bed with springs to make it sufficiently firm, and blocks under legs will make it proper height. Have bed made up as follows, with everything sterile if possible:

BED ARRANGED FOR CHILD-BIRTH.

1. Mattress, covered with sheet.
2. Rubber sheet, full length.
3. Ordinary sheet, no wrinkles. Fold corners under to make it fit well.
4. Short rubber sheet for hips, covered with draw sheet.
5. Absorbent bed pad, to hold all excreta. (Use the other for puerperium).
6. Upper sheet, blanket, and covering, folded up at foot of bed.
7. Pillow.

TENEMENT HOUSES.—Very few conveniences can be expected in a tenement house, and physician must improvise things as needed. 1. A table oilcloth and clean sheet (one newly

laundered will answer) can be used to cover mattress, which will probably be a dirty feather tick. 2. Have Kelly pad, as near sterile as possible, on edge of bed, and covered with sterile towels. 3. A wash boiler may be used for boiling water. 4. Stocking drawers can be improvised. 5. Cover the entire field with towels wrung out of bichlorid solution.

DIRECTIONS FOR NURSE.—1. Move bowels by enema before labor begins. 2. Give surgical bath, especially of vulva and hips, with soap and water, and brush. 3. Give *no vaginal douche* except when specially indicated, as normal secretions of vagina are sterile and have bacteriacidal power. 4. Have woman on back, preferably, if bed be clean and high; if bed is low and dirty, have woman on side, as buttocks can be brought well to edge of bed and field well covered with sterile towels. 5. Clip hair on vulva.

BEHAVIOR AT CASE.—*Go when called* is of first importance, as a woman in labor has precedence over all other patients. When with patient, "simply act as a gentleman."

First Stage of Labor.

EXAMINATION OF PATIENT.—Thoroughly ascertain condition of patient, but make as few examinations as possible.

Vaginal Examination.—One, at least, is necessary, but make just as few as possible. Best to substitute external examination. Always clean vulva with bichlorid or lysol solution before making vaginal examination; then separate labia with one hand and insert examining fingers directly into opening.

External Examination.—1. With hands on upper abdomen, feel hard mass (head), or soft, irregular, kicking mass (feet); thus ascertain if head is above or below, breech to right or left. 2. Facing feet of woman, place one hand on each side of abdomen; if hard mass (head) is felt in pelvis, note on which side it projects farthest (face—usually to right), and opposite smooth, straight side (occiput, from flexion—usually to left). 3. Note length of diameter of hard mass: If long, it is the occiput (O. A.); if short, it is the face (O. P.). 4. Fetal heart, most commonly heard at the center of a line joining umbilicus and left anterior superior spine (L. O. A.); if R. O. P., heart is heard to right and well in flank, the sinciput is felt more distinctly, soft small parts are prominent, to front and left; if

L. O. P., heart is heard in left flank, small parts prominent, to front and right, narrow forehead right and front.

CARE OF WOMAN.— If everything is found all right, allow labor to advance. Let patient walk as she chooses, but do not let her become exhausted, however. Avoid chloroform in first stage if possible. Do not let woman bear down in the first stage — save her strength for second stage.

Second Stage of Labor.

CARE OF PATIENT.— Have patient in bed. If chloroform is necessary give a few whiffs during pain. Pulling on a knotted sheet attached to foot of bed will aid pains. Make as few vaginal examinations as possible; one before and one after rupture of membranes to ascertain if cord is prolapsed. Keep sterile pad over vulva.

POSITION OF PATIENT.— Ordinarily patient should be on her *back* during the delivery. 1. The fetal heart can be more easily auscultated, and thus compression of cord noted. 2. The uterus can work to better advantage with body of child in mid-line. 3. Chloroform can be easier administered, and 4. The position is more comfortable for patient. The *left lateral* position: 1. Gives better control of situation, as the perineum is in full view, and the left elbow on patient's abdomen assists in stimulating uterus. 2. It is preferable in tenement house cases, to prevent child becoming soiled by contact with dirty bed.

PROTECTION OF PERINEUM.— Do not support the perineum, but support head of child to keep it from coming with a rush. The hand should cover the anus, but finger should not be put into rectum.

MOULDING OF HEAD.— Sutures of fetal skull allow overlapping of flat bones (*moulding*), causing an increase in long diameter and narrowing of transverse diameter of head. This requires time and pains.

CONTROL OF HEAD.— 1. Support head through perineum, in order to throw the long diameter of head in line of long axis of canal. 2. To prolong process use (*a*) chloroform, and (*b*) back pressure on head until complete control can be had of it— *don't let head come out suddenly*. 3. With patient under chloroform, place left elbow on abdomen over fundus, and fingers of left hand on fetal head to control its advance, pulling

head forward until right middle finger can engage chin; have thumb and forefinger of right hand on labia, posterior to and encircling presenting part of head; and middle finger, flexed, and usually behind anus, engaging the chin and holding head up under symphysis. If vulva sticks on occiput, put it back with left fingers, then gradually extend head as it escapes from vulva. As soon as head is born look to see if cord is about neck; if so remove it by slipping cord over head or shoulder, or tying and cutting.

DURATION OF DELIVERY.— If the cord is not over the head, or can be easily removed, there is no hurry. May wait a minute between birth of head and of shoulders. Do not make too great traction on head, as cervical roots of brachial plexus may be ruptured, resulting in paralysis (Erb's palsy).

BIRTH OF SHOULDERS.— Depress head until anterior shoulder engages under symphysis, then bring head forward and let posterior shoulder slip over perineum; this is better than to have posterior shoulder born first. After birth of shoulders the body is rapidly lifted out, practically without mechanism.

CAPUT SUCCEDANEUM.—The edema of scalp over presenting part of head, and outlined by opening in the cervix. Must be distinguished from cephalhematoma — caput subsides in a few hours.

LACERATIONS OF PERINEUM.—The causes of perineal lacerations are: 1. Disproportion between passage and passenger—large head with small canal. 2. Malformations of pelvis, e. g., a masculine pelvis, with an acute subpubic angle and a long symphysis. 3. Lack of elasticity, especially in patient past thirty-five. 4. A too rapid advance of presenting part.

Prevention of Lacerations.—1. Keep long axis of head in axis of birth canal. 2. Control labor by chloroform, and by back pressure on head, with finger behind anus engaged under chin.

Third Stage of Labor.

CARE OF CHILD BEFORE BIRTH OF PLACENTA.—Clean out mouth with boric acid gauze on little finger as soon as mouth is born. If child is puny, let it rest a few minutes before cutting cord, as it will gain a few ounces in weight from blood left in placenta by: 1. Aspiration by fetal chest. 2. Contaction of

uterus on placenta. During this time, take temperature of child by rectum. If the child is pale and not breathing well, it should be stimulated by slapping its back or buttocks, or if necessary, by performing artificial respiration. In the latter case, tie and cut the cord at a distance of one foot from umbilicus in order to avoid infection; the cord is retied later.

CARE OF CORD.—Treat cut ends of cord as surgical wound. If in haste, tie as long as convenient (about three inches), using sterile ligatures. Tie cord twice before cutting, on fetal and maternal side, as: 1. There may be more than one baby, with placental anastomoses. 2. A large placenta (full of blood) is desirable for uterus to act upon. 3. It prevents soiling bed. The long initial stump allows for subsequent dressing.

Tying and Cutting of Cord.—Have ligatures, hands and scissors sterile, and, before tying, press or strip cord away from body at point of ligation, in order to press out Wharton's jelly and allow ligatures to come in closer contact with vessel walls. In drawing the knots, press thumb against thumb to: 1. Avoid tearing cord from child if ligature should slip. 2. Regulate pressure and prevent cutting. Ligate, with single knot, in two places, about one inch apart, the proximal ligature being about one inch from the navel; then cut between with dull scissors, about one-fourth inch from proximal ligature. Sponge off cut end of cord, and if there is no oozing, complete the tying by making a square knot; if there is bleeding, the first knot may be tightened before completing the tying. The final stump should be left just long enough to tie again should ligature cut through. The ends of ligature should be left long to permit of retying in case of subsequent bleeding. For greater security the vessels may be ligated separately: First make square knot, then make a second loop over cut end of cord between vessels, tying once; make a third loop, tying once on opposite side from first knot; then a fourth loop, completely surrounding cord, finishing with a square knot.

Dressing of Cord.—Use sterile hands, sterile dressings, and keep the cord sterile. Sponge off cut end with sterile swab. Anoint abdomen with albolene, sterile white vaselin, or sterile olive oil, wherever dressing will cover it, and wipe off



vernix caseosa. Do not dress cord with powder, but use several thicknesses of sterile white gauze cut in squares of three inches with a slit in center; pull stump of cord through slit, fold over the edges of gauze, and apply gauze bandage. Inspect at end of fifth day to see if dry. *Do not put baby in tub until cord is separated.* After ten days, the cord may be gently twisted to see if yet loose. A core may persist if it receives nutrient supply; silver nitrate will remove this.

CARE OF EYES.—Attend to eyes at once. If there is any delay after birth of head, the eyes may be treated before birth of shoulders; if not, then immediately after birth of child. Irrigate with boric acid solution from dropper—physician holding eyes open and nurse dropping solution. Follow this with protargol, 5 percent., or argyrol, 10 percent. solution. Silver nitrate, 1 percent. solution, may be used, but is not so good as it may irritate. After caring for eyes, wrap child in blanket and put a hot water bag to its back, using great care not to burn child.

TREATMENT OF WOMAN.—After expulsion of child, have nurse hold the fundus for at least fifteen minutes (better thirty), to cause its contraction upon placenta.

MECHANISM OF THIRD STAGE.—(Expulsion of membranes and contraction of uterus.) Soon after expulsion of child, uterus contracts upon the placenta, which, like child, is gradually expelled by uterine contractions.

Separation of Placenta.—Causes: 1. Diminution of surface to which placenta is attached is so rapid (from contraction of uterus) that the placenta is separated off. 2. Contraction of uterus is intermittent, and in intervals, blood is poured out behind placenta, dissecting it off. 3. Placenta acts as a foreign body and is expelled from uterus.

Presentation of Placenta.—Usually edgewise (*Duncan mechanism*), with the fetal surface out, and membranes trailing behind on opposite side; or as an inverted umbrella, fetal surface first (*Schultze mechanism*).

MANAGEMENT OF THIRD STAGE.—As soon as child is born, nurse gently massages fundus, continuing for fifteen minutes or longer; this tends to keep fundus against placenta, and prevents hemorrhage. Physician then performs Crede's method of

expressing placenta. If this method does not cause birth of placenta wait half an hour before extracting it manually.

Expression of Placenta.—*Crede's method* consists in: 1. Compression and kneading of fundus. 2. Downward pressure of fundus in conjunction with uterine pains. The placenta soon presents at vulva. Too vigorous downward pressure may cause inversion of fundus.

Delivery of Placenta.—Should be gradual, allowing the membranes to separate spontaneously. Do not twist membranes into a rope; gently elevating and depressing the placenta (outside) will aid in separating membranes.

Examination of Membranes.—Carefully examine membranes to see if intact. If considerable portions are lacking, *go after them*: if only a small portion is missing, await results.

Cleansing of Parts after Delivery.—Use sterile gauze or cotton, and a weak antiseptic solution; *do not use sponges*. In hospital practice, keep strip of gauze, wrung out of 1:5000 bichlorid solution, over vulva, under pad, for a few days. In private practice, simply cleanse with antiseptic solution and use pad.

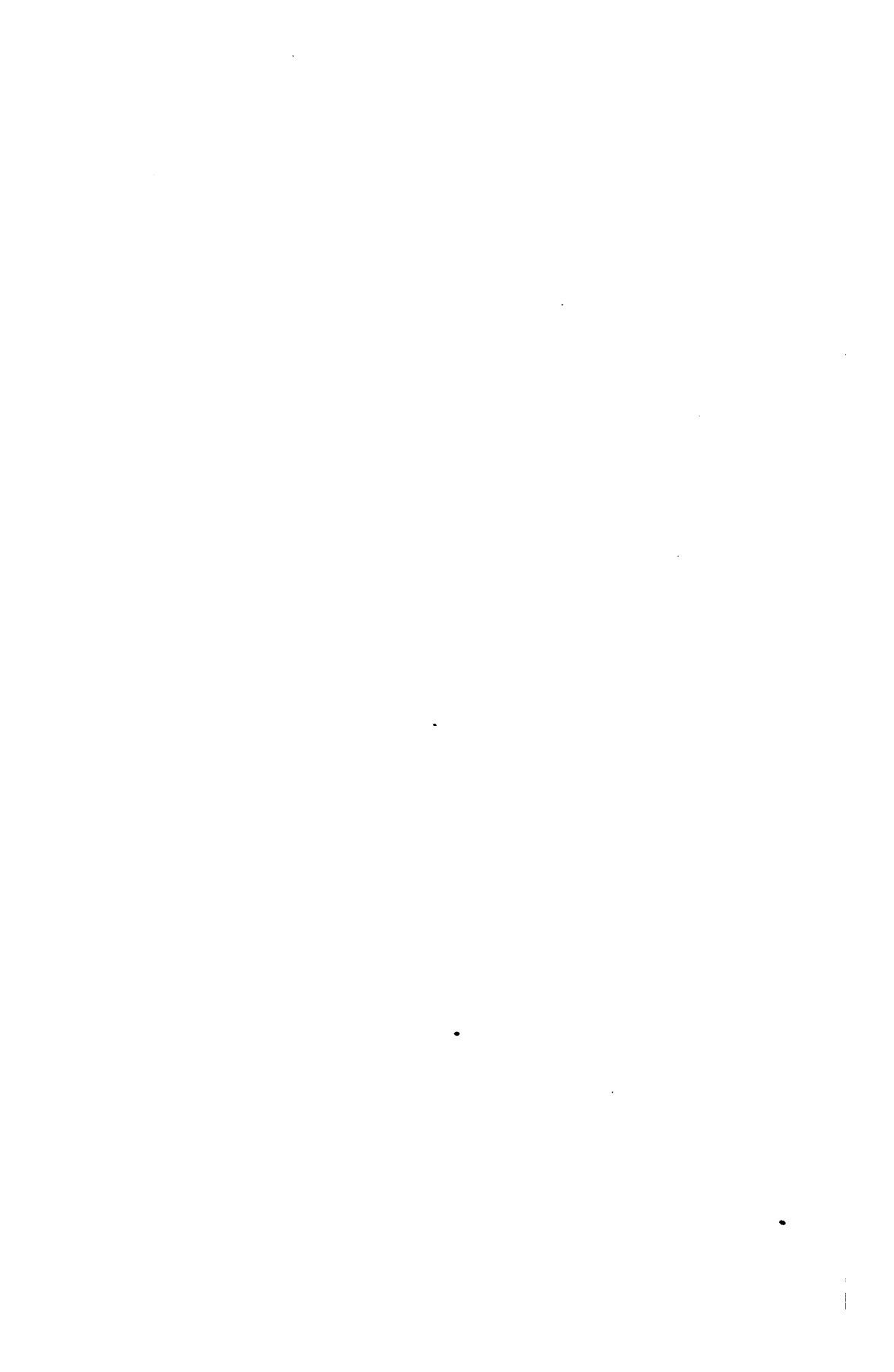
Care of Uterus after Birth of Placenta.—The fundus should be held and gently massaged for at least an hour after birth of placenta; this causes contraction of uterus and prevents clots forming. Ergot may be necessary to contract uterus.

Abdominal Binder.—Should not be applied sooner than one hour after birth of child, and should be used for first five days.

Breast Binder.—(Murphy's). Prevents sagging of breasts, keeps them empty and thus avoids damming back of milk with subsequent infection and mastitis (providing nipples and baby's mouth are kept clean).

RIGOR AFTER DELIVERY.—A rigor, or chill, is commonly seen following labor: it simply means that body heat has been reduced, owing to increased loss; there may also be a nervous element, with decrease in heat production. It is not of much importance, and should be treated with blankets and hot-water bottles. In dirty cases, it may mean infection.

AFTER-PAINS.—Caused by contractions of uterus after completion of labor. May be stimulated by nursing, distended bladder or bowels, or distention of uterus with blood clots (most frequent cause). In the latter case, express the clots and reapply abdominal binder. Best medication is codein in one-half grain doses.



V. THE PATHOLOGY OF LABOR

XIV. DYSTOCIA FROM MATERNAL CAUSES.

Anomalies in Expulsive Forces.

NORMAL BALANCE.—Normally the forces of labor are well balanced, but this balance is easily disturbed. There may be either an excess or deficiency in expulsive or resisting forces; in expulsive forces, the more common anomaly is a deficiency, while in resisting forces, an increase is more common. Normal labor means vertex presentation, with birth occurring in a reasonable time and without injury to mother or child; an equilibrium is necessary in all forces. Modern obstetrics considers both the passage and the passenger.

INERTIA UTERI.—The most common cause of deficiency in the expulsive forces. A condition in which the uterine muscle is unable to overcome the normal resistance. May be due to: 1. Faulty development from lack of exercise. 2. Uterus too weak (from poor development) to overcome resistance of cervix (in shop girls, etc.). 3. Hyperesthesia, causing inhibition of pains. 4. Lack of supplementary forces—abdominal inertia, from lack of tone, or overstretching from twins or polyhydramnios. 5. Malformations of uterus (bicornate, etc.). 6. Tumors of uterus. 7. Nervous inhibition (from yelling and crying).

ABDOMINAL INERTIA.—As a result of pendulous abdomen the accessory forces of expulsion may be absent. During the last three months such women should wear abdominal supporter (corset). During labor the abdomen should be pressed upward and held there.

MISDIRECTED FORCES.—Caused by full bladder or rectum, prolapse of uterus, pendulous abdomen, etc. Malposition of uterus (e. g., retroversion) may result in misdirection of forces, and tends in early months to miscarriage. Pains may be frequent, but are not effective; woman is easily tired out—both muscular and nervous exhaustion; pulse is rapid. *Treatment:*

Remove cause (full bladder or rectum), and treat as inertia uteri.

RESULTS.—Woman is easily tired out, and becomes hysterical; pains are too short, and are ineffective — the cervix remaining undilated. Results are worse in primiparæ.

TREATMENT.—Rest for patient and physician, as both are tired out; give chloral by rectum, or hypodermatics of morphin; upon waking, give hot broth or warm food, and let resume. Prophylactic treatment should be instituted in last month of pregnancy — strychnin sulphate, 1/30 gr. t. i. d., combined with massage and exercise (walking) daily. At time of labor, give 1/30 gr. strychnin every two hours, alternating with quinin sulphate, 5 gr. every two hours, until four doses of each are taken. *Never use ergot until uterus is empty.*

ARTIFICIAL DILATATION OF CERVIX.—Artificial dilatation may be necessary in cases of deficient expulsive forces. It is performed by means of elastic bags or graduated bougies, but best by use of fingers.

Elastic Bag Dilators.—Two forms are in use: 1. Barnes, or fiddle-shape bag. 2. The Champetier de Ribes bag, conical, with canvas lining (Voorhees' modification). Both styles have four sizes in a set. *Method of using:* Have everything aseptic, and precede introduction by lysol vaginal douche. If cervix is too small to admit bag, first use glove-stretcher dilator. Roll up bag, well lubricated, into as small compass as possible, and grasp with holder; then pass it along fingers into cervix — a speculum, as a rule, is not needed. When the bag is in place, dilate with air or antiseptic solution (lysol is usually used), using a metallic or Davidson's syringe; when full, remove the syringe, and tie the tube (folded) with tape. Put tube into vagina, and cover vulva with sterile towel. Bag will usually stimulate contractions of uterus; if it does not, have the nurse exert gentle traction on tube every fifteen minutes. **Dangers:** A large bag may derange presenting part, and cause prolapse of the cord; there is little danger with the two smaller sizes.

Fingers.—Dilatation alone, or combined with accouchment force after one hour. With flattened cervix, dilatation is easy. Insert one finger, then two, then gently stretch; then one of each hand, one and two, two and two, etc. If version is

to be done, don't attempt it until the cervix is sufficiently dilated to admit folded fist; begin with hand folded in shape of cone, then dilate by folding up fist in cervical canal. There is danger of laceration if done too hastily; hence take time, and use great care.

RESULTS OF PROLONGED LABOR.—*Dangers to mother:* 1. May cause necrosis from the prolonged pressure. 2. Exhaustion. 3. Postpartum hemorrhage. 4. Sepsis. *Dangers to child:* 1. Head may be injured. 2. Cord pressed upon. 3. Pressure on the circulation. 4. Inspiration pneumonia, from efforts to inspire in utero.

Anomalies in Resisting Forces.

DEFICIENCY IN RESISTING FORCES.—Must be combined with good uterine contractions. A very unusual condition, resulting in precipitate labor. Is not common in primigravida, and is usually due to small child. May be due to justomajor pelvis.

Dangers.—Principally to child, as it may be born anywhere: 1. Cord may snap if too short. 2. The head may be crushed by striking floor. 3. Water closet may be receptacle for baby. *Dangers to mother,* from sudden emptying of uterus: 1. Postpartum hemorrhage, and syncope. 2. Lacerations. 3. There may be inversion of uterus from traction on placenta. 4. Shock.

Treatment.—Some women have only two pains, the first rupturing the membranes, the second expelling child. If woman has had one experience, call every two weeks and examine for thinning of cervix. When found, have her go to bed with first pain, and have nurse instructed to give morphin to prevent sudden expulsion. Use chloroform to control delivery.

EXCESS IN RESISTING FORCES.—Mainly due to deformities of bony parts. Common in America, occurring mainly in blacks (in Baltimore, about equally in both races); 13 percent. of both races combined have deformed pelvis while it is found in 6 percent. of white women and 18 percent. of colored. However, more blacks have spontaneous labors, owing to smaller size of fetal head. The character of deformities differs in the two races, rachitis being more common in the colored race, due

to poor hygiene. The frequency varies in different races and localities, from 5 to 20 percent. About 50 percent only of deformed pelves cause trouble.

Causes of Pelvic Deformity.—1. From *faulty development*: Due to disturbances which cause changes in nutrition; the bones assume abnormal shapes from (a) natural expansion; (b) traction of muscles; (c) pressure of the trunk downward, through the spinal column; (d) pressure from below, through thighs. 2. From *disease* (most commonly rachitis). 3. From *traumatism*.

Direction of Deformity.—1. Antero-posterior contraction (flat). 2. Oblique contraction (Naegele). 3. Transverse contraction (Roberts). 4. General contraction (justminor).

Diseases and Deformities of Bony Structures.

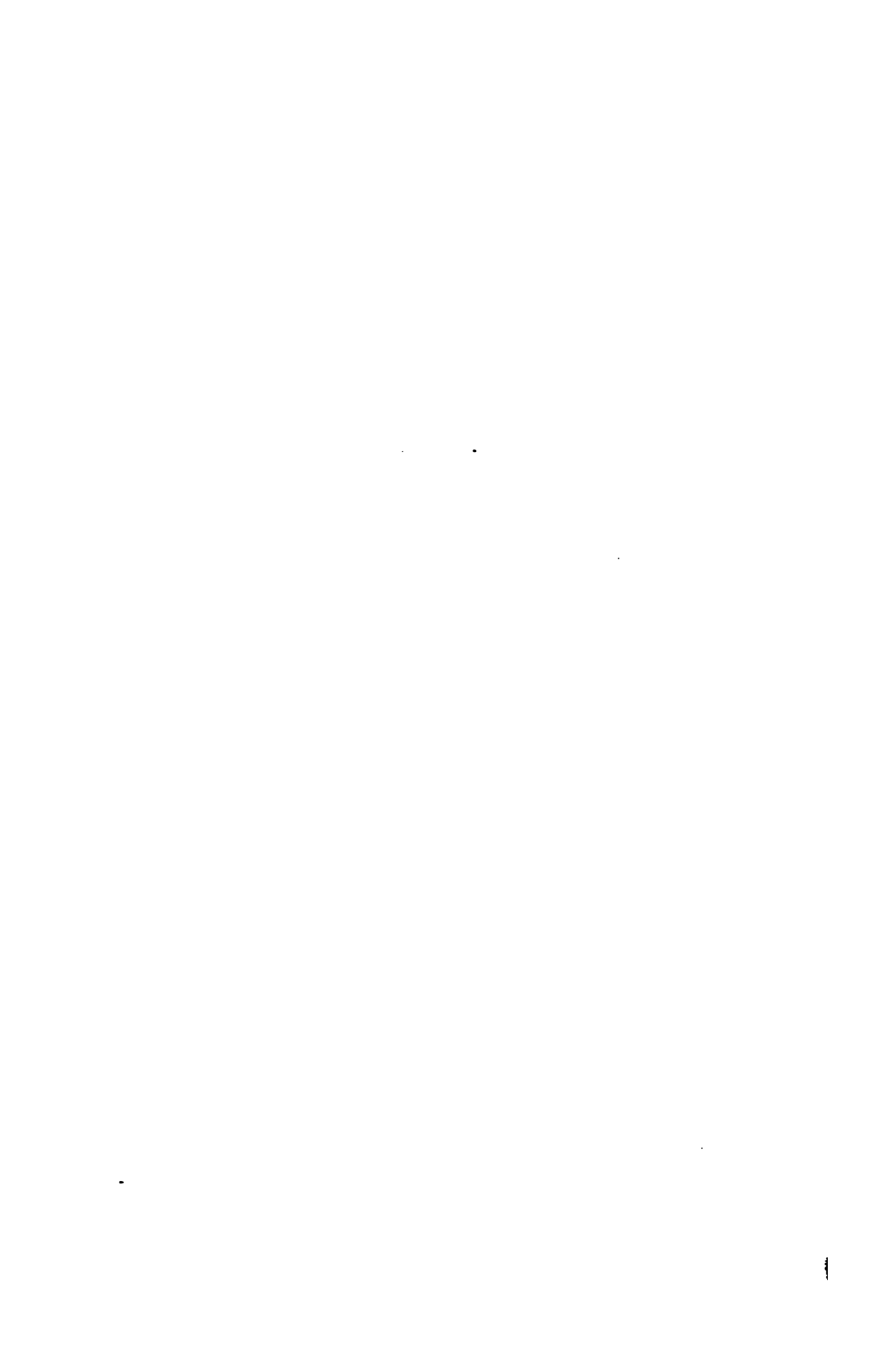
DEFORMITIES OF THE PELVIS.

- | | | |
|-------------------------|---|---|
| A. Faulty development | { | <ol style="list-style-type: none"> 1. Simple flat. 2. Justminor (generally equally contracted). 3. Flat, generally contracted (justminor flat). 4. Narrow, funnel-shaped (masculine). 5. Obliquely contracted (Naegele). 6. Double obliquely contracted (Roberts). 7. Justomajor (generally equally enlarged). 8. Split pelvis. |
| B. From disease of bone | { | <ol style="list-style-type: none"> 1. Rachitis. 2. Osteomalacia. 3. New growths of bone. 4. Fractures. 5. Caries and necrosis. |
| C. Anomalies in union | { | <ol style="list-style-type: none"> 1. Abnormally firm joints (synostosis). 2. Abnormally loose joints. |

SIMPLE FLAT PELVIS.—One of the most common deformities in white race. The oblique and transverse measurements are practically normal, while the conjugate is diminished, due to throwing forward of sacrum as a whole; the external conjugate is also diminished. The pelvis is symmetrical, and deformity is not noticed on inspection.

Etiology.—A congenital condition as a rule; may be due to faulty development in girls with poor hygienic surroundings and subject to hard work. May result from too early walking, or carrying heavy weights on the head.

Influence on Labor.—Head of child is generally in transverse diameter—most commonly L. O.; this is longest diameter, due to forward position of promontory. First stage is



usually prolonged; but after head passes promontory, the labor progresses normally unless woman is exhausted. Anterior fontanelle is felt presenting. Prolapse of cord is common, due to delayed engagement. Promontory causes a depression on posterior parietal bone, near anterior fontanelle and parieto-frontal suture. The anterior parietal bone may catch on symphysis, causing reversed obliquity of head; this is rare.

JUSTOMINOR PELVIS.—The most common deformity in the colored race. Contraction in all directions; external oblique measuring 20 cm. or below. The sacrum is small, but relatively farther back than normal, there being a relative increase in both internal and external conjugates.

Influence on Labor.—Head takes the normal oblique position. There is extreme flexion, marked moulding, and labor is prolonged. The posterior fontanelle is easily felt, while anterior is not felt, due to marked flexion; the overlapping of bones can be felt. Strong pains and prolonged labor are necessary to force head through the narrow canal, but latter part of labor is normal. Prolapse of cord is not common.

JUSTOMINOR FLAT PELVIS.—This is a combination of simple flat and justominor, there being less space at sides than in the flat.

Influence on Labor.—Labor is very difficult, and version is less favorable than in simple flat. It combines difficulties of both flat and justominor; the head usually becomes firmly impacted, and child is lost.

NARROW, FUNNEL-SHAPED PELVIS.—Best example is the male pelvis; there is plenty of room at brim, the measurements being about normal; while outlet is narrow, the tuberosities being close together and coccyx projecting forward. Symphysis is deep and the angle acute. This form may be associated with deformities of spinal column.

Influence on Labor.—First stage of labor is normal, the child easily entering inlet; but difficulty arises when head reaches outlet, and necrosis may result from the prolonged pressure. The child being mainly in lower zone and pelvis, the uterus works at a disadvantage—the upper segment thickens and the lower thins, the common result being rupture. Version, forceps, or Cesarean section must be prepared for.

OBLIQUELY CONTRACTED PELVIS.—An uncommon deformity, first described by Naegele in 1834, and bearing his name. Pelvis is asymmetrical, the symphysis being toward healthy side. One side is thrown upward and inward, while the healthy side is thrown upward and outward, due to the pressure of femurs. Ischial spine of diseased side approaches sacrum, projecting into cavity. One oblique, measured from the diseased side in front to healthy side behind, is shortened; while the opposite oblique is increased.

Etiology.—Due to the absence of bony nuclei in one ala of sacrum, lateral process remaining undeveloped. Deformity is noticed in infant, and it increases after child begins to walk; ankylosis later takes place, from friction and inflammation in sacro-iliac articulation.

Influence on Labor.—Head can only descend in one diameter—the oblique measured from diseased side behind to healthy side in front. There is marked moulding, and faulty rotation at outlet, if head be of normal size. Symphysiotomy is not indicated, owing to ankylosis. If seen early, induction of labor and version may be performed; if rupture of uterus has occurred, use forceps, or perform Cesarean.

DOUBLE OBLIQUELY CONTRACTED PELVIS.—The rarest of all pelvic deformities; first described by Roberts in 1842. Is the result of maldevelopment, and ankylosis of both sacro-iliac joints; both sides being flattened.

Influence on Labor.—The difficulties are those of the Naegele pelvis doubled, the delivery of the child being almost impossible. Cesarean section is the only treatment.

JUSTOMAJOR PELVIS.—When external oblique is 24 cm. or above. Generally causes no trouble unless woman is walking about at time of labor, hence put to bed near time of confinement to prevent precipitate labor. Give a guarded prognosis in regard to length of labor, however, as head may impinge on projecting spines and be retarded.

Influence on Labor.—There is danger of laceration, syncope, and postpartum hemorrhage from precipitate labor. Let the woman recline at onset of labor, and keep her from straining; use chloroform and restrain head.

SPLIT PELVIS.—A rare condition, due to lack of develop-

ment of symphysis; there is usually a fault in abdominal wall, and extrophy of the bladder.

Influence on Labor.— Only seven cases of pregnancy recorded. Labor is not difficult; there is danger of precipitate labor, prolapse of uterus, etc.

RACHITIC PELVIS.— Most common deformity from disease. In normal development of bone, there are two processes—the growth of bone on the exterior, and absorption of bone on the interior; in rachitis, both processes go on more rapidly than normal, there being a rapid proliferation of bone cells but a deficiency in deposit of lime salts; hence the bones are soft and easily deformed.

Etiology.— It occurs early in life, while the bones are in the cartilaginous state, the deformities resulting from pressure, mainly after the child begins to walk. It results from poor hygiene, and poor and deficient food. After the softening process has ceased to operate the pelvis solidifies in the misshapen condition.

Deformity.— Simple flat, justominoir, and justominoir flat may result from rachitis. The seat of deformity is most commonly at sacro-iliac synchondrosis. The sacrum is rotated forward—not moved forward as a whole, as in simple flat; the erectores spinæ muscles tend to draw middle parts of sacrum upward and backward, while sacro-sciatic ligaments tend to hold coccyx forward; hence marked curve of sacrum, with concavity forward. The sacrum is narrow, and convex from side to side anteriorly. The posterior superior spines are thrown downward and inward, and anterior superior spines are thrown forward and outward; hence the distance between spines is greater than between crests. The natural outline of pelvic brim is changed—there is a sharp curve in lateral wall, just anterior to synchondrosis; the symphysis is drawn backward and depressed, due to throwing outward of the ilia and the pulling of Poupert's ligament; result is "figure-of-8"-shaped inlet. Transverse diameter is widened above and narrowed below, while the conjugate is narrowed both above and below. The acetabula are closer together and nearer the front, from the exaggerated curvature of innominate bones. The deformity may end as a justominoir, flat or justominoir flat pelvis if the

disease is cured before the child walks; while if disease continues, deformity is caused by walking, carrying weights, etc., and may resemble the osteomalacic pelvis (pseudo-osteomalacia).

Diagnosis.—The woman is short and small, the legs being short and thick, and curved forward. The head is large and square; nose is flat, and forehead is low and broad. She is chicken-breasted (pectus carinatum), and the joints are large. History shows that woman did not walk until three or four years old, and was late in getting teeth. While pregnant, she has pendulous abdomen. Pelvimeter shows diameter between spines to be equal or greater than crests; vaginal examination (also by pelvimeter), shows narrowed conjugate.

Influence on Labor.—With head in brim, the deformity has all the disadvantages of simple flat, only worse; the head is transverse, and lateral obliquity and rotation is increased. Head usually goes more easily after passing brim, owing to curve of sacrum.

OSTEOMALACIA.—Rare in United States, but common in Italy, etc. It develops, as a rule, during pregnancy and lactation, and consists in a general softening of bones once hard, the bones becoming very pliable. The inlet may be almost completely shut off by deformity, while the outlet is narrowed. The brim becomes beak-shape, with apex to front. Woman complains of pain on pressure and from walking.

Diagnosis.—Bones are soft, and there is marked beak-shaped deformity. Woman's height is diminished, may be $1\frac{1}{2}$ ft. shorter during pregnancy. Spinal column is sunk into pelvis, and she has a swinging gait, from approximation of thighs.

Influence on Labor.—If deformity is marked, Cesarean section must be performed; remove uterus and ovaries, as destruction of sexual function cures the disease.

NEW GROWTHS.—Generally exostoses, occurring at pectineal eminence, pubic rami, or sacro-iliac synchondrosis. They may obstruct canal, but greater danger is from sharp projection causing injury to child. Fibrous and other tumors may also occur. Treatment is Cesarean section if disease is marked.

FRACTURES.—Not commonly met with in labor, as mortality is high; they may be found if in the anterior portion of

pelvis. Deformity may result from: 1. Malposition of the fragments. 2. Formation of callus. 3. Ankylosis of joints. Deformity is less marked if fracture has occurred in the anterior portion; if behind, result is practically a Naegele pelvis.

CARIES.—Tuberculosis is most common cause. It generally occurs at the sacro-iliac synchondrosis, resulting in oblique contraction (Naegele).

SYNOSTOSIS.—Abnormally firm joints may occur at symphysis pubis, sacro-iliac and sacro-coccygeal articulations. If in front, it is not noticed unless it offers obstruction to knife in symphysiotomy, as normal mobility is not noticed; if behind, there is usually a lack of development (Naegele or Roberts). Ankylosis of coccyx to sacrum is common, and most important; it is due to falls on buttocks. The angle is abnormally acute, from union in abnormal position; it may be overcome in labor by fracture, from action of Nature or by forceps.

ABNORMALLY LOOSE JOINTS.—May be exaggeration of normal condition during pregnancy, or may be due to suppurative disease of joints. Relaxation predisposes to rupture. Causes difficulty and pain in walking, or on moving joints. Patient may be made more comfortable by firm bandage; the trouble subsides after delivery.

DISEASES AND DEFORMITIES OF SUBJACENT SKELETON.

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|----------------------|---|--|
| A. The spinal column | { | 1. Spondylolisthesis.
2. Kyphosis.
3. Scoliosis.
4. Kyphoscoliosis.
5. Lordosis. |
| B. The hip joints | { | 1. Coxalgia.
2. Ankylosis.
3. Dislocation.
4. Deformity. |

SPONDYLOLISTHESIS.—The third, and sometimes fifth to seventh lumbar vertebræ roll down and lie in pelvis upon the sacrum; only the bodies, however, come into the pelvis, the spines and laminae being thinned and stretched. It develops most commonly in childhood, but may become worse during adult life. Fracture may occur from lack of development—the bones being thin and delicate.

Deformity.—Pressure is downward and backward, resulting in backward rotation of the sacrum; projection forward of

the vertebral bodies tends to flatten inlet, while throwing forward of apex of sacrum results in flattening of outlet. The sacral spines are prominent, while the trochanteric regions and buttocks are flattened. Bony ankylosis may occur between the lumbar vertebræ and sacrum.

Diagnosis.—The woman is shortened; the vertebral column rolls forward, and she feels as if falling forward; hence the shoulders are thrown backward, and it is impossible to carry any weight in front. In walking, woman has a swinging gait, placing one foot on line with and in front of the other. The ribs seem to have settled down into a broadened pelvis.

Influence on Labor.—The mechanism of labor is similar to that with simple flat, behavior of child being about the same. The *working conjugate* is measured from vertebra instead of sacrum. Head is transverse, with marked lateral flexion; rotation is normal, the head having easy advance after passing the false promontory.

KYPHOSIS.—*Hump-back.* More common than spondylolisthesis. Pelvis is funnel-shape, due to irregular pressure from above. “Do you see that hump?”—it means sacrum is thrown forward, the amount depending on size and nature of the hump. There is a compensatory lordosis; the vertebral column being bent forward below, pushing the base of sacrum back, and tilting the apex forward; hence pelvis is large at brim and small at outlet.

Influence on Labor.—Not every kyphotic pelvis necessitates Cesarean. Difficulty usually increases with each labor; there is rupture of uterus if head can't pass obstruction. Pregnant uterus is prominent, and abdomen is pendulous, due to short stature and pelvic deformity. Head usually engages readily, but trouble is experienced at outlet. If transverse diameter is 8.5 cm. or above, not much trouble will be experienced; if 6 cm. or below, Cesarean is necessary; if between 6 cm. and 8 cm., other means may be used.

SCOLIOSIS.—Lateral curvature of spinal column. The greatest pressure from below will be upon the side toward which the lumbar vertebræ are bent, and this results in lateral flattening of pelvis. This condition is generally combined with rachitis. Deformity may be marked in school girls, from work-

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ing at desk ; while in boys, it is less marked, owing to a greater amount of exercise. If combined with rachitis, a living child cannot be born.

KYPHOSCOLIOSIS.—A combination of kyphosis and scoliosis, but the former, being of rachitic and not of carious origin, is not angular. The pelvis is usually an asymmetrically contracted rachitic pelvis.

LORDOSIS.—A bending forward of spinal column. Usually complicates some other deformity, as kyphosis, spondylolisthesis, etc., being a compensating curve. It is mainly symptomatic.

THE HIP JOINTS.—*Coxalgia*, and *luxations* and *deformities* of the hip joints may interfere with labor, and may be the cause of pelvic deformity owing to the unequal pressure from constant walking on the normal limb. *Ankylosis* of the hip joint may seriously interfere with labor, owing to inability to abduct the thighs ; while disease of both hips may necessitate Cesarean section.

Results of Bony Deformities.

DANGERS TO MOTHER.—When the pelvis is contracted at the brim, the abdomen is usually pendulous ; the head fails to engage, and is directed into iliac fossa or in front of the symphysis, resulting in : 1. Prolapse of cord, as the head does not fill up brim. 2. Membranes extend through cervix in a finger-shaped process, contractions of uterus cause their rupture and early escape of liquor amnii ; the result is a dry labor, with marked pressure on tissues of mother and baby, followed by sloughing of the maternal structures ; before time of forceps, fistulæ were common. Labor is tedious, and the woman becomes exhausted ; there is lack of contraction of uterus after delivery, with hemorrhage, and sepsis from pressure and retained blood clots. 3. Uterus may become incarcerated by being caught under contracted brim. The difficulty increases with each successive confinement up to thirty-fifth year. If pelvis will not admit head, uterus will be ruptured ; if uterus is weak and abdominal muscles are lax, child cannot be delivered

without forceps. 4. Pressure may result in hemorrhage, sloughing or sepsis.

DANGERS TO CHILD.— 1. Prolapse of cord. 2. Pressure on the placenta, shutting off the blood supply and causing asphyxia, or reflex inspiration and pneumonia. 3. Pressure on soft parts of head, causing necrosis. 4. Intracranial hemorrhage. 5. Injury from forceps, if not used early.

MANAGEMENT OF LABOR.— Method of delivery depends on the degree of deformity; may be left to Nature, or may require forceps, version, induction of labor, etc. 1. If conjugate is more than 9.5 cm., delivery will be normal. 2. With conjugate between 9.5 cm. and 9 cm., with previous abnormal labor, (*a*) induce labor about two weeks before term and perform version, or (*b*) if head is engaged, use forceps. 3. Between 9 cm. and 8 cm., perform version. 4. Between 8 cm. and 7 cm., induction of premature labor, as no living term child can be born; forceps may be tried, but case may demand Cesarean section or symphysiotomy. 5. Below 7 cm., perform Cesarean section. Cesarean section is probably best even above 7 cm.; in flat pelvis as high as 8.5 cm., and in just minor, 9 cm. 6. Below 6.5 cm., Cesarean section is necessary even with dead child. Craniotomy is practically always limited to cases where child is dead. Study the relative sizes of head and passage.

Aids to Delivery.— 1. Moulding of head, and flexion. 2. Enlargement of canal. 3. Walcher position.

Walcher Posture.— With woman on back, pelvic brim makes an angle of 30° with horizon; with thighs flexed (lithotomy position), 40°. In Walcher position, brim makes an angle of 10° to 15°. *Method:* The woman is placed on table in dorsal prone position, with buttocks on edge of table and the legs dropped; this causes an increase in conjugate of .5 cm. to 1 cm., by rotation of pelvis around an axis passing through sacro-iliac synchondrosis. This aids in engagement of head, and throughout the whole delivery. This position is best for use of forceps, but is inconvenient; hence best to combine it with Trendelenburg posture, by using a chair without round between back legs. In Walcher posture, abdominal muscles are made tense, and this also aids in delivery.



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Dystocia from Diseases and Anomalies of Soft Parts.

- A. Anomalies in uterine development.
- B. Anomalies and diseases of cervix {
 - 1. Rigidity.
 - 2. Edema.
 - 3. Atresia.
 - 4. Cicatrices.
 - 5. Septa.
 - 6. Carcinoma.
- C. Anomalies and diseases of vagina or vulva {
 - 1. Congenital stenosis.
 - 2. Cicatrices.
 - 3. Septa.
 - 4. Tumors.
 - 5. Vaginismus.
 - 6. Unruptured hymen.
 - 7. Rectocele.
 - 8. Cystocele.
 - 9. Malformations.
 - 10. Infections.
- D. Uterine position or shape {
 - 1. Displacements.
 - 2. Cacculation.
 - 3. Prolapse.
- E. Dystocia from tumors {
 - 1. Uterine.
 - 2. Ovarian.
 - 3. Rectal.
- F. Dystocia from displaced kidney.
- G. Dystocia from vesical calculi.
- H. Dystocia from conditions of rectum {
 - 1. Foreign bodies.
 - 2. Impacted feces.
 - 3. Contraction of muscles.

UTERINE DEVELOPMENT.—In a double, or septate uterus, one side may be pregnant, the other side blocking the delivery.

1. The contraction may be interfered with by attachment of placenta to the septum, resulting in postpartum hemorrhage.
2. Septum may rupture.
3. Retention of placenta or membranes, from insufficient contraction, may result in sepsis.
4. Septum may block way of forceps, or forceps may include septum in grasp.

CERVIX.—The cervix may obstruct labor my reason of rigidity, edema, atresia, cicatrices, septa and carcinoma, in order of frequency.

Rigidity.—Common, especially in “hot-house” primiparæ. Give hot vaginal douche, and chloral by rectum, and let woman rest if tired. Use same treatment as for cicatrices, first glove-stretcher, then bag or fingers.

Edema.—Due to obstructed circulation or to an angioneurosis. May obstruct labor, and require multiple incision, etc.

Atresia.—Occlusion, from inflammation of cervix. There is no dilatation until os is opened. A dimple may mark site of

external os. *Indication:* Make opening with sterile probe or finger nail, or by a crucial incision with scissors; after an opening has been made, dilatation is rapid.

Cicatrices.— Common in multipara, resulting from lacerations during former delivery, use of caustics, trachelorrhaphy, syphilis, malignant disease, etc. *Indication:* Cesarean section in all malignant cases; in non-malignant cases use: 1. Glove-stretcher dilator. 2. Elastic bags. 3. Fingers. Dilate gradually, using one or more methods. A hot vaginal douche may favor dilatation. Use chloral to give rest before mechanical dilatation.

Septa.— Due to faulty development—from fault in fusion of Mueller's ducts. Bands of tissue extend across the canal, usually in longitudinal direction with antero-posterior attachment. *Indication:* If it cannot be slipped past head, cut the band, as there is usually no hemorrhage; or cut between two ligatures.

Carcinoma.— Usually ends in abortion (34 percent.). If at term, best perform Cesarean section, removing uterus and cervix.

VAGINA OR VULVA.— Labor may be obstructed by anomalies of the lower birth canal, either congenital malformations, or abnormalities due to disease.

Congenital Senosis of Vagina.— Usually in upper third. The woman usually delivers spontaneously, as tissues soften and dilate similarly to atresia of cervix; if not, use fingers to dilate.

Cicatrices.— Result from lacerations, use of caustics, etc. If benign, use fingers or bags to dilate, as in cicatrices of cervix; if cancerous in origin, perform Cesarean section.

Septa.— From faulty development. Usually soft, and can be pushed past head; if not, cut between ligatures.

Tumors.— 1. *Cyst of Gartner's duct* may obstruct labor; puncture cyst, deliver child, then attend to tumor. 2. If a *cancerous tumor* obstruct passage, perform Cesarean section. 3. *Hematomata* are most common, resulting from rupture of varices and effusion of blood into labia; bluish in color, and feel like soft snowball. If obstructing labor, incise at muco-cutaneous junction, turn out clot, and pack with gauze—amount of

packing to be less than that of clot, and to be changed often; not necessary to catch bleeding points, as hemorrhage can be controlled by pressure. 4. *Polypoid hypertrophies* of mucous membrane. 5. *Edema* and *elephantiasis* of vulva. 6. *Suppuration* and *gangrene*. 7. *Vaginal enterocele* is rare, and should be reduced if possible.

Vaginismus.— May obstruct labor from spasm of muscles surrounding outlet. Overcome spasm by anæsthetic.

Unruptured Hymen, with small orifice, may require incision, but is usually ruptured by advance of presenting part.

Rectocele and *cystocele* may obstruct labor, and if large, should be replaced and held back until forceps is applied and head is pulled past them. Version and extraction may be found necessary.

Anus Vaginalis or *vestibularis* may obstruct labor from accumulation of feces, due to abnormal position of anus.

Vaginal Leukorrhœa, *gonorrhœa*, *mycosis* and *condylomata* may complicate labor, and be a source of subsequent infections of mother or child.

UTERINE POSITION OR SHAPE.— The uterus may be displaced forward, backward, downward, or to either side; may be twisted on the cervix, or form part of contents of a hernial sac.

Displacements.— *Anterior displacement* is usually due to a pendulous abdomen—the result of kyphosis, or laxity of muscles from multiple pregnancy, etc. The direction of uterine force is upward and backward, driving child against vertebral column. *Treatment*: Keep woman on back during labor, and apply an abdominal bandage; or stand by and hold fundus up until head engages. *Lateral displacement to right* is an exaggeration of normal inclination, and may result in misdirection of forces. *Treat* by placing patient on her side (right), and putting under her a rolled blanket or pillow.

Sacculation.— May result from retroversion with fixation, or an improperly done ventro-fixation. 1. In posterior fixation, the *anterior wall* distends, cervix being up under symphysis. *Treatment*: Open abdomen and break up adhesions, if discovered in early months. 2. In anterior fixation, the *posterior wall* distends, the cervix points back, and anterior thickened wall may obstruct labor. *Treatment*: If discovered in early preg-

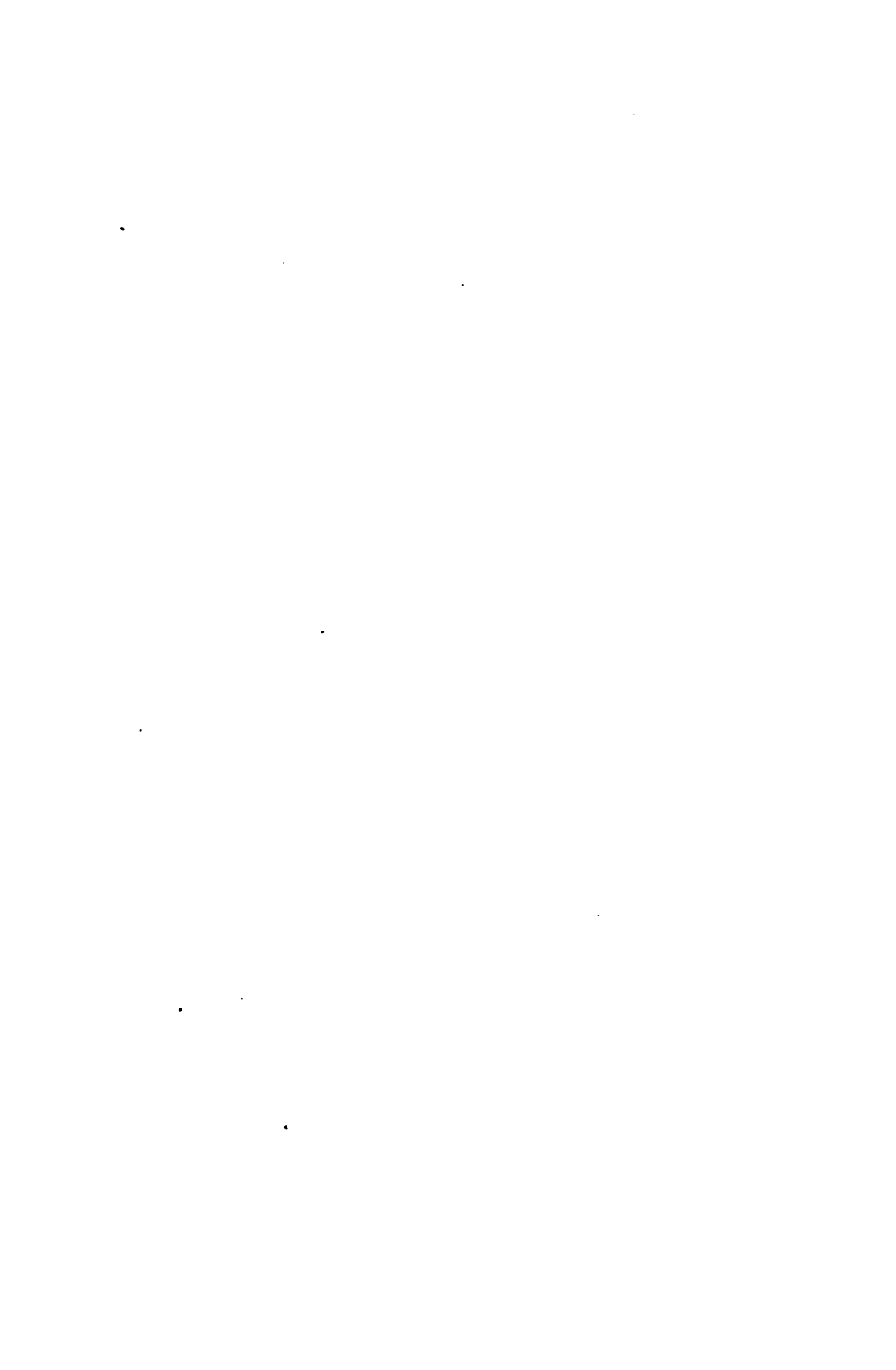
nancy, separate adhesions, or dilate cervix and empty uterus. In either case, if not found early, let go to term and perform Cesarean, as there is danger of rupturing thin wall of uterus if woman goes into labor.

Prolapse.—Partial, with edema of cervix; delivery may go on to term, but abortion is the rule. May require forceps with counter-traction on cervix, or extensive incisions into cervix.

UTERINE TUMORS.—*Fibromata*, or *fibro-myomata*, are the most common, their size and position determining the degree of dystocia. The subperitoneal variety is most likely to cause obstruction, while the interstitial and submucous tumors are most apt to cause hemorrhage; a pediculated submucous or subserous tumor, low down in uterus, is also apt to obstruct passage, and long pressure on head and soft parts of canal may cause necrosis. There is a tendency to postpartum hemorrhage, retention of membranes, and sepsis; while with interstitial variety, there is poor contraction, with long labor, hemorrhage, infection, etc. As a rule pregnancy stimulates growth of a fibroid. A myoma, however, may involute with the uterus, and sometimes a cure results.

Treatment.—1. If found early, and with signs of impending danger, best to remove tumor; if small, pregnancy may not be interfered with. Myomotomy may be done in favorable cases. 2. If woman has had previous dystocia, and tumor has increased in size during pregnancy, it is justifiable to empty uterus in early weeks rather than do Cesarean later. 3. In severe cases, best to remove uterus and child. 4. If woman has gone on to term, first see what she can do alone, as many women (especially colored), go through labor safely with numerous “knobs and bobs.” If advance of the head is found blocked by tumor after several hours, put patient in knee-chest position, and try to push tumor out of the way; if a small fibroid, try to enucleate and pack; if obstruction is bad, best to perform Cesarean, with or without removal of uterus. In any case, prepare for postpartum hemorrhage.

OVARIAN TUMORS.—Ovarian *cysts* are most common, and are usually found in early months; if not removed until later, they may get low down in pelvis and obstruct passage. If large



(size of cocoanut), and found in early pregnancy, they should be removed, as only 20 percent. abort from operation; if not discovered until time of labor, treatment is same as for uterine tumors. In case of a fluctuating tumor during labor (and especially if of the intraligamentous variety), an obstructing cyst may, in an emergency, be tapped aseptically, and treated after birth of child; but tapping is most objectionable in the dermoid variety, as fluid is too thick to aspirate, and leakage is liable. If prepared for it, abdominal section is best—either removing cyst and allowing labor to progress normally, or performing Cesarean section. With normal delivery of child, danger is not over, as the pedicle may become twisted from relief of pressure, necessitating operation.

RECTAL TUMORS.—*Carcinomata* and *benign tumors* of rectum may interfere with labor if large or if they involve vaginal tissue. When they cannot be entirely removed, perform Cesarean section.

DISPLACED KIDNEY.—May be congenital; if so, there is usually but one, hence investigate before removing. If both are displaced, neither should be removed. *Cyst of ureter* may result from pressure. Kidney may be removed through vagina, but better to perform Cesarean section.

VESICAL CALCULI.—A large stone in the bladder may obstruct labor by pressure on uterus from front. If very large, Cesarean section may be necessary.

CONDITIONS OF RECTUM.—*Impacted fecal masses* must be dug out or removed by enemata. *Foreign bodies* may require incision of pelvic floor for removal. *Resisting muscles* may be overcome by an anæsthetic and application of forceps.

XV. DYSTOCIA FROM FETAL CAUSES.

Breech Presentation.

Breech presentation means the presence at cervix of any part of pelvic extremity, as knee, foot or buttocks. It is a semi-abnormal condition, occurring quite often.

CAUSES.—1. Prematurity is most common cause. 2. Excessive amount of liquor amnii. 3. Lax abdominal and uterine walls. 4. Fetal monstrosity. 5. Deformed pelvis, preventing

entrance of head. 6. Multiple pregnancy. 7. Multiparity. 8. Malpositions of uterus. 9. Congenital malformations of uterus.

FREQUENCY.—Varies with time, whether term or premature: 1. Of both mature and premature, one in thirty cases. 2. Of mature alone, one in sixty cases.

POSITIONS.—Sacrum (S.) is used in naming positions, instead of occiput as in vertex; consider child as sitting in the pelvis; L. S. A. and R. S. A., R. S. P. and L. S. P.

DIAGNOSIS.—Signs and symptoms are: 1. Presence of head above. 2. Absence of head below. 3. Fetal heart is usually heard at level of or above umbilicus. 4. Feel breech—the nates, genitals, sulcus, and sacrum. 5. Hour-glass membranes. 6. Flat vaginal vault.

BREECH	vs.	FACE.
Head in upper abdomen.		Head in lower abdomen.
Anus: Small; no bony ridges; has sphincteric action.		Mouth: Large; hard, bony alveolar ridges; has no sphincteric action.
Meconium discharged.		No meconium discharged unless labor is prolonged.
Feel sharp spines of sacrum.		No such projections.
FOOT	vs.	HAND.
At right angle to leg.		In line with arm.
Toes short, and parallel to each other.		Fingers long, and thumb at right angle to fingers.
Heel felt.		No such projection.

MANAGEMENT.—On account of after-coming head, have first part of labor as slow as possible, and latter part speedy; five minutes is limit of time for birth of head, while several hours may be given to first part. Non-interference is best in first part of labor; *do not pull on foot*, as hands may be displaced by side of head.

MECHANISM.—Steps before labor are absent. Long diameter of hips is chiefly concerned in mechanism; it starts in oblique diameter of pelvis; and then rotates to antero-posterior diameter.

Birth of Hips, Shoulders and Extremities.—The anterior hip engages under symphysis; posterior hip slips over perineum, then anterior hip emerges, and breech is born. Feet usually come easily, anterior first, then posterior. Shoulders rotate and are born same as hips. The arms are born folded (unless dislodged by traction); free the anterior arm first, by



finger in bend of elbow. Place the cord where least pressed upon—usually opposite sacro-iliac synchondrosis. As soon as hips are born, wrap child in hot towel to avoid stimulation of respiratory center by contact with cold air. Support body of child upward, to prevent undue friction, and to prevent traction on neck.

Birth of After-coming Head.— Many methods of delivering, but the Smellie-Veit method (modification of Mauriceau's method), is best: Flexion and traction are desired; flexion is obtained by two fingers in mouth, and traction by two fingers of other hand over shoulders, with hand at back. Child is supported on forearm, and at same time traction is exerted, the body is raised. When mouth is born, need of haste is past; the nurse clears mouth, and body of child is thrown forward on abdomen of mother. Support perineum same as in vertex presentation. *Brachial palsy*, or Erb's paralysis (upper arm type), may result from undue traction on the after-coming head, and may occur from the same cause (traction on neck), in vertex deliveries. It is due to injury, usually tearing, of the fifth and sixth cervical roots of the brachial plexus. To avoid, always make traction in line with fetal spinal column.

MANAGEMENT OF SPECIAL CONDITIONS.— Interference in breech presentation may be caused by: 1. Impaction of breech. 2. Uterine inertia. 3. Extended legs. 4. Extended arms.

Impacted Breech.— The pelvis and feet are too large to pass together, and there is no advance. *Indication:* Pull down one or both feet and break impaction.

Uterine Inertia.— If labor is not advancing, deliver one or both legs, whether cervix is dilated or not.

Extended Legs.— The cause is not clear, but perhaps due to contraction of muscles. *Indication:* Go up to foot and bring down one leg; if fetal heart shows need of haste, bring down both legs. *Method:* Press the popliteal space outward and backward, flex the knee, secure foot and bring down leg.

Arms Extended at Side of Head.— Common when labor must be hastened (as in eclampsia), and due to undue traction. The arms are above head, on line with shoulders or in front. *Indication:* Raise legs and body of child; pass fingers along abdomen or back, over posterior shoulder to elbow (the first

bend) of posterior arm, then cause elbow to sweep across face; fracture of humerus may occur. Then depress body of child, and extract anterior arm in same manner.

Nuchal Hitch.—An arm may be locked at back of the neck, forming the nuchal hitch. *Indication*: Before extracting arm, rotate body and head, in direction to unlock hitch, until arm is free (hitch will probably be anterior arm).

Face Presentation.

Face presentation begins with brow presentation. More common in multiparæ, and with premature labor. Occurs once in 250 cases.

ETIOLOGY.—*Fetal*: 1. Dicephalus. 2. Prematurity. 3. Dead fetus. 4. Short cord. 5. Polyhydramnios. *Maternal*: 1. Multiparity. 2. Oblique axis of uterus. 3. Flat pelvis. 4. Fibroid tumors. *Caused by*: 1. Something preventing flexion: (a) Tumor of neck (e. g., thyroid); (b) abnormal size of thorax; (c) coils of cord around neck. 2. Something favoring extension: (a) Oblique position of the uterus; (b) tumor of pelvis obstructing advance of occiput but not of sinciput; (c) posterior occipital position; (e) pendulous abdomen; (f) flat pelvis.

POSITIONS.—Named according to direction of chin (M.): L. M. A. and R. M. A., R. M. P. and L. M. P.

DIAGNOSIS.—1. By *external examination*: (a) Presenting part high; (b) sulcus between hard head and body; (c) fetal heart heard most distinctly over front of child instead of over back as in vertex (in vertex, heart is heard on opposite side from small parts, at side upon which most prominent part of head is felt). 2. *Vaginal examination*: (a) Vaginal fornix nearly flat; presenting part high—at brim; (b) after cervix is dilated, note absence of smooth parts and presence of bony ridges of orbits, mouth with alveolar processes, and chin.

PROGNOSIS.—Depends on position: If chin is in front, labor is not difficult; if to rear, labor is very difficult or impossible.

MECHANISM.—Most favorable condition is extension, which corresponds to flexion in vertex presentation.

L. M. A.—The most favorable position in face presentation. There is extension of head, and rotation in birth canal.

the chin coming under symphysis; then flexion occurs, with eyes, forehead, bregma and occiput successively passing over the perineum; head rotates externally, then rotation and birth of shoulders.

R. M. P.—The most frequent position. All cases of face presentation probably start as brow, with continuation of the extension. Delivery is only accomplished with chin to front, hence rotation must occur. Head descends to pelvic floor only by stretching of neck, as neck is but 4 cm. long, while depth of pelvis is 4 cm. in front, 9 cm. as sides, and 12.75 cm. behind; the neck will stretch to 9 cm. at sides, but requires a long time; hence if chin is posterior, head will never be born until turned. *Mortality:* About 13 percent. of babies, and 6 percent. of mothers, owing to long labor, and lacerations. *Mechanism, if chin remains posterior:* Nature attempts to force thorax (18.50 cm.) down through pelvis (12.75 cm.), and the result is impaction.

RESULTS OF FACE PRESENTATION.—1. Tumefaction of the eyes. 2. Pressure on top of head. 3. Increase of long diameter, and flattening of head. 4. Tumefaction of mouth. 5. Prominence of forehead. 6. Caput succedaneum on right cheek or over right malar bone. 7. Ecchymosis of face. 8. Lacerations of perineum.

MANAGEMENT.—Keep membranes unruptured until dilatation is complete: 1. To prevent injury to the eyes, especially from examining finger. 2. Opening of mouth allows air to enter, stimulating respiration. 3. To allow complete dilatation. Disregard perineum, as first consideration is to get a living child.

CHOICE OF OPERATION.—1. Leave to Nature. 2. Manually correct position. 3. Version. 4. Forceps.

Left to Nature.—Only safe when chin is to front, and child and pelvis are normal.

Correction of Presentation.—Best to change to vertex, if possible: 1. *Schatz's method*, by external manipulation alone, will probably fail, but it does no harm to try; liquor amnii must be present, and head not engaged. *Method:* Raise shoulders up with one hand at front of baby, and push to opposite side; at same time push the head in opposite direction, flexing

it. 2. *Bimanual method*, or manual flexion: One hand in cervix, on head, the other hand on abdomen, holding the shoulders; change position of head by flexion, about same as in Schatz's method. 3. If uterus is oblique, fetal trunk falls to one side and favors face presentation; place woman on opposite side, so uterus will fall into normal position, i. e., if uterus inclines to left, place woman on right side.

Version.— If face is M. P., and presentation cannot easily be changed to vertex, version is indicated if uterus is not firmly contracted.

Forceps.— 1. With face M. A., and labor delayed, forceps is indicated if version is impossible; perhaps better than version. 2. With M. P. (in center), only indication for use of forceps is in starting rotation, and much skill is required for this; a vectis may be used for this, as traction is not indicated until M. A. If child is impacted, do craniotomy, if dead; if alive, perform Cesarean section.

Brow Presentation.

Brow presentation is rare, said to be one in 1,500 cases. The head remains throughout labor in a position midway between vertex and face. One of the worst presentations for both mother and child, as with normal pelvis and child the delivery is impossible.

POSITIONS.— Named from direction of face: R. F. A., R. F. P., L. F. A. and L. F. P.

DIAGNOSIS.— Vaginal examination shows the brow presenting, with orbits on one side and large fontanelle on the other; one parietal bone is flattened against promontory; the anterior presents.

MANAGEMENT.— 1. *Correction* is indicated; it is sometimes possible to change to vertex or face, preferably vertex, as it will then generally deliver normally. With hand in vagina, flex head; but if woman has been in labor for some time, the head is flattened, broadened and lengthened from moulding, and correction is impossible. If vertex is impossible, try to change to face, M. A. 2. *Version*, if not contra-indicated. 3. If head is engaged M. A., and there is danger of rupture from version, the head may be *extended with forceps*, bringing the chin to front.



4. With M. P. and the head fixed, and manual correction is impossible, try *traction with forceps* to make it face M. P., then attempt to rotate in the canal to M. A. 5. If delivery is impossible, do (a) *craniotomy* if child is dead (the fetal heart is usually feeble, hence use care in diagnosis); or (b) *Cesarean section*; delivery will be very difficult if head is firmly engaged—disengage it by one hand in vagina.

Transverse Presentation.

Transverse presentation is the presentation of any part of the fetal trunk; practically means shoulder. One case in 169 at Sloane Maternity.

ETIOLOGY.—1. Uterine causes: (a) Malposition; (b) abnormal shape; (c) pendulous abdomen; (d) uterus bicornis; (e) uterus deformed by fibroids; (f) placenta previa. 2. Anything interfering with cephalic or pelvic presentation at the brim: (a) Maldevelopment of the pelvis; (b) tumors; (c) malformed child. 3. Excessive mobility of the child: (a) Prematurity; (b) excessive liquor amnii or polyhydramnios.

DIAGNOSIS.—Inspection and palpation show long diameter of uterus to be transverse. Vaginal examination shows presence at cervix of scapula, clavicle or ribs, and absence of the hard, round head; a hand may present if membranes are ruptured.

POSITIONS.—Anterior or posterior, according to back (D.) of fetus; right or left, according to head. Positions are L. D. A. and R. D. P., L. P. and R. D. A. L. D. A. is most common.

MECHANISM.—Ordinarily none; with uterine contractions, the child is forced into pelvis, the uterus becoming drawn out; the child dies, and uterus ruptures if neglected, as delivery of normal sized child is impossible.

RESULTS.—1. *Death of child* and rupture of uterus if neglected. 2. *Spontaneous version*: Starts as transverse, but head gains position in pelvis; can only occur when liquor amnii is present and fetus is free to move, and requires vigorous contractions. It is the same process that occurs during pregnancy, being delayed until labor; it is most likely to occur with living child. 3. *Spontaneous evolution*: Less common than version,

and occurs only with dead child; two methods: (a) The child is crowded down into pelvis, with body folded upon itself; the head remains stationary, everything else going down past it—thorax, side, breech, legs, feet and head, in order. (b) Child goes down as a wedge, head and thorax together, and feet last; it is only possible with a "putty-like" child. 4. If left untreated, *uterus may rupture*, and patient die of shock and hemorrhage.

PROGNOSIS.—For mother and child, depends on the doctor, and how soon he sees patient. In early stage, prognosis is good; if left alone, prognosis is bad for both.

TREATMENT.—*Version* is the only treatment; before the labor begins, try external method; if in labor and membranes have ruptured, use internal method. Podalic variety is indicated in most cases. Remember danger of rupture; it is better to sacrifice child than mother. If arm is down, best to tie with sterile tape or bandage before doing version, to keep away from side of after-coming head.

Impacted Child.—If child is impacted, and uterus is firmly contracted, version is contra-indicated; the child is dead, or nearly so, and Cesarean is impossible. *Indication*: Perform decapitation, deliver body, then head.

Complex Presentation.

Complex or compound presentation means that more than one part presents, as head and hand, head and foot, hand and foot, head and two or more extremities; usually head and hand. A rare condition, occurring once in 250 cases.

CAUSES.—Disproportion between child and canal, or lack of conformity: 1. Head too large. 2. Too great mobility, from excessive amount of fluid. 3. Pelvic deformity. 4. Anything which interferes with cephalic or pelvic presentation. 5. Attempts at version with failure to rotate.

TREATMENT.—*Replace the part not desired* (this is contra-indicated, unless presenting part has been forced down naturally, on account of danger of infection). If replacement is impossible (from contraction of uterus), *apply forceps to the head alone* (if head and extremity are presenting), and exert traction, avoiding the other part. If hand presents, secure it by a loop of tape before replacing: 1. To be able to pull arm past



head if version is done. 2. To be able, if necessary, to recognize it as first child born, should there be another child (primigeniture). If other treatment fails, perform *Cesarean section* if child is alive, or *embryotomy* if dead.

Multiple Pregnancy.

FREQUENCY.—1. *Twins*, one in about eighty-six cases (at the Sloane Maternity, thirteen pairs in 8,000 cases). 2. *Triples*, one in about 5,000 cases (two cases at Sloane).

ETIOLOGY.—Twin pregnancy may be caused by: 1. Development of two separate ova, from one or two Graafian follicles; the most common cause. 2. May result from one ovum with two nuclei (double-yolked egg).

DEVELOPMENT.—If from two ova, there is a separate amnion and chorion for each fetus, and generally a separate decidua reflexa, if points of lodgement have been far enough apart; if close together, the decidual membranes fuse, and there is also fusion of placentæ. 2. If from one ovum with two nuclei, each child has separate amnion, but when seen there is a common chorion and decidua. 3. One fetus may so rapidly outgrow the other that the latter is deprived of nourishment, killed, and finally, with its placenta, pressed flat against the uterine wall (*fetus papyraceous*). 4. One fetus may develop into a monster.

SEX.—1. If from one ovum, same sex. 2. If from two ova, sex may be the same or opposite. (Of thirteen pairs at the Sloane, five were of opposite sex; five were males, and three were females).

PLACENTÆ.—1. *Twins*, placentæ may be separate or fused. 2. *Triples*, placentæ may be separate, all fused, or may be two with one double.

PRESENTATION.—More commonly vertex. (Of thirteen pairs, eight were both vertex; four were vertex and breech; one was both breech.)

DIAGNOSIS.—As a rule by inspection; the abdomen is larger in transverse diameter, and as a whole is larger than normal. Sulcus usually seen between fetuses. *Twins* are shown, on palpation, by presence of two heads and two breeches; or on auscultation by two hearts.

PROGNOSIS.—Uncertain for both mother and children; the results of multiple fetation are bad for both:

Mother.—1. Abnormal pressure. 2. Greater excretion of toxins, hence albuminuria and eclampsia are more common. 3. Uterine inertia is common from over-distention, and results in postpartum hemorrhage. 4. More danger of infection from surgical interference.

Children.—1. Apt to be premature, from early over-distention of uterus; hence children are under-developed. 2. One is apt to gain nourishment at expense of the other; hence one is apt to be undersized, ranging from slight underweight to *fetus papyraceus* (the remains of an early fetus in the membranes of a normal baby). 3. Circulation may be interfered with, from pressure of one child on the other, or from locking, due to (a) both heads presenting, the head of one being locked against the neck of the other; (b) one presenting by breech, the other vertex, and locking chin to chin; (c) one baby transverse, the other sitting astride its body.

MANAGEMENT.—Labor, in multiple pregnancy, is tedious, due to uterine inertia from over-distention.

First Child.—Labor is usually normal, but slow. After the birth of first child, tie cord twice, owing to placental anastomosis (better to tie all cords twice). Wait fifteen to thirty minutes before rupturing second membranes, to allow uterus to contract.

Second Child.—Examine presentation, and if normal, rupture the membranes and let labor proceed. There is usually little difficulty, as maternal tissues are already stretched. It is necessary to hold fundus for at least an hour after birth of last child.

Triplets.—Management is same as in twins. The babies are usually smaller, and it is exceptional to get more than one living child.

Placentae.—Ordinarily, the placenta and membranes are not born until after birth of both babies. Both may be expelled after birth of first child, in which case second child must be delivered at once.

Locked Twins.—1. Head of one child may be locked against that of the other, both heads being below. 2. Chins

may be locked one against the other. 3. One baby may present sitting astride the other. *Treatment*: Always avoid the abdomens coming in contact, as chin of one may lock with any part of the other. In case of locked twins: 1. Push up obstructing head, and deliver first child. If this fails: 2. Apply forceps to head of second child and deliver it past the first. 3. As a last resort, decapitate first child and deliver second with forceps.

Anomalies of Fetal Appendages.

MEMBRANES.—The membranes may be *too thin*, in which case they may rupture too early and give rise to *dry labor*; if they are *too thick* they may not rupture until the head presents at the vulva (*caul*), or the whole ovum may be expelled unbroken (usually with premature babies). An *excess in liquor amnii* (polyhydramnios) may cause dystocia by the consequent thinning of uterine wall; while a *deficiency of liquor amnii* (oligohydramnios) results practically in a dry labor.

UMBILICAL CORD.—The cord may be *too short*, and prevent advance of child or cause premature separation of placenta; it may also give rise to malpresentation. *Diagnosis* is difficult, but may be suspected if there is exaggerated pain at placental site, marked recession of presenting part after each pain, and retardation of labor without other cause. *Treatment* is forceps delivery (if cephalic presentation), cutting cord as soon as it presents. If the cord is *too long*, it may be wrapped around head or extremities of child and be fatally compressed; or it may become prolapsed during labor.

PLACENTA.—The placenta may obstruct labor by its *position* (placenta previa); by being *abnormally adherent* as a result of inflammation (e. g., syphilis); may be retained on account of *large size* (as in twins); and may be *prematurely separated*, causing severe hemorrhage (accidental hemorrhage).

Anomalies in Fetal Development.

OVERGROWTH OF CHILD.—1. *Prolongation of pregnancy* may cause dystocia from overgrowth of child (prolonged (?) pregnancy is usually due to miscalculation). Best not let go more than three weeks beyond expected date. Impregnation may not occur until just before period succeeding insemination, but just in time to stop menstruation; hence pregnancy may go three weeks beyond expected time. Watch carefully the rela-

tive size of child and pelvis; if child is getting too large, induce labor. 2. *Overgrowth of one or both parents*, and especially a large father and little mother. 3. *Multiparity*—size of child increases with each successive pregnancy up to fourth or fifth; size remains stationary for two or three pregnancies, then decreases up to menopause.

PREMATURE OSSIFICATION OF HEAD.—Moulding is impossible, and no overlapping of cranial bones can be felt. The condition is difficult to diagnose. Craniotomy, Cesarean, or forceps may be necessary.

FETAL MONSTROSITY.—Especially double monsters, as double heads, double bodies, or both (e. g., Siamese twins). Action of Nature in delivering monsters is marvelous, and embryotomy, etc., is rarely necessary. It is justifiable to sacrifice one or both children if necessary for safety of mother.

HYDROCEPHALUS.—A common condition. The fluid as a rule is in ventricles (lateral); but may be outside of brain, or even outside of skull, under skin (*hydroencephalocle*).

Diagnosis.—In *vertex presentation*, suspect hydrocephalus if the head does not advance and is felt above pubes, with bones soft, sutures widely separated and fontanelles long. First make sure that trouble is not due to distended bladder; if there is no advance with strong pains and normal pelvis, disinfect hand, go into lower segment and feel. With *breech presentation*, the body is born normally, while the head fails to engage and can be felt as a large mass above the brim.

Treatment.—If sufficiently marked to cause pronounced dystocia, the child is not worth saving, hence tap the head and remove the fluid. *Vertex*: Forceps is not indicated, owing to poor application, with slipping, and laceration of the maternal soft parts. If head is too large after removing fluid, do cranioclasty or craniotomy. If, for any reason, it is necessary to have the child live (e. g., when necessary to have an heir), then tap head (providing presentation is vertex), and after the birth, strap up head so child will live for a short time. May sometimes be best to do version. The danger to mother is considerable if attempts are made to save child. *Breech presentation*: Breech may be born before diagnosis is made; the head

may be sufficiently drawn out to be born, but if delayed, tap behind the ear or through spinal canal.

Prognosis.—Difficulty in labor is not proportionate with the amount of fluid—with large amount of fluid, bones are thin and easily moulded, while with a small amount of fluid, the bones are solid, moulding is impossible and labor is difficult. The latter are disappointing cases, as they later develop marked degree of hydrocephalus.

ENCEPHALOCELE.—A hernia of skull; causes dystocia from the malformation. If in occipital region, the tumor is large; if in frontal region, tumor is small. The dystocia is not usually marked, as tumor is in line with head.

Varieties.—*Encephalocele*, when the protruding meninges contain only brain tissue. *Hydrocephalocele*, when the tumor contains brain tissue distended with fluid. *Meningocele*, when only the meninges protrude through the defect in the skull.

GENERAL ANASARCA.—There may be marked distension of skin with serum, resulting from various causes; it is usually accompanied by fluid in the serous cavities. The babies as a rule are premature.

TUMORS OF FETUS.—Teratomata, and cystic (*spina bifida*) and other tumors of sacrum may obstruct labor and require amputation or puncture of tumor or embryotomy or Cesarean section.

XVI. ACCIDENTS AND DISEASES CAUSING DYSTOCIA.

Prolapse of Cord.

The cord is said to be *prolapsed* when it presents with, or slips past presenting part.

ETIOLOGY.—1. Lack of conformity of the presenting part and pelvis, and favored by (*a*) downward direction, and (*b*) slipperiness of cord. 2. Multiparity—a large, lax uterus, and poor conformity. 3. Polyhydramnios, with sudden gush of fluid. 4. Malposition of uterus, as from pendulous abdomen. 5. Abnormally long cord. 6. Abnormal insertion of cord (velamentous or marginal). 7. Dead child. 8. Standing position

during labor. 9. Placenta previa. 10. Pelvic deformity. 11. Multiple fetation (twins, triplets, etc.). 12. Abnormal presentation (breech, transverse, etc.). 13. Version.

DIAGNOSIS.—1. Before rupture, feel worm-like, looped mass at side of presenting part. 2. After rupture, feel cord; the presenting part may be within loop, but is usually at the side. May be mistaken for prolapsed intestines, from rupture of the uterus, or exomphalos (umbilical hernia) of child.

MANAGEMENT.—Treatment depends on whether or not cord pulsates; if not, then child is dead, and there is no need for haste; if pulsations are felt, child is alive, and cord must be replaced. *Position of woman:* To replace the cord, have woman's head low and pelvis elevated: 1. Knee-chest, probably the best in private practice. 2. Trendelenburg, on inverted chair. *Method:* Keep hips elevated until membranes rupture and part is engaged; after rupture, if cord presents, put woman in knee-chest position and replace: 1. Introduce fingers into cervix and push cord back to side of presenting part, letting the part come down past cord. Best to replace by fingers if possible; if not: 2. Use a cord repositor, or a soft rubber catheter, with loop of tape through eye; apply end of catheter to cord, and hook loop of tape over end of catheter; while passing in upward direction the loop remains in place and carries the cord with it, but on withdrawing catheter the loop slips off, releasing the cord. 3. If impossible to keep cord in place, apply forceps, being careful not to compress cord under blades; or do version, as mortality of breech with prolapse is only half that of vertex with prolapse; this only applies where forceps is contra-indicated from non-dilatation of cervix.

MORTALITY.—1. *For child:* Vertex, 64 percent., breech, 32 percent.; hard head shuts off fetal circulation, while the soft breech does not fit so closely. If breech presents, place cord where least pressed upon, and watch the fetal pulse. 2. *For mother:* (a) From interference in doing version; (b) early separation of placenta from traction; if breech presents, and cord is between legs, endeavor to pull down loop and place to one side of presenting part.

Premature Rupture of Membranes.

ETIOLOGY.—1. Membranes too thin. 2. Careless examina-



tions, especially during pains. 3. Deformity of pelvis, preventing engagement of presenting part.

RESULTS.—1. *Dry labor*, in which the birth canal must be dilated by the hard, unyielding presenting part instead of by the bag of waters. 2. Labors are longer and more painful than the average. 3. Greater likelihood of lacerations of cervix, vagina and perineum. 4. More frequent demand for artificial termination of labor by forceps.

TREATMENT.—1. Prevent patient from becoming exhausted before onset of second stage of labor. 2. Use great care in preservation of tissues. 3. Use forceps if necessary.

Hemorrhage.

- A. Before labor, from
 - 1. Abnormally situated placenta.
 - 2. Normally situated placenta.
 - 3. Abnormally situated placenta and fetus.
- B. During labor, from
 - 1. Abnormally situated placenta.
 - 2. Normally situated placenta.
 - 3. Lacerations.
- C. After labor - - -
 - 1. Postpartum hemorrhage (so-called).
 - 2. Puerperal hemorrhage.

HEMORRHAGE BEFORE ONSET OF LABOR.

PLACENTA PREVIA.—Placenta situated wholly or partially in that part of the uterus which dilates during labor—the lower uterine segment. (*Unavoidable hemorrhage*, as opposed to *accidental hemorrhage* from normally situated placenta.)

Varieties.—1. *Complete*, when internal os is entirely covered. 2. *Incomplete*, when the os is not completely covered; may be (a) *lateral*, when placenta does not reach os; (b) *marginal*, when just reaching os; (c) *partial*, when overlapping os.

Etiology.—1. Rare in primiparæ. 2. More common in multiparæ, the liability increasing with each successive pregnancy. 3. Low implantation of ovum: (a) *Primary*, when first lodgment is low; (b) *secondary*, when first attachment of ovum was imperfect, with subsequent slipping down, usually due to endometritis, subinvolution, malformed uterus, or multiple pregnancy.

Frequency of Placenta Previa.—Ordinarily, one in 750 cases; at Sloane, one to 154, in 8,000 cases.

Source of Blood.—From thickened decidua serotina, and

not from fetal part, unless from injury; hence great danger to mother.

Diagnosis.— Hemorrhage in first three months is not from placenta, as placenta is not formed until third month; most common time is from the sixth to seventh month. 1. Note profuse discharge of bright red blood, usually without pain (unless in labor). 2. Cervix is softer, more congested and purple, and pulsations in the vagina are more marked than normal. 3. Indistinctness of presenting part. 4. Edge of placenta may be felt with the finger, but in lateral implantation this cannot be verified positively.

Cause of Hemorrhage.— Difference in rapidity of growth of placenta and lower segment, the uterus growing faster. The hemorrhage may occur at any time, whether violently exercising or lying quietly in bed.

Indications.— The more complete the placental separation, the more profuse the hemorrhage. In cases of severe hemorrhage, the one indication is to empty uterus; soften cervix and proceed to induce labor. "Red blood is red flag of danger." Amount of first hemorrhage is no indication of amount of second or third; the first may be slight in amount, followed by a second and fatal hemorrhage. Does not always occur during pregnancy (before seventh month), but may occur first during labor and be fatal. The nearer complete the placenta previa, the more severe the hemorrhage; if lateral, it may not be found until after a normal labor, as head comes down and presses on placenta, preventing hemorrhage.

Treatment.— With pronounced hemorrhage from placenta previa occurring at seventh month, do Braxton-Hicks version as soon as possible: Pull down foot, thigh and half breech, to plug cervix; this dilates cervix and checks hemorrhage. If cervix is undilated (less than two fingers), dilate it with gauze or bag for one or two hours; then introduce fingers and bring down the part; use largest size Voorhees bag (No. 3 or 4), and introduce outside of membranes (extra-ovular). If the placenta has lateral implantation, with little bleeding and vertex presentation, rupture the membranes and let child come down, as pressure of head will check bleeding.

Prognosis.— Not more than 10 percent. of mothers should



be lost, while the mortality of babies is about 50 percent., owing to: 1. Prematurity (large percent.). 2. Malposition or malpresentation. 3. Prolapse of cord (common). 4. Version, with early delivery through cervix not well dilated. In a series of 20,000 deliveries at Sloane Maternity, there were 174 cases, 39 complete and 135 incomplete; these cases were treated variously by Braxton-Hicks version, cervical tampon and Voorhees bag, with a total maternal mortality of 20 (11.5 percent.)—9 (25 percent.) in the complete and 11 (8.1 percent.) in the incomplete; the fetal mortality was 60.3 percent. In a subsequent series of 5,000 deliveries, there were 49 cases, 14 complete and 35 incomplete; these were treated by dilatation with Voorhees bags combined with version and rupturing of membranes (allowing head to come down), with a total maternal mortality of 4 (8 percent.)—2 (14.2 percent.) in the complete, and 2 (5.7 percent.) in the incomplete; the fetal mortality was 51 percent. (*Cragin*). It should be remembered that plugging of the cervix by version, etc., may not always control the hemorrhage, and that an open hemorrhage may be converted by this means into one of the concealed variety; this is very rare, however.

PREMATURE SEPARATION OF PLACENTA.—*Accidental hemorrhage* from complete separation of a normally situated placenta is the most dangerous condition met with in obstetrics; the most frequent cause is toxemia of pregnancy. Hemorrhage may occur before or during labor, from: 1. Hemorrhage into placenta (*white infarct, placental apoplexy*), from diseased vessels, with formation of blood clot. 2. Premature separation of the placenta (*accidental hemorrhage*). The hemorrhage may be open or concealed, more often the former. The blood is dark in color, and trickles down the uterine wall out into the vagina.

Etiology.—1. Placenta is less firmly attached in later months. 2. Multiparity. 3. Endometritis. 4. Disease of kidneys, as threatened eclampsia and nephritis. 5. Short cord pulling on placenta. 6. Syphilitic disease of placenta. 7. Severe infectious diseases, as smallpox, or scarlatina. 8. Falls, blows, etc. 9. Toxemia of pregnancy. 10. Over-stretched uterus, as from polyhydramnios, etc. 11. Malformations of uterus. 12. Subinvolution.

Varieties.—1. *Complete* (rare). 2. *Incomplete*; hemorrhage is open or visible, or concealed: (a) Opposite middle of placenta; (b) may break through placenta into amniotic sac; (c) blood dissects upward under membranes; (d) may form clot and plug cervix. Bleeding usually becomes open, but often not until too late to save life after being detected.

Symptoms and Diagnosis.—1. Tearing pain at site of hemorrhage, due to stretching of uterine fibres (no pain in placenta previa). 2. Placenta not felt (it can be felt in most cases of placenta previa). 3. Often a bulging, boggy mass at site of hemorrhage (absent in placenta previa). Aside from hemorrhage, the three most important symptoms are: 1. Tearing pain. 2. Bulging mass. 3. Shock of internal hemorrhage.

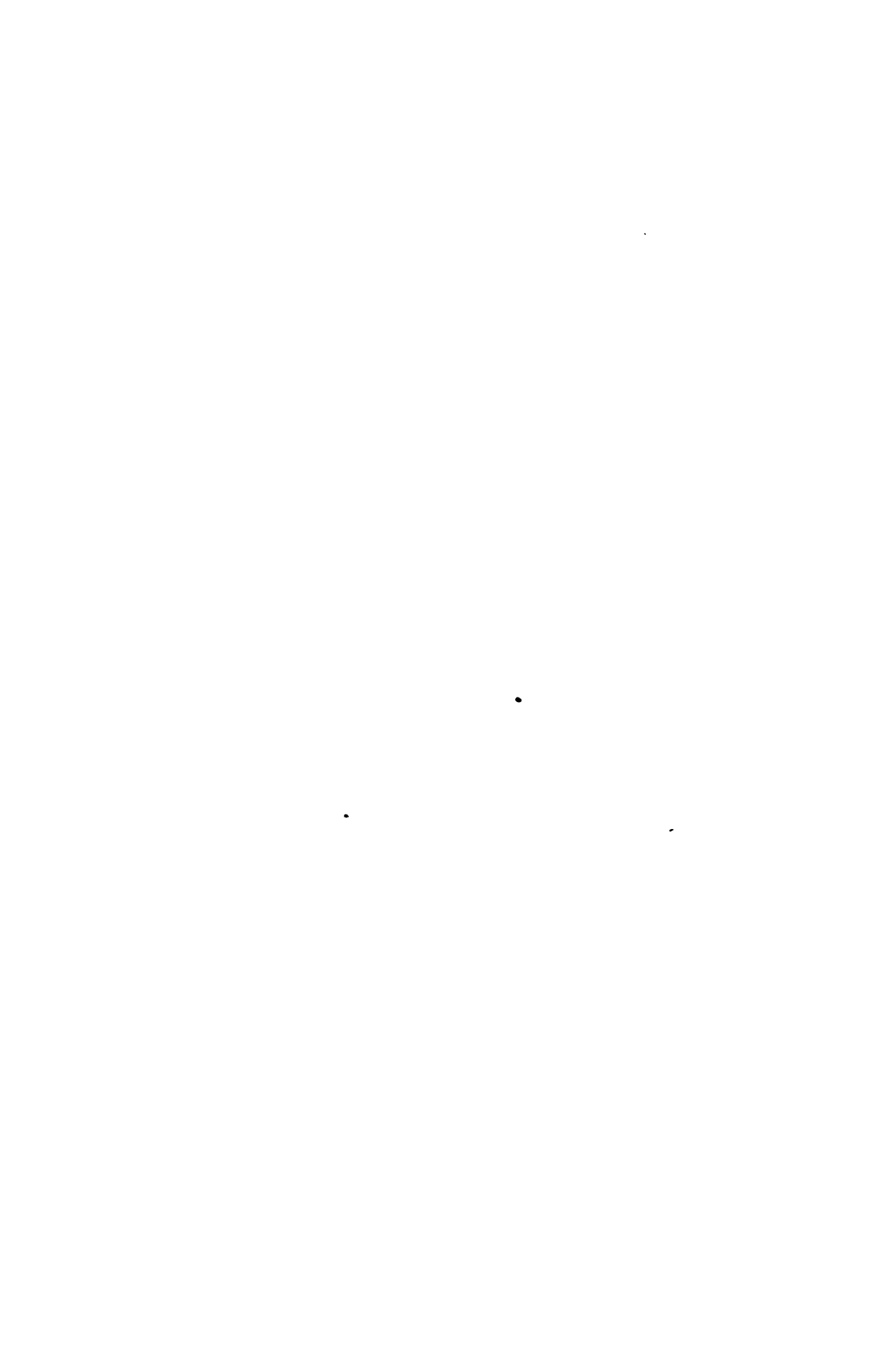
ACCIDENTAL HEMORRHAGE	VS.	RUPTURE OF UTERUS.
Occurs during pregnancy or early in labor.		Usually late in protracted and difficult labor.
Membranes usually not ruptured.		Membranes ruptured.
Uterus is large and flabby, and but slightly contracted.		Uterus firmly contracted.
Presenting part does not recede.		Presenting part recedes.

ACCIDENTAL HEMORRHAGE	VS.	PLACENTA PREVIA.
Tearing pain.		Usually no pain unless in labor.
No placenta can be felt.		Placenta may be felt.
May feel bulging mass near fundus (hematoma).		No such mass felt.

Mortality.—The danger is greater in concealed than in open hemorrhage, hence high mortality. 1. Mortality of children, 90 to 100 percent. 2. Mortality of mothers is high, and depends on the treatment instituted.

Treatment.—If hemorrhage is very slight, keep patient quiet and pregnancy may go on to term; keep a close watch, however. If she has continued sharp pain and signs of toxemia, hasten dilatation of cervix and empty uterus. Disregard child, as it is usually dead unless the hemorrhage is slight; consider only life of mother, combatting shock and hemorrhage. For shock, use strychnin. For hemorrhage, empty uterus as speedily as safety to soft parts will permit; using version or forceps, causing the presenting part to press upon bleeding area. After bleeding has been stopped, make up amount of blood lost by infusion of salt solution, and keep the uterus contracted. Small hemorrhages into the placenta may occur with-





out danger and without being noticed, the child going on to delivery; shown after birth by white placental infarcts.

ECTOPIC GESTATION.—1. Internal bleeding, into the abdominal cavity, from rupture of Fallopian tube. 2. Bleeding from the uterus, from separation of decidua.

HEMORRHAGE DURING LABOR.

RUPTURE OF UTERUS.—Most likely to occur before child is out, about once in 3,000 or 4,000 cases. Generally due to lack of judgment on part of obstetrician.

Etiology.—Lower segment thins, while the upper segment thickens; while in this condition: 1. If obstruction is insurmountable, uterus goes on to rupture (*capped uterus*—the upper uterine segment can be felt resting on upper pole of child). 2. Attempts at version with uterus firmly contracted. 3. Fatty degeneration, old cicatrices, or fibroids may act as predisposing causes. 4. Anything obstructing advance of head. 5. Forceps improperly applied.

Location of Rent.—Usually in lower segment, the line being horizontal; on left side, right side or behind, in order of frequency; may also extend upward, in T-shape.

Varieties.—1. *Complete*, when extending entirely through uterine wall into abdominal cavity. 2. *Incomplete*, when extending partially through wall.

Results.—In incomplete variety, peritoneum may be stripped off, forming a large cavity which contains blood and part or whole of fetus; hand may pass into this cavity, and intestines be felt through the thin peritoneal membrane.

Symptoms.—1. Labor pains cease. 2. Tearing pain. 3. By feeling through abdomen, upper segment is found small and hard. 4. Recession of presenting part. 5. Presence of tumor. 6. Hemorrhage (as a rule). 7. Shock. Diagnosis is often not made until after labor, as when version is done in unsuitable cases—the patient is usually under chloroform and the pain is absent; however, hemorrhage and shock are guides.

Treatment.—*Prophylaxis:* Avoid over-distention of lower segment by: 1. Correcting malpresentation. 2. Avoiding version in tonic uterus. 3. Not allowing labor to remain long in second stage (rule, two hours). *Active treatment:* 1. Incom-

plete: Not necessary to open abdomen; clean out uterus and sac, and pack the cavity, using plain or, better, weak iodoform, gauze. 2. Complete: The laceration is usually worse, the shock and hemorrhage more pronounced than in incomplete variety; the upper and lower segments may be almost entirely separated. Treatment depends on circumstances—if alone, packing is safest; if help is at hand, open abdomen, irrigate, and sew up rent, or amputate uterus. Give infusion of salt solution, strychnin, etc., for shock.

Delivery of Child After Rupture of Uterus.—If rupture is small, deliver through natural passage; if most of child is in abdomen, deliver by Cesarean.

Mortality.—Children, 90 percent.; mothers, 60 percent. The mortality of mothers is lower when abdominal section is possible, but difference does not justify the risk of doing laparotomy when without assistance.

LACERATIONS OF CERVIX AND VAGINA.—With fundus firmly contracted, hemorrhage must come from lacerations of cervix or vagina, or both.

Causes.—1. Premature or precipitate labor. 2. Premature rupture of membranes. 3. Extraction of head (forceps, etc.), before dilatation is complete. 4. Impaction of interior lip of cervix between head and symphysis. 5. Abnormal rigidity of cervix, from cicatrices, etc.

Diagnosis.—1. If fundus is relaxed and blood comes in gushes, it is probably from uterus. 2. With fundus firmly contracted and perineum intact, a steady flow of bright red blood is probably from cervix. 3. Bleeding from vagina or perineum can be detected by damming back blood from above with cotton or gauze sponges.

Treatment.—If the laceration is small and bleeding is slight, or if no instruments are at hand, give a hot acetic *douche*, and *pack with gauze*; if laceration is extensive, best to repair it, as suturing is the best means of checking hemorrhage. *Sutures:* Have speculum, scissors, volsella, artery clamps, needles and suture material; silkworm gut is best, but catgut or silk may be used. If no volsella at hand, pull down cervix with stitch in anterior and posterior lips (tissues are relaxed and easily brought down). Begin at upper angle of tear, leav-

ing a large opening. (That it interferes with involution is one argument against immediate repair, as the cervix may become contracted, and retained lochia favor infection; hence leave a larger canal than appears necessary, to allow good drainage.)

Complications.—Rupture of uterus may result from extensive lacerations of cervix running up into lower uterine segment.

LACERATIONS OF PERINEUM.—Should be repaired at once, as: 1. Pain is slight (parts are non-sensitive from pressure). 2. Lessens danger of infection. 3. Prevents future relaxation. Any tear a half inch or over in extent should be repaired.

Rupture of Bulbs of Vestibule.—Use purse-string suture, as it is impossible to catch pleading points and needle may increase hemorrhage. If suturing fails to check bleeding, pack with gauze.

HEMORRHAGE AFTER LABOR.

POSTPARTUM HEMORRHAGE.—So called, when occurring within twelve hours after birth: 1. Before birth of placenta, from partial separation, and inability of uterus to contract and close vessels. 2. After birth of placenta, from relaxation of uterus due to uterine inertia; or may be due to lacerations.

Conditions Normally Preventing Hemorrhage.—1. Increased coagulability of blood during pregnancy. 2. Contraction and retraction of uterus, closing vessels (chief factor).

Causes of Relaxation of Uterus.—1. *Favoring relaxation:* (a) Poorly developed uterine muscle; (b) over-stretched muscle; (c) over-tired muscle; (d) muscle weakened by disease; (e) too rapidly emptied uterus; (f) insufficient innervation of the muscle from disease. 2. *Preventing contraction:* Causes inside uterus: (a) Retained placenta; (b) retained blood clots; (c) fibro-myomata. Causes outside uterus: (d) Adhesions fixing the uterus; (e) over-distended bladder or rectum.

Symptoms.—Have symptoms well in mind, as there may be no external signs of blood and yet woman die from internal hemorrhage. Note if uterus is firm and hard (normally size of a cricket ball), or a soft bag of blood clots, which are expressed with a gush on squeezing fundus. *Signs of hemorrhage:* Pallor of face, pinched nose, rapid pulse, shallow respiration, air hun-

ger, the patient wanting to be fanned; restlessness, gasping, obscured vision.

Treatment.—1. *Prophylaxis* is most important: (a) Have good hygiene, plenty of fresh air, etc., during pregnancy to prevent weak muscle. (b) Don't leave too long in the second stage of labor; deliver by some operative treatment rather than let the woman become exhausted. (c) Third stage: Deliver placenta early, but not within twenty minutes after birth of child; use Crede's method of expulsion, avoiding traction. Have fundus held for fifteen minutes after child is born, and forty-five minutes after birth of placenta (one hour in all)—holding it until uterus contracts and stays so; this prevents formation of clots. 2. *If clots form in uterus*, disinfect hand, go in and get them; if uterus is still bleeding, the pressure of hand inside, with the other hand on abdomen, will usually stimulate contractions and stop bleeding. A hot douche, 116° to 120° F., simple, saline or astringent (2 to 6 percent. acetic acid solution), may check hemorrhage. If other means fail, follow by gauze packing, having gauze reach well to fundus. 3. *Packing of uterus*: Iodoform gauze is best, as it keeps sweet longer; it should be removed in twenty-four hours, washing out any clots remaining. If no gauze is at hand, do not wait, but use anything clean, as newly laundered towels, sheets, etc., torn into strips—the danger from infection being less than that from bleeding; this must be removed sooner than if sterile packing is used. A large amount of gauze is necessary—uterus and vagina must be completely filled. 4. *Stimulate contractions of uterus*: Ergot in some form may be administered immediately after the birth of placenta, *but never give ergot until the uterus is empty*; give 2 dr. of fluid extract, or ½ to 1 dr. of ergotol by mouth, or 15 m. of ergotol hypodermatically. 5. *Compensate for loss of blood*: (a) Give intravenous saline infusions at bend of elbow. If no cannula at hand, use aspirating needle in breast or back (hypodermatoclysis); it is painful and less rapid, but fluid is readily absorbed. (b) Elevate legs and hips, and compress abdominal aorta. (c) Elevate foot of bed and bandage extremities, frequently changing bandage from one to other extremity (bleeding into veins). (d) Saline rectal enemata are of great value, relieving thirst and supplying fluid

to blood. (e) As soon as patient has rallied, give water frequently and in small amounts, as much as stomach will tolerate. 6. *Stimulate patient* by use of strychnin, 1, 30 gr. every hour; or give morphin, 1, gr. (Magendie's solution). Begin administration of iron as soon as possible. The food should be easily digested and nourishing—remember the stomach is sensitive; give milk and lime water, broth, etc.

PUERPERAL HEMORRHAGE.—(So-called.) Any hemorrhage occurring between twelve hours and one month after labor.

Causes.—Anything which interferes with the contraction and retraction of uterus. *Predisposing causes* are: 1. Lack of massage of fundus. 2. Distended rectum (do not let go over twenty-four hours). 3. Over-distention of bladder (catheterize every eight hours if woman cannot void). 4. Displacement of uterus. *Active causes:* Some foreign body in uterus, as: 1. Retention of portions of placenta or membranes, or blood clots (most common); hence examine placenta and membranes in every case to see if intact. If only a small portion of amnion or chorion is left (size of silver dollar), it is not necessary to go in unless the temperature rises in a day or two; if a large portion is left, sterilize hand and remove it at once. Portions of placenta succenturiata may be left and give rise to trouble. 2. Placental polypus—a persisting villus, with fibrin, etc., deposited around it; may remain for a month or even a year preventing normal contractions of uterus. 3. If flexion of uterus occurs, clots may accumulate and bleeding occur from resulting congestion. Retroflexion is caused by over-distended bladder; antelexion (less common), from distended rectum. 4. Emotion—family discord, etc.; vessels open and uterus balloons up.

Treatment.—Clean out uterus, and keep it contracted with ergot or-ergotol. Remove polypi with fingers or curette.

Inversion of the Uterus.

Inversion of the uterus (*prolapse of the uterus*, or *procedentia*) is the rarest of all accidents to parturient woman. Occurs with equal frequency before and after delivery of the placenta.

Varieties.—1. *Complete*, when the uterus is inside out and upside down. 2. *Incomplete*, when there is a cup-shaped de-

pression in the fundus. It may be: 3. *Acute*, the only form considered in obstetrics. 4. *Chronic*, the result of acute, or caused by weight of fibroid.

Causes.—Often caused by the accoucheur; it is favored by relaxation of uterus. 1. May occur spontaneously, from the weight of placenta pulling down fundus, or from short cord (rare). 2. Too vigorous application of Crede's method is the cause of many incomplete inversions; if slight, may correct itself. 3. Pulling on cord, to extract placenta, as once practiced, was a common cause.

Symptoms.—1. Shock, especially if the inversion is complete (inexplicable). 2. Hemorrhage, due to interference with contraction. 3. Pain, like tenesmus, from uterus contracting on inverted portion.

Diagnosis.—Inspection and palpation show: 1. Absence of the fundus above. 2. Presence of tumor below. 3. Uterine character of tumor, especially if it can be felt; perhaps placenta is attached, and openings of tubes may be seen. Must be differentiated from pelypus, or pediculated uterine fibroid.

INVERSION OF THE UTERUS	VS.	PEDICULATED FIBROID.
Tumor is central.		Tumor is usually lateral.
Sound passes all around, but does not pass into uterus.		Sound passes the whole length of uterus except at attachment of pedicle.
Fundus is absent or indented.		Fundus is not indented.

Treatment.—*Prophylaxis:* 1. See that the uterus is firmly contracted and retracted after labor. 2. Use care in expelling placenta, not to indent fundus. 3. Avoid traction on cord. *Active treatment:* 1. If uterus is completely inverted, and outside vagina or vulva: First separate placenta, if attached. To replace portion outside, begin by pushing back, with tips of fingers, that part first which came out last, beginning at the cervix posteriorly; the greatest difficulty is in starting, and this increases with the length of time uterus has been inverted. Use great care not to bruise tissues; may try twice, or even three times, at intervals of five or six hours, each time using an anæsthetic. 2. If impossible to replace early, wait five or six weeks until involution has taken place, unless the symptoms are urgent. 3. In subacute and chronic cases, start with col-



peurynter (elastic bag); then try method as at first, with fingers at cervix and one hand on abdomen. 4. In partial prolapse, insert sterile hand into uterus and round out the inverted fundus. *Cutting operations:* 1. Open the abdomen, dilate ring from above with glove-stretcher, and replace uterus (not recommended). 2. Cut ring from below, replace uterus, and sew up cut. (*Hirst*). 3. Removal of uterus may be indicated at any time, especially if there is sloughing. After replacement of uterus stimulate contractions with ergot, hot douche and packing.

Toxemia of Pregnancy.

The Toxemia, or *auto-intoxication of pregnancy*, is the direct cause of pernicious vomiting, and, in the later months, of eclampsia.

IN EARLY MONTHS.—The toxemia in the first half of pregnancy is probably due to the growth and secretion of syncytial cells which produce a hemolytic substance, this in turn exciting the production of an anti-body, syncytiolysin.

Symptoms.—The chief symptom of the toxemia of early pregnancy is exaggerated vomiting; the blood pressure is low.

Pathology.—Fatal cases show a degeneration of the hepatic lobules, beginning in the center and extending to the periphery.

IN LATER MONTHS.—The auto-intoxication occurring in the latter half of pregnancy is probably due to the inability of the damaged kidneys and liver to transform and excrete the products of fetal metabolism. The kidneys are probably more frequently at fault.

Symptoms.—In only about one-fifth of the cases are the toxic symptoms not preceded by albuminuria. The chief symptoms are rapid pulse, high blood pressure, failing vision, and finally an outbreak of eclampsia. Edema, scanty urine and albuminuria are usually present, and occasionally there is a prolonged irregular fever, rapid pulse and marked emaciation (resembling tuberculosis).

Pathology.—In this type the liver degeneration begins in the periphery of the lobule and extends to the center. Extreme conditions may result in acute yellow atrophy of the liver.

TREATMENT.—Is practically that for kidney diseases in pregnancy, eclampsia and pernicious vomiting—the stimulation of elimination and, if necessary, the emptying of the uterus.

Pernicious Vomiting.

Pernicious Vomiting is an exaggeration of the physiological nausea and vomiting of pregnancy, increasing until the stomach becomes almost or totally unretentive.

CAUSES.—1. Toxemia of pregnancy (most important). 2. Reflex irritation of stomach, due to enlarging uterus; hence, more common in primiparæ (especially elderly women), twin pregnancy, polyhydromnios, chronic metritis or displacements of uterus. 3. Neurotic condition of the woman; but first two causes are more likely to occur in neurotic patients.

DIAGNOSIS.—May be difficult to determine the cause, but always let hyperemesis excite a suspicion of pregnancy. A change in the relative proportion of ammonia nitrogen (normal 5+ percent.), and urea nitrogen (normal, 80 to 85 percent.), may indicate toxic vomiting, the former rising to 20 percent. or higher. A bad picture is vomiting combined with jaundice, high ammonia nitrogen and low urea nitrogen.

TREATMENT.—*Hygienic:* Regulation of diet; attention to gastro-intestinal tract, sexual relations and mode of life; rectal alimentation may be resorted to with success. *Medicinal:* Anti-emetics, nerve sedatives, and rectal or hypodermatic injections of normal salt solution. *Gynecological:* The correction of malpositions of uterus, and treatment of inflammation of cervix or canal. *Obstetrical:* The artificial termination of pregnancy should be decided upon as a last resort, but it must not be delayed too long.

Eclampsia.

Eclampsia is a series of convulsive movements, with loss of consciousness, and ending in coma; it may occur during pregnancy, labor or puerperium. Eclampsia in the later months corresponds to pernicious vomiting of the early months.

TYPES.—There are three types, depending upon the organs chiefly involved: 1. *Hepatic type*, when the liver alone is involved; the urine contains little or no albumin. 2. *Nephritic*

type, due to chronic diffuse nephritis, the liver being normal. 3. *Hemorrhagic liver type*, the most dangerous, is accompanied by jaundice and vomiting of blood.

ETIOLOGY.—Many theories: 1. Accumulation of urea in the blood. 2. Formation of ammonium carbonate in the system. 3. Spasm of arteries in brain. Either of these may be associated with the disease, but none explain. It is due to storing up in body of certain toxic materials which should be eliminated; the kidneys (most probably); liver, skin, intestines, and lungs, may one or all be at fault. There are certain changes in the liver which resemble those in acute yellow atrophy.

OCCURRENCE.—Most apt to occur in those cases where uterine and abdominal pressure is greatest, as in: 1. Primiparæ. 2. Multiple pregnancy. 3. Very young or very old women.

SYMPTOMS.—The responsibility is greatest in threatened cases, as premonitory symptoms do not always exist; the attack may be brought on suddenly by exposure, excessive eating, drinking of wine, etc.; hence avoid over-eating, and exposure of skin in pregnancy—low neck dresses and banquets.

Premonitory Symptoms.—Be on guard for: 1. Headache. 2. Disturbances of vision, as blurring of print or twitching of lids. 3. Disturbances of hearing, as tinnitus aurium. 4. Pain in the epigastrium. 5. Nausea and vomiting. 6. Nervous symptoms (generally first to appear), as nervousness, irritability or apathy. 7. High tension pulse.

Active Symptoms.—1. Twitching of eyelids. 2. The pupils alternately contract and dilate. 3. Twitching of mouth. 4. Tonic spasms of fingers, hands, arms, jaws, respiratory muscles; tongue may be bitten; fingers and thumbs are flexed in palms, forearms are flexed on arms, etc. 5. Face is cyanosed. 6. Head is drawn to one side, eyes in opposite direction. These symptoms last but a few seconds, then: 7. Clonic spasms come on, with jerking of whole body; this lasts for from one to five minutes, and is followed by: 8. Coma, lasting for half an hour. There may be many attacks—a case with eighty convulsions has been reported.

Symptoms of Grave Case.—1. Elevation of temperature, if it rises with each attack. 2. Large number of convulsions. 3. Condition of urine—after first attack, there is diminution in

quantity, urea is diminished, and there is a large amount (as much as 16 percent.), of albumin, casts and perhaps blood. 4. High tension pulse. Three hundred grains of urea in twenty-four hours is a liberal amount. A danger signal is an increasing amount of albumin which does not yield to treatment, and a decreasing amount of urea, combined with nervous symptoms.

DIAGNOSIS.—Eclampsia must be diagnosed from other conditions associated with convulsions, as hysteria, brain disease, etc., and especially from epilepsy.

ECLAMPسيا	VS.	EPILEPSY.
Patient is not subject to convulsions.		Subject to convulsions.
Urine usually shows albumin.		Urine usually shows no albumin.
Edema common.		No edema.
Prodromal symptoms, as a rule.		None, except aura.
Rising temperature.		Temperature normal.
ECLAMPسيا	VS.	HYSTERIA.
Unconsciousness.		Usually not unconscious.
Coma.		No coma.
Urine scanty.		Urine abundant.
Albuminuria.		No albumin in urine.
Decrease in urea.		Urea normal.
Muscular contractions more marked.		Less marked.

PROPHYLACTIC TREATMENT OF ECLAMPسيا.—Begin early in pregnancy, watching urine, and advising as to food (low proteid diet and an abundance of water); clothing, care of body, etc.; examine urine frequently, even once a day in suspected cases, and watch for any evidences of lack of elimination, as headache, edema, scanty urine with albumin and decreased amount of urea, etc.

ACTIVE TREATMENT.—*Sources of toxins:* 1. The ingestion of too much food of nitrogenous character, especially red meats (potassium compounds). 2. Storing up of bile. 3. Accumulation of intestinal contents, with fermentation. 4. Storing up of products of metabolism of mother and child (if child dies during attack the symptoms cease). Hence, *if symptoms appear*, shut off red meats, allowing, at the beginning only, white meats and fish; keep liver active, and bowels freely open with calomel and salines. Flannels should be worn, and no "lo and behold" dresses. Order frequent warm baths, taken at night, and advise free ingestion of water—specify the kind of water, time

for drinking and the number of glasses (six) to be taken daily in order to make patient drink freely. The kidneys may be embarrassed in pregnancy even when normal; they are often abnormal, due to congestion (kidney of pregnancy), and if the seat of nephritis, they are still less able to take care of excretion. If albumin is present in urine, and steadily increasing in amount, with a low percentage of urea (anything under 300 gr. daily), begin treatment at once. *If more marked symptoms appear*, put patient on milk diet, and lower tension of pulse with nitroglycerin. If symptoms still continue, put patient to bed and continue the treatment; further stimulate the skin by wet pack, covered by rubber blanket, and give plenty of drink—lemonade or water with potassium citrate (1 dr. to each 8 oz.) ; or “tartar water,” made with potassium bitartrate (1 dr. to each 8 oz.). If symptoms have not yet abated, it is not wise to try to tide over to term, but best to get rid of fetal metabolism (Nature’s method).

TREATMENT OF ECLAMPTIC SEIZURE.—The *three indications* are to: 1. Control the convulsions. 2. Empty the uterus. 3. Stimulate avenues of elimination.

Convulsions.—1. *Ether* is the one drug used in every case for control of convulsions; use as little as possible, and only during the attacks (chloroform was formerly used almost exclusively, but recent investigations have shown that it may itself cause more or less damage to the liver from necrosis of hepatic cells, extreme cases resembling acute yellow atrophy). Be ready for another convulsion as soon as coming out of one. 2. *Opium* is not so good, as elimination is checked; if pulse is strong, and patient is thrashing about, a hypodermic injection is justifiable. 3. *Chloral* is valuable as a routine treatment in almost every case; give 30 gr. by rectum, as soon as convulsions begin. 4. *Veratrum viride*; the fluid extract is a fairly constant preparation; it reduces the pulse rate and lowers temperature. **Indications** (same as for venesection): With a hard, rapid and bounding pulse, give 5 m. of the fluid extract hypodermatically, repeated in thirty minutes; if pulse has not dropped to sixty within thirty minutes, give a third injection. It is not indicated in every case. After its use, do not allow the patient to sit up in bed for some time, as it is a depressing drug.

Emptying Uterus.—Mother is liable to danger, and child is apt to die as result of disease; hence best to relieve woman of child. *Rule:* After one convulsion, empty uterus as soon as is safe for tissues of canal. If cervix is soft and dilated, use accouchement forcé—dilate with fingers, insert hand, pull down leg and extract child; go slow (take fifteen to thirty minutes), and avoid lacerations. Child is premature, but it is better to take chances of raising it than let it die in utero. If cervix is hard, dilate with gauze packing or elastic bag, and deliver as above (version).

Stimulating Elimination.—1. Best means is by giving rectal irrigations of saline solution, using a double tube and Kelly pad, and continuing for twenty to thirty minutes each time; this empties bowels, and stimulates skin elimination through water absorbed. 2. If the patient is still comatose, introduce gastric syphon and wash out stomach; then introduce, through tube,, 5 gr. calomel and 1 or 2 oz. magnesium sulphate. 3. After recovering from shock of delivery, stimulate skin by (a) hot pack—wrap patient in blanket wrung out of hot water, and cover with rubber sheet; or (b) put into tub of hot water.

AFTER-TREATMENT.—*In next twenty-four hours, give:* 1. Chloral per rectum, 20 gr. every two to four hours if needed. 2. Nitroglycerin, by mouth or hypodermatically, 1/100 gr. every four hours to 1/50 gr. every two hours. 3. Strychnin may be needed to overcome shock. 4. If shock is severe, give intravenous injection of normal salt solution, 1,000 cc. to 1,200 cc. Next morning the patient may be in a semi-comatose state, and able to speak; on second day she should have regained complete consciousness.

TERMINATION.—Mode of Death: Patient may die from exhaustion, due to frequent convulsions; edema of lungs or brain; asphyxia, from spasm of the respiratory muscles; heart failure; apoplexy, or toxemia. *Recovery:* Patient may completely recover; or there may be serious damage to kidneys, with albuminuria and casts for many years. Advise not to continue a subsequent pregnancy except under closest observation.

PROGNOSIS.—When appearing early in pregnancy, the disease is worse than when developing late in pregnancy, during labor or in the puerperium. Responsibility of the physician is



very great, being second only to infection. When occurring near term prognosis is best, as contractions are stimulated and uterus empties itself.

Mortality.— Mothers, from 10 to 20 percent., depending on treatment. Babies, 50 percent. or higher: 1. Usually premature. 2. Often killed by convulsions of mother. 3. Placental pressure, with edema and hemorrhage. 4. Asphyxia, from too little oxygen in mother's blood. 5. Toxemia of mother may kill the child. Even if the child goes on to term it will be poorly nourished, but its chances outside uterus are better than inside.

XVII. REPAIR OF LACERATIONS.

Perineum and Cervix.

LATERAL TEARS OF THE PERINEUM.— The most common; may extend through levator ani. If tear is in fourchette, and is less than 2 cm. deep, it does not necessitate suturing; if over 2 cm., sutures are required. A few stitches will close in a raw surface, and render the patient less liable to infection. Deep tears are almost always unilateral, but may be bilateral; they are never median. Superficial tears, through skin and sphincter, may be almost central. Never be satisfied with mere inspection of vulva, but separate labia and examine the sulci.

Suturing.— Begin above at angle of tear, pass needle down and in toward center of raw area, then up and out, passing underneath wound; when the fourchette is reached, insert a crown or purse-string suture, closing in the whole.

Suture Material.— For inside sutures, use catgut; for fourchette and perineum, externally, use silk-worm gut, removing it in six to eight days; tie all ends together in a large knot, and cut close to knot.

LACERATIONS THROUGH SPHINCTER ANI.— Result in perfect misery for both patient and physician. A rare condition, due to the too rapid extraction of child.

Repair.— Unless woman is in extreme shock, best to repair at once. *Two stages of operation:* 1. Suture of rectum and sphincter: Use silk-worm gut for rectum; insert needle from

rectal side, across tear, and back into rectum, beginning at the upper angle and placing sutures until sphincter is reached; tie sutures on rectal side, and let ends hang out anus. This closes the inverted V-shaped opening, and restores the rectal cylinder. 2. Suture vaginal mucous membrane and perineum with cutgut, inserting stitches same as in lateral tears.

Care of Bowels.—Do not allow the bowels to move for three days, giving an opiate if necessary; after third day, move the bowels, cautioning woman not to strain. To soften the stools, give small doses of salines (teaspoonful of Rochelle or Epsom every hour), until an inclination is felt to empty bowels; then inject 3 oz. to 4 oz. olive oil and let retain, to soften lower part of fecal mass, following it later with a soapsuds enema.

Removing Sutures.—Leave sutures longer than in shallow tear, leaving those in rectal wall for two weeks; to remove, put woman in Sims' position, use a small Sims' speculum and see sutures, then grasp ends and cut loops.

LACERATIONS OF THE CERVIX.—Unless hemorrhage is severe, best not repair at once. Much experience is necessary to avoid closing cervix too tightly, and thus causing retention of the lochia. If repaired, use catgut, or silk-worm gut.

XVIII. NON-CUTTING OPERATIONS FOR DYSTOCIA.

Induction of Labor.

INDUCTION OF ABORTION.—The artificial production of labor at any time before seventh month, and before viability of child. Life of child is disregarded.

Indications.—Justified when either mother or child is in danger. 1. *On part of child:* Usually some abnormality of the membranes, as (a) acute polyhydramnios; (b) cystic degeneration of chorion; (c) accidental hemorrhage, or (d) placenta previa; (e) fetal death from any cause. 2. *On part of mother:* The two most common indications are (a) pernicious vomiting and (b) threatened eclampsia; less common indications are (c) toxemia; (d) albuminuria; (e) pronounced and steadily increasing disease of heart or lungs; (f) chorea; (g) pernicious



anemia; (*h*) mania; (*i*) melancholia, and (*j*) any condition which may necessitate Cesarean section, as tumors, deformities, etc.

Methods.—Use of drugs, tents, vaginal tampons, electricity, etc., has been abandoned, as they are too slow, and are inefficient and dangerous; no drug will empty the uterus completely, and their use is attended by grave danger—kidney congestion, etc. Two methods now used (choice depending on age of pregnancy and condition of cervix), are: 1. The mechanical dilatation of cervix and emptying of uterus with fingers and forceps. 2. Same as above, but preceded by preliminary softening and dilatation of cervix. First method is indicated when gestation is not past second month, while between third and fifth month choice of method must be made from circumstances.

Operation.—*Single sitting:* Up to third month, uterus may be emptied at one operation. Have everything sterile. Dilate the cervix with glove-stretcher sufficiently, if possible, to admit middle finger. If gestation is six weeks or under, use dull curette and forceps (sponge holder) to empty uterus; first make a sweep around uterine cavity with finger or curette to separate membranes, then remove ovum and irrigate; feel for secundines, and pack if bleeding. After the third month, the operation should be done at *more than one sitting:* First dilate the cervix by packing the canal (up to membranes), fornix and vagina with iodoform gauze, and leave for twelve to twenty-four hours; then complete dilatation of cervix with fingers and glove-stretcher, and empty uterus by using one or two fingers.

INDUCTION OF PREMATURE LABOR.—Emptying of uterus after seventh month, and after viability of child. Interests of both mother and child are considered.

Indications.—1. *On part of child:* (*a*) Large and prematurely ossified head, with no moulding; (*b*) habitual death at certain time (induce labor before this time); (*c*) fetal death (but be sure fetus is dead—heart-beats may not be heard even with living child). 2. *On part of mother:* (*a*) Contracted or deformed canal (judge time from the biparietal diameter at various months—seventh month, 7 cm.; eighth month, 8 cm.; ninth month, 9.25 cm.); (*b*) tumors; (*c*) placenta previa; (*d*)

toxemia and eclampsia; (e) chorea; (f) mania and melancholia; (g) pernicious vomiting (toxemia), and (h) any grave systemic disease. *Do not perform the induction of labor without aid of consultant.*

Time for Operation.—It is difficult to induce labor at seventh month. Best time is at eight or eight-and-a-half months, as may then get a perfectly healthy baby. Small size of head and ease of moulding will give considerable advantage. In selecting time for operation, remember that children gradually increase in size with successive pregnancies up to thirty-fifth year.

Methods.—Drugs are no longer used; the methods now in use are: 1. Puncture of membranes. 2. Packing vagina with gauze. 3. Injection of glycerin. 4. Introduction of bougie. 5. Mechanical dilatation.

Puncture of Membranes.—A slow and dangerous method. It results in a dry labor, which is tedious and bad for mother and child.

Tamponing of Vagina.—Also a slow method, and uncertain, but probably safe if strict asepsis is observed. It softens and dilates the cervix, and hence is generally combined with other methods.

Injection of Glycerin.—Introduced by Pelzer, of Germany. A small amount (1 or 2 oz.) of glycerin is injected between the membranes and uterine wall. Usually rapid, but is attended with danger, as may cause bloody urine, etc. *Action:* 1. Irritant to mucous membrane. 2. Mechanical separation of the membranes. 3. Draws water from tissues by hygroscopic action, and reflexly causes contraction. *Method:* Observe strict asepsis; attach catheter to glass funnel, fill the catheter with fluid and insert, on left side, between membranes and uterine wall, injecting the glycerine by gravity; withdraw tube, and if necessary, put tampon against cervix. It may produce hematuria, which is bad in eclampsia.

Introduction of Bougie.—Best and quickest method and is to be preferred in private practice; it may be combined with puncture of membranes and tamponing. *Krause's method* is used: Use a stiff, silk bougie, and not a catheter, as the eye is dangerous (may retain dirt); it is better to sterilize by heat.

Have the parts thoroughly aseptic, and pass bougie along two fingers into cervix; if obstruction is met, change position. Introduce all but two or three inches, bend this upon itself in vagina, and hold in place by a gauze vaginal tampon. Introduce about nine o'clock in evening, and labor will generally begin next morning. Do not leave in over 24 hours; if labor has not then begun bougie may be again introduced. There is danger of rupturing membranes, thus causing dry labor.

Mechanical Dilatation.—If the use of bougie does not cause dilatation of cervix within twelve hours, introduce one or two fresh bougies, or dilate with elastic bag (use Nos. 2 or 3 Voorhees bag if possible); this softens cervix and hastens labor. Leave bag until labor is well advanced, exerting gentle traction every fifteen minutes if dilatation is delayed. If No. 3 bag does not start labor, insert bougie and rupture membranes. In case of emergency, soften cervix with a bag or tampon in vagina, dilate with fingers or glove-stretcher, and deliver with forceps.

Forceps.

HISTORY.—Invented by William Chamberlen, a Huguenot physician, who moved to England in 1569; he had a large family, two of the sons, both named Peter, being physicians. The invention was held in the Chamberlen family as a secret for several generations, descending to Peter the Third, whose son, Hugh, also a physician, tried to dispose of it in Paris. After losing a test case in Paris (a deformed dwarf), he went to Amsterdam, where he sold the invention to the College of Physicians of Amsterdam. The secret was later published by two philanthropic students, but the instrument as made public was probably a victis. The original Chamberlen instrument was very crude, and had only the cephalic curve; Smellie, in England, and Levret, in France, added the pelvic curve, while Simpson, in Edinburg, and Hodge, in this country, patterned the modern instrument after these. The shoulders on handles were added by Busch, in Germany.

VARIETIES.—There are at present many varieties of forceps, which may be classified under four different types:

Elliot Forceps.—Largely used, has fenestrated blades and

a long and smooth shank, with a screw between the handles to determine distance between blades. The screw is dangerous, however, as it is difficult to keep clean; otherwise, this is a good forceps.

Simpson Forceps.—Patterned after Smellie's; a short forceps, with fenestrated blades, and shoulder on proximal and distal ends of handles. Distal shoulder is a disadvantage, as it may stretch vulva.

McLane Forceps.—(Tucker-McLane). Has solid blades, and a long shank (length of Elliot forceps). The chief objection (mainly theoretical), is that the solid slip more easily than the fenestrated blades; but as head is held by the shape more than by pressure of blades, there is seldom any slipping with McLane instrument. If labor is difficult, and grooves have been made in head by blades, slipping may occur; hence it is well to have two pairs, both solid and fenestrated. In introduction and removal, the solid blades have advantage, as there are no fenestræ to catch on ears, etc.; they are also better for rotating in pelvis, which is now more practiced than formerly. Its three chief advantages are: 1. Ease of introduction. 2. Ease of rotation. 3. Ease of withdrawal; if fenestrated blades are applied for some time, they may be difficult to withdraw from catching of tissues in fenestræ.

Axis-Traction Forceps.—The Tarnier instrument is best. It is invaluable if much obstetrical work is done. It has a pulling rod and handle with universal joint, which keeps the direction of force always in line of pelvic axis, regardless of location of head in canal; simply keep rod parallel with the handles, letting forceps descend and rotate as it will. It is an expensive and complicated instrument, and does not have universal use, hence two are required. For use in emergency, it is good to have one at hand.

CHARACTERS OF FORCEPS.—The three types of forceps, long, short, and axis-traction, have different uses and applications: 1. Short (examples being Chamberlen and Smellie), are of use only when head is at outlet; they are generally without pelvic curve, and are little used at present day, as long type answers purpose. 2. Long, has both the pelvic and cephalic curve, and is best and most useful all-round type. 3. Axis-traction, re-

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quires some experience in using, but is a great advantage, no force being lost as when pulling on the handles alone.

Selection of Forceps.—A forceps should fill certain requirements in blades, shank, handles, and lock: 1. The distance between tips of blades should not be less than 1 in. to $1\frac{1}{8}$ in.; all forceps vary somewhat. 2. Distance between blades at concavity, $3\frac{3}{4}$ in. 3. Width of blade, $1\frac{1}{2}$ in. (solid blade). 4. Bow of blade, $6\frac{1}{2}$ in. long. 5. Shank of little consequence. 6. Shoulders rounded, with no sharp edges. 7. Lock, English is probably best, cleanest, and easiest of adjustment; French is the most secure, and is necessary on axis-traction forceps.

INDICATIONS FOR USE OF FORCEPS.—1. When expulsive forces are insufficient to overcome the resistance. 2. When speed of delivery is necessary for safety of mother or child.

Contra-Indications.—1. Disproportion between child and canal—impossible delivery from abnormal size of child or canal. 2. Impossible delivery from position or presentation, e. g., transverse. 3. Undilated cervix. 4. Non-rupture of the membranes.

DANGERS FROM USE OF FORCEPS.—1. Compression of fetal head. 2. Laceration of maternal structures. 3. Fracture of skull. 4. Infection of birth canal.

THE OPERATION IN GENERAL.—As a rule, forceps should not be applied until woman has been *in labor at least two hours*; but if there has been *no advance for one hour*, they may be used if case is suitable, or even sooner if child's heart is bad, or if passing meconium or showing other signs of pressure.

Varieties.—1. *High forceps*, when head is at brim; a grave operation. If head is movable at brim, do version; if engaged, use forceps, or do version if uterus is not firmly contracted. 2. *Medium forceps*, when head is in cavity of pelvis. 3. *Low forceps*, when head is at outlet.

Position of Woman.—Always have patient in the *dorsal prone position*. Have bladder empty to avoid pressure, and have everything sterile.

STAGES OF OPERATION.—Usually divided into four stages (sometimes three): 1. Introduction. 2. Locking. 3. Traction. 4. Removal.

INTRODUCTION AND APPLICATION.—Posterior and lateral

introduction with pelvic and cephalic application.

Posterior Introduction.—The blades go in behind, and are then rotated to the desired position; the left blade is usually introduced first with right hand, passing it along fingers of left hand (either may be used); then introduce right blade along concavity of left, and rotate both inward until they can be locked.

Lateral Introduction.—One blade is introduced on each side; introduce fingers up to cervix, then pass left blade into cervix with blade in direction of canal, using left hand; have nurse hold in position, and introduce right blade with right hand along fingers of left hand. (“Right” and “left” blade refers to handles as forceps lays on table with concavity of spoons turned upward; the right is the “male” blade, the left the “female” blade. Right and left blades go to respective sides of pelvis.)

Pelvic Application.—Considers only the pelvis, the blades catching head regardless of direction; usually practiced in England.

Cephalic Application.—Considers position of fetal head and disregards pelvis; is mainly used on the Continent.

Combined Posterior and Lateral Introduction, with Cephalic Application.—If position is L. O. P., the first blade (left) is introduced posteriorly; this usually starts rotation, and blade is rotated to side; then second blade is introduced laterally. If position is R. O. P., the right blade is introduced first and rotated; then left blade is introduced laterally.

Choice of Application.—In beginning the use of forceps, pelvic application is always safer; it is not wise to practice forceps rotation until experienced in commoner operations. If head is above brim, pelvic application is the only safe one, and should always be used until sure each time of position of head. Cephalic application is of advantage when position of head is known, and blades can be rotated to bring to sides of the head.

LOCKING.—Never use traction until the blades are locked, as injury to head is liable. Handles should be as close together, when locked, as they will come with gentle pressure. The distance between handles, when closed, will show nature of grasp—whether biparietal or fronto-occipital. Loosen blades

frequently to prevent stopping circulation in parts compressed.

TRACTION.—The functions of forceps are: 1. *Traction*. 2. *Compression*. 3. *Leverage*, or rotation. Traction is the most desirable, compression the least desirable; but traction itself brings about compression.

REMOVAL.—Unlock blades, then remove them in reverse order of introduction—first the right blade, then the left, letting them follow the curve of blades as they are withdrawn.

SPECIAL OPERATIONS.—Have the patient and all instruments as sterile as for any cutting operation; *boil the blades* in lysol solution. *Always catheterize* before beginning operation.

L. O. A.—With insufficient expulsive forces, and disproportion between head and canal: Use lateral introduction, with pelvic application; exert tentative traction, pulling gently to see if head moves. Pull in direction of that part of canal at which the head is engaged, i. e., backward at inlet, forward at outlet, etc., separating the blades every few moments. Use chloroform to apply the blades, and it is best to keep up full anæsthesia until operation is finished to avoid accident should woman regain partial consciousness (one case of rupture of uterus from woman rising up, then sitting down on forceps); but if plenty of help is at hand, let woman become partially conscious so she can aid; then “pull when she pushes.” Up to this time have the woman in lithotomy position, with leg-holders applied; when head is almost out, remove holders, having nurse hold legs, and secure chin with flexed middle finger. When head can be controlled, gently remove forceps, having nurse hold fundus.

Head in Abnormal Position.—Use the combined introduction with pelvic application (have considerable experience with forceps before using direct rotation). Disregard position of head, pull gently, and unlock occasionally to allow Nature to rotate. When forceps become antero-posterior, remove the blades and reapply at sides of head, at same time holding the fundus to prevent displacement of head.

Use of Axis-Traction Forceps.—The above applies to ordinary forceps; with axis-traction, the manner of introducing is the same—first right, then the left blade, and then locking;

the traction rods are than snapped on, and the handle adjusted. Approximate blades by means of set screw, or towel wrapper around handles. *Pull with traction rod parallel with handles.* Universal joint in handle allows for rotation, hence the axis-traction is best for high forceps, requiring less skill in its use.

Persistent O. P.—Labor is tedious, head is poorly flexed, and woman is easily exhausted. Except when head is on floor of pelvis, pelvic application is safer. Always best to bring to O. A. before head is born; to obtain this, try manual means before using forceps rotation.

Forceps Rotation.—A persistent O. P. is very bad, as extensive lacerations are common; but attempt forceps rotation only after many years' practice on normal cases. Put blades on as if O. A.—at sides; to increase the flexion, bring the handles forward and upward; now gradually rotate forceps until occiput is opposite one spine, then remove and reapply forceps in normal position, and deliver. *Always rotate by hands when possible.*

Face Presentation.—The chin (M.) is considered in naming, instead of occiput; then deliver M. A. instead of O. P., bringing the chin under the symphysis.

Breech Presentation.—Forceps are rarely applied to breech, but they have been used in cases of impaction. Forceps are not fitted to shape of hips, but best application is over trochanters, as this is long diameter. After breech is down sufficiently far, remove forceps and pull down leg by inserting finger in groin. Forceps may be needed for *after-coming head*; with back of child to front, blades are applied underneath body, the body of child being raised up toward body of mother. Application may be pelvic or cephalic.

Version.

VERSION.—The substitution of some other part for that which presents at the superior strait; as one pole for another, or a longitudinal for a transverse presentation.

Varieties.—1. *Cephalic*, the head is made to present; rarely indicated. Use external method before labor, or if head is at brim. *Partial cephalic version* is the correction of posi-

tion of head in pelvis, as when head is a little to one side of brim in oblique presentations. 2. *Pelvic*, the pelvis is made to present; it has few indications and little use, but may be tried in oblique breech presentations. 3. *Podalic*, the feet are made to present; the best variety. Use bipolar method if in no haste, internal if in haste.

Methods.—1. *External*. 2. *Bipolar* (Braxton-Hicks), or combined internal and external. 3. *Internal*.

Indications for Version.—1. The exchange of a position less favorable for one more favorable for delivery. 2. Speedy delivery, as in eclampsia. 3. Deformed pelvis, with conjugate not below 8 cm. 4. To make part serve as a uterine tampon, as in placenta previa. 5. Certain cases of prolapsed cord, when cord cannot be kept in place.

Contra-Indications for Version.—1. Tonic uterus, contracted down on child, with liquor amnii drained away; thick upper and thin lower uterine segments (danger of rupture). 2. Head firmly engaged. 3. Pelvis too small to allow delivery of after-coming head. 4. Undilated cervix (except for external method).

EXTERNAL METHOD.—The *conditions* essential for its use are: 1. Labor must not have commenced. 2. Liquor amnii must be present. 3. The abdominal and uterine muscles must be relaxed.

Technique.—By external manipulation alone, the part not wanted is displaced and part desired is pressed downward to brim. Force child into desired position, then put pad where the displaced breech or head was, and apply abdominal bandage. If labor is beginning and cervix is dilated, the membranes may in some cases be ruptured, then let labor proceed. The child must float freely in liquor amnii. A desirable method, but unsatisfactory as a rule, as it is difficult to keep desired part in the canal.

Indications.—Is ordinarily used in transverse presentation, oblique position, with one pole on edge of brim.

COMBINED METHOD.—One hand in vagina, with two fingers in cervix, the other hand on abdomen. *Conditions* necessary are: 1. Uterus must not be contracted. 2. Liquor amnii must be present, or but recently drained. 3. Abdominal walls must

be relaxed. 4. No demand for extra haste in delivery. 5. Cervix must be dilated.

Indications.—1. Podalic variety, especially in placenta previa, to secure tamponage of uterus until head is engaged and cervix is dilated; with two fingers in cervix and one hand on abdomen, displace the part not wanted, secure foot and draw down leg. The pressure of leg in cervix stops hemorrhage, dilates cervix, and prepares for delivery. 2. When feet and breech are so close together that a foot can be secured, thus changing from breech presentation. 3. Cephalic variety, when head is near enough cervix to be secured. Not indicated if there is demand for haste.

INTERNAL METHOD.—Practically always podalic; it is the one method giving control of labor. Demands a cervix sufficiently dilated to admit hand.

Indications.—1. Speedy delivery. 2. To secure tamponage, if the cervix is dilated. 3. Conjugate not below 8 cm. 4. Pro-lapse of cord.

Technique.—Have patient on back, and ascertain presentation and position; have hand and forearm thoroughly sterile, using hand which corresponds to abdomen of child. With palm next to small parts, fold fingers and hand into cone and pass into cervix (cervix must be sufficiently dilated to admit folded fist, to allow birth of head). Pass hand up next to the abdomen, and secure the *anterior foot*, as: 1. It is a simpler procedure, disturbing fetus and position less. 2. More apt to bring back of fetus to front. 3. Arms more apt to stay folded on chest. *One or both feet?* Unless in extreme haste, it is best to secure but one foot, allowing large breech with other leg to act as dilator for after-coming head. When one leg is down as far as knee, stop and listen to fetal heart—it may be tumultuous for a time; if the heart is all right, let labor proceed naturally. If a loop of cord is felt, place it where it will be least pressed upon—usually opposite the sacro-iliac synchondrosis.

When Baby Is Partially Born.—Wrap in hot towel: 1. To preserve body heat. 2. To prevent reflex inhalation before head is born, from stimulation of cold air. Do not hurry, as arms may be dislodged if traction is exerted—they are best born folded; let child advance slowly until arms can be secured.

XIX. CUTTING OPERATIONS FOR DYSTOCIA.

Embryotomy.

Embryotomy is the reduction in size of the fetus, by cutting or crushing some part of the fetal body; it generally means *craniotomy*.

INDICATIONS FOR CRANIOTOMY.—1. Dead child, with obstruction to advance in labor (the ideal indication). 2. When mother is in extreme danger, and child is undelivered—consider the mother first, whether child be living or dead. 3. (Doubtful) with both mother and child in good condition, but with child too large to come through passage; depends on accoucheur and his surroundings (if with skilled assistants and good surroundings, Cesarean is indicated). Its use should be the rarest exception. 4. Middle ground, where family object to any cutting operation on mother; if in the city, better retire from the case; if in country, must respect wishes of parents. Very rarely practiced upon the living child, as pregnancies are now more closely watched, and if necessary are terminated before term.

TECHNIQUE OF CRANIOTOMY.—Separate instruments, such as Smellie's perforator and Hicks' cephalotribe, are now seldom used; the combined instrument, Tarnier's basiotribe, being now used almost exclusively.

Steps of Operation.—Prepare the patient as for forceps, etc., having bladder empty and parts sterile, with woman under chloroform. 1. *Perforation*: Introduce two fingers, and pass perforator along fingers to suture or fontanelle; then pierce skull and churn up brain to kill the child. With nurse holding perforator, introduce and lock left blade, then right blade. 2. *Crushing*: Upon approximating the handles, the brain substance will ooze out over perineum. 3. *Delivery*: Same as with forceps, following the curve of Carus and protecting the perineum. Should instrument slip, introduce cranial forceps along basiotribe, attach to skull, and exert traction; if well applied, the instrument should seldom slip.

DECAPITATION.—If impossible to use perforator (owing to impacted shoulder, etc.), and it is impossible to perform version, decapitation may be resorted to. With Braun's hook,

pass the instrument along fingers, hook over neck and sever head; deliver body, then head. A pair of heavy strong scissors is the best single instrument for decapitating. After decapitating, perform version, pulling down a foot; deliver the head with the basiotribe, first crushing skull.

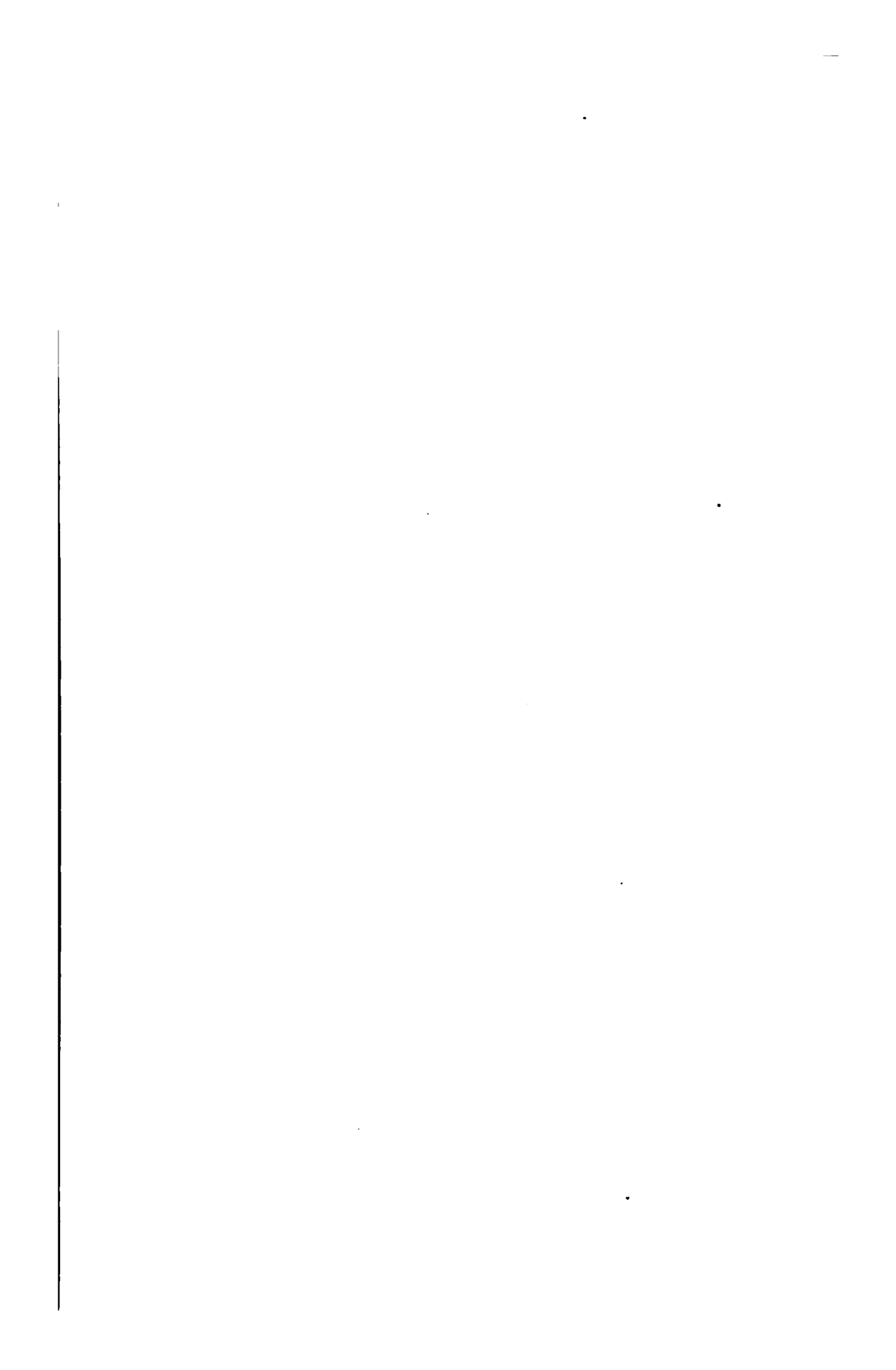
EVISCERATION.—The fetal abdomen is opened and its contents removed; then the thoracic viscera are removed through the abdominal opening. Especially indicated in transverse presentation where version cannot be done. Any part of fetus may be amputated with scissors, but be careful of soft parts of mother.

Cesarean Section.

Cesarean Section (not from *Caesar*, but from Latin description of the operation, *Caeso matris utero*), means the delivery of the fetus through an incision in abdominal wall and uterus; was originally used only after death of woman. Was practiced by the ancients upon living women, but uterine wound was left unsutured; in 1876 *Porro* made an advance by practicing hysterectomy in addition to the celio-hysterotomy; while in 1882 *Sanger* introduced the operation in use at present, of closing wound in uterus with a double row of sutures.

PELVIC MENSURATION.—Ordinarily not necessary to examine pelvis before seventh month; at that time relative size of pelvis and head can be ascertained. If the deformity is marked, however, pelvis must be examined earlier than seventh month. Pelvimeter is not positive, but generally shows deformity; examination, by palpation, of head and pelvis is of most importance.

Use of Pelvimeter.—Have patient on her back, with the pubes covered and abdomen exposed; an undervest or union suit is a handicap. 1. *Distance between spines:* Feel spines with thumbs, and take measurements from points just outside; in normal pelvis the measurement increases as pelvimeter passes backward along crests; if it does not, the pelvis is probably rachitic. 2. *External conjugate:* Take tip of spine of last lumbar vertebra as one point (not depression below), and crest of pubes as the other. 3. *Oblique diameters:* From tip of left posterior superior spine to the anterior superior spine of oppo-



site side; then with patient on opposite side, measure right oblique (right is usually longer than left); this serves as a check on measurement.

INDICATIONS FOR CESAREAN SECTION.—1. *Absolute*, when unable to deliver in any other way, e. g., with conjugate 7 cm. or below, or with abnormally large child. 2. *Relative*, with a simple flat pelvis of $8\frac{1}{2}$ cm., or generally contracted pelvis of as high as 9 cm. Better use Cesarean in preference to any operation involving much shock, such as high forceps, etc., as mortality is lower. 3. When *mother is moribund*; or, stretch or cut soft parts and deliver by forceps or version. 4. *After death of mother*; must be done within twenty minutes, or case is hopeless; child usually dies with mother.

INDICATIONS FOR HYSTERECTOMY.—*Porro operation*. 1. Disease of uterus. 2. Osteomalacia. 3. Marked bleeding. 4. Disease of ovaries. 5. With obstruction too great to permit subsequent normal delivery. 6. Cancer of uterus or cervix. 7. Infection. 8. Tumors of uterus or ovaries. 9. Marked inertia, with hemorrhage which cannot be checked. 10. Ruptured uterus.

TECHNIQUE OF SANGER OPERATION.—Prepare woman same as for any laparotomy (but often no time for thorough preparation); use soap dressing, afterwards scrubbing with soap and water, bichlorid, etc. Cervix must be dilated to allow subsequent drainage.

Incision in Abdomen.—Make median longitudinal incision, with assistant pressing firmly against abdominal wall on each side about level of umbilicus to prevent gush of blood when uterus is opened, and to keep abdominal wall in close contact with uterus, thus preventing escape of blood into peritoneal cavity.

Incision in Uterus.—1. Best as a median longitudinal cut in upper part of uterus, parallel with the abdominal wound; have assistant hold broad ligaments to prevent excessive bleeding, and extract the child as rapidly as possible. 2. Transverse incision across the Fundus (Fritsch); is objectionable, as the abdominal incision must be very large to allow uterus to roll out, but has advantage of less bleeding, with less danger of tearing. Incision in abdomen must be high up, with umbilicus at its center.

Sutures.— Usually best to deliver uterus through abdominal wound in order to suture; have assistant compress broad ligaments to check bleeding. Use catgut throughout (silk is no longer used). 1. Make first line of sutures in muscular tissue of uterus, being careful to avoid endometrium; use continuous line of stitches, interrupted in two or three places. This checks most of the bleeding. 2. Second line is continuous, including peritoneum and superficial muscles. 3. Close peritoneal wound by a continuous Lembert suture; this prevents adhesions of uterus to abdominal wall. Draw omentum down as far as possible over uterine wound; this renders adhesions less liable. 4. Close the abdominal wall in any approved manner, being careful to bring together like tissues.

MORTALITY.— The mortality in the pre-antiseptic days ranged from 30 to 50 percent. or higher. The Porro operation gives a considerably higher mortality (about 25 percent.), owing to the more serious condition of the mother before operation. From 90 to 95 percent. of the children are saved. The mortality in the Sanger operation (the operation of choice), is, in the hands of the best surgeons, from 7 to 10 percent. (7.5 percent. for both mothers and babies.—*Cragin*).

Vaginal Cesarean Section.

Vaginal Cesarean Section, or *anterior vaginal hysterotomy*, is one of the newer operations, and has a limited field of usefulness.

INDICATIONS.— In cases of undilated cervix, when rapid delivery is imperative, it may be employed with advantage; it has been recommended as the first stage in the treatment of eclampsia.

TECHNIQUE OF OPERATION.—A transverse incision of the anterior vaginal vault is followed by a longitudinal section of the anterior vaginal wall; the bladder is separated completely from the cervix and vagina, the peritoneal cavity being opened if necessary; the cervix is pulled down by strong double tenacula, and its anterior lip and the lower uterine segment split in the median line for a sufficient distance to permit the delivery of the child, which is then delivered by version. Hemorrhage during the operation is controlled by forcibly pulling down the

cervix. *In primiparae*, in order to gain more space, it may be necessary to precede the uterine section by a deep incision in the left posterior vaginal sulcus extending through the perineum.

After Delivery the wounds are sutured — the uterus and cervix with tiers of catgut (continuous), the vaginal vault with interrupted sutures. Gauze drainage is employed for several days.

Symphysiotomy.

Symphysiotomy is the division of the symphysis of a woman in labor, for the purpose of enlarging the pelvis and securing the delivery of a living child. Was suggested as early as 1598, but was first successfully used in 1777, by Sigault in Paris. In 1892 the operation spread from France, but it was little used until 1899, when a paper read before the International Congress showed the mortality to be a little over 14 percent. for both mothers and babies — 10 percent. for mothers alone and 18 percent. for children. However, the operation does not compare with Cesarean for safety, it having a mortality of but 7.5 percent. for both mothers and babies. The operation is not complete in itself, as there is still the uncertainty of delivering child; another objection is the tiresome position of woman for three weeks — with hips bandaged together and in a trough bed; there is a long convalescence, with a wabbling gait for six or eight weeks. *Symphysiotomy is generally to be condemned.*

INDICATIONS.—Operation has a small field, midway between Cesarean section and the induction of premature labor, or version. Not an operation of election, but is determined on during labor, when head is impacted and only a little more room is required, and where forceps cannot be used. It is indicated with conjugates from 8 cm. to 9.5 cm., but never below 7 cm. or 8 cm.

RESULTS OF OPERATION. — Upon dividing symphysis the pubic bones separate, going outward and downward; they may be separated as much as $2\frac{1}{2}$ in., but must avoid straining the sacro-iliac ligaments. The pelvic canal is enlarged $\frac{1}{2}$ in. in conjugate, $\frac{3}{4}$ in. in transverse and 1 in. in oblique diameters.

TECHNIQUE OF ITALIAN OPERATION.— Make small incision above pubes, large enough to admit finger, and separate tissues from posterior surface of symphysis down to bottom; introduce a Galbiati's sickle-shaped knife along finger, and cut upward and forward. Have catheter in urethra, holding it to one side.

TECHNIQUE OF FRENCH OPERATION.— Make skin incision from base of symphysis down to clitoris; pass a broad grooved director behind symphysis, and incise either toward the front or back. A complete open incision is not advisable; avoid soiling the wound with lochial discharge. If ankylosis has taken place the bones may be separated with the saw.

DELIVERY OF CHILD.— The subpubic ligament must be cut or there will be little separation; have assistant support trochanters to avoid more than $2\frac{1}{2}$ in. diastasis. Deliver child by *forceps* or *version*, after separation of bones. If oozing of blood occurs, pack wound with iodoform gauze until after delivery; this also prevents injury to bladder during delivery. It is not necessary to suture bones or periosteum; simply bring surfaces into close apposition, being careful to push bladder back out of the way, and suture tissues immediately over wound in bone; silver wire is not much used at present time. Put on a firm zinc oxide bandage, passing around trochanters.

AFTER-TREATMENT.— Bed should be trough-shaped; a hospital stretcher, with flap for hips, is good; or may suspend patient in a hammock stretcher. A hard bed may be used by placing sand bags at either side of patient. Keep patient in trough at least three weeks, then one week on a hard bed, after which she may sit up with a strong bandage about hips. She has a wabbling gait for six or eight weeks, and does not completely recover for six months. Incontinence of urine or fistulae may result from injury to bladder.

VI. THE PUERPERIUM

XX. MANAGEMENT OF THE PUERPERIUM.

Care of the New-Born Baby.

CLEARING OF AIR PASSAGES.—Immediately after birth the *mouth* should be cleared of mucus by a piece of gauze on the end of the little finger; then clear the *nostrils* by covering the baby's face with gauze, applying the open mouth to its lips, and giving a quick puff; the nose is left open, and air is prevented from entering the stomach by placing the open hand over the abdomen.

INSTITUTION OF RESPIRATION.—Sudden changes in environment, combined with abolition of placental respiration, and stimulation of respiratory center by accumulation of CO₂, normally cause institution of respiration, which is usually ushered in by a lusty cry. However, respiration may fail to be established, owing to asphyxiation.

Causes of Asphyxia.—1. Fetal inspiration. 2. Any interference with the placental respiration, as prolonged uterine contractions; coiling, compression, or prolapse of cord; the premature detachment of placenta; phlebitis of funic vessels, from syphilis. 3. Prolonged pressure of brain during labor. 4. Grave diseases and hemorrhages of mother. 5. Anomalies and diseases of fetus, preventing entrance of air. 6. Accidental causes preventing access of air, such as placing baby in unfavorable position; precipitate labor; imposition of caul.

Treatment of Asphyxia.—1. The application of *exaggerated stimuli*, as slapping buttocks; vigorous rubbing of body; alternate immersion in warm water and ice water, with gentle friction; application of electricity. 2. *Artificial respiration*, Schultze's method being preferable: Physician holds infant in hands, face to front, with thumbs over shoulders, index fingers in axillæ, and rest of fingers supporting back; the child is then swung alternately between knees and over the head, flexing head upon chest in latter position. This should be used in con-

junction with immersion in warm and cold water. 3. *Mouth-to-mouth insufflation*, with child's head extended and mouth covered with gauze; only the first part of expired air should be used, and baby's nostrils should be left open to act as safety valves. 4. *Catheterization of larynx* or tracheotomy may be practiced, as last resorts in cases of obstructed air passages, from disease, neoplasms, etc.

EYES.—Immediately following birth, the eyes of all babies, whether gonorrhoea is present or not, should be irrigated with boric acid solution and 5 percent. protargol solution, 10 percent argyrol solution, or 1 percent. silver nitrate solution.

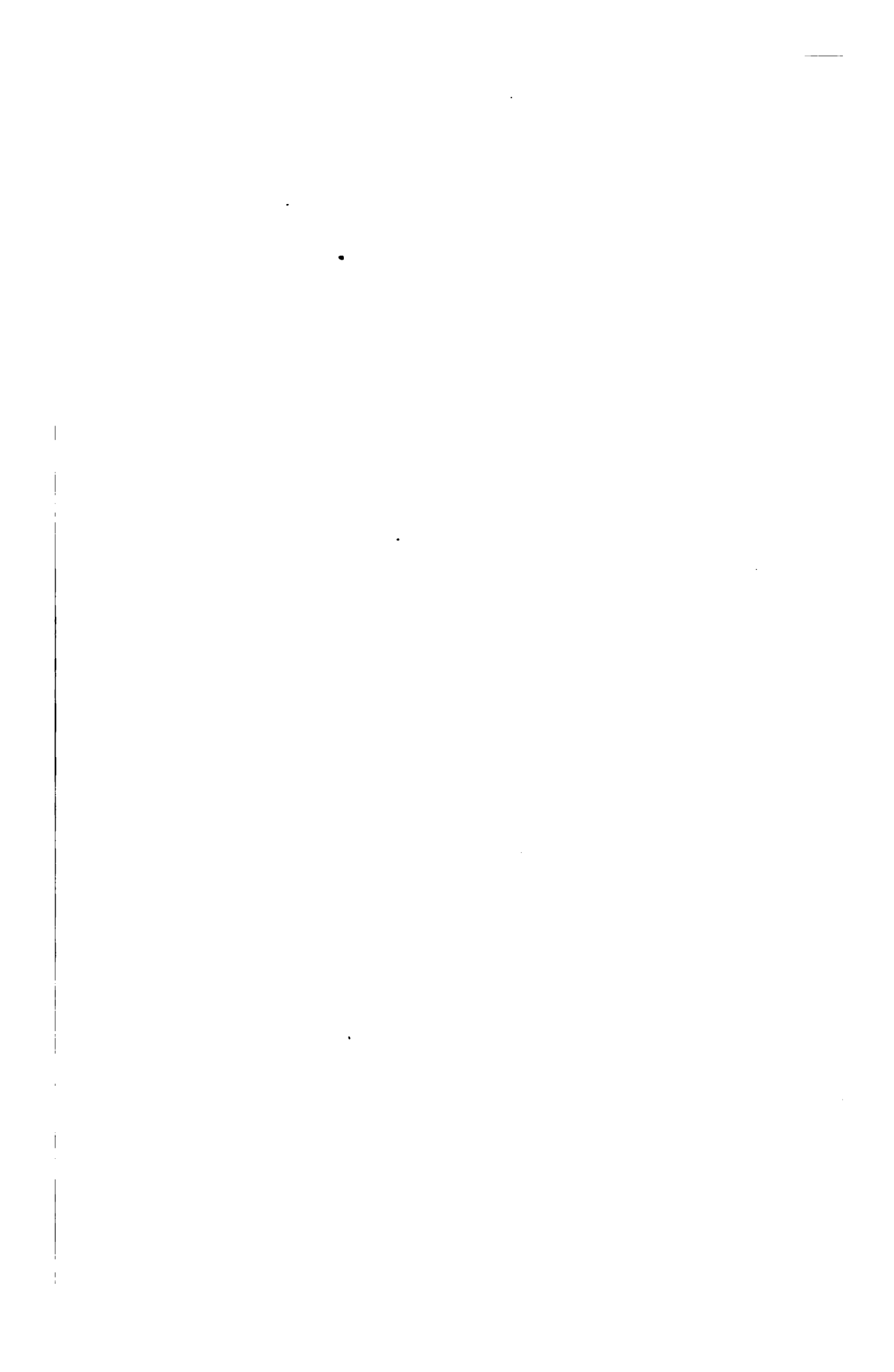
DRESSING OF NAVEL.—Anoint baby's abdomen with sterile albolene or white vaselin, and wipe off vernix caseosa; then apply gauze about cord, and bandage. Have hands and gauze sterile.

BATHING.—Instruct nurse not to wash baby for six hours; vernix caseosa may be wiped off with vaselin or albolene. Allow baby to become accustomed to its new environment before using water. Don't bathe in tub till cord is off; at end of six hours, may be bathed on lap.

Tub Baths.—Be sure of temperature of the water before immersing baby—have temperature above that of the body (105°). First wash face, with baby on lap, keeping body covered, and using any good soap (preferably castile). Put baby in tub, supporting occiput with hand, and first wash head. Cleanse creases well, to avoid eruptions. Don't wet umbilicus until completely healed—best have water shallow on beginning. Dry in sheet and blanket, gently rubbing outside with hand. After bath dust skin with talcum powder, and put sterile cotton over umbilicus if it is not yet firm.

DRESS.—1. Abdominal band; after cord separates, this may be sewed on. 2. Shirt—short, made of flannel. 3. Slip—long, with arm holes and hole for neck. 4. Slip—muslin, over all. 5. Diapers—small one to collect excreta, and large one outside smaller, with apex unfastened, to protect dress.

WHERE TO PUT BABY.—Baby should be put in a warm separate room, to avoid disturbing mother. It should be loosely wrapped in blankets, etc., with free breathing space, and laid on its right side, this position favoring closure of the foramen



ovale. Never lay the baby on a chair or any place where it may be inadvertently sat down upon.

BABY'S FIRST FEEDINGS.— Best to put baby to breast as soon as mother has rested for a time, as: 1. First milk is the best laxative for baby. 2. Nursing stimulates contraction of uterus. 3. Stimulates development of milk secretion. Do not put to breast at night until milk comes; and thereafter no oftener than is necessary, leaving mother rest from 11 p. m. to 5 a. m. if possible. During day, put baby to breast for five minutes only every four hours until the milk comes, after which put to breast every two hours. Baby should have ten feedings in the twenty-four hours, one every two hours (best on even hours, 2; 4, 6, etc.), except between the hours of 10 p. m. and 6 a. m., when it should nurse but once (at 2 a. m.)— the next sleep carrying it over until the morning. At the end of the third or fourth week the 2 a. m. feeding should be discontinued.

Care of the Mother.

LENGTH OF PHYSICIAN'S VISIT.— The length of time physician should stay with patient depends on her condition; if heart and respiration are all right, it is not necessary to remain more than an hour after completion of labor. Instruct nurse to watch: 1. Fundus. 2. Lochia. 3. Temperature. 4. Pulse. 5. Urine and bowels. 6. Breasts.

TEMPERATURE.— Take temperature of both mother and child twice daily; if above normal, every two hours.

BLADDER.— The bladder may become greatly distended before woman has desire to empty it, owing to: 1. Changed conditions above— the relief of pressure. 2. Edema of urethra, from long continued pressure. Woman should try to empty bladder every eight hours (unless lacerations, etc., have occurred); *flow of urine may be stimulated by:* 1. Sound of water running from tap. 2. Warm water running over vulva.

Catheterization.— There may be an increased secretion of urine. If woman is unable to void urine, catheter should be passed every eight hours, and in some cases oftener, to avoid: 1. Discomfort. 2. Overdistention, which favors postpartum

hemorrhage by preventing involution: 3. Full bladder being mistaken for tumor.

CARE OF BREASTS.—New and tender breasts are liable to have *cracks in nipples*; prevent their formation by the use of white vaselin or abolene, or a mild astringent, before confinement. If no milk is present in breast, do not allow baby to remain and chew nipple—do not leave longer than ten minutes at a time; but best to put baby to breast every four hours to get colostrum.

Cracked Nipples.—When cracks occur, apply silver nitrate, 8 percent. solution (40 gr. to 1 oz. water), over abrasions, then use nipple shield. Keep the nipple and baby's mouth clean, to avoid infection of abrasions. Nipples may be softened with a solution of five parts of borax to eight parts of 50 percent. alcohol.

Occlusion of Ducts.—Occluded ducts furnish good soil for bacteria; hence don't allow sagging of breasts, but support by binder, and use gentle massage if milk does not flow freely. To prevent infection, boil shield daily, and when not in use keep in boric acid solution made fresh every day.

TO DRY UP MILK.—Best method is to apply firm pressure by well-fitting bandage, then leave alone. Apply a smooth fold of cotton over entire breasts and axillæ, leaving small holes for nipples; then apply breast binder, or figure-of-8 bandage, with holes for nipples; bandage may be renewed in two or three days. Move bowels freely with salines. Ice bag over breast may be necessary. Best not use breast pump, as any form of stimulation of nipples is bad.

LOCHIA.—Inquire about lochia on second visit. Better to have abundant flow than too little, as small amount may mean infection.

Amount and Character.—Pads should not be soiled oftener than once in three or four hours; if oftener, the amount is excessive. *In first few days*, lochia is composed mainly of blood, as shown by appearance and smell. *After first week*, odor becomes characteristic of mucus; color becomes lighter, finally light yellow. Flow should cease at end of first month, the bloody character ceasing at end of second week.

LENGTH OF TIME IN BED.—Depends upon time required for

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involution, and this depends on nature of patient — whether a “hot-house” girl or a shop girl, or one properly developed. Do not allow patient to get up until fundus can scarcely be felt above symphysis. *General rule:* Keep in bed for nine or ten days; *second week*, between bed and chair, being carried from one to other (no walking), and have feet elevated from floor while on chair; *third week*, may walk from bed to sofa or chair, lying down frequently; *fourth week*, allow all about the same floor; at end of fourth week, patient may go down stairs and take drives.

USE OF COMMUNE.— Patient may sit up to use commode after the fifth day (occasionally as early as the third day). If in good condition, let patient slide off edge of bed onto the commode. The sitting position allows drainage of lochia, but there is danger of embolus.

CARE OF BOWELS.— Best not wait longer than thirty-six hours after labor to move bowels. Salines are agreeable — Rochelle salts or magnesium citrate; castor oil may also be used, and enemata are good to supplement.

SUBSEQUENT VISITS.— Depend on the patient's circumstances. Rule in “Fifth Avenue” case: *First week*, for one or two days, two visits daily; *second week*, one visit daily; *third week*, every other day; *fourth week*, one visit to discharge case. Best to make a careful examination at end of second month for perineal tears.

PHYSICIAN'S CHARGES.— Best to name a fixed sum for confinement and puerperium, with a certain fee for each subsequent visit after case is discharged.

XXI. PATHOLOGY OF THE PUERPERIUM.

Mastitis.

CAUSES.—*Predisposing:* 1. Congestion and engorgement of breasts, from excess of milk, death of baby, etc. 2. The occlusion of lacteal ducts, usually from sagging of breasts; hence, support breasts with binder. 3. Hard and cracked nipples. *Active:* 1. Use of dirty nipple shield or breast pump. 2. Lack of cleanliness of baby's mouth and the nipples before and after nursing.

SYMPTOMS.—When the breasts become infected there are pronounced symptoms of acute inflammation; there is a sudden rise of temperature with rigor, and acute pain and sensitiveness in the affected breast.

TREATMENT.—1. *Empty the breast*; before bacterial infection occurs, let baby empty breast; if it cannot, then massage the swollen quadrant toward nipple. Exercise great care in use of breast pump; put only over nipple, and avoid bruising of tissues. 2. *Empty the bowels* by large doses of saline—2 to 3 oz. Rochelle salts, or smaller doses taken every half hour; open the bowels *freely*. 3. *Put on ice bag*—nothing better to abort inflammation. Ice bag will blister if applied directly to skin; interpose towel or thick layer of gauze.

Treatment of Abscess.—If breast becomes infected, *do not put baby to nipple*; treat same as abscess elsewhere, by *incision and drainage*. Avoid disfiguring scar by confining the incision to either the areola or white skin, never extending it from one to the other. Glands of Montgomery may be incised inside the areola. Incision may be made underneath breast at periphery; if opening is to be near nipple, make incision in a radiating direction, to avoid transverse incision of ducts. Use *drainage tube* and aseptic absorptive dressing. Don't put baby back to breast until microscope shows absence of pus cells.

Puerperal Sepsis.

By Puerperal Sepsis is meant a local or general pathological condition, resulting from the invasion, during labor or puerperium, of various micro-organisms, and the absorption into the system of various pathogenic bacteria, or the toxins of bacteria which are either pathogenic or non-pathogenic.

VARIETIES OF SEPSIS.—1. *Septic infection* (pyemia or bacteriemia—general infection), when the bacteria themselves enter circulation, setting up local processes in different parts of the body. 2. *Septic intoxication* (toxemia, or sapremia—local infection), due to absorption into the blood of the toxins of living or dead pathogenic or, more commonly, non-pathogenic bacteria; is more frequent than pyemia, but may result in septic infection.

BACTERIOLOGY OF THE VAGINA.—Secretions of the vagina

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are good due to method of disinfection suggested by the bacteria. This ability prevents growth of pathogenic bacteria and when put into vagina they die within twenty-four hours. Leucocytes and mucus of vagina also prevent bacterial infection.

INFECTIONS OF VAGINA.—During labor the vagina shrinks, wastes out mucus, protecting medium. Infection is also favored by congestion from downward and outward tendency of blood clots, etc. It occurs the more common times in a child's medical and when present before or after labor it may work its way upward into uterus. It may also be introduced from vagina by fingers. The majority of vaginitis becomes chronic later months of pregnancy.

SOURCES OF INFECTION.—1. May be introduced from vagina of nurse or physician especially when physician has recently attended a case with lower infections or fever with pyogenic complications. 2. May be introduced from vagina of long black fingers, long black nails. 3. If vagina some had called keep surgically clean, e. g. if suffering from gonorrhoea, and in such cases rather give up the idea of preventing infection. 4. Never get and had an abscess, but rarely do cause infection. 5. Sexual intercourse during the last few weeks of pregnancy; the penis is not sterile especially if seat of gonorrhoea, hence abstain from indulgence after seventh month. 6. Infection may come from within as from an old abscess of ovary or tube (rare). 7. From vagina usually by fingers.

VARIETIES OF INFECTING BACTERIA.—Streptococcus is most common and fatal cause of infection; other bacteria found are staphylococcus, colon bacillus, gonococcus, bacillus aerogenes capsulatus, and others both pathogenic and non-pathogenic. If bacteria are confined to uterus, the course of disease is short and prognosis good; if very virulent, they may go through uterus before barriers can be established.

NATURAL PROTECTING AGENTS.—1. Blood clots and leucocytes. 2. Healthy tissues—epithelial and connective tissues. 3. Infiltration of leucocytes under placenta, and at site of infection.

PREDISPOSING CAUSES OF INFECTION.—1. Low tone of the patient's system, from hardships, poor food, etc. 2. Long pressure of tissues during labor. 3. Hemorrhage, and presence of

clots. 4. Presence of lacerations and abrasions. 5. Infectious diseases.

SITE OF INFECTION.— 1. Placental site most commonly, as it is a fresh wound with open sinuses. 2. Any laceration along the birth canal, as of cervix or vulva.

APPEARANCES OF THE CASE.— Depend on the form and severity of infection. 1. With septic intoxication there is very little change in appearances. 2. Septic infection: The cervix looks angry, and where lacerated is covered by a gray, sloughing membrane resembling that of diphtheria; this shows a grave infection.

ODOR OF DISCHARGE.— Does not necessarily accompany infection, but depends on the bacterium present. Cases with worst odor are usually simplest; however, the colon bacillus causes bad odor and severe infection, while the streptococcus causes a bad infection with no odor.

PATHOLOGY.— 1. Infection ordinarily extends through the *lymphatics*, but may travel by veins, or both; if through veins the process is more apt to be local, and the progress is better. There may be foci of infection all through uterine wall—small abscesses or local edema, and cellulitis wherever cellular tissue. Lymphatics of uterus are most abundant just under peritoneum, hence the easy spread of infection to peritoneum. Acute cellulitis, pyogenic or simple, is a very common result of pyogenic infection. 2. The *tubes* may become infected by (a) the direct extension through lumen; (b) by lymphatics of broad ligaments, or (c) by peritoneum. 3. Infection may be carried by *veins*, with breaking down of tissues and formation of septic emboli. The trouble does not necessarily end in uterus, as uterus may clear up and patient die from abscess of liver, etc.

SYMPTOMS.— Do not appear, as a rule, until third day; may be rise in temperature during labor without subsequent remission. If no symptoms develop within eight or ten days the case may usually be considered safe. Late cases are due to: 1. Involved cervix, with large uterus and retention of lochia. 2. Flexed uterus, with retained lochia.

Rise in Temperature (over 100.6° F.), is one of the first and most important symptoms. With any elevation in temperature always suspect infection, and keep it in mind until some



other cause is found. A slight rise may be due to beginning of milk secretion on third day (but old "milk fever" was usually infection), and a distended breast may also cause elevation (treat by massage, etc.). Moving the bowels after twenty-four hours may bring down temperature, and may also empty uterus of retained lochia, etc. *Increase in pulse rate*, with or without rigor, is also an important symptom. If uterus is emptied, temperature usually comes down; if the elevation is due to septic infection, it may continue for from one to three months, with joint symptoms, etc., and may even end in recovery.

Uterus.—Size is usually large, and fundus feels boggy (subinvolution); if uterus remains small and hard prognosis is much better.

Pain.—As a rule the fundus is usually sensitive to touch, but at this time it is much more so; this is an important guide.

Secretion.—Lochia is generally diminished or suppressed, and the milk is decreased in amount. The lochia may be retained from other causes; if it is diminished inside of a week it is probably due to infection, while if not until after first week, Nature is at fault. Lochia may be foul.

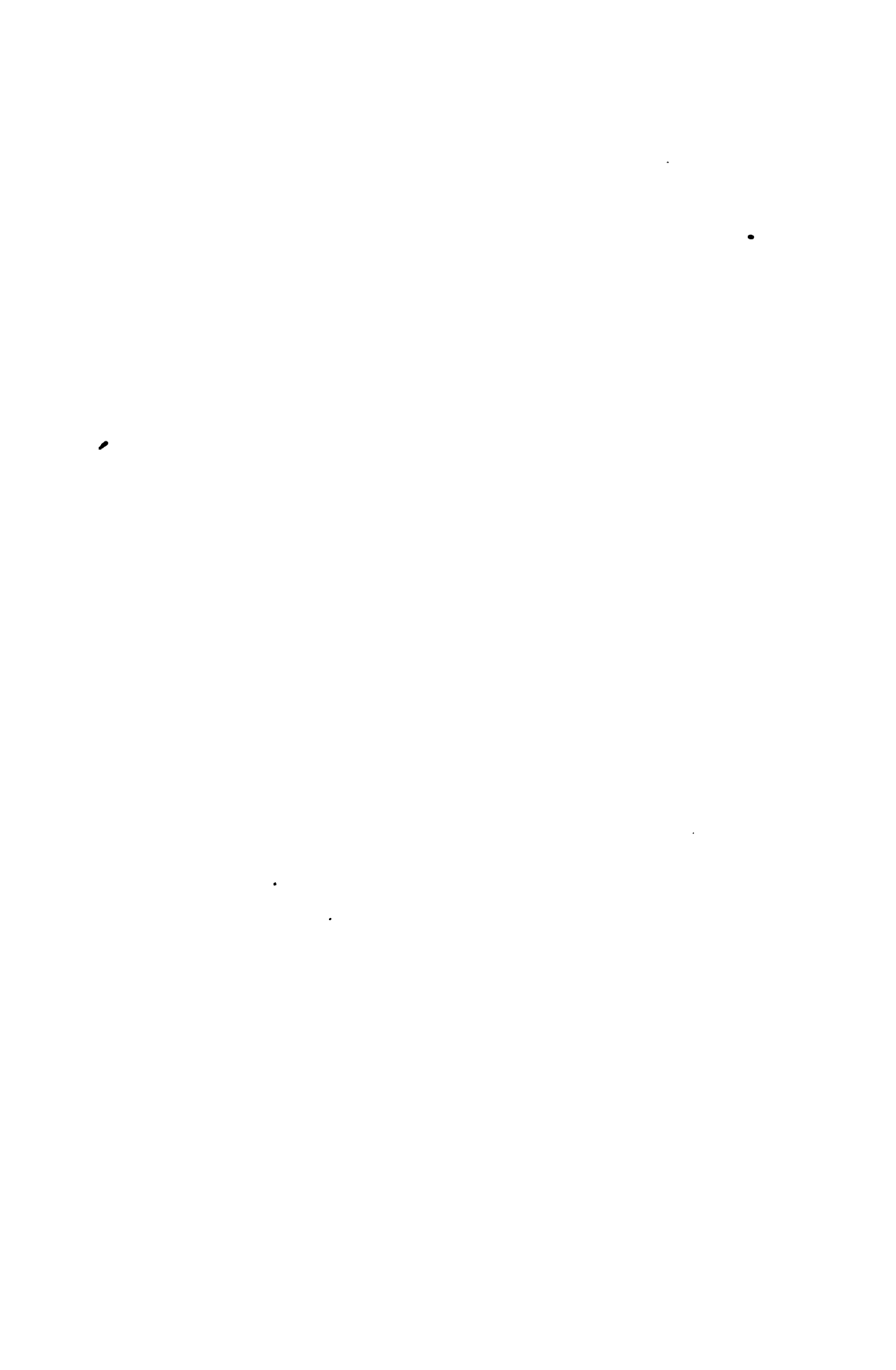
PROPHYLACTIC TREATMENT.—1. Have patient in a sunny, clean room, with plenty of *fresh air* and free from sewer gas. 2. Have patient *surgically clean*, especially about the vulva and thighs. 3. The accoucheur is the most dangerous element; have the *fingers sterile*, and don't use them any oftener than necessary; avoid touching vulva when examining per vaginam, and, if recently from an infective or suppurating case, use *rubber gloves*. 4. *Douche*: None unless woman has gonorrhea, or a sinus discharging into vagina, in which case, scrub with green soap, and use a bichlorid douche as part of the cleansing process. Otherwise douche is dangerous from (a) nonsterile douche-tip carrying dirt from vulva, etc., and (b) from washing away the natural protecting lubricant.

ACTIVE TREATMENT.—1. If rise in temperature, first look to *bowels and breasts*, and empty if necessary. If temperature remains at 102° or above, give a hot (115° F.) bichlorid intra-uterine *douche* (1 to 5,000 or 10,000), followed by normal salt solution (teaspoonful to the pint of water), or use salt solution alone; use sterile nozzle and bag. If after six to twelve

hours the temperature is still up (103° to 104°), go into uterus with fingers (using rubber gloves if possible), or a *dull curette*, and ascertain if it is clean and empty. Work as gently as possible, as it is dangerous to disturb uterus, and especially if bacteria are entering blood; but make sure that the uterus is clean, then douche out debris; don't repeat the operation. This is almost always followed by a rise in temperature (105° F.), and perhaps chill. When uterus is clean, best to pack with iodoform gauze. May make culture from uterine discharge, but do not wait for report, as it may take forty-eight hours; better investigate once in meantime. 2. *Use of the douche* is only for mechanically emptying uterus, and not for disinfecting; to prevent sloughs from accumulating and decomposing, and thus adding sapremia to septicemia. May be used twice daily, but in sapremia, perhaps a single douche will suffice; normal salt solution is probably best.

GENERAL TREATMENT.—*Food and medication*: 1. Alcohol, in form of whiskey, is very essential, and one of best means of treatment; give $\frac{1}{2}$ oz. every two or three hours. 2. Strychnin is next best drug; give $\frac{1}{30}$ gr. every two hours, alternating with whiskey. These two drugs may be needed for from one to three months. 3. The food should be easily digestible and nourishing; milk especially should be used. 4. *Serum-therapy*: Antibacterial, or bacteriolytic serum. Not generally advisable, as infection is usually mixed; inject 10 c. c. of serum, and repeat several times. 5. *Unguentum Crede*—an ointment of metallic silver; use as inunctions inside loins, using 2 dr. once daily, or, better, 1 dr. twice daily. 6. *Autogenous vaccines* have proven beneficial in some cases.

RADICAL TREATMENT.—1. *Incisions* are indicated when pus can be located (as in pelvis), and the abscess can be opened and drained. 2. *Hysterectomy* is rarely indicated, as more patients die with than without operation; hence never undertake it unless specially indicated, as when a collection of pus is found inside or just outside uterus. Best results are obtained usually late in the puerperal month, when pus may have become encapsulated in the uterine wall. The infection has generally gone beyond uterus to liver, spleen, kidneys, etc.; hence it is futile to remove uterus. The usual result of hysterectomy is septic



peritonitis; hence *never operate except as a last resort*, and only with woman in good condition. Five saved out of a hundred operated is a high percent.

Other Puerperal Infections.

PHLEGMASIA ALBA DOLENS.—"Milk-leg." A painful affection (phlebitis) of leg and thigh, from obstruction to lymphatics, or veins and lymphatics, and usually due to infective processes in the pelvis.

Thrombotic Form.—1. *Primary*, caused by (a) pressure on blood vessels; (b) extension of thrombi from uterine sinuses; (c) slowing of blood current; (d) character of blood during pregnancy (it contains more fibrin-factors, hence clots more readily). 2. *Secondary*, due to septic infection of veins, causing thrombi.

Cellulitic Form.—An infection of the cellular tissue of pelvis, due to extension, through lymphatics, of various germs from the uterus; the veins become inflamed, and blood current is obstructed.

Symptoms and Diagnosis.—1. In the *thrombotic form*, swellings begin at feet; (a) the primary variety usually occurs in eight or ten days after delivery, but may not appear until late, especially when due to extension of thrombi from the uterus; there may be no rise in temperature; while in (b) the secondary variety there is always rise in temperature, and distress of stomach with nausea and vomiting. 2. *Cellulitic form* is the most severe; there is marked infection, with multiple abscesses, the disease usually ending in death. In this form, the swelling, as a rule, begins at top.

Course.—Left leg is usually affected, but right or both may be involved. Patient may not completely recover for a year, but if the delivery has been clean the disease may last but a month. Milk-leg may be caused by a low grade of infection from hysterectomy; it may also result from typhoid fever, occurring in either sex.

Prognosis.—1. In thrombotic form, prognosis is good; the clot is absorbed, but the leg (usually left), may remain swollen for a year. 2. In the cellulitic form, the danger is great, and

mortality high; the muscles, etc., may slough, and require many drains.

Treatment.—Elevate leg, and apply ice bag over the veins, especially at groin (cold is better than heat); rest is of chief importance. Keep the parts covered with gauze soaked in alum acetate solution (alum, 6 parts; lead acetate, 25 parts, and water, 500 parts), to which a little opium may be added; protect the bed by covering with a rubber sheet. Have patient wear an elastic stocking for resulting swollen condition of leg.

PELVIC CELLULITIS.—May result as a direct extension of infection from a diseased uterus. It begins with edema, and as the serum is absorbed there is left a dense infiltration if there has been much cell-proliferation; or if the cell production is scanty, the process may entirely disappear. In the majority of cases the infiltrate is eventually absorbed.

Abscess Formation.—In about one-fifth of cases abscess results. The process may be extensive or may be limited to the broad ligament. The abscess may rupture spontaneously into the abdominal cavity, or into the cavity of bladder, rectum, uterus or vagina.

Diagnosis.—There is a bulging of the thickened tissues into the vault of the vagina. It has a feeling of denseness, and as a rule is confined to one side and does not involve the pouch of Douglas. An opening in abdomen or vaginal vault may be necessary to establish the presence of pus.

Treatment.—*Palliative:* 1. Rest in bed. 2. Counter-irritation. 3. Ice-water coil or poultices over lower abdomen. 4. Hot vaginal douches. *Operative:* Incision and drainage through abdominal wall, above Poupert's ligament, or through vaginal vault.

PYELITIS.—Pus in the kidney. May occur at any time during pregnancy or the puerperium. In pregnancy the right ureter is normally more distended than the left, due to the damming back of urine from pressure of the gravid uterus. This causes a lowered vitality of kidney and a good field for the development of bacteria. Infection may extend up from the bladder, as a result of careless catheterization; result as a direct extension of infection from neighboring tissues; or be carried by the blood stream.



Symptoms.—The urine is acid and contains pus, mucus and bacteria, and there is frequent, painful micutrition. The temperature is elevated, and there is tenderness over the kidneys and pain in the lumbar region.

Treatment.—Empty the uterus (if before labor), empty the bowels, apply ice bags, and prop up in bed so that pus will drain downward. Give urinary antiseptics and an abundance of water. Ordinarily patient should be well in about two weeks. Severe cases may require drainage of the pelvis of kidney, or removal of the diseased organ.

Anomalies in Involution of Uterus.

SUPERINVOLUTION.—An abnormally rapid return of the gravid uterus after delivery to the size of the non-pregnant organ, or to a size smaller than normal.

Etiology.—1. Nervous derangements. 2. Wasting diseases. 3. Anemia. 4. Over-lactation. 5. Too rapid succession of labors. 6. Local inflammations, especially of ovaries.

Treatment.—Attention to causative factor; electricity to uterus, either as galvanism applied by platinum intrauterine electrode, or as Faradism.

SUBINVOLUTION.—An abnormally slow return of the puerperal uterus to the normal size and condition.

Etiology.—Any condition which prevents a decrease in the blood-supply of the puerperal uterus, or any condition which interferes with its contraction. 1. Absence of lactation. Nervous influences. 3. Insufficient time in bed after labor. 4. Hyperplasia of the endometrium. 5. Small fibroids in uterine wall. 6. Lacerations of the cervix. 7. Endometritis. 8. Retention in the uterus of fragments of placenta or membranes, polypi or blood-clots. 9. Chronic constipation. 10. Displacements of uterus by over-distended bladder, adhesions, or tumors. 11. Too early resumption of coitus. 12. Anything causing pelvic congestion (disease of heart or liver, pelvic tumors, etc.).

Diagnosis.—Depends on *height of fundus* at different periods after labor: First day, finger's breadth above umbilicus; second day, level of umbilicus; third to fourth day, one

finger below; fifth to sixth day, two fingers below; seventh to ninth day, three or four fingers above symphysis; tenth to twelfth day, at level of or a little below pubes. The process should be completed in from six to ten weeks.

Treatment.—Directed to the cause of the disease, rather than to the disease itself. After local causes are removed, ergot and other uterine tonics should be administered.

VII. THE NEW-BORN BABY.

XXII. THE BABY'S FOOD.

The Mother's Milk.

PHYSICAL CHARACTERS.—Woman's milk is bluish-white in color, and quite sweet to the taste.

Reaction.—When freshly drawn, woman's milk is normally slightly alkaline or neutral to litmus, but may be slightly acid to phenolphthalein; it should never be acid to litmus. (Cow's milk is slightly acid).

Specific Gravity.—Varies between 1026 and 1036, the average being 1031 at 60° F. (Cow's milk, from 1028 to 1033). Fats lessen and proteids increase specific gravity.

Microscopical Appearance.—Milk contains great numbers of fat-globules of nearly uniform size, and some granular matter; epithelial cells are occasionally seen. During the first three or four days large granular bodies (*colostrum corpuscles*) are seen; these are several times as large as the fat-globules, and are probably epithelial cells which have undergone fatty degeneration. Blood and pus cells should never be present.

QUANTITY OF MILK.—The exact daily quantity is very difficult to estimate, but experiments show the average normal amounts at different periods to be as follows (*Holt*):

APPROXIMATE DAILY QUANTITIES OF BREAST MILK.

At end of first week.....	10 to 16 oz.
During second week	13 to 18 oz.
During third week	14 to 24 oz.
During fourth week	16 to 26 oz.
From fifth to thirteenth week.....	20 to 34 oz.
From fourth to sixth month.....	24 to 38 oz.
From sixth to ninth month.....	30 to 40 oz.

Means of Determining if Normal.—1. The length of time baby nurses (should nurse at least twenty minutes). 2. Length of time baby sleeps (should sleep two hours—if hungry, will

wake up). 3. Palpation and inspection of breasts (large breasts do not always indicate large amount of milk, hence express and measure milk, using breast pump). 4. Use of scales (baby should steadily gain after first three days). 5. Use of thermometer (baby's temperature will rise if milk is insufficient in amount).

COMPOSITION OF MILK.—Woman's milk may be normal in amount, but poor in quality; it may contain abnormal elements, or the normal constituents may vary in amounts.

Colostrum.—Is of high specific gravity (1030 to 1040), and rich in proteids and salts; it has a strongly alkaline reaction, and is not so sweet as the later milk. Colostrum is *Nature's laxative*, hence baby should be put to breast early in order to clear its bowels of meconium (and also to stimulate contractions of uterus). Colostrum corpuscles should disappear from the milk by the twelfth day.

Fat.—Keeps up body weight, saves nitrogenous waste, maintains bodily heat, and is stored up in the body as fat; is essential for growth of nerve cells and fibres, and of bone.

Sugar.—Also keeps up weight of child, and maintains animal heat, being partly converted into fat.

Proteids.—Are essential to life, in building up tissues and replacing the continuous nitrogenous waste. They are furnished by the casein and other albuminoide.

Salts.—Necessary for the growth of bone and tissue cells. Phosphates of lime and magnesium are the most important.

Soluble Albumin and Casein.—The albumin is in solution, while the casein is held in solution by the phosphates.

Water.—From 85 to 90 percent. Is needed for solution of sugar and some of proteids, and suspension of other proteids and of fats. Essential also in digestion of food and elimination of waste products.

PERCENTAGES OF COMPOSITION.—First milk from breast is poor in fat and rich in proteids, while later it is rich in fat and poor in proteids; to get average for testing, take milk from middle of nursing.

AVERAGE PERCENTAGES OF WOMAN'S MILK.

	Normal average.	Healthy variations.	Cow's Milk.
Fat	4.00	3.00 to 5.00	(4.00)
Sugar	7.00	6.00 to 7.00	(4.50)
Proteids	1.50	1.00 to 2.25	(3.50)
Salts	0.20	0.18 to 0.25	(0.75)
Water	87.30	89.82 to 85.50	(87.25)
	100.00	100.00 100.00	100.00

Estimation of Fat.—Fill graduated cylinder (cream-gauge of Holt's lactometer outfit) up to zero mark with fresh milk, cork, and set away at room temperature for twenty-four hours; then read off percentage of cream. The ratio of cream to fat is approximately 5 to 3:

Percent. of cream : percent. of fat :: 5 : 3.

Estimation of Proteids.—Clinical methods for determining are not satisfactory; but percentage can be roughly determined by an estimation of specific gravity and fat content—the specific gravity varying directly with the proportion of proteids, and inversely with the proportion of fat. This principle is shown by the following table:

VARIATIONS IN WOMAN'S MILK.

	Sp. Gr.—70° F.	Cream—24 hrs.	Proteids.
Normal average	1031	7%	1.5%
Normal variations	1028-1029	8%-12%	Normal (rich milk)
Normal variations	1032	5%-6%	Normal (fair milk)
Abnormal variations	Low (1028—)	High (10%+)	Normal or little below
Abnormal variations	Low (1028—)	Low (5%—)	Very low (very poor)
Abnormal variations	High (1032+)	High	Very high (very rich)
Abnormal variations	High (1032—)	Low	Normal (or nearly so)

ANOMALIES OF MILK SECRETION.—When quality of milk disagrees with baby, it is due to either fat or proteids. If the mother's milk is at fault it can be corrected; a meat diet will increase fat and proteids, while an excess of either can be reduced by a vegetable diet. Disagreement is most marked in the first month; after that time baby can take care of any irregularity in the milk.

Milk too Rich.—To dilute mother's milk when too rich for baby: 1. Let mother have plenty of liquids. 2. Give baby from 2 dr. to 1 oz. of barley or sugar water from ten to fifteen minutes after nursing. 3. First milk is poor in fat and rich in proteids, last milk is the reverse; hence take first milk (5 oz.) with breast pump, then let baby nurse.

Impregnation During Lactation.—Stop nursing at once, as: 1. Milk is poor in quality and quantity. 2. Woman cannot nourish both baby and fetus. 3. Danger of miscarriage from reflex of nursing.

Menstruation During Lactation.—Best to have amenorrhea during lactation; menstruation does occur, but is exceptional. If woman's suffering is slight, there is little disturbance of milk and it is best to continue nursing, as danger of deranging child is less than from change of milk.

Nervous Impressions.—Fright, grief, etc., of mother may cause derangement of baby through milk—probably due to increase in proteids; hence avoid all emotion. A placid disposition of mother or nurse is best; consider this in advising continuance of nursing. (Milk of cow is also changed by fright.)

Substitutes for Mother's Milk.

MIXED FEEDING.—Nothing equals the mother's milk as food for baby; but if the quantity is not sufficient to nourish baby, then select the best available substitute. If the mother has some milk, *mixed feeding* may be resorted to, using part modified cow's milk—mother's milk serving to keep bowels open.

WET NURSE.—Select a congenial, healthy, well-bodied woman, about same age as mother. It is difficult to find a good one, and hard to keep her in the family. Look out for syphilis and tuberculosis. A good "human cow" is needed; "the proof of the pudding is in the eating"—the condition of baby is the best evidence of agreement of milk. Important to examine condition of the other baby as well as the mother. An unmarried woman is preferable: 1. She does not fret so much about her own baby. 2. She is not so apt to become pregnant. 3. Has fewer family ties. 4. Has no husband to bother her.



MILK OF ANIMALS.—Cow's milk is used almost exclusively in this country as a substitute for mother's milk; the composition of camel's milk is nearest that of human. Good milk from a reliable source is of the first importance.

ARTIFICIAL FOODS.—All require much sugar to preserve them; hence they "make fat babies for good pictures, but very unhealthy babies who easily contract disease." If necessary, they may be used, in conjunction with fat, *for a short time only*, e. g., condensed milk on a long journey; but *never* use as a steady food.

APPROXIMATE COMPOSITION OF VARIOUS INFANT-FOODS (HOLT).

	Yeast's food.....	Mellin's food.....	Islay's food.....	Malted milk.....	Ridge's food.....	Imperial granum.	Farrik's food.....	Condensed milk.....
	%	%	%	%	%	%	%	%
Fat	5.50	0.24	1.16	8.78	1.11	1.0	7.45	6.94
Proteids	14.34	11.50	5.82	16.35	11.81	14.00	10.25	8.43
Cane sugar	25.00	.....	.....	.....	.....	.....	.....	40.44
Dextrose .....	.....	.....	.....	.....	0.52	0.42	.....	.....
Lactose (milk sugar)	6.57	.....	53.46	.....	.....	.....	.....	10.25
Maltose .....	.....	60.80	.....	49.15	.....	.....	.....	.....
Dextrins	27.36	.....	.....	.....	.....	.....	.....	.....
Total soluble carbo- hydrates	58.93	19.20	14.35	18.80	1.28	1.38	.....	.....
Insoluble carbohy- drates (Starch) ..	15.39	80.00	67.81	67.95	1.80	1.80	27.08	50.69
Inorganic salts	2.03	3.59	1.30	3.86	0.49	0.39	4.42	1.39
Moisture	3.81	4.73	2.70	3.06	8.58	9.23	3.42	31.50

Condensed Milk.—When necessary to use condensed milk it should be diluted with from six to twelve parts of water, or as much as eighteen in very young infants.

EFFECT OF DILUTION OF CONDENSED MILK (HOLT).

	Plain.	6 parts water.	12 parts water.	18 parts water.
Fat	6.94	0.99	0.53	0.36
Proteids	8.43	1.20	0.65	0.44
Sugar { Cane, 40.44 } { Milk, 10.25 }	50.69	7.23	3.90	2.67
Salts	1.39	0.17	0.10	0.07
Water	31.50	90.49	94.82	96.46

Cow's Milk.

PHYSICAL CHARACTERS.—Cow's milk is not so sweet to the taste as woman's milk, and is whiter in color and more opaque owing to the calcium phosphate with which the casein is combined.

Reaction.—Cow's milk becomes acid soon after it is drawn, and it is in this condition when it is received by the consumer unless some alkali has been added. (Woman's milk is decidedly less acid or neutral.)

Specific Gravity.—Varies between 1028 and 1033 (about the same as woman's milk).

Microscopical Appearance.—About the same as woman's milk, except that a few leucocytes are almost constantly present. Colostrum corpuscles and pus cells should not be found, but when the latter are present examine the sediment for pyogenic bacteria.

COMPOSITION OF COW'S MILK.—The composition of cow's milk differs considerably from that of woman's milk in both the character and percentages of the constituents. Except in the percentage of fat, the composition of mixed or herd milk varies but little, regardless of breed or season. The fat is lowest in Holsteins, and highest in Jerseys.

COMPOSITION OF COW'S MILK.

	Jers ys.	Holsteins.	Average good herd milk.
Fat	5.61	3.46	4.00
Sugar	5.15	4.84	4.50
Proteids	3.91	3.39	3.50
Salts	0.74	0.74	0.75
Water	84.59	87.57	87.25
Total.....	100.00	100.00	100.00

DIFFERENCES BETWEEN COW'S AND WOMAN'S MILK.—In order to properly understand the modification of cow's milk a study of their relative compositions is necessary. It must be remembered, however, that this difference is shown not alone by the relative percentages, but also by the relative digestibility of the various ingredients, and especially the proteids.

COW'S MILK	VS.	WOMAN'S MILK.
Reaction, acid.		Reaction, neutral or slightly alkaline (may be very slightly acid).
Sp. Gr., 1028 to 1033.		Sp. Gr., 1026 to 1036—average, 1031.
Sugar, 4.5 percent. (same composition—lactose).		Sugar, 6 to 7 percent.
Fat, same percentage but contains greater amount of volatile fatty acids.		Fat, contains less volatile fatty acids.
Proteids, 3.50 percent., the insoluble greater than the soluble (3 to 1).		Proteids, 1.50 percent., the soluble greater than the insoluble (5 to 4).
Casein, readily coagulated by rennet, acids, and many metallic salts.		Casein, not readily coagulated by rennet, and only slightly by acids and metallic salts.
Curds, formed by gastric juice, tough and firm and dissolve slowly in digestion.		Curds, loose and flocculent, and readily and completely dissolved by digestive fluids.
Inorganic salts, 0.75 percent., relatively greater amount of calcium phosphate.		Inorganic salts, 0.20 percent.; relatively greater amount of potassium salts and iron oxid.
Bacteria—always contains a large number, depending upon age of milk.		Bacteria—either sterile or contains a few cocci from milk ducts.

Modification of Cow's Milk.

PURPOSES OF MODIFICATION.—Cow's milk differs from woman's milk both in percentage and character of composition. By means of various additions and dilutions cow's milk may be made to approach woman's milk in percentage and digestibility, and the various ingredients may be separately altered to meet the indications at different ages, and in the various pathological states of infant digestion. The baby can digest more fat in mother's milk than in cow's milk. Sugar must be added to cow's milk, while the proteids are far too great in amount and are less digestible; hence cow's milk must be diluted to bring all percentages below those of woman's milk (practically four times), and fat and sugar must be added to restore the normal percentage of these. The proper dilution reduces the proteids to 0.80 percent., as against 1.50 percent. in woman's milk—this being rich enough for baby. Cow's milk must be made alkaline, hence lime water, etc., is added; this also changes the character of proteids somewhat.

SOURCE OF MILK.—Mixed milk from herd is best, as it is not subject to so marked variations as milk from one cow, no matter how healthy she may be. *Absolute cleanliness* should

be maintained of stables, cows, milkers and dairy, and the first milk from teat should be discarded. The milk should be cooled immediately after milking and be shipped at once, in bottles and on ice, to the consumer. It is not necessary to sterilize good milk in the winter time, as milk well cared for may have as few as 10,000 bacteria per cc.

Fats.—The fat content is practically the same in both cow's and mother's milk (4 percent.), both as to character and amount; but since the former must be diluted in order to reduce the percentage of proteid, the fat must be increased. This is done by the use of cream of various strengths for the primary formulae, the other ingredients in all of which remain about the same. When the fats are at fault in cases of indigestion, the percentage is reduced (other ingredients remaining the same) by the use of weaker primary formulae, even plain milk or whey being used.

Gravity Cream.—In which the Fat : Proteid :: 5 : 1. As a basis for the modification of cow's milk gravity cream may be used when a high percentage of fat or a low percentage of proteid is desired; and from it, by dilution with plain milk, may be made the primary formulae (ten- and seven-percent. cream) used during the first nine months. It is the cream which rises to the surface after four to twelve hours from the time the milk is set aside. Its average composition is 16 percent. fat, 4.50 percent. sugar, and 3.50 percent. proteids.

Centrifugal Cream.—This is cream which has been removed by a mechanical separator, and has the disadvantage of great variation in percentage (from 8 to 40 percent. fat), and the mechanical breaking up of some of the fat-globules. It should not be used unless the percentage is definitely known.

Top Milk.—To obtain fresh cream of any percentage the upper portion of milk is taken from quart bottles which have been allowed to stand in a cool place for four hours or longer, the length of time making little difference.

FAT PERCENTAGE IN TOP MILK.

Percentage of fat in—	After 4 hrs.	After 8 hrs.	Over night.
Upper 4 oz.	20.50	21.25	22.00
Second 4 oz.	6.00	6.50	6.50
Third 4 oz.	1.50	1.40	1.00
Fourth 4 oz.	1.20	1.00	0.30
Fifth 4 oz.	1.00	1.00	0.20

Ten-Percent. Cream.—In which the Fat : Proteid :: 3 : 1. This may be obtained by the dilution of gravity cream (16 percent. fat) with an equal amount of plain milk, as indicated below; or by the removal of the upper ten ounces (*upper third*) from a quart bottle of milk after it has been standing undisturbed in a cool place for from four to twelve hours. Use a Chapin (1 oz.) dipper, filling the dipper the first time by means of a teaspoon; then dip up the other nine ounces, disturbing the milk as little as possible. (Or take the upper half of 5.25 to 5.50 percent. Jersey milk, or the upper fourth of 3.25 to 3.50 percent. Holstein milk.) This formula is used during the first four months.

TEN PERCENT. CREAM FROM GRAVITY CREAM.

	F.	S.	P.
One part gravity cream	16	4.50	3.50
One part plain milk	4	4.50	3.50
	2 | 20	9.00	7.00
	10	4.50	3.50=10% cream.

Seven-Percent. Cream.—In which the Fat : Proteid :: 2 : 1. This may also be obtained by the dilution of gravity cream, as indicated below; or by the removal of the upper sixteen ounces (*upper half*) of a quart bottle of milk after it has been standing for four hours or longer. (Take the upper three-fourths of 5.25 to 5.50 percent. Jersey milk, or the upper third of 3.25 to 3.50 percent Holstein milk.) This formula is used from the fourth to the ninth months.

SEVEN-PERCENT. CREAM FROM GRAVITY CREAM.

	F.	S.	P.
One part gravity cream	16	4.50	3.50
Three parts plain milk.....	4	4.50	3.50
	4 | 28	18.00	14.00
	7	4.50	3.50=7% cream.

PROTEIDS.—The greatest difference between cow's and woman's milk exists in the proteids, these being from two to three times as abundant in the former and of different composition, and being less digestible by the infant's stomach; they coagulate into larger and firmer clots, which dissolve more

slowly. When the proteids are at fault in a case of indigestion the percentage may be relatively lowered by the use of a primary formula richer in fats. Proteids may be made slightly more digestible by the dilution to strengths far below that in woman's milk, and by the addition of lime water and, occasionally, starchy substances to the diluting fluid.

EFFECT OF DILUTION OF COW'S MILK.

	Normal milk.	Diluted once.	Diluted twice.	Diluted 3 times.	Diluted 4 times.
Proteids	3.50	1.75	1.16	0.87	0.70
Salts	0.75	0.37	0.25	0.18	0.15

SUGAR.—The carbohydrate in milk is in the form of milk sugar (*lactose*), the percentage remaining practically constant. The percentage is higher in woman's milk, and hence must be added in modifying cow's milk. Other forms of sugar may be used, but the natural sugar of milk has proven the most satisfactory. The most convenient method is to use a five-percent. sugar solution in diluting the milk. The percentage of sugar in the finished product will then be from 6 to 7 percent, regardless of the amount of diluent.

INORGANIC SALTS.—More than three times as abundant in cow's milk as in woman's milk. In cow's milk there is a relatively larger proportion of calcium phosphate and sodium chloride, with a smaller proportion of potassium chloride. The percentage is brought down to that required by the dilution.

REACTION.—Woman's milk is normally alkaline or neutral, while cow's milk is acid. This is overcome by the addition of lime water (one ounce to each twenty of the food) or bicarbonate of soda (one grain to each ounce of the food). The alkali also assists in retarding the coagulum formed in the stomach, and hence assists in the digestion of the proteids.

BACTERIA.—Mother's milk is normally sterile while cow's milk, as obtained, contains many bacteria. Ordinarily this requires some process of sterilization.

Sterilization of Milk.—The best "certified" milk used need not be sterilized in the winter time; while in the summer time sterilization is the safer rule. An Arnold sterilizer may be

used, while the process of "scalding" of milk, as practiced in the tenement houses, is not bad—put on stove in pan and heat slowly for about 30 minutes until scum forms (this is nearly 155° F., which is about the right temperature). Milk should never be boiled, as: 1. Taste is bad. 2. Milk is dead, and not so good for baby.

Pasteurization.—Pasteur demonstrated that heating milk to 155° F. is enough to kill bacteria (sterilizing requires 212° F.). The Freeman sterilizer (to be obtained from Mr. J. T. Dougherty, 409-411 W. 59th St., N. Y.) is a convenient means for Pasteurizing, and insures uniform results; it maintains the milk, contained in the feeding bottles, at 155° F. for thirty minutes, when it is rapidly cooled. Milk thus treated should be used within twenty-four hours. Before feeding, place bottle in warm water.

DILUENTS.—Ordinarily plain sterile or boiled and cooled water is used; or this may be supplied by the *five-percent. sugar solution*. In some cases *thin gruels* in various amounts may be used instead. These are made from barley, oatmeal, rice, arrowroot, etc.; they are slightly nourishing (especially after the fifth month), and tend to assist in the digestion of the proteids by rendering the coagulum less firm.

Barley Water.—Soak two tablespoonfuls of barley (grains) over night; in the morning, drain and add one quart of fresh water, boil six hours, keeping the quantity up to one quart by the addition of water, and strain through coarse muslin. Prepared barley flour may be used instead, taking one even tablespoonful to twelve ounces of water and boiling fifteen minutes. It has a *slightly constipating* action.

Oatmeal Water.—This is *slightly laxative*, and is to be preferred where there is a tendency to constipation. It is made similarly to the barley water, using the same proportions of either the grains or flour.

PRESERVATION OF FOOD.—After the milk has been modified and sterilized (or before sterilization of the Freeman apparatus is used) it should be put in the individual feeding bottles (one feeding to each), lightly plugged with cotton, and placed on ice. Before feeding, place the bottle for a short time in water heated to body temperature (about 100° F.).

Feeding of Baby.

WATER.—Baby should have water in first few days, before milk secretion begins; give two teaspoonsful of five-percent. sugar solution whenever it seems to want water (about every two hours). Later on baby should have water frequently.

BREAST FEEDING.—Put baby to breast every two to four hours during the day, and not at all or only once during the night. To dilute breast milk, follow nursing with sugar water, or alternate with nursing.

ARTIFICIAL FEEDING.—During first day baby should be given sugar water frequently, but no cow's milk. After ninth month gradually decrease diluent until plain milk is used. If a change is made from breast to modified milk begin with a lower formula than that of mother's milk, as cow's milk is not so easily digested.

Nursing Bottles.—Nursing bottles should be so shaped that all parts of inside can be reached and cleaned with a stick. As soon as bottle is empty, rinse out with cold water, and once daily scrub with soap and water; also put bottles in cold water and boil for a half hour daily, then drain thoroughly.

Rubber Nipples.—Use plain or "anti-colic" nipple, attached directly to bottle; *never use a tube*. Nipple should be short, with the hole just large enough to allow water to drop through when nipple alone is filled. Boil nipple every day, and keep in fresh boric acid solution when not in use. To give sugar solution, use a small bottle and small nipple (a 2-dr. bottle with medicine dropper is convenient size); best not use spoon.

Directions for Preparing the Food.—In the first few days the milk should be very dilute, increasing the strength rapidly up to the fourth day. After the fourth month the percent. of proteids can be increased, and after the ninth month plain cow's milk may be used, with or without the addition of sugar, etc. In preparing the food the following table may be used:

COMPOSITION OF FOOD FOR VARIOUS PERIODS.

Age.	Lime water.	Primary formula.	5% sugar solution.	Composition		
				F.	S.	P.
First day	1 oz.	1 oz. 10%	to 20 oz.	0.50	5.20	0.17
Second day	1 oz.	2 oz. 10%	to 20 oz.	1.00	5.40	0.33
Third day	1 oz.	3 oz. 10%	to 20 oz.	1.50	5.60	0.50
4th to 10th day.....	1 oz.	4 oz. 10%	to 20 oz.	2.00	5.80	0.60
10th to 30th day.....	1 oz.	5 oz. 10%	to 20 oz.	2.50	6.00	0.85
1st to 2nd month.....	1 oz.	6 oz. 10%	to 20 oz.	3.00	6.20	1.00
2nd to 4th month.....	1 oz.	7 oz. 10%	to 20 oz.	3.50	6.40	1.20
4th to 9th month.....	1 oz.	10 oz. 7%	to 20 oz.	3.50	7.25	1.75

Directions for Feeding.—The food should be warmed to about 100° F. by placing the bottle in a tall cup of water at a temperature slightly above this. The baby should not be more than twenty minutes in taking its food, and should not be allowed to sleep with the nipple in its mouth. The following table will give the number of feedings in twenty-four hours and the approximate amount at each feeding for a normal infant at the various periods during the first year (*Holt*):

SCHEDULE FOR FEEDING HEALTHY INFANTS.

Age	Daily intervals, Hours.	Night feedings, 10 p. to 7 a.	Number feedings, 24 hrs.	Quantity one feeding, Ounces	Quantity for 24 hrs. Oz.
2nd to 7th day..	2	2	10	1 -1½	10-15
2nd to 3rd weeks	2	2	10	1½-3½	15-35
4th to 5th weeks	2	1	10	2½-3½	25-35
5 wks. to 2 mo..	2½	1	8	3 -5	24-40
2 to 5 months..	3	1	7	4 -6	28-42
5 to 9 months..	3	0	6	5 -7½	30-45
9 to 12 months.	4	0	5	7 -9	35-45

Food for Premature Baby.—Incubator babies should usually be started on 1 percent. milk, giving 2 dr. hourly during the first week. If this milk does not seem to agree, stop food for twelve to twenty-four hours, allowing stomach to rest; give barley water in meantime.

Evidences of Agreement of Milk.

USE OF SCALES.—Have a good scales with large scoop and arm, and weighing to one-half ounce. Baby normally loses during the first three days, but it should not lose over ten ounces; if it does not gain after four days the food is generally at fault. A bottle-fed baby may not regain its birth-weight for a month or more. Use scales every day and keep an accurate weight chart.

USE OF THERMOMETER.—If baby has enough food its temperature will remain normal. A primipara may have no milk for two or three days, and baby may run up temperature from inanition (*starration temperature*). With insufficient food, the weight decreases at same time temperature rises; after giving proper amount of food, temperature reaches normal before weight. Rise in temperature and loss of weight show disagree-

ment of food; begin with weaker milk, the strength depending on state of weakness of baby. Take temperature once a day.

CHARACTER OF STOOLS.—Character of the stools, combined with weight, is an important indication of agreement of food. *Smooth, yellow stools* with normal temperature and gain in weight, show that baby is doing well; *curds* in stools show too much proteids; vomiting and *too frequent stools* show excess of fat. *Green stools* show that liver is not functioning properly, and may be caused by any disturbance of mother.

XXIII. PATHOLOGY OF THE NEW-BORN BABY.

CONGENITAL SYPHILIS.—May be inherited from either the father or mother, usually the father; if both parents have disease, baby does not suffer worse than if the father alone has it. A syphilitic woman becoming pregnant is more likely to abort than is a woman who contracts syphilis after becoming pregnant. Baby may contract syphilis during labor from lesions about vulva.

Mortality.—Mortality of babies born with syphilis is about 50 percent., while those that live are very feeble. If badly diseased, babies usually die inside of two weeks.

Symptoms.—Marked coryza, or “snuffles,” like cold in head, only more persistent and pronounced. Skin of the palms and soles may be macerated and denuded; also skin about mouth and anus. Skin has serous discharge, and danger of infection is very great. There may be bullous eruptions (*pemphigus syphiliticus*), leaving brown spots after healing. Later in the disease, the skin becomes scaly. May be *lineal ulcers* at mucocutaneous junctions, lesions being more likely to occur where skin is thin and delicate. Spleen and liver are large, and there may be interstitial pneumonia.

Nursing.—Let baby nurse, even if mother has not syphilis, as she is immune to it; but do not employ a healthy wet nurse, especially if baby has lesions in mouth, as the danger of infection is very great.

Danger of Infection.—Danger to other babies, nurses, etc.,

is very great, as from kissing, use of spoons, etc.; but danger is not so great as in primary stage.

Treatment.—Begin inunctions of blue ointment at once—10 gr. daily, to inner surface thighs, loins, axillæ, palms and soles, choosing a different location each day; it may be mixed with equal parts of a bland ointment. Internal treatment may be used when necessary to conceal nature of disease—gray powder, calomel, etc. Keep up nourishment, and get baby under treatment as rapidly as possible.

PREMATURITY.—Premature babies under 4½ lbs., poorly nourished babies over this weight, and babies with subnormal temperature, are best cared for in an *incubator*. Even 3 lb. babies may be saved.

Temperature in Incubator.—Incubator should be heated by tank of water, and should be kept at 80° to 90° F., usually near 90°. Bunsen burner is preferable, but oil or alcohol may be used if without gas supply. Have thermometer through lid, or at side of baby.

Air Supply.—Have abundant air supply, and keep air moist by vessel with wet cotton. Have good current of air—collection of moisture on glass shows insufficient ventilation.

Clothing in Incubator.—Should be loose, to allow free movement and expansion of chest: 1. Abdominal band. 2. Short shirt. 3. Inner napkin, to collect the discharges. 4. Outer napkin, pinned over feet and folded up like a sleeping-bag. May have a third napkin between thighs.

Feeding.—The digestion is weak—too weak for breast milk. Best use diluted breast milk, as modified milk is not so good; dilute with equal parts sugar solution, 5 or 6 percent. Give breast milk (or second-day modified milk) in “half strength, half amounts, and twice as often.” Gradually work up to full breast milk—at first, putting to breast two or three times daily, and after a few days’ feeding, remove baby from incubator and keep on breast.

Substitute for Incubator.—Babies between incubator weight and 5 lbs. should be wrapped in cotton dress (*cotton babies*). Have gauze and cotton dress to fit body and arms, with separate pads for feet. This method supplies sufficient heat; (hot water bags are dangerous, as they may cause fever

if too hot or too numerous). **Receptacle for cotton baby:** Use bureau drawer, or clothes basket, with firm pillow to keep baby off of bottom; have near enough top to allow air to circulate freely over baby.

ATELECTASIS.—From imperfect lung expansion. During blue attacks, with feeble circulation and respiration, give oxygen for five minutes in each hour to supplement air supply.

ICTERUS NEONATORUM.—Occurs in 33 percent. of cases at Sloane. Usually appears on third to fifth day and lasts about ten days. It disturbs baby very little and requires no treatment.

Etiology.—Due to occlusion of bile ducts from pressure of enlarging blood vessels, the ducts being more or less congested. Physiological jaundice must be distinguished from the pathological variety which may be due to: 1. Sepsis. 2. Syphilis. 3. Congenital malformation of bile ducts.

CEPHALHEMATOMA.—Due to a subpericranial hemorrhage, which lifts up the pericranium, irritates it, and stimulates it to a production of new bone. It may be unilateral or bilateral, and is limited in extent by the sutures. It occurs in about one-half percent. of cases, and is usually the result of injury during labor, but may occur before birth. Usually situated over presenting parietal bone, and usually corresponds to opening in cervix.

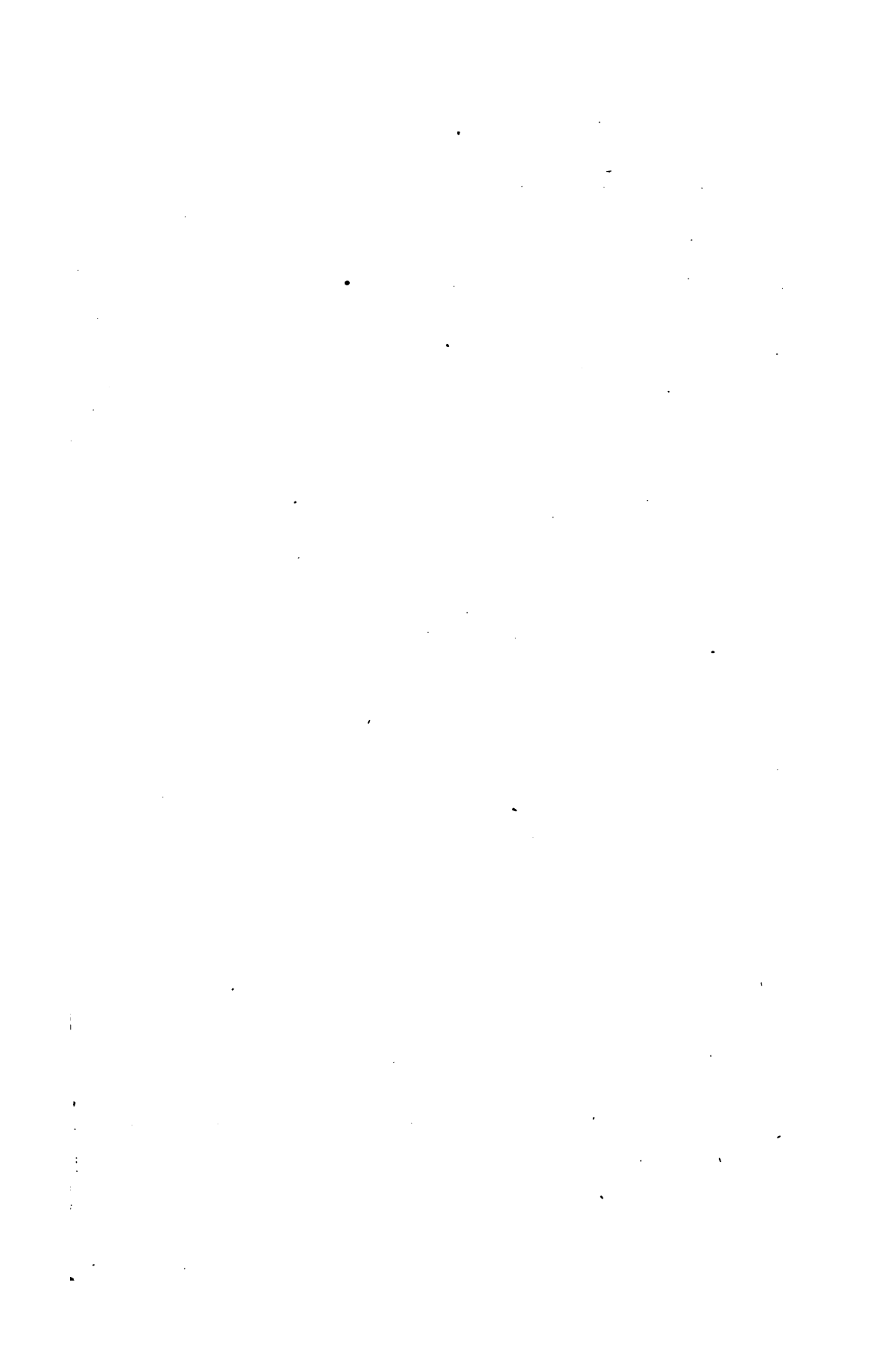
Diagnosis.—A soft, fluctuating tumor, with a crackling sensation or crepitus over the surface, and surrounded by a bony ridge.

Treatment.—Non-interference is the treatment, except when the hemorrhage is excessive or there is suppuration. The latter may require incision and drainage under strict asepsis, while the former may be controlled by cold and pressure.

OPHTHALMIA NEONATORUM.—The result of infection of the conjunctiva by the gonococcus during the passage of the head through the birth canal.

Symptoms.—After twenty-four to forty-eight hours the eyelids become edematous and puffed out, and there appears a seropurulent discharge which soon becomes greenish-yellow pus. The conjunctiva is red and velvety, the cornea may lose its epithelium, become glazed, ulcerated and be perforated.

Treatment.—*Phophylaxis* consists in the use of Crede's treatment of the eyes of all new-born infants. *Active treatment* consists in the hourly cleansing of the eyes day and night with a saturated solution of boric acid; the use of cold compresses as long as the cornea is clear; and the instillation twice daily of 25 percent. argyrol solution. Atropine may be required in cases of ulceration. If one eye alone is affected the other should be protected by bandage or shield. Great care should be exercised in handling these cases to avoid auto-infection (a pair of goggles is a wise safeguard.)



INDEX

- Abdomen, changes in, as sign of pregnancy, 49**
flattened, indicating pregnancy, 51, 52
increase in size of, in pregnancy, 52, 53
- Abdominal inertia, 113**
wall, changes in, during pregnancy, 47
- Abortion, 78**
after-treatment of, 81
causes of, fetal, 79
maternal, 78
paternal, 79
traumatic, 78
complete, 79
dangers, from, 81
definition of, 78
dilatation of cervix in, 80
emptying of uterus in, 80
etiology of, 78
habitual, 81
incomplete, 79
induction of, 160
indications for, 160
methods of, 161
operation of, 161
inevitable, 79
treatment of, 80
missed, 79
subsequent, 81
symptoms of, 79
threatened, 79
treatment of, 80
prophylactic, 79
varieties of, 79
- After-pains, 112**
- Air passages, clearing of, in new-born, 109**
- Allantois, formation of, 34**
- Amnion, diseases of, 70**
false, formation of, 33, 34
formation of, 3
true, formation of, 33, 34
- Amniotic fluid (see liquor amnii), 35**
formation of, 35
functions of, 35
- Anasarca, general, of fetus, 141**
- Anemia in pregnancy, 62**
- Animals, milk of, 195**
- Anus, anatomy of, 12**
vaginalis, 127
vestibularis, 127
- Appendages, fetal, formation of, 33**
- Areolae, anatomy of, 22**
changes in, as sign of pregnancy, 48
- Arms, extended, in breech presentation, 131**
- Arteries and veins, development of, 39**
- Artery, ovarian, 18**
uterine, 18
- Ascites vs. pregnancy, 56**
- Asphyxia, causes of, 177**
treatment of, 177
- Atelectasis, 206**
- Baby, feeding of, 179, 202**
artificial, 202
breast, 202
directions for, 203
schedule for, 203
water in, 202
food for, 191
the new-born, 191
bathing of, 191
care of, 177
clearing of air passages of, 109
dress of, 178
pathology of, 204
treatment of eyes in, 111
where to put, 178
premature, 205
food for, 203
weight of, at birth, 43
- Bag, obstetrical, 105**
of waters, 36
- Ballottement, 52, 53**
- Barley water, 201**
- Bartholin's glands, anatomy of, 12**
- Bathing of new-born, 178**
tub, of new-born, 178
- Bed, labor, 106**
length of time in, after delivery, 180
- Binler, abdominal, 112**
breast, 112
- Bladler, care of, after delivery, 179**
symptoms in pregnancy, 51
- Blood, changes in, during pregnancy, 49**
clots in uterus, 149, 150
- Body cavity, primitive, formation of, 33**
- Bony deformities, 115, 116, 121**
dangers of, to child, 124
to mother, 123
results of, 123
- Bottles, nursing, 202**
- Bougie, introduction of, in induction of premature labor, 162**
- Bowels, care of, in puerperium, 181**
- Brachial palsy, 131**
- Braxton-Hicks' sign, 52, 54**
- Breast abscess, treatment of, 182**
feeding, 202
- Breasts, care of, after delivery, 180**
in pregnancy, 60

- changes in, as sign of pregnancy, 48
 during pregnancy, 47
 fluid in, as sign of pregnancy, 48
 vessels of, changes in, as sign of pregnancy, 48
 Breech, impacted, 131
 Bulbs of vestibule, anatomy of, 10
 rupture of, in labor, 149
 Calcull, vesical, lystocia from, 125, 129
 Canal, parturient, 96
 Caput succedaneum, 109
 Carunculae myrtiformes, 11
 Catheterization after delivery, 179
 Caul, 36
 Cellulitis, pelvic, 188
 abscess in, 188
 diagnosis of, 188
 treatment of, 188
 Cephalhematoma, 206
 diagnosis of, 206
 treatment of, 206
 Cervical dilators, elastic bag, 114
 144, 158, 163
 Cervix, anomalies and diseases of, 125
 artificial dilation of, 114, 144, 158, 163
 atresia of, 125
 cancer of, in pregnancy, 66
 carcinoma of, 66, 125, 126
 changes in, during pregnancy, 51, 52
 cicatrices of, 125, 126
 dilatation of, in labor, 99
 diseases of, causing dystocia, 125, 126
 edema of, 125
 lacerations of, 148, 159, 160
 repair of, 148, 159, 160
 mechanical dilatation of, in induction of premature labor, 163
 mucous membrane of, 16
 rigidity of, 125
 septa of, 125, 126
 softening of, in pregnancy, 51, 52
 violet color of, in pregnancy, 51, 52
 Cesarean section, 172
 incision in abdomen, 173
 in uterus, 173
 indications for, 173
 hysterectomy in, 173
 mortality in, 174
 Porro operation, 172
 indications for, 173
 Sanger operation, 172
 technique of, 173
 sutures in, 174
 vaginal, 174
 indications for, 174
 operation, technique of, 174
 treatment after delivery of child, 175
 Chadwick's sign of pregnancy, 51, 52
 Charges, physician's, 181
 Child, care of, before birth of placenta, 109
 delivery of, after rupture of uterus, 148
 overgrowth of, 139
 Chorea in pregnancy, 62
 prognosis of, 63
 treatment of, 63
 Chorion, cystic degeneration of, 71
 diseases of, 71
 fibromyxomatous degeneration of, 71
 formation of, 34
 rupture of, 71
 Climacteric, 20
 Clitoris, anatomy of, 10
 Coitus, 29
 in pregnancy, 60
 Colostrum, 22
 corpuscles, 22
 Commode, use of, in puerperium, 181
 Condylomata complicating labor, 127
 Copulation, 29
 Cord, umbilical, anomalies of, 37, 76, 77
 in length, 76, 78
 in size, 76, 78
 attachment of, to placenta, 37
 calcareous degeneration of, 76, 77
 coiling of, 76, 77
 cysts of, 76, 77
 degeneration of, 76, 77
 diseases of, 76
 substances of, 76, 77
 vessels of, 76, 77
 dressing of, 110
 formation of, 38
 knotting of, 76, 77
 irregularities of, 38
 measurements of, 38
 prolapse of, 141
 diagnosis of, 142
 etiology of, 141
 management of, 142
 mortality in, 142
 stenosis of vessels of, 76, 77
 thickness of, anomalies in, 76, 78
 torsion of, excessive, 76, 77
 treatment of, in labor, 110
 tumors of, 76, 77
 twists of, 38
 tying and cutting of, 110
 varicosities of, 76, 77
 vessels of, 38
 anomalies of, 76, 78
 hypertrophy of valves of, 76, 77
 stenosis of, 76, 77
 Corpus luteum, 27
 of menstruation, 27
 of pregnancy, 28
 Coxalgia, 121, 123
 Craniotomy, 171
 indications for, 171
 operation, steps of, 171
 technique of, 171

- Cream, centrifugal, 198
 gravity, 198
 seven-percent., 199
 from gravity cream, 199
 ten-percent., 199
 from gravity cream, 199
 Cystocele, 125, 127
- Decapitation**, 171
- Decidua**, atrophy of, 72, 73
 diseases of, 72
 hemorrhage into, 72, 73
 mature, 36
 new growths of, 72, 73
 of menstruation, 35
 of pregnancy, 35
 passage of, in ectopic gestation, 85
 reflexa, 36
 serotina, 36
 vera, 36
- Decidual apoplexy**, 72, 73
- Deciduitis**, acute, 72
 exanthematous, 72
 hemorrhagic, 72
 purulent, 72
 chronic, 72
 catarrhal, 72
 cystic, 72
 diffuse hyperplastic, 72
 polypoid, 72
 tuberculous, 72, 73
- Delivery**, duration of, 109
 premature, 78
- Diabetes in pregnancy**, 63
 prognosis of, 63
 treatment of, 63
- Digestive tract**, development of, 39
- Dress of new-born**, 178
- Ductus arteriosus**, closure of, 45
 venosis, closure of, 44
- Dystocia**, accidents and diseases causing, 141
 cutting operations for, 171
 from fetal causes, 120
 from maternal causes, 113, 125
 from tumors, 125, 128, 129, 141
 non-cutting operations for, 160
- Ectoderm**, primitive, formation of, 31
 true, formation of, 31
- Eclampsia**, 154
 after-treatment of, 158
 convulsions in, 157
 diagnosis of, 155
 emptying of uterus in, 158
 etiology of, 155
 mortality in, 159
 occurrence of, 155
 prognosis in, 158
 sources of toxins in, 156
 symptoms of, 155
 terminations in, 158
 treatment of, active, 156
 prophylactic, 156
 seizure, 157
 types of, 154
 vs. epilepsy, 156
 vs. hysteria, 156
- Ectopic gestation**, 82, 147
 amnion and chorion in, 84
 changes in tube in, 84
 in uterus in, 84
 classification of, 83
 deciduae in, 84
 definition of, 82
 development of ovum in, 84
 diagnosis of, 86
 direction of escape of ovum in, 87
 etiology of, 83
 fate of ovum in, 88
 frequency of, 82
 history of, 82
 menstruation in, 85
- Ectopic gestation**, multiple, 83
 operation in, 89
 preparation of abdomen, 88
 physical signs of, 86
 prognosis in, 88
 results of hemorrhage in, 87
 situation of developing ovum in, 82
 sources of hemorrhage in, 87, 147
 symptoms of, 85
 after rupture, 86
 at different periods, 85
 at time of rupture, 85
 before rupture, 85
 terminations of, 87
 time of occurrence of, 83
 treatment of, 88
 after rupture, 90
 at time of rupture, 89
 before rupture, 88
 rupture into broad ligament, 90
 vs. fibroid at side of uterus, 87
 vs. miscarriage, 86
 vs. ovarian cyst, 87
 vs. salpingitis, 87
 with living child, 90
 diagnosis of, 90
 management of, 90
 operation for, 91
 time for, 91
- Edema of legs in pregnancy**, 63
- Ejaculation**, mechanism of, 29
- Embryo**, character of, at end of various months, 41
 development of, 38
- Embryonal structures**, primitive, formation of, 32
- Embryotomy**, 171
- Encephalocele**, 141
- Endometrium**, changes in, during pregnancy, 46
- Entoderm**, primitive, formation of, 31
 true, formation of, 31, 32
- Epilepsy vs. eclampsia**, 156
- Erb's paralysis**, 131
- Erection**, mechanism of, 29
- Ergot**, use of, in postpartum hemorrhage, 150
- Erysipelas in pregnancy**, 69
- Evisceration**, 172
- External genitals**, anatomy of, 9
 development of, 40
 in female, 41
 in male, 41
- Eyes of new-born**, care of, 111

- Fallopian tubes, anatomy of, 19**
 divisions of, 19
 lumen of, 19
 mucous membrane of, 19
 muscular coat of, 19
 peritoneal covering of, 19
 vessels and nerves of, 20
- Feces, impacted, causing dystocia, 125**
- Feeding, artificial, 202**
 directions for, 203
 first of new-born, 179
 mixed, 194
- Fetal age, estimation of, 43**
 appendages, anomalies and diseases of, 70
 causing dystocia, 139
 circulation, 44
 death, diagnosis and treatment of, 55
 evidence of, 54
 development, anomalies in, causing dystocia, 139
 head, action of, in labor, 97
 rotation of, 97
 heart sounds, 49, 52, 53
 measurements, 96
 movements, 49
 as sign of pregnancy, 49, 52, 53
 trunk, 97
- Fetus, development of, 38**
 nutrition of, 45
 papyraceous, 137
 tumors of, 141
- Fibroid, pediculated, vs. inversion of uterus, 152**
- Fibromyomata, differentiation from pregnancy, 56**
- Follicles, Graafian, 21**
 Nabothian, of cervix, 16
- Fontanelles, 45**
- Food, baby's, 191**
 directions for preparing, 202
 Carnrick's, 195
 Eskay's, 195
 for various periods, composition of, 191
 Mellin's, 195
 Nestle's, 195
 preservation of, 201
 Ridge's, 195
- Foods, artificial, 202**
 infant, approximate composition of various, 202
- Foot vs. hand, in breech presentation, 130**
- Foramen ovale, closure of, 45**
- Forceps, 163**
 application of, 165
 cephalic, 166
 choice of, 166
 pelvic, 166
 axis-traction, 164
 use of, 167
 characters of, 164
 contra-indications for use of, 165
 dangers from use of, 165
 Elliot, 163
 Forceps, history of, 163
 indications for use of, 165
 introduction of, 165
 combined, 166
 lateral, 166
 posterior, 166
 locking of, 166
 McLane, 164
 operation, 165
 in breech presentation, 168
 in face presentation, 168
 in L. O. A., 167
 position of woman in, 165
 stages of, 165
 varieties of, 165
 with head in abnormal position, 167, 168
 removal of, 167
 rotation, 168
 selection of, 165
 Simpson, 164
 traction on, 167
 varieties of, 163
- Forces of labor, expulsive, 93, 97**
 resisting, 93, 96
- Fundus, position of, at various months, 47**
- Gait of women during pregnancy, 50**
- Generative organs, female, anatomy of, 9**
 physiology of, 23
- Genitalia, diseases of, in pregnancy, 64**
- Genitals, cleansing of, after delivery, 112**
 external (see External genitals), 9
 internal (see Internal genitals), 12
- Germinal area, formation of, 32**
- Glands, Bartholin's, anatomy of, 12**
 mammary, anatomy of, 21
 ducts of, 22
 glandular tissue of, 22
 secretion of, 22
 vessels and nerves of, 22
 Montgomery's, 22
- Glycerin, injection of, in induction of premature labor, 162**
- Gonorrhoea, complicating labor, 127**
 in pregnancy, 68
 treatment of, 68
- Graafian follicles, anatomy of, 21**
 structure of, 21
- Haase's rule, 43**
- Hand vs. foot, in breech presentation, 130**
- Head, fetal, control of, in labor, 108**
 moulding of, 108
 premature ossification of, 140
- Heart, changes in, during pregnancy, 50**
 development of, 38
 sounds, fetal, 49, 52, 53
- Hegar's sign of pregnancy, 51, 52**
- Hematometra vs. pregnancy, 57**
- Hemorrhage, 143**
 accidental, 143, 145
 after labor, 143, 149
 before labor, 143

- during labor, 143, 147
 postpartum, 143, 149
 conditions normally preventing, 149
 symptoms of, 149
 treatment of, 150
 puerperal, 143, 151
 causes of, 151
 treatment of, 151
 source of, in ectopic gestation, 87, 147
- Hemorrhoids in pregnancy, 12
 Herpes in pregnancy, 62
 Hip joint, ankylosis of, 121, 123
 deformity of, 121, 123
 diseases and deformities of, 121, 123
 dislocation of, 121, 123
- History of pregnant woman, 57
 Hydrencephalocele, 141
 Hydrocephalus, 140
 treatment of, in labor, 140
 Hydrometra vs. pregnancy, 57
 Hydorrhoea gravidarum, 72, 73
 vs. discharge of liquor amnii, 73
- Hymen, anatomy of, 11
 unruptured, 11, 125, 127
- Hypogastric arteries, closure of, 45
- Hysterectomy, anterior vaginal, 174
 indications for, in Cesarean section, 173
- Hysteria vs. eclampsia, 156
- Icterus neonatorum, 206
 etiology of, 206
- Imperial Granum, 195
- Impregnation during lactation, 194
- Incubator, air supply in, 205
 clothing for, 205
 substitute for, 205
 temperature in, 205
- Inertia uteri (see Uterine inertia), 113, 131
- Infections, puerperal, 183
- Insemination, 28
- Instruments and supplies furnished by patient, 106
 by physician, 105
- Internal genitals, anatomy of, 12
 development of, 40
- Johnson's sign of pregnancy, 51, 52
- Kidney, displaced, dystocia from, 125, 129
- Kyphosis, 121, 122
 Kyphoscoliosis, 121, 123
- Labia majora, anatomy of, 9
 minora, anatomy of, 10
- Labor, bel in, 106
 cause of onset of, 98
 course and duration of, 98
 dry, 99
 duration of, 99
 expulsive forces of, 93, 97
 Labor, first stage of, 98, 107
 care of woman in, 108
- forces involved in mechanism of, 93
 classification of, 93
 expulsive, 93, 97
 anomalies in, 113
 misdirected, 113
 normal balance in, 113
 resisting, 93, 96
 anomalies in, 115
 deficiency in, 115
 excess in, 115
 induction of, 160
 management of, 104
 before onset, 104
 in pelvic deformity, 124
 in tenement house, 106
 mechanism of, 99
 pains, 97
 adjuncts to, 97
 effect of, on fetus, 98
 on uterus, 98
 force of, 98
 pathology of, 113
 physiology and management of, 93
 prediction of date of, 55
 premature, 78
 induction of, 161
 indications for, 161
 injection of glycerin in, 162
 introduction of bougie in, 162
 mechanical dilatation of cervix in, 163
 methods of, 162
 puncture of membranes in, 162
 tamponing or vagina in, 162
 time for operation, 162
 prolonged, results of, 115
 resisting forces in, 92, 96
 second stage of, 98, 108
 position of woman in, 108
 stages of, 98
 third stage of, 99, 109
 management of, 111
 mechanism of, 111
- Lacerations, hemorrhage from, 143, 148, 149
 of cervix, 148, 159
 and vagina, causes of, 148
 complications of, 149
 diagnosis of, 148
 treatment of, 148
 of perineum, 149, 159
 repair of, 149, 159
 through sphincter ani, 159
- Lactation, impregnation during, 194
 menstruation during, 194
- Legs, extended, in breech presentation, 131
- Leukorrhoea, vaginal, complicating labor, 127
 in pregnancy, 67
 treatment of, 67
- Ligaments, broad, anatomy of, 16
 changes in, during pregnancy, 46
 contents of, 17
- Ligaments of uterus, 16
 round, anatomy of, 16

- utero-sacral. 17
 Liquor amnii (see Amniotic fluid). 35
 anomalies in. 70
 discharge of. vs. hydrorrhoea gravidarum. 73
 Liver and spleen, changes in, during pregnancy 50
 Lochia, amount of. 180
 character of. at various periods. 180
 in puerperal sepsis. 180
 odor of. 180
 Lorchiosis. 121, 123
 Male germ cell, 28
 formation of. 28
 maturation of. 29
 means of reception of. 29
 motion of. 29
 point of union with female cell. 30
 vitality of. 28
 Mammary glands, anatomy of. 21
 changes in, indicating pregnancy. 51, 52
 Mastitis. 181
 causes of. 181
 symptoms of. 182
 treatment of. 182
 Maternal body changes in, during pregnancy 46
 impressions. 62
 Measles in pregnancy 69
 Meatus, urinary anatomy of. 11
 Medullary groove, formation of. 32
 Membranes, examination of. 112
 fetal, anomalies of. 0
 formation of. 3
 maternal structures contributing to. 35
 premature rupture of. 142
 etiology of. 142
 results of. 43
 re-amen case in. 143
 puncture of, in induction of premature labor. 162
 rupture of, in labor. 99
 Menopause. 25
 Meningocele. 141
 Menstrual cycle, stages of. 24
 flow, characters of. 23
 duration of. 23
 quantity of. 23
 source of. 23
 stimulation. 23
 Menstruation 23
 age of onset of. 24
 and ovulation, proofs of independence. 25
 cause of. 23
 cessation of, indicating pregnancy. 51
 during lactation. 194
 during pregnancy. 25
 Menstruation in ectopia gestation. 85
 pathology of onset. 26
 periodicity of. 24
 relation of, to ovulation. 25
 stages of. 24
 first. 24
 second. 24
 third. 24
 Mesoderm, formation of. 31
 Metritis, differentiated from pregnancy 56
 Milk, condensed. 195
 effect of dilution of. 195
 cow's. 196
 bacteria in. 200
 composition of. 196
 differences between woman's and. 196
 effect of dilution of. 200
 fats of. 198
 inorganic salts of. 200
 microscopical appearance of. 196
 modification of. 197
 management of bacteria in. 197
 of fats in. 197
 of inorganic salts in. 197
 of proteids in. 197
 of reaction in. 197
 of sugar in. 197
 purposes of. 197
 use of barley water in. 201
 dilutents in. 201
 oatmeal water in. 201
 modified, evidences of agreement of. 203
 preservation of. 201
 pasteurization of. 201
 physical characters of. 196
 proteids in. 199
 reaction of. 200
 source of. 97
 specific gravity of. 196
 sterilization of. 200
 sugar in. 200
 vs. woman's milk. 197
 ducts, occlusion of. 191
 malted. 195
 mother's 191
 to dry up. 180
 top. 198
 fat percentages in. 198
 woman's composition of. 192
 percentage of. 192
 differences between cow's and. 196
 fat of. 193
 estimation of. 193
 management of, when too rich. 194
 microscopical appearance of. 191
 physical characters of. 191
 proteids of. 192
 estimation of. 193
 quantity of. 191
 approximate daily. 191
 means of determining if normal. 191
 Milk, woman's, reaction of. 191
 salts of. 192
 secretion of. 22
 anomalies in. 193
 nervous impressions affecting. 194
 soluble albumin and casein in. 197
 specific gravity of. 191

- substitutes for, 194
 sugar of, 192
 variations in, 193
 vs. cow's milk, 197
 water of, 192
 Miscarriage, 78
 dangers from, 81
 subsequent, 81
 vs. ectopic gestation, 86
 Monstrosity, 140
 Mons veneris, anatomy of, 9
 Morning sickness, as indication
 of pregnancy, 51
 causes of, 61
 feeding in, 61
 rectal, 61
 treatment of, 61
 surgical, 62
 Mother, care of, after delivery,
 111
 temperature of, after delivery,
 179
 Multigravida vs. primigravida, 58
 Mycosis complicating labor, 127

 Naegele's rule, 55
 Navel, dressing of, 110
 Nervous impressions, affecting
 development of fetus, 62
 affecting milk secretion, 194
 system, changes in, during
 pregnancy, 50
 development of, 39
 Nipples, anatomy of, 22
 areolae of, 22
 changes in, as sign of preg-
 nancy, 48
 cracked, treatment of, 180
 rubber, 202
 Notochord, formation of, 32
 Nuchal hitch, 132
 Nurse, directions to, before la-
 bor, 107

 Oatmeal water, 201
 Oligohydramnios, 70
 Ophthalmia neonatorum, 206
 symptoms of, 206
 treatment of, 206
 Orgasm, 29
 Osteomalacia, 116, 120
 Ovarian cyst with pregnancy vs.
 ectopic gestation, 87
 tumor vs. pregnancy, 56
 Ovaries, anatomy of, 20
 borders of, 20
 cysts of, in pregnancy, 66
 obstructing passage, 66
 diameters of, 20
 epithelial covering of, 20
 parenchyma of, 20
 position of, 20
 Ovaries, surfaces of, 20
 tumors of, 56, 125, 128
 vessels and nerves of, 21
 Ovulation, 26
 Ovum, development of, 26
 fertilization of, 30
 impregnated, development of,
 31
 maturation of, 26
 migration of, 27
 segmentation of, 30

 Oxygen, source of, in fetal
 blood, 45

 Pain in ectopic gestation, 85
 Pains, labor, 97
 Patient, examination of, in first
 stage of labor, 107
 Pelvic cellulitis (see Cellulitis,
 pelvic), 188
 exudate vs. pregnancy, 57
 joints, abnormally firm, 116
 loose, 116, 121
 changes in, during preg-
 nancy, 47
 synostosis of, 121
 measurements, 58
 mensuration, 172
 Pelvimeter, use of, 172
 Pelvis, anatomy of, 93
 anomalies in union of, 116
 articulations of, 93
 axes of, 94
 brim of, 94
 caries and necrosis of, 116, 121
 deformities of, 116, 119
 causes of, 116
 direction of, 116
 from disease of bone, 116
 from faulty development, 116
 diameters of, 95
 cavity of, 96
 diaphragm of, 94
 female, 93
 characteristics of, 96
 vs. male pelvis, 96
 fractures of, 116, 120
 justomajor, 116, 118
 justominor, 116, 117
 flat, 116, 117
 masculine, 116, 117
 measurements of, at brim, 95
 at outlet, 96
 cavity of, 96
 external, 95
 muscles of, 94
 Naegele, 116, 118
 narrow, funnel-shaped, 116, 117
 new growths of, 116, 120
 obliquely contracted, 116, 118
 double, 116, 118
 osteomalacia of, 116, 120
 plane of contraction of, 94
 position of, 94
 rachitic, 116, 119
 Roberts, 116, 118
 shape of, 95
 simple flat, 116
 Pelvis, soft parts of, 94
 split, 116, 118
 union of, 93
 Perineal body, anatomy of, 9
 Perineum, lacerations of, 109, 159
 prevention of, 109
 repair of, 159
 suturing of, 159
 lateral tears in, 159
 obstetrical, anatomy of, 9
 protection of, 108
 Peritoneal exudate vs. preg-
 nancy, 57
 Pernicious anemia in pregnancy,
 63

- Persistent occiput posterior, 104, 168
- Phlegmasia alba dolens, 187
 course of, 187
 forms of, cellulitic, 187
 thrombotic, 187
 prognosis of, 187
 symptoms and diagnosis of, 187
 treatment of, 188
- Pigmentation of skin as sign of pregnancy, 48
- Placenta, abnormally large and thin, 75
 large and thick, 75
 situated, hemorrhage from, 143
 small, 75
 accessory, 75, 76
 anomalies in, 75
 number of, 75, 76
 position of, 75, 76
 shape of, 75
 size of, 75
 annular, 75, 76
 attachment of cord to, 37
 battledore, 37, 75, 76
 bipartita, 75, 76
 circulation of, 37
 cysts of, 73, 75
 delivery of, 112
 degeneration of, 73, 74
 diseases of, 73
 double, 75, 76
 edema of, 73, 74
 expression of, 112
 fenestrata, 75, 76
 formation of, 36
 hemorrhage of, 73, 74
 causes of, 74
 results of, 74
 horseshoe, 75
 malformations and anomalies of, 75
 marginata, 75
 membranacea, 75
 normally situated, hemorrhage from, 143, 145
 number of, 37
 premature separation of, 145
 diagnosis of, 146
 etiology of, 145
 mortality in, 146
 symptoms of, 146
 treatment of, 146
 varieties of, 146
- Placenta, premature separation of vs. placenta previa, 146
 vs. rupture of uterus, 146
- presentation of, 111
 previa, 75, 76, 143
 complete, 75, 76, 143
 diagnosis of, 144
 etiology of, 143
 frequency of, 143
 hemorrhage in, cause of, 144
 source of blood in, 143
 marginal, 75, 76, 143
 lateral, 75, 76, 143
 partial, 75, 76, 143
 prognosis in, 144
 treatment of, 144
 varieties of, 143
- vs. premature separation of placenta, 146
- separation of, in labor, 111
 shape of, 37
 spuriae, 76
 succenturiatae, 75, 76
 surface of fetal, 37
 maternal, 37
 tripartita, 75, 76
 triple, 75, 76
 tumors of, 73, 75
- Placental apoplexy, 73, 74
 circulation, 37
 villi, degeneration of, 73, 74
 calcareous, 73, 74
 caseous, 73, 74
 fatty, 73, 74
 fibrous, 73, 74
 myxomatous, 73, 74
 syphilitic, 73, 74
- Placentitis, acute, 73
 chronic, 73
 simple, 73, 74
 syphilitic, 73, 74
 tuberculous, 73, 74
- Pneumonia in pregnancy, 69
- Polyhydramnios, 70
 results of, 70
 symptoms of, 70
 treatment of, 70
- Position, classification of, 100
 vertex, explanation of frequency of, 100
 L. O., 100
 L. O. A., 100
 definition of, 100
 diagnosis of, 100
 mechanism of, 100, 101
 before labor, 101
 during labor, 102
 L. O. P., 100, 104
 definition of, 104
 diagnosis of, 104
 mechanism of, 104
 relative frequency of, 100
 R. O., 100
 R. O. A., 100, 103
- Position, vertex R. O. A., definition of, 103
 diagnosis of, 103
 mechanism of, 103
 R. O. P., 100, 103
 definition of, 103
 diagnosis of, 103
 mechanism of, 103
- Postpartum hemorrhage (see Hemorrhage postpartum), 149
- Pregnancy, abdominal (see Ectopic gestation), 83, 91
 bathing in, 59
 care of breasts in, 60
 clinical history of case in, 57
 coitus in, 60
 constipation in, 60
 diagnosis of, 31, 48, 51
 differential, 55, 56, 57
 diagnostic signs of, during first three months, 51
 during last six months, 52
 dress in, 59
 drink in, 59
 duration of, 55
 examinations during, 58, 107

- exercise in, 58
 exposure in, 59
 food in, 59
 general symptoms of, 49
 hygiene of, 57
 infectious diseases in, 68
 in uterus bicornis, 92
 laxatives, use of in, 60
 management of, 31, 57, 104
 multiple, 137
 development of ova in, 137
 diagnosis of, 137
 etiology, 137
 frequency of, 137
 management of, 138
 placentae in, 137
 presentation in, 137
 prognosis in, 138
 sex in, 137
 ovarian, 91
 pathology of, 61
 physiology of, 31
 previous, determination of, 58
 signs and symptoms of, 48, 49,
 51, 52
 during first three months,
 51
 during last six months, 52
 in ectopic gestation, 85
 three positive, 54
 teeth, care of in, 59
 tonics in, 59
 toxemia of (see Toxemia), 153
 tumor complicating, 56
 urine, examination of, 60
 vs. ascites, 56
 vs. fibromyomata, 56
 vs. hematometra, 57
 vs. hydrometra, 57
 Pregnancy vs. metritis, 56
 vs. ovarian tumor, 56
 vs. pelvic exudate, 57
 vs. peritoneal exudate, 57
 vs. pseudocystitis, 57
 vs. subinvolution, 56
 Pregnant woman, advice to, with
 obstructed fibroid, 66
 diseases of, 61
 general systematic, 61
 history of, 57
 management of, 58
 Premature labor (see Abortion),
 78
 Prematurity, 205
 feeding in, 205
 use of incubator in, 205
 Presentation, 99, 100
 cephalic, 99, 100
 complex, causes of, 136
 treatment of, 136
 breech, 99, 129
 causes of, 129
 diagnosis of, 130
 forceps in, 168
 frequency of, 130
 management of, 130
 special conditions in, 131
 mechanism of, 130
 positions in, 130
 vs. face, 130
 brow, 99, 134
 correction of, 134
 diagnosis of, 134
 management of, 134
 positions in, 134
 face, 99, 132
 corrections of, 133
 diagnosis of, 132
 etiology of, 132
 forceps in, 134, 168
 management of, 133
 mechanism of, 132
 positions in, 132
 prognosis in, 132
 results of, 133
 version in, 134
 vs. breech, 130
 foot, 99
 hip, 99
 longitudinal, 99
 pelvic, 99
 shoulder, 99
 transverse, 99, 135
 diagnosis of, 135
 etiology of, 135
 mechanism of, 135
 positions in, 135
 prognosis in, 136
 results of, 135
 treatment of, 136
 trunk, 99
 vertex, 99
 Primigravida vs. multigravida, 58
 Primitive streak, formation of,
 32
 Pruritus vulvae, in pregnancy, 67
 treatment of, 67
 Pseudocystitis, 56
 vs. pregnancy, 57
 Puberty, changes in body at
 time of, 26
 hygiene at time of, 26
 Pudendum, anatomy of, 9
 Puerperal hemorrhage (see Hem-
 orrhage, puerperal), 151
 infections, 183
 sepsis (see Sepsis, puerperal),
 182
 Puerperium, the,
 length of time in bed, 180
 management of, 177
 pathology of, 181
 Pyelitis, 188
 symptoms of, 189
 treatment of, 189
 Quickening, 52, 53
 as sign of pregnancy, 52, 53
 Rectocele, 125, 127
 Rectum, anatomy of, 12
 conditions of, causing dysto-
 cia, 125
 contractions of muscles of,
 causing dystocia, 125
 foreign bodies in, 125
 tumors of, 125, 129
 Respiration, changes in, during
 pregnancy, 50
 institution of, 110
 Respiratory tract, development
 of, 39
 Rigor after delivery, 112
 Salivation in pregnancy, 51, 62
 Salpingitis vs. ectopic gestation,
 87

- Scales**, use of, in determining results of feeding, 203
- Scarlatina** in pregnancy, 69
- Scoliosis**, 121, 122
- Seminal fluid** (see **Male germ cell**), 28
- Sepsis**, puerperal, 182
 appearance of case of, 184
 bacteria in, 182
 fever in, 182
 lochia in, 180
 natural protecting agents against, 182
 odor in discharge in, 184
 pain in, 185
 pathology of, 184
 predisposing causes of, 183
 site of infection in, 184
 source of infection in, 183
 symptoms of, 184
 treatment of, active, 185
 general, 186
 prophylactic, 185
 radical, 186
 uterus in, 185
 varieties of, 183
- Sex**, determination of, 44
 diagnosis of, 44
- Shoulders**, birth of, 109
- Signs of pregnancy** (see **Pregnancy, signs and symptoms**), 48, 51
- Skeleton**, subjacent, diseases and deformities of, 121
- Skene's tubules**, 11
- Skull**, fetal, 45
 base of, 45
 sutures of, 46
 vault of, 45
- Small-pox** in pregnancy, 69
- Soft parts**, maternal, diseases and anomalies of, 125
- Somatopleure**, formation of, 32
- Somites**, formation of, 33
- Souffle**, funic, 49, 52, 54
 uterine, 49, 52, 53
 umbilical, 49, 52, 54
- Special sense organs**, development of, 39
- Spermatozoa** (see **Male germ cell**), 28
- Spincter ani**, lacerations of, 159
 care of bowels in, 160
 removal of sutures in, 160
 repair of, 159
- Spinal column**, diseases and deformities of, 121
- Splanchnopleure**, formation of, 33
- Spondylolisthesis**, 121
- Sterility**, history of, in ectopic gestation, 85
- Stools**, character of, in determining results of feeding, 204
- Striae**, as sign of pregnancy, 49
- Subinvolution of uterus** (see **Uterus, subinvolution of**), 189
- Superinvolution of uterus** (see **Uterus, superinvolution of**), 189
- Symphysiotomy**, 175
 after-treatment of, 176
 delivery of child in, 176
 French operation, technique of, 176
 history of, 175
 indications for, 175
 Italian operation, technique of, 176
 results of, 175
 technique of, 176
- Syphilis**, congenital, 204
 dangers of infection in, 204
 mortality in, 204
 nursing in, 204
 symptoms of, 204
 treatment of, 205
 in pregnancy, 68
 prognosis of, 68
 treatment of, 68
- Temperature**, starvation, 205
- Thermometer**, use of, in determining results of feeding, 205
- Thyroid**, changes in, during pregnancy, 50
- Toothache** in pregnancy, 51
- Toxemia of pregnancy**, 153
 in early months, 153
 pathology of, 153
 symptoms of, 153
- Toxemia of pregnancy**, in later months, 153
 pathology of, 153
 symptoms of, 153
 treatment of, 153
- Tubal mole**, 84
- Tubes**, Fallopian (see **Fallopian tubes**), 19
- Twins**, locked, 138
- Typhoid fever** in pregnancy, 69
 treatment of,
- Umbilical bruit**, 49
 cord (see **Cord, umbilical**), 38
 soufflé, 49
 stalk, formation of, 34, 35
 vein, closure of, 44
 vesicle, formation of, 34
- Umbilicus**, changes in, during pregnancy, 53
- Urethra**, anatomy of, 11
 caruncles of, 10
- Urinary meatus**, anatomy of, 11
- Urine**, changes in, during pregnancy, 50
- Uterine**, inertia, 113, 131
 results of, 114
 treatment of, 114
 ligaments, anatomy of, 16
 position or shape, dystocia from, 125, 127
 soufflé, 49, 52, 53
 sounds, 49
- Uterus**, anatomy of, 14
 bicornis, pregnancy in, 92
 blood clots in, 149, 150
 care of, after birth of placenta, 112
 cavity of, 14
 changes in, during pregnancy, 46
 development of, anomalies in, 125
 displacements of, 64
 causing dystocia, 125, 127

- common results of, 64
 course of pregnancy with, 64
 in pregnancy, 64
 signs and symptoms of, 64
 treatment of, 64
 uncommon results of, 64
 emptying of, in eclampsia, 158
 fibroid tumors of, in pregnancy, 65
 at side of, vs. ectopic gestation, 87
 growth of, during pregnancy, 46
 intermittent contractions of, in pregnancy, 54
 inversion of, 151
 causes of, 152
 diagnosis of, 152
 symptoms of, 152
 treatment of, 152
 varieties of, 151
 vs. pediculated fibroid, 152
 involution of, anomalies in, 189
 ligaments of, 16
 Uterus, lymphatics of, 18
 changes in, during pregnancy, 46
 malformed, causing dystocia, 125
 measurements of, 14
 mucous membrane of, 15
 muscles of, changes in, during pregnancy, 46
 muscular coat of, 15
 nerves of, 17, 18
 changes in, during pregnancy, 46
 packing of, 148
 peritoneal coat of, 15
 changes in, during pregnancy, 46
 prolapse of, 64, 125, 128, 151
 in pregnancy, 64
 treatment of, 64
 relaxation of, causes of, 149
 rupture of, 147, 149
 etiology of, 147
 delivery of child after, 148
 location of rent in, 147
 mortality in, 148
 results of, 147
 symptoms of, 147
 treatment of, 147
 varieties of, 147
 vs. premature separation of placenta, 146
 sacculation of, 65, 125, 127
 in pregnancy, 65
 treatment of, 65
 subinvolution of, 189
 diagnosis of, 189
 etiology of, 189
 treatment of, 189
 vs. pregnancy, 56
 superinvolution of, 189
 etiology of, 189
 treatment of, 189
 tumors of, 125, 128
 changes occurring in, during pregnancy, 66
 management of obstructed labor with, 65, 128
 vessels of, 17, 18
 changes in, during pregnancy, 46
 Vagina, anatomy of, 12
 anomalies and diseases of, 125
 bacteriology of, 49
 changes in, as sign of pregnancy, 49
 during pregnancy, 47
 congenital stenosis of, 125
 fornices of, 13
 infection of, 125
 integument of, 14
 lacerations of, 148
 mucous membrane of, 13
 muscular coat of, 13
 nerve and vascular supply of, 14
 or vulva, anomalies and diseases of, 125, 126
 catrices of, 125, 126
 congenital stenosis of, 125, 126
 infections of, 125
 Vagina or vulva, malformation of, 125
 septa of, 125, 126
 tumors of, 125, 126
 relations of, 12
 secretions of, 13
 tamponing of, in induction of premature labor, 162
 violet color of, as sign of pregnancy, 51, 52
 in pregnancy, 47
 Vaginal bulbs, anatomy of, 10
 Caesarean section, 147
 fornix, anatomy of, 13
 Vaginismus, 125, 127
 Varicosities in pregnancy, 67
 treatment of, 68
 Version, 168
 baby in, treatment of, when partially born, 170
 contra-indications for, 169
 indications for, 169
 methods of performing, 169
 bipolar, 169
 Braxton-Hicks', 169
 combined, 169
 ind'cations for, 170
 external, 169
 indications for, 169
 technique of, 169
 internal, 169, 170
 indications for, 170
 technique of, 170
 varieties of, 168
 cephalic, 168
 partial, 168
 pelvic, 169
 podalic, 169
 Vesicular mole, 71
 diagnosis of, 71
 etiology of, 71
 pathology of, 71
 symptoms of, 71
 treatment of, 71
 Vestibule, anatomy of, 10
 Visits, physician's, length of, 179
 in puerperium, 179
 Vomiting, pernicious, 154
 causes of, 154

- diagnosis of, 154
treatment of, 154
Vulva, anatomy of, 9
changes in, as sign of pregnancy, 49
during pregnancy, 47
or vagina, anomalies and diseases of, 125, 126
- varicosities of, in pregnancy, 67
violet color of, as sign of pregnancy, 51, 52
in pregnancy, 47
Walcher posture, 124
Wet nurse, 204





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