THE CASTRATION OF CRYPTORCHID HORSES

AND THE

OVARIOTOMY OF TROUBLESOME MARES

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THE CASTRATION OF CRYPTORCHID HORSES

AND THE

OVARIOTOMY OF TROUBLESOME MARES

BY

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TO THE MEMORY

OF

M. CHARLIER

A DISTINGUISHED FRENCH VETERINARY SURGEON, WHO, IN 1850,
FIRST PERFORMED THE VAGINAL METHOD OF OVARIOTOMY
IN THE MARE AND COW
AND
BY STERILISING HIS INSTRUMENTS WITH BOILING
WATER BEFORE OPERATION
INTRODUCED
TO THE VETERINARY PROFESSION ONE OF THE MAIN
PRINCIPLES OF ANTISEPTIC SURGERY

THIS LITTLE BOOK
IS RESPECTFULLY DEDICATED.

INTRODUCTORY PREFACE.

UNTIL recent years operations involving the interior of the abdomen have been considered to be accompanied by the gravest risks, and the percentage of fatalities used, indeed, to justify this assumption. Nowadays, however, thanks to the researches of Pasteur and their adaptation by Lister to modern surgery, the introduction of antiseptic methods have altered all that, and the surgery of the abdomen has taken its proper place with that of any other part of the body.

It is not to be inferred that an abdominal operation should be lightly undertaken, as of course it will always figure as a major one, but the results of present-day work show that, with careful manipulation and strict attention to true surgical cleanliness, the proportion of successful sequelæ are quite as great as with any other operation of importance.

Cryptorchid operating is to a certain extent very much like the "lucky bag" competition of a bazaar. Even the most experienced surgeon cannot always tell, before making an exploratory examination, what is in front of him, the exact site in which he will find the testicle (he may not be able to find one at all), or the abnormal condition of that organ when found.

Ovariotomy of the mare is much more straightforward, for the reason that variations in character and position are much less common than those which occur in the testicle of the cryptorchid horse.

Neither offer insuperable difficulties, and, given the faculty for operating, determination and patience enough to attend to the necessary details, together with certain opportunities, there is no reason why any qualified practitioner who is so minded should not attempt and achieve successful results in both.

The opinions given in this little volume are based principally upon the results of more than 100 cases given in detail (and illustrated as far as possible) in the Appendix. These are taken *consecutively*, not merely *selected*, and the mistakes as well as the successes are recorded, as a reader must gain much more benefit from studying the difficulties which others have met with than from a mere perusal of a list in which only the successes are recorded. For their previously published statistics and deductions on one or both operations the names of Charlier, Colin, and Cadiot in France, Fröhner, Möller, and Ostermann in Germany, Bang in Denmark, Degive and Hendrickx in Belgium, and Farmer Miles in England and America, must always stand pre eminent.

My thanks are due to Professor M'Fadyean for assistance in reading the proofs, to my partner, Mr F. H. Ridler, M.R.C.V.S., and to those gentlemen, mentioned in the text, who have kindly helped me in many ways, especially in regard to the illustrations. I have also to acknowledge the courtesy of Messrs Arnold & Sons in lending the woodcuts of various instruments.

F. H.

KENSINGTON, LONDON, W.

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VETERINARY MEDICAL SOCIETY GLASGOW

THE CASTRATION OF CRYPTORCHID HORSES.

Definition and Reason for Operating.—By the term "cryptorchid" is understood an animal that has one or both testicles hidden from external view. If one is out of sight, the animal is said to be a unilateral cryptorchid or monorchid; if both are hidden, then the term bilateral or double cryptorchid is applied. The agricultural community know an animal of this kind better under the name of "rig" or "ridgling." The terms "retention of the testicle" or "undescended testicle" are more commonly applied by our medical *confrères* to a similar condition in human patients.

Cryptorchidism may exist in any of the domesticated animals, and has been observed in the horse, bull, pig, ram, dog, and cat. Probably it is more frequently operated upon in the horse, dog, and pig than in any of the others. The removal of this hidden testicle is, in the majority of instances, a matter of necessity, especially in the horse, as the animal may at any time display a vicious and treacherous disposition. I have had one instance in which a cryptorchid horse had worked quite quietly for three years, but one day, without any warning, the animal suddenly turned upon its driver, knocked him down, and bit him savagely. In any case, even if not vicious, a "rig" colt is a nuisance to its owner, because it will constantly be trying to get at the mares and is uncertain with other horses, being therefore unable to be turned out to grass. The ex-

ternal form, especially about the neck and head, becomes somewhat like that of the stallion, although this rule is not constant.

A condition is occasionally met with in which no testes are present at all.[1] Such an animal is technically known as an "anorchid."

Many apparent hermaphrodites have predominating male tendencies, and prove upon exploration to be cryptorchids. In some parts of England a horse with this malformation is known under the name of a "will-gill" by the farmers.

Heredity.—There can be no question upon this point. The tendency for a horse with one testicle retained and one in the scrotum to produce progeny having a similar defect is well illustrated in districts where a stallion with only one testicle visible is allowed to be used at stud. It is possible, too, that atavism plays some part in this malformation, for I have met with, at all events, two authenticated instances in which the tendency appeared to come from the mare's side (see Appendix, page 64).

Power of Procreation.—When one testicle is visible the animal may be quite as good a stockgetter as when both are present, but when this has been removed, or when the testes are in the inguinal canal or the abdomen, the probability is that (although the sexual instinct is very marked) the animal is unable to propagate its species. When examined microscopically after removal it is not rare to find spermatozoa in testicles which have remained in the lower part of the inguinal canal, but in those found in the upper part, and in those taken from the abdomen itself, this is exceptional.

In fourteen instances Professor M'Fadyean reported upon testes which I had taken from the abdomen, and spermatozoa were discovered twice. In eleven testes taken from the inguinal canal five contained spermatozoa. Three of these were at the extreme upper portion of the canal, and all were beyond dispute in such a position that they could be termed "inguinal"

1 "Journal of Comparative Pathology and Therapeutics," Vol. XIII., page 75. See Appendix cases 27 and 50.

testicles. They were quite out of sight even when the patient was cast and secured on its back.

Fertility, however, depends upon many things, including the number and state of maturity of the spermatozoa; the actual presence, therefore, of a few specimens in the semen removed from a testicle does not necessarily imply power to propagate species.

Preparation of the Patient before Operation.—The disadvantage of an engorged condition of the digestive organs is too obvious to need much comment, and for any operation involving exploration of the abdominal contents the advantage of a few hours' fast cannot be too strongly insisted upon. In fact, cases have been recorded where operators have failed to discover the retained testicle in a patient which has not been fasted, whereas a few weeks afterwards the horse has again been cast after being starved for twenty-four hours, and the testis has been discovered without difficulty.

No food should be allowed for about twenty-four hours before the time of operating, and water should only be given in limited quantity. Even this should not be given within five or six hours previously. Care must be taken that the bedding is not eaten, the animal being tied up short or made to wear a muzzle.

As to the advisability or otherwise of the previous administration of a dose of physic, opinions differ a little. Personally I do not consider it necessary except in special circumstances, as a laxative diet prescribed for a few days before and after the operation is quite sufficient and the patient is not nauseated. It seems theoretically, and practical experience has borne it out, that it is better to operate upon a patient in good spirits and in good health rather than one whose system has been depressed and depleted by a strong purgative. In any case, if a laxative is used, a mild dose of magnesium sulphate or oil is preferable to any drug such as aloes, which causes nausea and depression. An enema an hour beforehand is sometimes a useful adjunct, although in restive colts which

have not been handled it is objectionable, the better plan being to disturb them as little as possible before casting for the actual operation. The hair of the tail should be plaited up or otherwise secured so that it does not unexpectedly swish round and foul the operator's arm, or the site of operation.

Methods of Securing.—The methods of securing for the cryptorchid operation vary with the fancy of the operator. A cryptorchid can be castrated when fixed either on its side or on its back. When the lateral position is chosen the animal

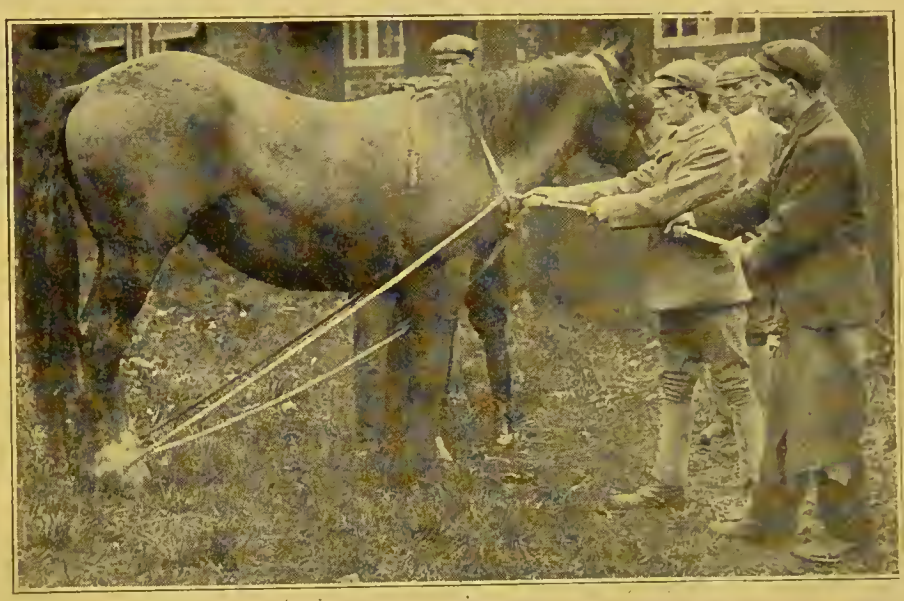


FIG. 1.
Rope adjusted previous to throwing the animal.

is cast either with rope or hobbles, the upper hind leg being fixed well forward in such a way that the operator can get the maximum amount of room in which to work. The side on which the hidden testicle is supposed to be is placed uppermost. The disadvantages of this position are that there is certainly less room in which to work, as the weight of the upper leg is in the way, the hand and arm of the operator are more likely to touch parts of the body which are not surgically clean, the field of operation is not so visible, and, in addition, when the history of which testicle has been removed is doubtful

or unknown, the search for the scar (unless the animal has been previously turned on its back) is more difficult. It is not so easy, too, to avoid injuring the large plexus of veins which are to be found in the inguinal region. The only advantage which can be claimed for it is that the risk of protrusion of intestine is not so great when the operator is not using a general anæsthetic.

With the dorsal position, and this is by far the most con-

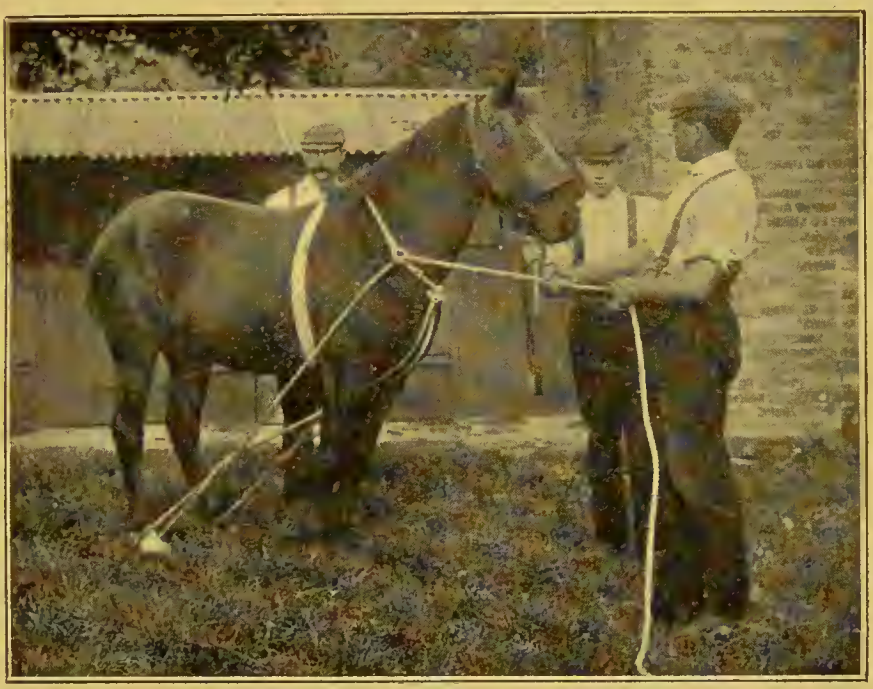


FIG. 2.

Rope with metal eyes, affixed for casting.

venient, the patient is cast with a rope just as for ordinary castration. With a manilla or cotton rope about fifty feet long a loop or collar is made in the centre and passed round the neck, the loose ends are passed between the fore legs, through the hind ones, brought up around the heels and passed through the rope collar, or through metal eyes previously inserted in the strands of the rope (see Figs. 1 and 2).

The rope, after leaving the heel, may or may not (at the fancy

of the operator) be twisted once on itself before it is passed through the collar (see Fig. 2).

One man attends to the twitch and head, his instructions being to sit on the neck as soon as the colt falls on his side. A sack loosely filled with oats is a very useful adjunct to keep the animal quiet if placed over the neck. Two or three men, depending upon the size of the patient, are placed on the rope at either side, being *outside* it and not between the colt's body and the rope on account of risk to themselves during the fall; they may be all instructed to walk backwards or, if the colt is to fall on his off side, those on the right rope stand still or walk slightly forwards whilst those on the left walk and pull backwards, running behind the animal's quarters when it falls. Whilst the under rope is kept tight the upper hind leg is pulled as close to the body as possible; the operator, or his assistant, passes a loop of the top rope over the hind heel, pulls it tight again, and fixes it with a couple of half hitches. The upper fore leg is then secured alongside the hind one, either inside or outside, with half hitches, and a final half hitch over the hind heel completes the tying of that side. This rope is given to a man to hold. The colt is turned over and the other side tied up in the same way.

Place the colt on his back and a bundle of straw (or a sack filled with straw) on either side, and the patient is now ready for operation.

If preferred the fore legs may be tied separately by passing a slip noose of rope, the leg being bent on itself, round each one (see Fig. 3).

Some practitioners prefer the knot of the collar to be on the withers, the ends of rope then being passed straight away along the flanks and through the hind legs as above directed. If the first-named method is chosen, a rope or surcingle should always be put round the chest behind the elbows and the collar of the rope firmly tied to it (see Figs. 1 and 2), or the animal will sometimes withdraw its head, and so necessitate the trouble of untying and recasting.

Farmer Miles, who was probably the first to introduce the "rig" operation into England, had a special set of ropes and an elaborate method of fixing, whilst the Danish method is also somewhat complicated. The main object of each way is to spread the legs out well, so as to open out the inguinal region

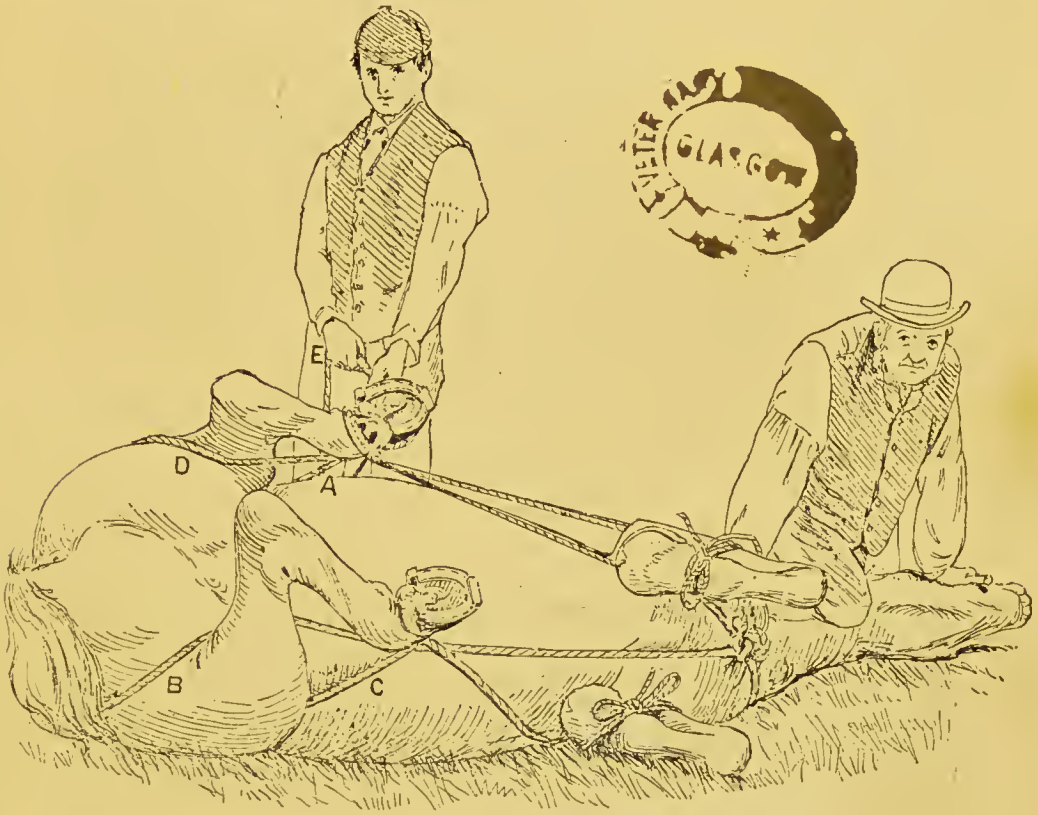


FIG. 3.
Cryptorchid colt secured in position by Mr Donald's method.

as much as possible, and this can be done quite readily with an ordinary casting rope.

For the above illustration, which shows one method of tying, I am indebted to Mr Joseph Donald, F.R.C.V.S., whose description[1] is thus summarised: An ordinary casting rope or good cart rope is used and doubled up so that one end shall be from two to three yards longer than its fellow on the opposite side. It is adjusted around the colt's neck as in the ordinary method

[1] "Journal of Comparative Pathology and Therapeutics," Vol. I., page 334.

of castration, the longer end being placed on the side upon which the colt is desired to fall. Throw in the usual way. "When the horse is down the operator seizes the under rope, pulls it backwards under the withers, and winds it two or three times around the upper fetlock. He then passes it down in

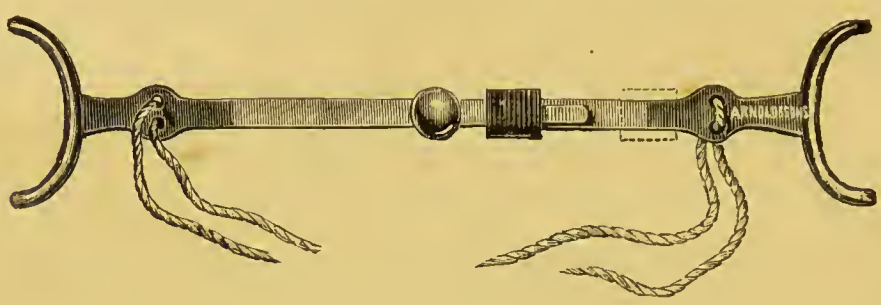


FIG. 4.
Spreader.

front of the upper stifle (A) backwards and under the quarters, bringing it up outside the opposite thigh (B), and round the front of the lower hind fetlock. The rope is next steadily and firmly pulled until the limbs are well flexed, then wound twice

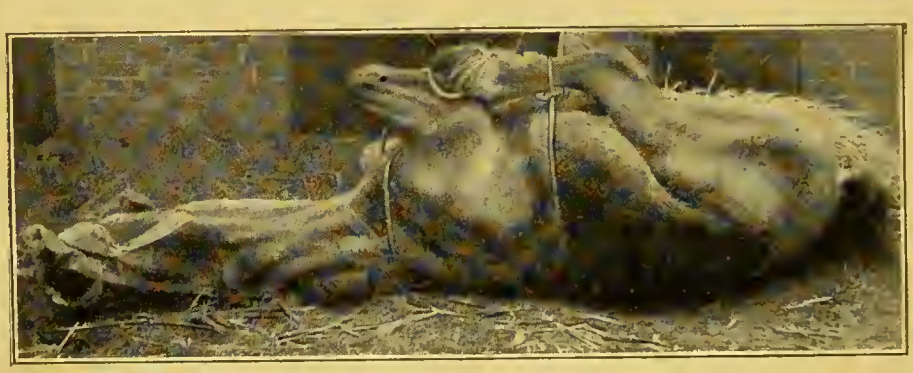


FIG. 5.
Shewing "back" rope applied, and a "rig" colt secured in the dorsal position.

round the lower fetlock, passed down in front of stifle (C), over the quarters to the opposite side, and up inside the thigh (D). Now pull firm, wind twice round the upper fetlock, and give the rope (E) to an assistant to hold. The animal's feet are thus thoroughly and firmly secured to his own hind quarters.

To secure each fore limb take a piece of light cord about a

couple of yards long—a piece of good plough line answers well —double it round the fetlock, and pass the loose ends through the loop so formed; flex the knee, and pass one cord to the inside and the other to the outside under the fore arm, and tie on the upper side of the metacarpal bone, as shown in the illustration. The patient can then be placed in any convenient position as required by circumstances."

In exceptional cases a spreader (Fig. 4) is useful, this consisting of a piece of iron with a curved piece and loops of rope at each end; it is tied near the hock and keeps the legs apart. It can be improvised by an ordinary long twitch or broom handle with a loop of rope on each extremity, or by putting a piece of rope or webbing just below the hock, passing it under the back, and tying it tightly to the hock on opposite side (see Fig. 5).

Value and Choice of an Anæsthetic.—The cryptorchid operation in particular is one in which an anæsthetic should always be used, as the operator can rarely tell with absolute certainty what conditions he is going to meet with before making an incision and exploration. On humane grounds the use of an anæsthetic needs no defence, and on grounds of convenience to the operator and increased safety to the patient it is also to be preferred. It is very much easier to operate and antiseptic measures can be more rigidly adopted when the patient is lying still, than when struggling is continually taking place. It is a precaution, too, of extra safety for the animal, as if the abdomen has to be entered the struggles are apt to eject a portion of omentum or intestine, whereas if an anæsthetic is used this is not nearly so liable to take place.

Chloral is sometimes used, from half an ounce to an ounce in mucilage being injected *per rectum* about an hour beforehand, or morphia (five to ten grains) may be given subcutaneously.

Cocaine, subcutaneously injected, answers well for the skin and parts involved when the testis happens to be superficially situated, but chloroform is undoubtedly the best for all general purposes. When the patient is under its influence the operator

is prepared for all eventualities, and if the operation is difficult and the search prolonged he is not persistently flurried or annoyed by violent and frantic struggling.

Instruments Required; Preparation for Operation.—The instruments required are a sharp scalpel, a pair of dressing forceps, two or three pairs of Spencer Wells' artery forceps, a director, needle and silkworm gut or stout silk, and an écraseur[1] or emasculator. The latter is for the removal of the testicle, although, if preferred, and the length of the spermatic cord will permit it, this can be taken off by ligature, torsion or the clam and iron. The écraseur is, however, the most useful for all emergencies.

All instruments must be surgically clean, and to effect this should be sterilised by boiling immediately before use, or by

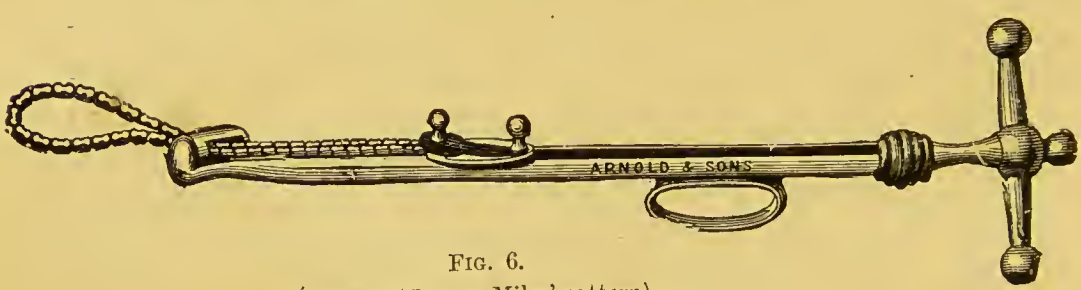
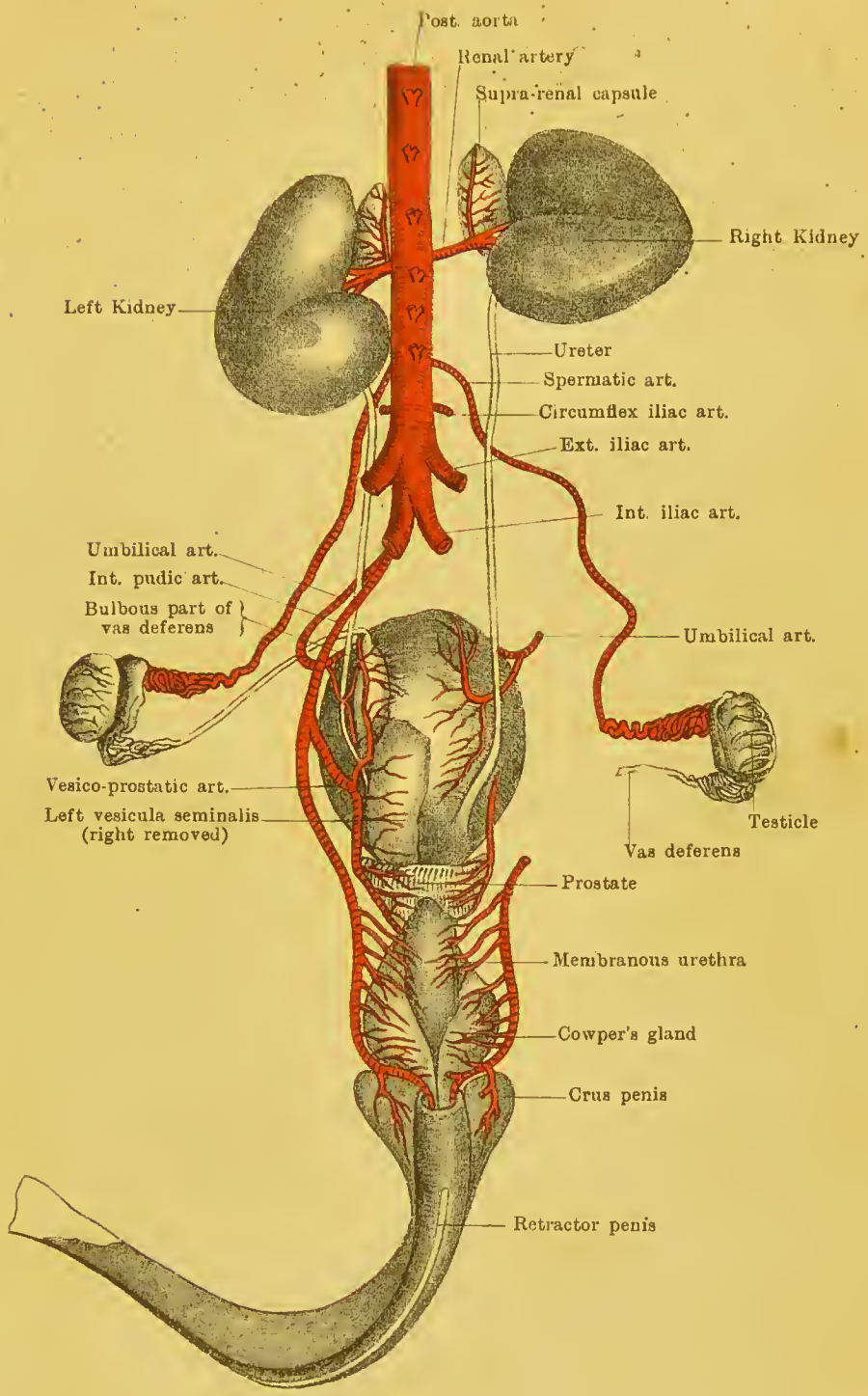


Fig. 6.
Écraseur (Farmer Miles' pattern).

placing for some time in a reliable antiseptic solution, and the operator should take care not to contaminate them during use. Cotton wool, too, which is so much better than sponges for cleansing the wound, should previously be rendered sterile in the same way. If preferred, dry antiseptic or sterilised wadding or gauze may be used for swabbing up the blood.

The site of incision and surrounding parts should have all hair removed by scissors and razor, if necessary, then be thoroughly soaked and scrubbed with soap and hot water containing some antiseptic (such as creolin, carbolic acid, or chinosol), and carefully rinsed and scrubbed again with ether or ether soap and fresh solution of antiseptic. If possible an assistant should first do the dirtier parts. After this it

[1] It is always wise to be provided with two chains in case of accident.



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GENITO-URINARY ORGANS OF MALE (CHAUVEAU)

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should be wiped dry with sterilised wadding. The operator's hands and arms should be treated in exactly the same way, particular care being taken of the nails. It is wise to have two nail brushes, one being kept for the hands alone.

Surgical Anatomy.—In the inguinal region, after carefully cutting through the skin almost immediately over it, a little more forward than in the operation for ordinary castration, the operator will encounter a large plexus of veins. These are often of great volume, and must be carefully pushed aside, the hand and fingers (held wedge-shaped) boring their way by a rotatory movement through a quantity of loose connective tissue up the inguinal canal. This is easily found, and if there is no trace of testicle the fingers seek the upper inguinal ring, turn inwards to the abdominal wall, and penetrate it about an inch on this side. If the fingers cannot feel the missing organ the whole hand must be introduced. One is then in contact with a large mass of intestine, amongst which a careful search is made. As rational guides it must be remembered that the abdominal testicle is denuded of its normal coverings, that it has at one end the spermatic artery, and at the other the epididymis and vas deferens. The spermatic arteries spring from the aorta just behind the kidneys, one on each side, and descend backwards towards the internal abdominal ring, being smoothly covered by parietal peritoneum during a considerable portion of their course.

The vas deferens, a long tube about two-thirds the thickness of an ordinary lead pencil, is a continuation of the epididymis, and finds its way to the side and neck of the bladder, where it dilates, forming what is known as the "bulbous" portion. The latter is an excellent guide to commence with, as from it the hand can make a start towards the testicle, following up the course of the vas deferens until the epididymis is reached.

Description of the Operation.—A shallow incision about four or five inches long is made through the skin almost directly above the inguinal canal, care being taken not to injure any of the large vessels which lie immediately underneath. These large

veins are frequently much dilated, and have on more than one occasion been mistaken for testicle, and even cut into; injury to them is followed by a profuse hæmorrhage, which is very difficult to stop, and may even be fatal.[1] The best method of avoiding this is to prick the skin carefully with a scalpel, and complete the incision with the aid of a director. When once the skin is cut through, the tissues are pulled apart and the remainder of the operation is done by the

FIG. 8.

Shewing site of incision with an abdominal testicle ready for removal by the écraseur. The chain of the latter lies in the surgical wound.

fingers, without again having recourse to the knife. Making sure again that the hand is thoroughly clean, the fingers are all put together in as small a space as possible in the shape of a wedge, and carefully rotated past the large veins into the inguinal canal. This is explored, and if the testicle is present it is grasped and withdrawn. Care must be taken not to unconsciously pass the testicle by or to remove an inguinal lymphatic by mistake.[2] Sometimes the epididymis is

[1] "Journal of Comparative Pathology and Therapeutics," December 1900. Appendix, Case 50.

[2] See Appendix, Cases 4 and 77.

in the canal and the remainder of the testicle in the abdomen,[1] and cannot be withdrawn without penetrating the wall of the latter. In such a case, if moderate traction is insufficient, the better plan is to enter the abdomen.

If the testis is not in the canal the operator carefully passes his hand until the fingers almost reach the upper extremity, then turning them inwards, the abdominal muscle is penetrated with the finger nail. Sufficient space is at first made to admit

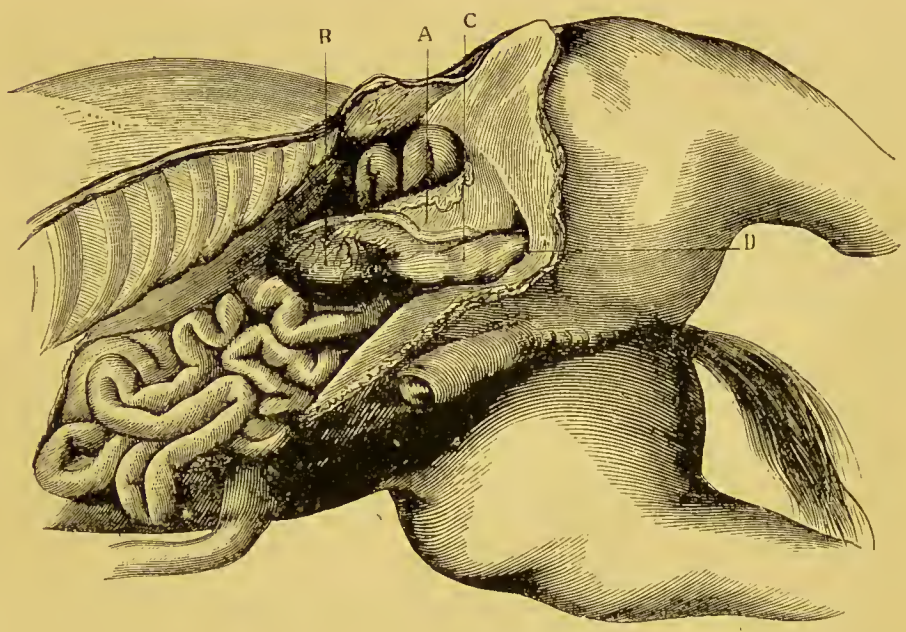

FIG. 9.

Position of the undescended testicle in the fœtus (Colin).

A. Fold of peritoneum by which the testicle is suspended from the lumbar region; B. Testicle; C. Gubernaculum testis; D. Inguinal ring.

the fore and middle fingers, which search just inside for the missing testicle. It may sometimes be found in this situation. If unsuccessful, the whole hand is introduced and another careful search made. Occasionally at this stage it comes into the hand quite unexpectedly.

If the testicle is not found at this juncture it is wise to commence a methodical search by seeking for some anatomical

[1] "Veterinary Record," Vol. XV., page 267. See Appendix, Cases 13 and 19.

guide. The best of these are the spermatic artery and the vas deferens. When either of these is found it merely requires to trace it up to the distal extremity to find the testicle. The vas deferens itself feels like a thick piece of soaked string and the artery is known by its pulsation.

When found the testicle is recognised by its shape, by the epididymis affixed to it, by its flabbiness and smooth surface, and because it is by itself. Fæces in the intestine (which are

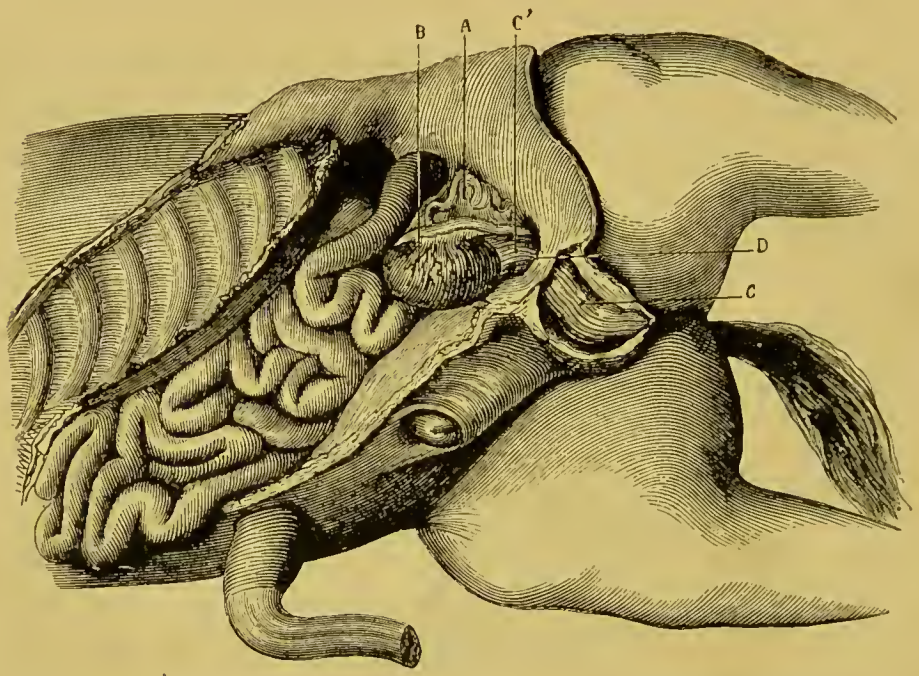

FIG. 10.

Shewing the fœtal testicle drawn towards the inguinal ring (Colin).

A. Fold of peritoneum by which the testicle is suspended from the lumbar region; B. Testicle; C. Portion of the gubernaculum testis which has passed through the inguinal ring D.; C.′ Internal portion of the gubernaculum folded on itself below the ring.

the most likely to be confounded with it) are hard to the touch and multiple in number. If the patient is not deeply anæsthetised pressure upon it will cause struggling. Should any grave doubt exist the organ ought to be slowly drawn into view. When the search for an abdominal testicle is prolonged the operator may find that his hand and arm become cramped. Great relief from this can be obtained by plunging them into a

bucket of cold water containing some disinfectant, or in some way sterilised.

It can readily be understood upon reference to Figs.[1] 9, 10 and 11 that if certain abnormalities occur in connection with the peritoneal fold, with the testicle itself or its appendages (the epididymis, vas deferens or spermatic cord), with the inguinal canal, the gubernaculum testis, or even the skin of the scrotum, a "rig" colt will probably be the result.

GLASGOW

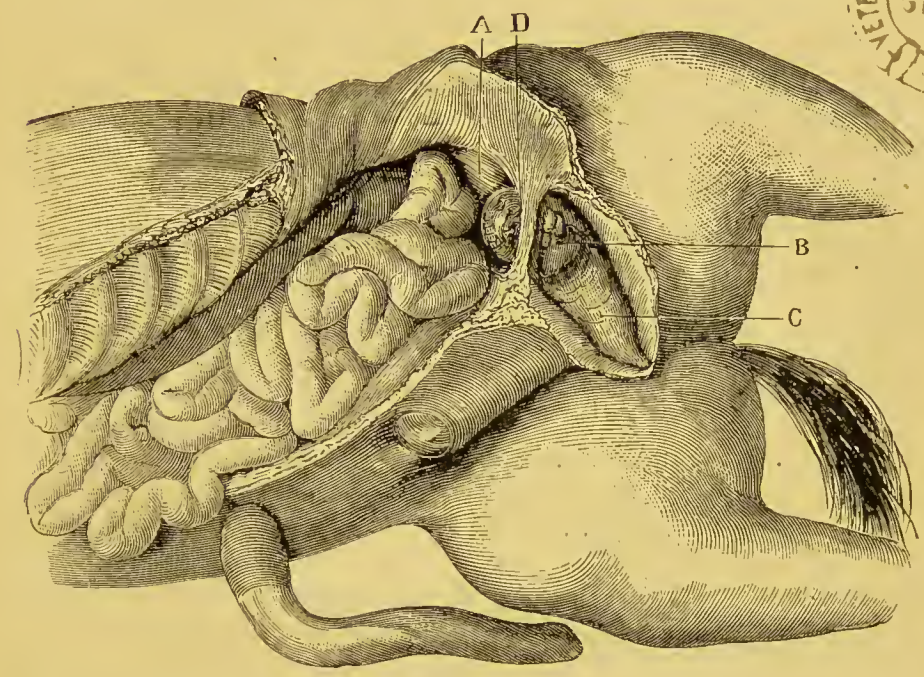

FIG. 11.

Shewing testicle passing through the inguinal canal (Colin).

A. Fold of peritoneum by which the testicle is suspended from the lumbar region; B. Testicle; C. Gubernaculum testis; D. Inguinal ring.

For example, the peritoneal attachment may be abnormally short or abnormally long at a certain period of fœtal or colt life. With the former the result might be that the testicle would never descend from its position in the lumbar region but become a fixture, or it might descend a little way and thus not be able to reach the internal inguinal ring. If abnormally long

1 "Traité de Physiologie Comparée des Animaux," by Professor Colin.

it might not reach the internal inguinal ring at the time when this aperture would be sufficiently relaxed to admit of its passage, and it might not even reach it at all but be pushed out of place by some internal organ.

The testicle itself may be abnormally large, being cystic or otherwise diseased; the epididymis is frequently excessively large or misshapen. An unnaturally short vas deferens or spermatic artery, too, would cause retention.

The inguinal canal may be so narrow, or its entrance or external exit so small and abnormally contracted just at the period when the testicle approaches, that this latter organ cannot gain admittance; or, if admitted, cannot pass through into the scrotal sac.

The gubernaculum testis, by which the testicle is drawn through the canal towards the scrotum, may be paralysed so that its natural function as a guide is useless; and, lastly, there may be some abnormal contraction of the skin of the scrotum by which, although the testicle has reached the external inguinal ring or even passed through it, the organ is either tightly held there or forced under the skin of the prepuce, abdomen, or thigh.

The operator should continually keep swabbing up any blood which may be present on his arm or at the entrance of the wound, and when once the testicle has been brought into sight it may be removed by the écraseur or whatever instrument is preferred.

After the wound has been carefully cleansed (not swilled out, as this is likely to send blood up into the abdomen) and all blood clot removed, the skin wound should be closely sutured with boiled silk or silkworm gut if the abdomen has been entered, and the colt allowed to get up. If the abdomen has not been opened there is no need to suture, the case really being little more complicated than an ordinary castration. The colt should be allowed to get up with the side upon which the abdomen has been entered next to the ground, the weight of the body and upper hind leg thus lessening the tendency to

hernia of the intestine whilst the patient is recovering from the chloroform and struggling to rise.

On several occasions successful attempts have been made to castrate abdominal cryptorchids through the flank,[1] but this method is not advisable if it can be done through the inguinal

FIG. 12.
Abnormal shapes sometimes assumed by testicles retained in the abdomen.

region. The animal is cast and chloroformed with the side uppermost from which the testicle is to be removed. The flank between the angle of the haunch and the last rib is shaved and disinfected as already described. An incision is made through the skin with scalpel and director, then through the muscle in the direction of its fibres, and finally through the peritoneum.

[1] G. E. King "Veterinarian," February 1897.

The operator's hand is inserted and directed towards the pelvis, where a search is made for the missing organ. When found it is removed by the écraseur and the wound carefully sutured, the muscle and peritoneum separately with boiled silk and the skin with silkworm gut, or, better still, both the latter layers with silkworm gut. This material, although it never becomes absorbed, is non-absorbent, and so leaves less likelihood of being the carrier of septic infection to the interior. The peritoneum may be sutured with the muscle, but the danger of hernia is lessened if it is done separately with fine boiled silk. Interrupted sutures, about a quarter of an inch apart, are the best. The skin is then carefully dried and covered with iodoform and collodion (1-10), or orthoform and collodion (1-8).

Prognosis and After-treatment.—Given the use of chloroform and strict attention to modern antiseptic principles, a most favourable prognosis may be given. It is astonishing how little swelling or disturbance (either local or constitutional) will ensue. A glance at the reports given of cases and the papers read on the subject will show that the proportion of deaths is very small,[1] especially if extraordinary abnormalities be left out of consideration.

The after-treatment consists in placing the patient in a clean loose box, removing the sutures (if any have been inserted) about the third day, opening the wound a little to allow free drainage, and afterwards keeping it clean with antiseptics. The attendant should always wash his hands carefully before touching the parts. If there is no discharge the wound is better to be left alone altogether. Exercise should be given about half an hour or an hour night and morning, and the diet should be laxative.

In animals which have been brought from grass immediately before the operation the better plan is to turn them out again as soon as possible; in fact, if the testis is not in the abdomen but only in the canal, they are better turned back to pasture

[1] "Journal of Comparative Pathology and Therapeutics," Vol. IV. (Donald); Idem Vol. XI., and "Veterinary Record," Vol. XV., page 267 (Hobday); "Castration du Cheval Cryptorchid" (Cadiot).

at once, the case really being only very little more serious than an ordinary castration.

FIG. 13.

Molar teeth (in various stages of development), removed from a dentigerous cyst taken from a cryptorchid's abdominal testicle by Mr Inglis. On the left is seen the curiously misshapen testicle itself. For this illustration and description I am indebted to Professors Williams and Taylor ("Veterinary Journal," 1901, page 25.)

Abnormalities.—The cryptorchid operator must always be on the look out for abnormal conditions either of his patient or of the testicle and its situation.

The testicles may be found in almost any part of the abdomen, and have even been recorded close to the diaphragm. There may be an entire absence of one or both,[1] the animal may be hermaphrodite,[2] the testicle may be much enlarged and cystic, degenerated (Fig. 22), adherent to the

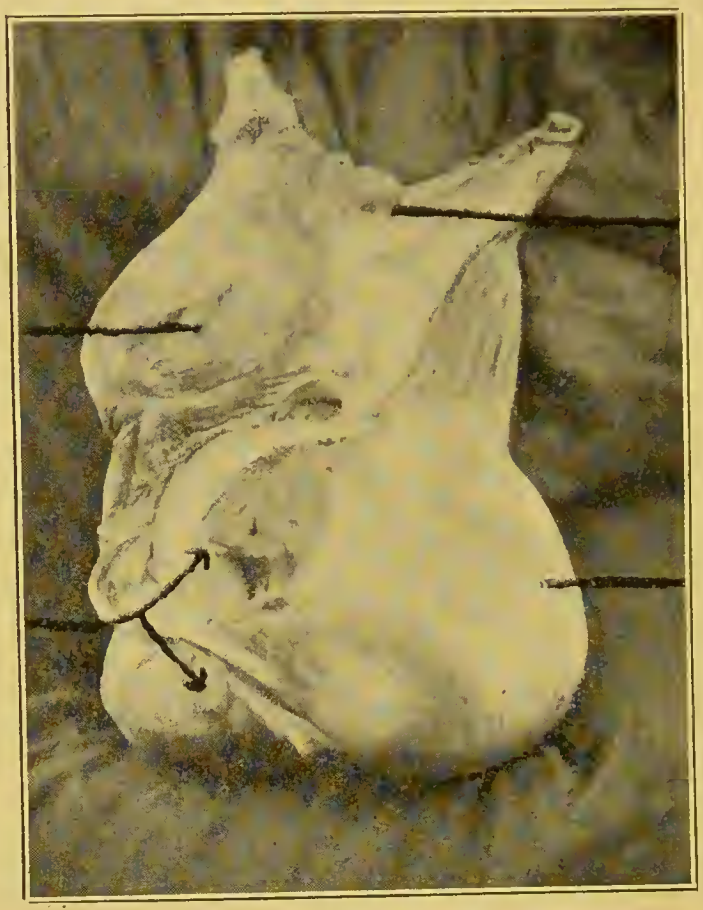

FIG. 14.
Dentigerous cyst of the testicle from two years old cryptorchid.[3]

peritoneum or some abdominal organ, or contain such foreign bodies as worms,[4] hair, cartilage, and osseous or even tooth-like structure[5] (dentigerous cysts).

1 "Journal of Comparative Pathology and Therapeutics," Vol. XIII., pages 74 and 365. See Appendix, Cases 27 and 50.

2 "Journal of Comparative Pathology and Therapeutics," Vol. XII., page 336. See Appendix, Case 18. "Veterinary Record," Vol. XV., page 247 (Dellaganna); "Veterinary Journal," May 1902 (Taylor and Rutherford).

3 For illustrations 14 and 15 I am indebted to Messrs H. Thompson and John Steel.

4 See Appendix, Cases 19 and 35.

5 "Veterinarian," Vol. LXVIII., page 371 (Dewar, Smith, and J. Peddie).

In the dentigerous cyst depicted on a preceding page (Fig. 13) the testicle was much larger than normal, being six and a half inches in length. There was gland tissue in the centre and a dermoid cyst at either extremity. In the anterior portion there were plates of bone and cartilage, and in the centre of the cavity there was a roundish mass about the size of an orange, containing several teeth in various stages of development. The mass was fairly easily detached into nine pieces. One was almost a perfect molar tooth, being $2\frac{1}{8}$ inches long and grooved like an ordinary molar. At the end, which

FIG. 15.

Same as Fig. 14, but showing the other side.

would correspond to the wearing surface in the ordinary condition, the infolding of the enamel was well shown. Six of the other pieces, one of which was bent upon itself, all bore more or less resemblance to molar teeth, the smallest being $1\frac{1}{4}$ inches in length. The three usual constituents, enamel, dentine, and cementum, entered into their composition.

The posterior extremity of the testicle contained a cyst having a wall chiefly composed of bone and cartilage. Inside this cavity were two smaller ones, one of which contained a coil of hair, black in colour and mixed with the *débris* usually found in these cases.

The cystic testicles have usually to be reduced in size before they can be withdrawn. This can be done with the finger nail,

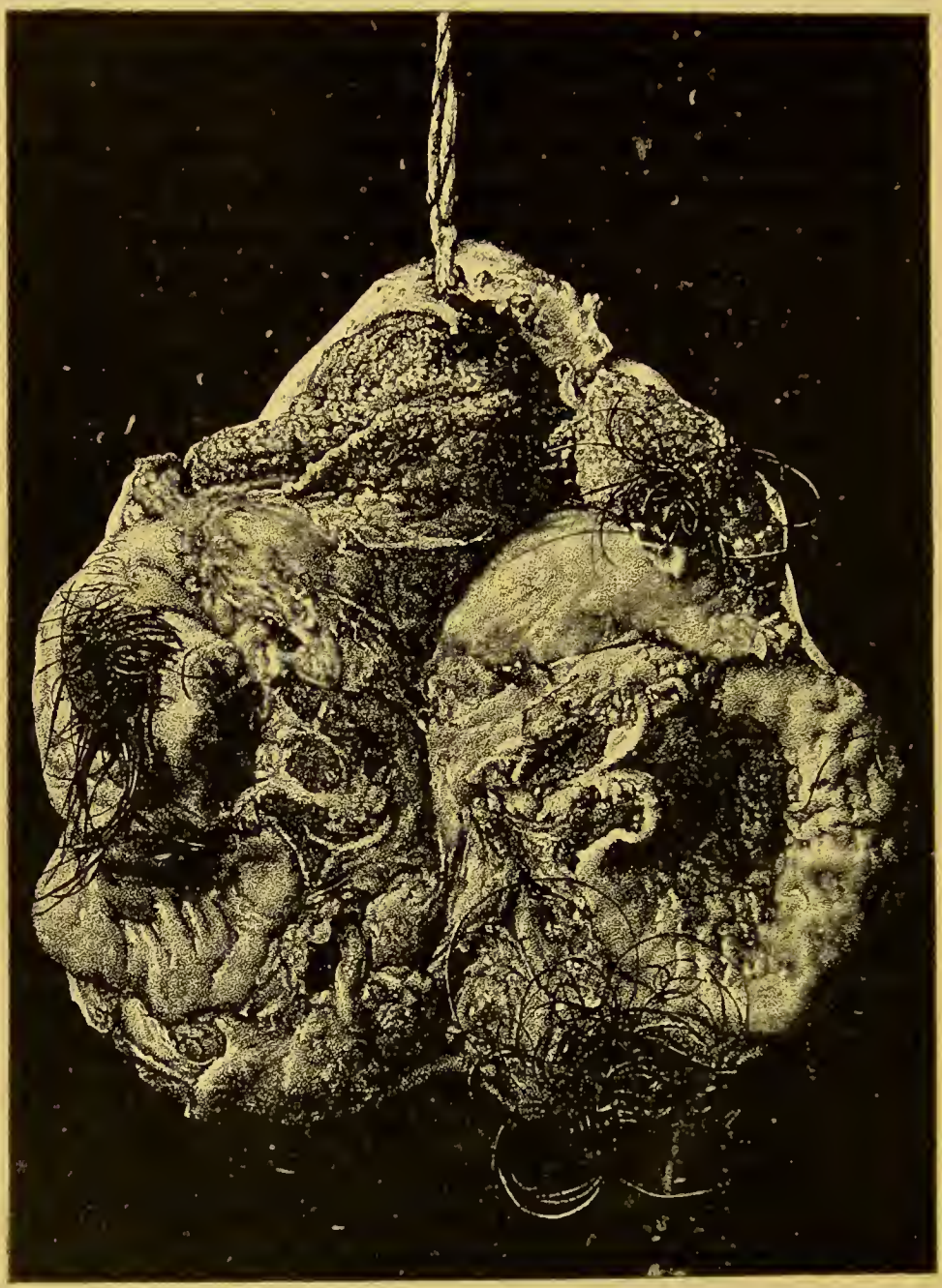

FIG. 16.
Illustration of dermoid cyst in testicle. (For this photograph I am indebted to Professors Williams and Taylor.[1])

[1] "Veterinary Journal," 1901, page 22 (Taylor and Forgham).

the contents escaping into the abdominal cavity; or a trocar or hollow needle with a long rubber tube attached may be used. A case of Degive's contained ten ounces. Dewar and Anderson have reported a case[1] in which a cystic testicle (intra-abdominal) removed from a two years old horse weighed 3 lbs. 2 oz., and when emptied only 5 oz. 1 dr. It measured over 18 inches in diameter one way and over 16 inches the other.

Dermoid cysts are not uncommon. In the one here illustrated (Fig. 16) it was found that, when incised, five separate cavities were present, four of which contained hair. Some of the latter was loose and some fixed. In colour the hairs were black, brown, and grey, and some of them measured seven inches in length. In the centre of the whole mass there was an irregular bony plate, and the rest of the dermoid appeared to be of fibrous tissue.

In cases where the testicle is of enormous size, as an alternative to making a large wound in the abdominal wall, Cadiot[2] and Degive suggest that the cord shall be pulled into the inguinal canal and cut through, a portion of it being removed, the enlarged testicle thus being allowed to drop free into the abdominal cavity.

The worm which sometimes finds its resting-place in the surrounding envelopes of the testicle, and sometimes even in the testicle itself, is the *Strongylus Armatus*.[3] Mr J. B. Gresswell has recorded a number of these parasites in a cavity in the centre of an abnormal testicle; this organ being for the most part indurated and weighing 4 lbs. 3 oz.

In the human subject living acari (*Histiogaster Spermaticus*) have been found.[4] In one particular instance the patient was a doctor, and it was estimated, after careful microscopical examination and calculation, that there were over

[1] "Veterinarian," Vol. XXXVI., page 155; Vol. XVIII., page 371.

[2] "Castration du Cheval Cryptorchid."

[3] "Journal of Comparative Pathology and Therapeutics," Vol. XIII., page 366; "Veterinary Journal," Vol. XXII., page 87 (J. B. Gresswell); "Veterinary Record," Vol. XV., page 190 (Bower and Hobday). See Appendix, Case 19.

[4] Pye Smith, "Quarterly Medical Journal," August 1902; Dr Trouessart, "Archives de Parasitologie," No. 3, 1902.

800 living acari in the contents of a cyst in the right testicle. "To account for their presence in the cyst Dr Trouessart (of Paris) suggests that an egg bearing female was adhering to the catheter which the patient had passed in India (some years before), that she attached herself to the urethral mucous membrane, entered one of the ejaculatory ducts, and followed the vas deferens till she reached the epididymis, where she probably commenced to lay her eggs; the infarct thus produced causing the rupture of the mucous membrane and the formation of the cyst."[1]

Adhesions between the testicle and peritoneum must be broken down with the fingers.

Lastly, one must not forget the curious shapes assumed by some testes (see Fig. 12); they are often, when in the inguinal canal or abdomen, no larger than a walnut, even in big horses (see Fig. 21), and at times the epididymis may be alone in the canal and the remainder of the testicle in the abdomen.[2]

Untoward Sequelæ.—Of course one must not overlook the liability to accidents, such as fractures, and those which may happen during any operation which involves casting. Other untoward events likely to happen are those of hæmorrhage from injury to some of the large inguinal veins, descent of the bowel, or death from shock and exhaustion if the animal is kept on the ground too long.

Amongst subsequent unfavourable results are those of colic, descent of omentum or bowel (hernia), peritonitis, septicæmia, excessive swelling, the formation of an abscess, and paraphimosis.

If the testicle is not found after half an hour's search it is a good plan to critically examine the condition of the patient before proceeding further. It may be necessary to remove all restraint and resort to the careful use of stimulants, such as strong ammonia or amyl nitrite, to the nostrils, and ether or

[1] "Lancet," 23rd August 1902.

[2] "Veterinary Record," Vol. XV., page 190 (Bower and Hobday). See Appendix, Cases 13 and 19.

other stimulants subcutaneously or per rectum if the patient is unable to swallow.

In regard to hernia, as a rule, if the bowel does not come down at the time or within an hour afterwards, there will be sufficient swelling of the lacerated tissues to prevent this mishap, although Ostermann has recorded a case[1] in which it came down on the tenth day afterwards. In this instance it was returned, and, with the exception of an inguinal swelling, the patient made a good recovery. It is always a serious sequel, and the only remedy consists in throwing the horse again, carefully washing the protruding portion with antiseptic, and then returning it. Sutures should be inserted as deeply as possible, and not more than a quarter of an inch apart. A plug of sterilised wadding or tow materially assists in some cases in keeping the bowel in, being pushed well up the inguinal canal before the skin wound is stitched. Some of the sutures are cautiously withdrawn either on the second or third day afterwards, the plug removed, and, after careful cleansing of the wound, replaced with a fresh one. The dressings are now changed two or three times a day.

Frohner has recorded[2] an instance in which a patient, operated upon six days previously through the left inguinal canal, showed symptoms of strangulated hernia. The swelling was as large as a child's head and the patient much distressed. Successful reduction was effected, and the horse did well.

Descent of the omentum alone is not so serious. The protruding portion may be excised, and the remainder replaced into the abdomen, sutures being inserted as in cases of descent of the bowel.

Colic, during the first twenty-four or forty-eight hours, is not uncommon. Probably it is due to a small piece of bowel having temporarily descended into the inguinal wound, or it may be

[1] "Journal of Comparative Pathology and Therapeutics," Vol. II., page 117.
[2] "Bulletin Vétérinaire," January 1900. (Monatshefte für Thierheilk.)

caused by soreness of the parts which have necessarily been injured during the operation. It is not usually a cause for alarm, and generally passes off without treatment. If anything is necessary either an opiate or full dose of cannabis indica can be given.

Peritonitis, that bugbear of old-fashioned surgery, may occur from septic infection (see Appendix, Case 43) either at the time of operating or afterwards. The former has nowadays, thanks to the application of modern antiseptic principles, become comparatively rare, and, to avoid the latter, the operator must see that the loose box, or place in which the patient is to be placed, has been cleansed and disinfected and otherwise made warm and suitable. In regard to the after-dressings (where such are needed), the person who applies them should do so with clean hands, and the dressings themselves must be kept in a clean place. When there is a lot of pus in the castration wound it must be removed as thoroughly as possible, because the organisms seem to have an exceptional faculty for reaching the peritoneum through the medium of the injured cord in the inguinal canal. Antiseptics should be used very freely. If the interior of the abdominal wall has become infected the patient may die within three or four days, or may linger for three or four weeks. Recovery is possible, but the prognosis must be very guarded. Antiseptics, opiates, and stimulants may be given internally at the discretion of the practitioner, and hot blankets applied to the abdominal wall.

Septicæmia, if the wound is not kept clean, may cause death in about a week or ten days (see Appendix, Case 35), especially if during the operation the muscles of the thigh have become lacerated so as to form little sinuses in which pus could lodge and burrow if the wound became infected.

Excessive swelling afterwards will cause the colt to be very stiff in gait, and show signs of inconvenience and pain. As a rule, exercise and antiseptic attention to the wounds will be followed by relief in three or four days, although the application of hot or cold water may be necessary. The chief precaution

in these cases is to keep the wounds well opened and as clean as possible.

If an abscess forms it should be lanced and thoroughly drained, the interior being irrigated with antiseptics.

In connection with this sequel, as also with those of peritonitis and septicæmia, it is worth while to recollect that, after a retained testicle operation it is by no means uncommon when the colt rises to hear air rush into the wound. If the operating bed is made of some dusty material, or the air is otherwise contaminated, this may prove a source of infection. Personally I prefer a grass field to operate in when it is at hand, or, failing that, a clean wheat straw bed.

Paraphimosis, a condition in which the penis becomes protruded and the horse cannot withdraw it into the prepuce is sometimes caused by excessive swelling of the tissues surrounding the wounds. It is more likely to occur after a prolonged operation upon both sides of the scrotum than when only one side has been opened. It may become very troublesome to treat, and convalescence may be prolonged. It may even terminate in paralysis of the organ.

Treatment consists in careful scarification of the protruding part, to which either hot or cold water (depending upon circumstances) is afterwards applied, and the use of some astringent lotion, such as a mixture of lead acetate and zinc sulphate (ʒii-ʒvi of each to a pint of water), or lead and alum, etc. The penis should be supported by a sling, which can be improvised from two or three stable bandages or a piece of netting and two bandages, the ends being tied over the patient's loins. The horse should be put under the best possible hygienic conditions, fed well and exercised regularly, and, internally, should be given some nerve tonic, such as arsenic, strychnine or nux vomica.

Prognosis of this condition should be guarded, especially if the organ has been protruding for some days before the practitioner's attention has been drawn to it, as occasionally one meets with a case in which permanent paralysis ensues. An

animal with a long protruding penis is apt to be objected to for road work, although it can be worked in the fields, where it will be comparatively free from observation. If the objection is very marked, and no improvement ensues after a prolonged period of regular treatment, the only remaining resource is to amputate the offending portion.

Influence of Age and Time of Year.—As a rule one is not asked to operate before the colt is two years old, because up to that age there is always the chance that the testes, if low down in the canal, may descend into the scrotum.

In operating upon a yearling, especially if the animal is not very well developed or is out of condition, there is always more risk of subsequent descent of the bowel if the abdomen has to be entered. The tissues are not so strong as in animals of more mature age. The actual season of the year does not make the slightest difference to the success or otherwise of the operation provided the patient can be placed under good hygienic conditions afterwards. Reference to the cases in the Appendix (page 46) will show that the cases recorded there were operated upon at all times of the year.

Concluding Remarks.—In many cryptorchid cases the history obtainable is very scanty and uncertain, so that now and again the "rig" operator will find that his patient has already been castrated, and that the real cause of the trouble is an enlarged epididymis. In the words of the farmer, he has been "cut proud." The removal of this will cure the sexual propensity, but of course such a case could hardly be termed a true "rig." One must not forget, too, that the swelling noticed by the owner may be a scirrhous cord. Unless the animal has shown decidedly troublesome or vicious propensities, or the owner is absolutely sure that castration has never been done, the operator should be cautious in regard to his method of procedure. The mere presence of a scar on the scrotum might mean that an unsuccessful attempt at castration had been made, or it might mean that the wound had been inflicted with fraudulent intention, the object being to deceive the intending purchaser.

Exploration of each inguinal canal will go a long way towards solving the difficulty, as, if the testis has ever been in the scrotum since the days the animal was a foal, and has been removed, the end of the spermatic cord will be felt as a long thin body varying in size from a piece of string to the piece of an ordinary casting rope. If nothing is to be discovered subcutaneously or in either canal, and the history is that of a "rig," the probability is that there is a testicle in the abdominal cavity. Rectal exploration is sometimes of assistance, the fingers being turned downwards towards the inguinal region, whilst an assistant pushes his fingers as far up the inguinal canal as possible from the exterior. Either the cord or a testicle may be felt upon manipulation. This can, in a quiet horse, be done when standing, but, of course, when cast and secured the facilities are greater. To examine the inguinal canal from the exterior the hand is held flat and pressed, with the fingers closed, between the thigh and the abdominal wall. If the operator has had his hand and arm in the rectum this should be thoroughly scrubbed and disinfected, and the other hand used for the search; also for anything connected with the wound if the operation is performed on that day. It is safer to postpone the operation. To ensure success the strictest care in regard to antiseptics and surgical cleanliness is as essential to our patients as to those of our human confrères.

APPENDIX.[1]

HEREWITH is appended a list of seventy-seven consecutive cryptorchid operations upon the horse, with brief details of each and a summary. Some of the more unusual ones have been referred to in the text.

As they are *consecutive*, and not in any way *selected*, cases, they will particularly illustrate some of the abnormalities which may be looked for during cryptorchid castration, and also that the percentage of fatalities is in reality small when strict surgical cleanliness is observed.

Although the abdomen was entered forty-one times, in no instance did hernia or septic peritonitis (the bugbear of the surgeon in the pre-antiseptic days), ensue as a sequel. Three (Cases 13, 19, and 74) were operated upon twice, and several had both testes concealed, the double operation being done at the one and the same time.

No. 2.—This animal had colic during the subsequent twenty-four hours, but otherwise made an uninterrupted recovery.

No. 4.—Before entering the abdomen an enlarged lymphatic gland was removed by mistake. The leg was afterwards stiff and swollen for about a fortnight, but otherwise no untoward symptom occurred.

1 The major portion of this has been published in the "Veterinary Record," Vol. XV., page 267.

No. of Case.	*Date.*	*Breed.*	*Age.*	*Testicle which was Hidden.*	*Situation of the Missing Testicle.*	*Other Testicle.*	*Remarks.*
1.	Mar. 1898	Cob	—	Left	Inguinal canal	Had been removed	——
2.	June 4, 1898	Hunter	2½ yrs.	Both	Inguinal canals	——	See Notes.
3.	July 7, 1898	Pony	—	Right	Inguinal canal	Had been removed	——
4.	July 8, 1898	Cart	3 yrs.	Both	Right one in inguinal canal; left one in the abdomen	——	See Notes.
5.	July 8, 1898	Cart	3 yrs.	Left	Inguinal canal	Had been removed	——
6.	Oct 9, 1898	Cart	2 yrs.	Right	Inguinal canal	Had been removed	——
7.	Nov. 26, 1898	Cart	3 yrs.	Left	Inguinal canal	Had been removed	——
8.	Nov. 26, 1898	Cart	3 yrs.	Right	Abdomen	Had been removed	——
9.	Feb. 21, 1899	Hackney	3 yrs.	Left	Abdomen	Had been removed	Very flabby; normal size.
10.	Mar. 28, 1899	Cart	3 yrs.	Right	Inguinal canal	Had been removed	About normal size.
11.	May 18, 1899	Pony	5 yrs.	Right	Inguinal canal	Had been removed	About the size of a walnut. See Notes.
12.	June 24, 1899	Pony	3 yrs.	Left	Inguinal canal	Had been removed	Much smaller than normal.
13.	July 6, 1899, and June 15, 1901	Cart	2 yrs.	Left	Epididymis in canal; testicle in abdomen	Had been removed	See Notes.
14.	July 15, 1899	Hackney	2 yrs.	Right	Inguinal canal	In scrotum	——
15.	July 20, 1899	Cart	2 yrs.	Right	Inguinal canal	In scrotum	See Notes.
16.	July 20, 1899	Cart	5 yrs.	Left	Abdomen	Had been removed	——
17.	July 22, 1899	Cart	1 yr.	Left	Abdomen	Had been removed	——
18.	July 22, 1899	Cart	3 yrs.	Both	Inguinal canals	——	See Notes.
19.	July 29, 1899, and Sept. 30, 1901	Hunter	6 yrs.	Right	Epididymis in canal; testicle in abdomen	Had been removed	See Notes.

No. of Case.	*Date.*	*Breed.*	*Age.*	*Testicle which was Hidden.*	*Situation of the Missing Testicle.*	*Other Testicle*	*Remarks*
20.	Sept. 12, 1899	Cart	5 yrs.	Right	Abdomen	Had been removed	—
21.	Sept. 12, 1899	Cart	3 yrs.	Right	Abdomen	Had been removed	See Notes.
22.	Sept. 12, 1899	Cob	4 yrs.	Left	Abdomen	Had been removed	—
23.	Dec. 7, 1899	Cart	3 yrs.	Left	Abdomen	Had been removed	—
24.	Dec. 8, 1899	Cart	3 yrs.	Left	Abdomen	Had been removed	—
25.	Dec. 8, 1899	Cart	4 yrs.	Right	Inguinal canal	In scrotum	—
26.	Dec. 8, 1899	Hackney	4 yrs.	Right	Inguinal canal	Had been removed	—
27.	Feb. 20, 1900	Thoroughbred	2 yrs.	Both	—	—	See Notes.
28.	May 1, 1900	Pony	2 yrs.	Right	Inguinal canal	In scrotum	See Notes.
29.	May 12, 1900	Cart horse	3 yrs.	Right	Abdomen	In scrotum	See Notes.
30.	May 21, 1900	Pony	2 yrs.	Right	Inguinal canal	In scrotum	See Notes.
31.	May 26, 1900	Hackney	3 yrs.	Left	Abdomen	In scrotum	See Notes.
32.	June 2, 1900	Cart	2 yrs.	Both	Inguinal canal	—	See Notes.
33.	June 20, 1900	Thoroughbred	3 yrs.	Right	Inguinal canal	Had been removed	—
34.	July 25, 1900	Cart	18 mos.	Right	Inguinal canal	Had been removed	—
35.	July 31, 1900	Hackney	2 yrs.	Left	Abdomen	Had been removed	See Notes.
36.	Aug. 4, 1900	Cart	4 yrs.	Left	Abdomen	Had been removed	—
37.	Aug. 23, 1900	Pony	11 yrs.	Left	Inguinal canal	Had been removed	See Notes.
38.	Sept. 5, 1900	Shire	7 yrs.	Right	Abdomen	Had been removed	See Notes.
39.	Sept. 11, 1900	Hackney	7 yrs.	Left	Abdomen	Had been removed	See Notes.
40.	Sept. 11, 1900	Cob	7 yrs.	Right	Abdomen	Had been removed	See Notes.
41.	Sept. 11, 1900	Cob	7 yrs.	Left	Inguinal canal	Had been removed	See Notes.
42.	Sept. 18, 1900	Cart	3 yrs.	Right	Inguinal canal	Had been removed	—
43.	Sept. 18, 1900	Cart	3 yrs.	Right	Inguinal canal	In scrotum	See Notes.
44.	Oct. 12, 1900	Cart	1 yr.	Right	Abdomen	Had been removed	—
45.	Oct. 12, 1900	Cart	2 yrs.	Both	Abdomen	—	See Notes.
46.	Oct. 12, 1900	Pony	3 yrs.	Left	Abdomen	In scrotum	—
47.	Oct. 12, 1900	Cart	4 yrs.	Both	Abdomen	—	—
48.	Nov. 3, 1900	Carriage horse	3½ yrs.	Right	Inguinal canal	Had been removed	See Notes.

49.	Nov. 5, 1900	Cob	4 yrs.	Left	Abdomen	Had been removed	See Notes.
50.	Nov. 17, 1900	Hackney	3 yrs.	Left	——	In scrotum	See Notes.
51.	Dec. 1900	Cart	4 yrs.	Right	Abdomen	Had been removed	——
52.	Jan. 18, 1901	Thoroughbred	3 yrs.	Left	Inguinal canal	Had been removed	——
53.	Feb. 11, 1901	Cart	3 yrs.	Right	Abdomen	Had been removed	——
54.	May 20, 1901	Cart	7 yrs.	Left	Abdomen	Had been removed	——
55.	June 5, 1901	Cart	4 yrs.	Right	Inguinal canal	In scrotum	——
56.	June 11, 1901	Hackney	2 yrs.	Both	Left testicle in abdomen; right testicle in canal	——	See Notes.
57.	June 15, 1901	Thoroughbred	2 yrs.	Left	Abdomen	In scrotum	——
58.	June 15, 1901	Thoroughbred	2 yrs.	Both	Inguinal canals	——	——
59.	June 21, 1901	Cart	2 yrs.	Both	Abdomen	——	Very short cords.
60.	June 21, 1901	Hackney	5 yrs.	Right	Inguinal canal	Had been removed	——
61.	July 1, 1901	Pony	2 yrs.	Left	Inguinal canal	In scrotum	——
62.	Aug. 1, 1901	Hackney	4 yrs.	Right	Inguinal canal	Had been removed	See Notes.
63.	Sept. 17, 1901	Hackney	3 yrs.	Right	Inguinal canal	In scrotum	——
64.	Sept. 17, 1901	Hackney	3 yrs.	Left	Inguinal canal	In scrotum	——
65.	Sept. 24, 1901	Thoroughbred	2 yrs.	Both	Right one in canal; left one in abdomen	——	——
66.	Sept. 24, 1901	Cart	5 yrs.	Left	Inguinal canal	Had been removed	See Notes.
67.	Dec. 11, 1901	Cart	3 yrs.	Left	Abdomen	Had been removed	——
68.	Feb. 18, 1902	Shire	8 yrs.	Right	——	In scrotum	See Notes.
69.	Mar. 1902	Cart	3 yrs.	Right	Abdomen	Had been removed	——
70.	April 1902	Hackney	3 yrs.	Right	Inguinal canal	Had been removed	See Notes.
71.	July 25, 1902	Shire	3 yrs.	Right	Abdomen	Had been removed	——
72.	Aug. 26, 1902	Cart	2 yrs.	Right	Abdomen	Had been removed	——
73.	Aug. 26, 1902	Cart	2 yrs.	Left	Inguinal canal	In scrotum	——
74.	Aug. 27, 1902	Cart	2 yrs.	Left	Abdomen	Had been removed	See Notes.
75.	Aug. 27, 1902	Cart	5 yrs.	Right	——	In scrotum	See Notes.
76.	Oct. 17, 1902	Cart	3 yrs.	Right	Inguinal canal	Had been removed	——
77.	Nov. 4, 1902	Cart	3 yrs.	Left	Inguinal canal	Had been removed	See Notes.

No. 11.—Before operation this pony was quite unmanageable and on this account came into the present owner's hands for £7. Recovery was uneventful, and within a few months the animal was regularly driven by a lady, and sold for £22, all its troublesome habits having disappeared.

No. 13.—On the first occasion (6th July 1899), thinking it to be an abnormally shaped testicle, I removed the epididymis only, finding it at the extreme top of the inguinal canal. The colt appeared quite cured of his troublesome habits for about six months, and then became as bad as ever. In the spring of 1901 the animal became quite unmanageable and dangerous, and a further operation was decided upon. On the 15th of June the abdomen was entered and a full-sized, flabby, testicle extracted. Recovery was uneventful and the colt has since been perfectly tractable and quiet.

No. 15.—This animal had had its pelvis fractured some nine months previously and the owner knew of the increased risk on this account. After the operation it was found that the pelvis was again displaced and, as the horse could not rise without assistance, the owner decided to have it shot.

No. 18.—This animal was an hermaphrodite, three years old, of the Suffolk cart horse breed.[1] It possessed a small thin penis, which measured (when extended) 9¼ inches long, and protruded backwards in the perineal region in the usual situation of the vagina in a mare.

When in contact with another animal, either horse or mare, the penis would become protruded and erect. Urination took place through this organ, the stream being directed backwards. There was no sign of scrotum, and in its place was a mammary gland with well-developed teats.

Thinking that the animal showed more male than female pro-

[1] "Journal of Comparative Pathology and Therapeutics," Vol. XII., page 336 (P. Turner and F. Hobday).

clivities, it was cast and secured as for cryptorchid castration, and, under antiseptic precautions, the inguinal canals were explored. In each case a tolerably large testicle was found. Both were well out of sight and close to the internal abdominal rings. They were removed with the écraseur and

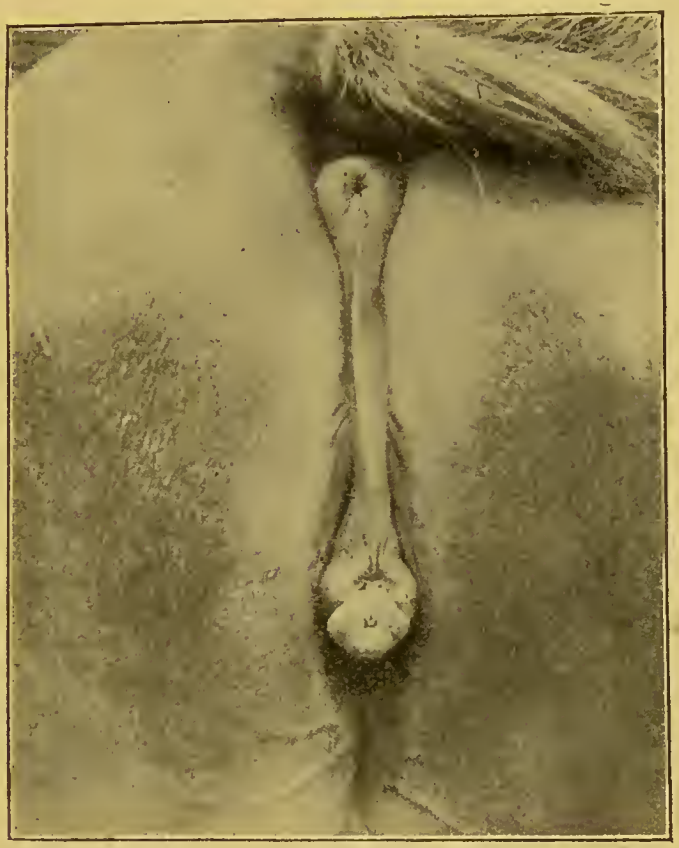

FIG. 17.[1]

External genitals of hermaphrodite (photographed when the animal was standing).

recovery was uneventful. The horse has since been as quiet and tractable as any ordinary gelding.

No. 19.—This case was similar to No. 13.[2]

The patient, a lady's hunter, aged six years, had been tractable until the spring of 1899, when he became very vicious,

[1] For photographs (Figs. 17 and 18) I am indebted to Mr G. Haskell, a veterinary student.
[2] "Veterinary Record," Vol. XV., page 190 (W. Bower and F. Hobday).

using his fore-feet freely and being very troublesome to mount. From his savage behaviour towards other horses and the little history which could be obtained, it was suspected that a retained testicle was at the bottom of the mischief. There was certain knowledge of the removal of the left testicle, but none of the right one.

On the 29th of July 1899, the animal was cast and chloro-

Fig. 18.

Appearance of the external genitals and mammary gland when the hermaphrodite was cast.

formed, a small irregular shaped body being surgically removed from the extreme upper portion of the right inguinal canal.

The wound healed and the horse became quieter in his habits for about two years. In the spring of 1901, however, he again manifested decided "rig" tendencies, and became as vicious and troublesome as ever.

Thinking that the curiously shaped piece of tissue which had been removed was not the complete testicle, the horse was again cast (30th September 1901) and chloroformed. An exploration

of the inguinal canal gave a negative result, the abdomen was entered and a full-sized testicle with the epididymis missing was extracted. Recovery was uninterrupted and a complete cure of all his former bad habits resulted at once. Upon incising the testicle, a very fine specimen of the strongylus armatus escaped from its interior, having been apparently about an inch below the surface.

The strongylus armatus (Prof. M'Fadyean kindly verified the specimen) is not very uncommon in the scrotum of the colt on

FIG. 19.

An abdominal testicle partly laid open to show a specimen of the *Strongylus Armatus*, *in situ*. (From a sketch made at the time by Mr Santy, M.R.C.V.S.).

the exterior of the testis, but its presence in the interior has not often been recorded. The testicle of a "rig" when retained in the abdomen, has no external envelopes and it was with surprise that we saw this worm emerge, as there was not the slightest indication of its presence discernible on the exterior.

Professor M'Fadyean also demonstrated the presence of spermatozoa.

No. 21.—This testicle was attached close under the loins by a very short cord so that it was quite impossible to drag it into

view, and the écraseur had to be introduced up the inguinal canal in order to get the chain over it.

No. 27.—This animal was a freak of nature and had no testes at all. It was a valuable thoroughbred belonging to a well-known nobleman, in whose stud it was bred, and had been sent to Newmarket for training. It had always shown a want of development of the penis, and this organ had never been "drawn," the urine always coming in contact with the prepuce when it was passed. No signs of either testicle were

FIG. 20.[1]

Abnormal genito-urinary organs of thoroughbred colt.

1, 1. Small masses of fat in the position of the testicles; 2. Urinary bladder; 3, 3. Vesiculæ seminales.

present externally, and the horse had never been seen to show any sexual desire, the animal being of an usually quiet disposition.

The inguinal canals were explored without result and the abdomen entered. No trace of anything with the characteristic form or feel of testicles could be detected during an hour and a half's careful search. The wounds were then sutured and restoratives applied, but death occurred about eight hours later from exhaustion (the bones of the spine were afterwards boiled to make sure that no fracture existed).

[1] "Journal of Comparative Pathology and Therapeutics," Vol XIII., page 75.

Post-mortem examination (made by Mr Potts, M.R.C.V.S., and myself) revealed the penis to be unusually small, whilst lying close along the under surface of the loins were the spermatic cords (or what represented them), each being much shorter and thinner than normal and terminating in a small bulb of fat. Of the latter, that on the left side was a little larger than a kidney bean, and that on the right hardly as large as a haricot bean.

Professor M'Fadyean kindly made a microscopical examination of the terminal portions, and informed me that there was

FIG. 21.
Shewing the contrast sometimes found between the visible testicle in the scrotum (10 oz.) and the hidden one in the abdomen (1 oz. 3 dr.).

no sign of testicular tissue present, the endings being merely adipose material.

I distinctly recollect applying traction to the fatty lumps on two or three occasions whilst my hand was in the abdomen, but I could not make up my mind that they were the representatives of the testicles, particularly as, owing to the shortness of the cords, I could not withdraw them a sufficient distance from the loins to bring into view or get them within reach of the écraseur chain.

Nos. 28, 29, and 30.—In each instance the descended testicle was fully one-third larger than normal.

No. 31.—The left (abdominal) testicle weighed only 1 ounce, 3 drachms, whilst the one which had descended weighed 10 ounces.

No. 32.—The right testicle weighed only 1 ounce, 6 drachms, the left one 2 ounces, 5 drachms.

No. 35.—This animal was a well-bred hackney colt, from the right side of whose scrotum a well-developed testicle had been removed about three months previously. The animal was troublesome with the mares. On the left side there was no sign of testicle, and exploration of the inguinal canal revealed this to be empty. The colt was bred by its present owner.

FIG. 22.[1]

Shewing a front view, split open, of a degenerated cyst-like body (actual size) removed from the end of the spermatic cord. The cord was attached behind. In the lower portion is to be seen a small mass of the sebaceous-like contents. At the side is a sketch of the worm (*strongylus armatus*) taken from the interior.

Under chloroform a careful search was made in the abdomen for the missing organ, and at last a degenerated cyst-like body about the size of a walnut, with attachments like those of a normal testicle, only much less fully developed, was withdrawn. As the undeveloped cord was too short to permit of its complete withdrawal, I removed it by scraping with the finger nail and then using traction. An incision made into this revealed the contents to consist of thick creamy-white material of the consistency of sebaceous matter or inspissated pus, and, in addition, there came out a small whitish-coloured worm about as thick as an ordinary wax match and nearly an inch

[1] 'Journal of Comparative Pathology and Therapeutics," Vol. XIII., page 366.

in length. After a renewed search, as nothing further in the shape of a testicle could be found, the wound was sutured in the usual way and the patient allowed to get up.

The horse appeared to progress in every way favourably until the ninth day afterwards, when the left hind leg became very much swollen. During the day the animal fell down and was unable to rise. Death took place at night.

At the *post-mortem* examination, which was made by Mr G. D. Martin, M.R.C.V.S., Mr Martin Sparrow, V.S., and myself, we found that the body I had removed was undoubtedly the degenerated remains of the testicle, as the thin poorly-developed cord could be discerned with the severed end clearly shown. There was no trace of peritonitis, and death appeared to have been due to septicæmia, as the muscles of the inside of the thigh were in a fœtid condition.

Professor M'Fadyean confirmed the diagnosis of the degenerated specimen, and also examined the worm, which proved to be a strongylus armatus.

No. 37.—This testicle was very hard and cirrhotic, the result of orchitis.

No. 38.—This animal had been quiet and tractable until the present year, when he had been very troublesome and dangerous. The testicle (abdominal) weighed 5 ounces. The cord was abnormally short, and the écraseur had to be passed right into the abdomen in order to pass the chain around the testicle.

No. 39.—This testicle was very flabby in consistency and weighed $4\frac{1}{2}$ ounces. It was about normal in size.

No. 40.—This testicle weighed 1 ounce, $5\frac{1}{2}$ drachms.

No. 41.—This testicle weighed 2 ounces, $4\frac{1}{2}$ drachms.

No. 43.—This is the only case of the whole series which died from peritonitis. The source of infection I am not quite

clear about as the case was one of the simplest of its kind, and I do not think it took place at the time of operating. In fact, all went splendidly until the eighth day afterwards, and at no time did the scrotum appear unduly swollen. Death occurred on the 2nd of October, the *post-mortem* revealing the presence of about half a gallon of pus in the abdomen, the canal from the scrotum to the abdomen also containing a considerable coating of it, showing that the seat of infection was the inguinal wound.

No 45.—Both these testicles had abnormally short cords, requiring the écraseur chain to be passed into the abdomen before they could be removed.

No. 48.—This testicle was situated at the extreme upper portion of the inguinal canal, and a microscopical examination by Professor M'Fadyean revealed the presence of spermatozoa.

No. 49.—This colt was very fat and a gross feeder. Having been deprived of manger food on the previous day, and, unluckily, not tied up to the rack, he had eaten a lot of the bedding straw. This caused some little delay in finding the testicle. The latter, when examined microscopically by Professor M'Fadyean, was found to contain spermatozoa.

No. 50.—In this patient the right testicle was quite twice the normal size, and present in the scrotum. When removed it weighed 12½ ounces, measured 6 inches from end to end, and had a circumference of 9 inches at its widest part. This was removed with the écraseur and gave a good deal of trouble owing to subsequent hæmorrhage. The left inguinal canal was then explored and the abdomen entered.

A careful search failed to discover any trace of the missing organ, and, recollecting my previous experiences, I ventured to assert that there was not another testicle present.

The blood vessels in the inguinal and scrotal regions were abnormally developed, and, although we left the animal appar-

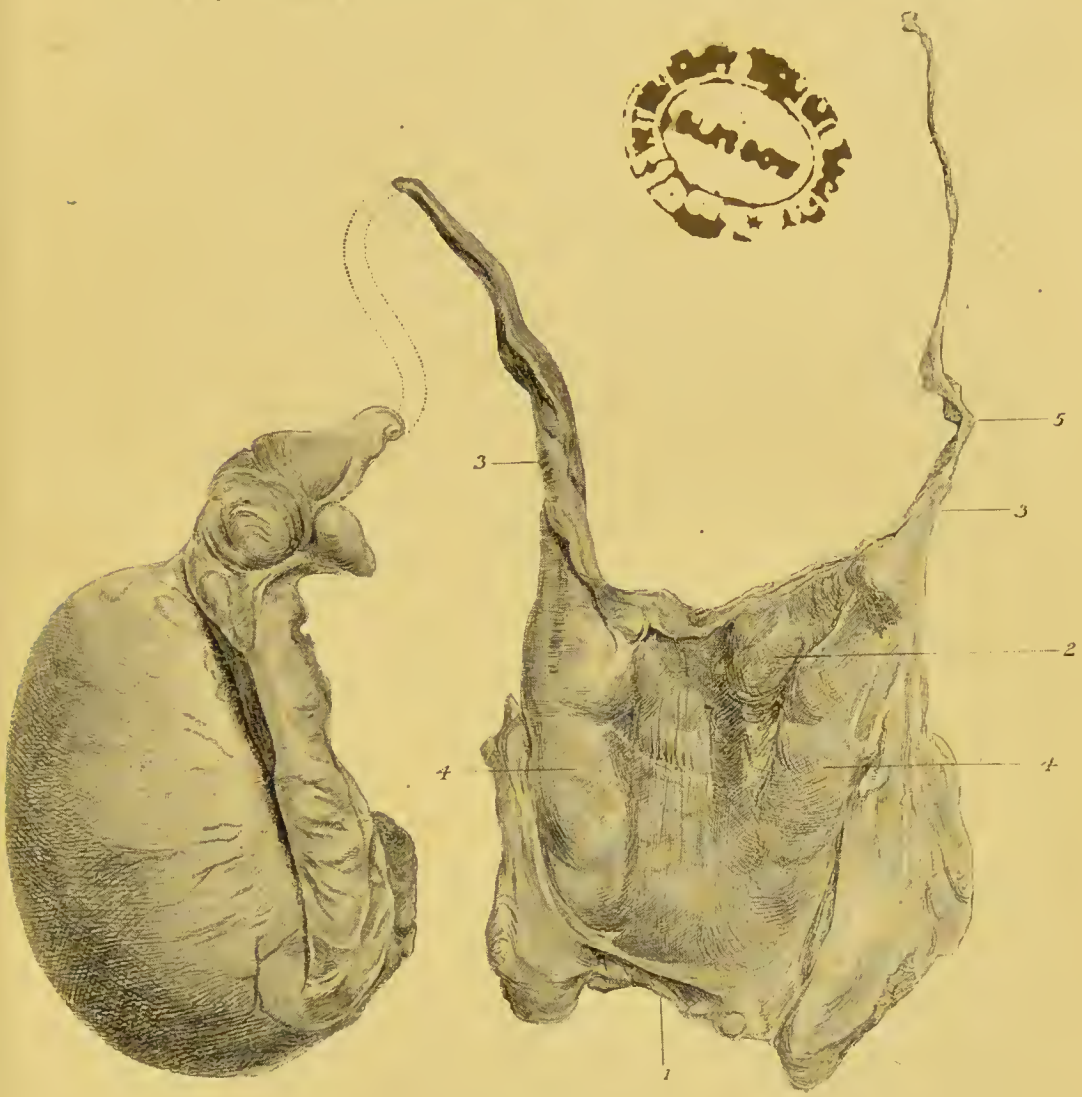

FIG. 23.[1]

Abnormal organs showing the scrotal testicle and the portion of the generative organs present on the other side beyond the fundus of the bladder (half natural size).

1. Fundus of the bladder; 2. Fold of peritoneum uniting the vasa deferentia; 3. Vas deferens; 4. Bulbous portion of the vas deferens; 5. The vas deferens on this side was pervious as far as this point.

ently all right, uncontrollable hæmorrhage set in on the following day, and death took place on the evening of the second day after.

[1] "Journal of Comparative Pathology and Therapeutics," Vol. XIII., page 367.

A *post-mortem* examination made by Mr T. D. Hughes, M.R.C.V.S., and myself, revealed that the hæmorrhage had undoubtedly been the cause of death. There was no sign of epididymis or testicle on the left side, the abnormality being as here illustrated. There was just a small, thin, atrophied cord, and from the fundus of the bladder the vas deferens could only be traced for a few inches, when it imperceptibly disappeared into the peritoneum.

Professor M'Fadyean kindly examined the specimen.

This animal had been bred by its present owner and no attempt at castration had previously been made.

No. 56.—This colt was seen to serve a mare on the 25th of March but she has not proved in foal. The left testicle was in the abdomen and the right one in the inguinal canal, neither being visible from the exterior.

Professor M'Fadyean examined both of them and reported: "I find a very small number of spermatozoa in the right and none in the left."

No. 62.—The right testicle was discovered at the extreme top of the inguinal canal and Prof. M'Fadyean reported "I find that a few spermatozoa are present."

Nos. 66 and 70.—In each of these cases the testicle was found in the lower part of the inguinal canal and contained a few spermatozoa (Prof. M'Fadyean).

No. 68.—After a prolonged search the attempt to find the right testicle was given up, it being thought that possibly the case was similar to No. 50. For some months the horse was quiet, but now the "rig" propensities have returned. As, however, the horse is workable, the owner will not at present consent to a further operation.

No. 74.—In this instance I took away something from the top of the inguinal canal and allowed the patient to get up. At the time I thought I had got epididymis and, with the owner's consent it was arranged that the wound should be allowed to heal and the effect observed. Recovery was uninterrupted, but the animal was "rigging" as bad as ever ten days later.

Three weeks after the first operation the abdomen was entered and a flabby, undersized, but perfectly formed testicle removed. The horse is now as quiet as any ordinary gelding.

What I really took away the first time I do not know unless it was a loop of cord which had come through the inguinal ring. It certainly was not epididymis nor was it a lymphatic gland. Cadiot, Hendrickx, Degive, Franck, and others have on several occasions observed this peculiarity.[1]

No. 75.—This case was similar to No. 68. The left side was badly ruptured and this has since been successfully operated upon by Mr W. C. Hazelton, M.R.C.V.S. The vas deferens of each side could be found without any difficulty, traction upon the left side pulling the left testicle towards the inguinal canal. On the right side the cord could be felt and traced up to its extremity, which appeared to blend almost imperceptibly into the peritoneum. As the patient still shews "rig" tendencies a further attempt will probably be made.

No. 77.—This animal was operated upon under somewhat adverse circumstances. It was done at dark by the aid of lanterns, and the commencement was made hurriedly owing to an endeavour to catch a train. Nothing could be seen or felt by external manipulation, and no history was obtainable as to the side from which a testicle had been removed; in fact it was not even known that one had been taken away. Exploration was first made on the right side, and as no remnant of cord was detected the abdomen was entered. After half an

[1] "Castration du Cheval Cryptorchid" (Prof. Cadiot).

hour's futile search the other side was explored with similar result. In all, the hand was in the abdomen about an hour and a quarter. Suddenly, after a withdrawal for a few moments' rest, and immediately after a struggle on the part of the patient, the testicle appeared at the wound on the left side. Whether it had come from the abdomen, or whether it had been in the

FIG 24.

Paraphimosis (five weeks after operation).[1]

canal the whole time and I had inadvertedly passed it by, I am not prepared to say for certain. The cord was abnormally thin, but the testicle was of fair size. Recovery from the operation itself was quite uneventful, except for the fact that paraphimosis ensued as a sequel, and the penis is not yet normal (December 1902).

[1] For this photograph I am indebted to Mr J. F. Talbot, M.R.C.V.S.

SUMMARY OF THE FOREGOING CASES.

Fatal Sequelæ.—Four deaths occurred, three of the patients (Nos. 27, 35, and 50) being distinct freaks of nature and the fourth death resulting from septic peritonitis. The latter (No. 43) was a very simple inguinal "rig" and I have been unable to definitely trace the source of infection. Another animal operated upon with the same instruments a few minutes afterwards, but taken to a different farm to be looked after, never gave the slightest anxiety.

The Affected Side.—In thirty-six instances the right testicle alone was missing, whilst in twenty-nine the left was the offending organ. Eleven had both concealed.

Position of the Testicles.—In thirty-nine instances the organ was found in the abdomen, forty-three being in the inguinal canal. In two (Nos. 27 and 50) the testicle was entirely absent, and in two others (Nos. 68 and 75) it was not found after a prolonged search, although the subsequent manner of each patient leads to the conclusion that it must be there in some form or other.

As a rule, the testicle, when found, was very flabby to the touch and smaller in size than normal. The latter was not however, necessarily the case, although it was usually marked where the other was present in the scrotum.

The horses were equally troublesome whether the testicle happened to be concealed in the inguinal canal or the abdomen, and the change in demeanour after having been operated upon was in each instance most marked.

Excision of the Epididymis alone.—Nos. 13 and 19 are good illustrations of the necessity for the removal of the whole of the testicle, and show that mere excision of the epididymis does not deprive the patient of sexual instinct or vicious propensity. They were also typical instances to prove that the epididymis is sometimes in the inguinal canal whilst the body of the testicle still remains in the abdominal cavity.

Fertility.—That there may be spermatozoa in those found even some distance up the inguinal canal is shown by Nos. 48, 56, 62, 66, and 70, and Nos. 19 and 49 are of especial interest because they were taken direct from the abdominal cavity, and Professor M'Fadyean discovered spermatozoa in them. The presence of spermatozoa, however, does not necessarily imply fertility, as they may be immature specimens, or too few in numbers.

Colt No. 56 was known to have served a mare three months before the operation, and spermatozoa were demonstrated from the right (inguinal) testicle, but she proved barren.

Heredity.—Nos. 20 and 21, 5 years and 3 years old respectively, each with an undescended abdominal testicle, were out of the same mare, but by different sires. Curiously enough, too, there was the coincidence of both being on the right side. Both the sires were well developed, and no more "rigs" have been got by them in the neighbourhood. The dam has only had one other foal, that being a filly. The mare has no known "rig" relatives but her two offspring.

Nos. 15 (2 years old, inguinal), 16 (5 years old, left abdominal), and 38 (7 years old, right abdominal) were by the same stallion, out of different mares. The dam of No. 15 only bred two colts and both were "rigs." They were by the same sire. This sire, a cart stallion, has been in the present owner's possession for 12 years. He is decidedly not a "rig," nor has he any known "rig" relatives except as regards his own colts. With reference to them the owner wrote me, "We have bred quite 15 colts from this particular sire, and 4 of these were "rigs." We have heard of no "rig" colts amongst the stock of the other farmers who have used him as a stallion. We have the stallion now; he is a sure foal getter although 17 years old."

The fact that two out of the four were from the same mare is certainly, when added to Nos. 20 and 21, worth special observation.

VETERINARY MEDICAL SOCIETY
GLASGOW

OVARIOTOMY OF TROUBLESOME MARES.

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VETERINARY MEDICINE LABORATORY

OVARIOTOMY OF TROUBLESOME MARES.

Definition and Reason for Operating.—By the term oöphorectomy is meant the removal of the healthy ovaries, and the word "ovariotomy" is used in the same sense when these organs are diseased. The commoner application, by which either is better understood in country districts, is that of "spaying." To "spay" an animal means to remove its ovaries, and the operation is practised on all the domesticated animals, especially the sow, the bitch and the cat. In the smaller animals the ovaries are removed through an incision in the flank or *linea alba*, and the flank method of operation used to be followed out for the mare and cow. Now, however, thanks to the researches of Charlier and Colin, removal through the vagina has completely taken its place. This method is cleaner, more surgical, and safer in every way.

In the mare it is by no means uncommon to get a condition of almost constant œstrum, during which period she will behave most indecently, squealing, stretching her hind legs apart and passing urine in short, sharp, jerky streams at frequent intervals. She may even become vicious and lash out or stamp her feet furiously. When put into harness she may lie against the shaft, or merely become out of condition, stubborn and listless. If anything touches the hind quarters she will kick and squeal. In some mares this state of affairs persists during œstrum; in

others it occurs between the periods, the animal being quieter when "in season." In either case the animal is objectionable to its owner, and professional aid is usually called in. Medicinal sedatives, such as the bromides of potassium, sodium or strontium, may answer temporarily, and even tide over a year or two, but eventually there comes a time when the mare is too treacherous or too objectionable to use, and she must either be sold or something further be done. It is at this stage that surgical aid can often intervene with success, and the operation of ovariotomy be performed. If a diseased condition of the ovaries is the cause of the trouble (and this is the case in by far the greater proportion), their removal will nearly always effect a cure if done soon enough. The failures are usually to be found in aged mares, or those to whom kicking has become a confirmed habit on account of its long standing.[1] If the operation is done before the habit has existed for any great length of time, the results are excellent,[2] and for mares which have become a nuisance on account only of indecent behaviour the operator can almost always give a prognosis of cure.[3]

Removal of the healthy ovaries (oöphorectomy) is sometimes practised in racing mares in order that when put into training they can be relied upon to keep in better condition during the summer, and not to stay alongside another horse during the race. They are also said to be more even tempered.[4]

In some cases one ovary only may be diseased, and its presence may cause so much pain and irritation as to prevent impregnation, whereas its removal may give the desired result.[5]

Condition of the Ovaries.—In troublesome mares, as a rule, an abnormal condition of the ovaries exists. They may be two or three times the normal size, in which case they are cystic, and contain a lot of Graäfian vesicles in various stages of

[1] See Appendix, Cases 1, 3 and 21.
[2] See Appendix, Cases 12, 13, 17, 20, 22, 27, 28, 29 and 30.
[3] See Appendix, Cases 5, 8, 11, 19 and 23.
[4] See Appendix, Cases 4, 7, 9, 14, 25 and 26.
[5] "Veterinary Record," Vol. XV., page 210. See Appendix, Case 10.

development,[1] or they may be cirrhotic even to cartilaginous hardness and very small.[2] It is impossible to tell with certainty, except by manual examination, which condition exists. In some instances there may be nothing very abnormal to all external appearances, and yet their removal may have the desired effect.[3]

Power of Procreation.—Although it is frequent to find that mares which are constantly in œstrum, and those which are known for their vicious, squealing, urinating and general nymphomaniac propensities, will not breed, even if repeatedly served by different stallions, the rule is not by any means a constant one.

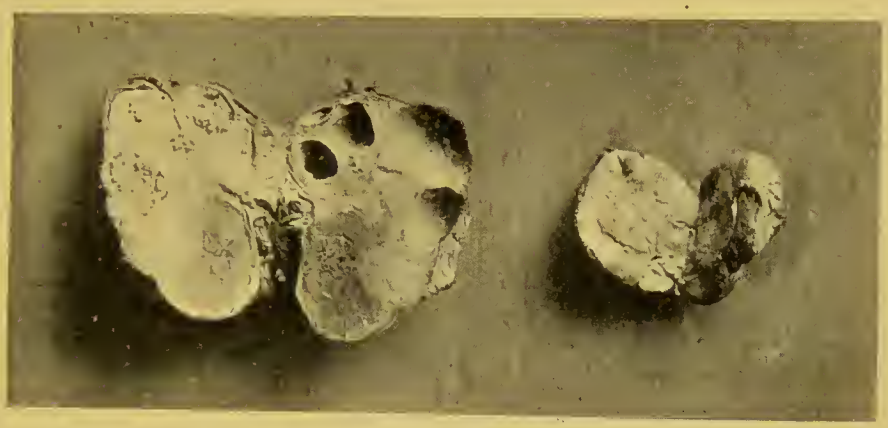


FIG. 25.

A small cirrhotic ovary and one which is enlarged and cystic (about one-fourth natural size).
A normal ovary is, in size, about midway between these two.

Case No. 2 (see Appendix, page 90) was one of the worst and most objectionable brutes imaginable; she was known to have been "covered" several times, but it was never even suspected that she could be pregnant. Yet a *post-mortem* examination demonstrated this fact, which perhaps ought to have been discovered at the time of operation, had not the owner been so very emphatic upon the point as to cause me to coincide with his opinion.

1 See Appendix, Cases 1, 11, 29 and 30.
2 See Appendix, Cases 2, 5, 7, 14, 16, 20, 22 and 28.
3 See Appendix, Cases 4, 6 and 8.

That a certain amount of cirrhosis will not prevent breeding is illustrated in Case 10 (Appendix, page 95), in which a manual examination of both ovaries revealed them to be cirrhotic and much harder to the touch than normal. The worst diseased one was removed, and the mare afterwards had a foal and has become pregnant for a second time.

Preparation of the Patient before Operation.—As in the case of the cryptorchid patient, the intestines should be kept as empty as possible. A dose of physic may be given a few days

FIG. 26.
Position of operator during operation.

beforehand, although this practice is by no means necessary; a laxative diet and twenty-four hours' enforced abstinence from food being all sufficient. Care must be taken that the bedding is not eaten, and a limited supply only of water should be given early on the morning of the operation. If an enema is used to empty the rectum this should be done at least an hour beforehand, or some of it may return and soil the arm of the operator and perhaps contaminate the vagina; sometimes it is wise to empty the bladder with a catheter or by inserting a finger into the urethral orifice. If the mare will allow it, the under

surface of the tail, the perinæum, vulva and surrounding parts should be well washed with soap and hot water, containing disinfectant, on the morning of operation. This is, of course, again washed thoroughly immediately before operating.

Methods of Securing.—No special method of securing is necessary if the patient is operated upon in the recumbent posture. It is better to cast with hobbles than with a rope, as the position of the legs in the former case causes less pressure upon the abdomen, and consequently more room and facility for the movements of the operator. The side upon which the patient is thrown depends entirely upon the operator's fancy; usually the right side is the one which is chosen, but sometimes it is an advantage to remove the left ovary when the animal is on the right side, and then turn her over to reach the right one. When operated upon in the standing position the mare should be placed deeply under the influence of chloral or morphia and then safely secured with hobbles or side lines, or else in a trevis fixed safely with a sling to prevent the patient from lying down. Of the two it is easier to operate in the standing position, but in the prone position one has the advantage of chloroform.

In Texas and the Western States of America,[1] where large numbers of horses are reared and run wild, geldings are found to be much more reliable and valuable than mares from a sale point of view, especially on those ranches from which army supplies are drawn. In the United States army no mares are purchased when geldings can be obtained, and even for cow-punching and ordinary ranch work geldings are preferable, owing to the care which has of necessity to be exercised when riding mares during the months of pregnancy.

With spayed mares this trouble is done away with, and in times of urgency, due to war or other causes, these animals become a marketable commodity. As a rule the proprietor of a large ranch will have a certain number done for the cow-

[1] For this description I am indebted to Dr F. Thaeher, one of the veterinarians of the State of Texas, U.S.A.

boys to use, because he will thus be enabled to part with all his geldings when opportunities offer.

Those under the age of two years, in which the vagina is too small to allow of passage of the hand, are operated upon through the flank (on the left side, between the last ribs and the angle of the haunch) or through the median line (midway between the umbilicus and mammary gland).

The abdominal incision is made just so large that it will admit the hand, the mare being thrown and secured with ropes, and, after removal of the ovaries, allowed to return to the prairie. No attempt at after-dressing is made on account of the wildness

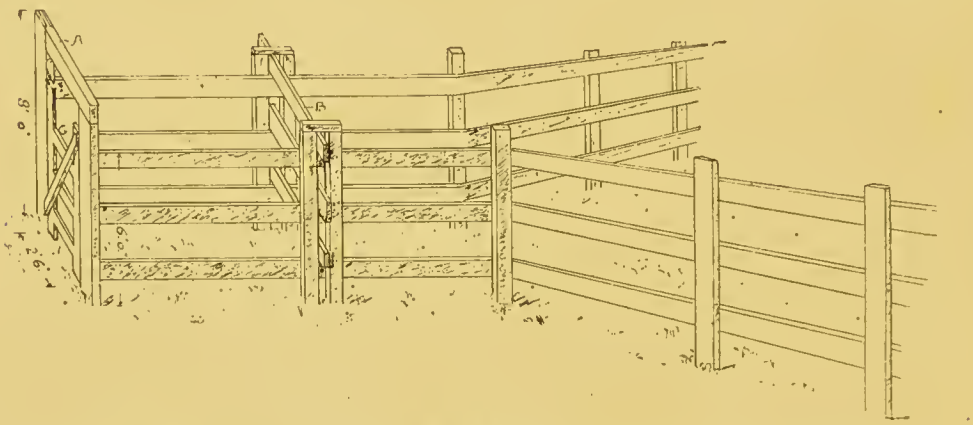


FIG. 27.

Diagram of "chute" (with sides about 6 feet high), into which the mare is driven and placed for operation. Her head passes through the space between A and G.

G. Gate, about 8 feet high and 2 feet 6 inches wide.

B. Set of rails to keep the animal wedged tightly in position and to prevent operator from being kicked.

of the patients, and it is not surprising that a certain proportion of deaths occur from peritonitis or protrusion of the bowels.

With the older and more roomy mares the vaginal method is practised, and, although no chloroform is used and the antiseptic precautions taken do not come up to modern ideas, the percentage of losses is very small.

The half-wild animals are driven into a wedge-shaped stockade, 6 feet high, termed a "chute" (see Fig. 27), and as soon as one has arrived at the farther extremity (which is only about 2 feet 6 inches in width), bars are slipped in behind the

quarters in such a position that the mare cannot injure the operator nor yet escape. In fact she is scarcely able to move, being tightly wedged in. No ropes or other tackle are affixed. As a general rule the animal is too panic-stricken to kick, merely squatting down when the vaginal incision is made or when the ovaries are being excised. After the operation the gate (A) is opened, the patient is turned loose on the prairie, and no further attention is paid to it.

Value and Choice of an Anæsthetic.—Both on humane grounds and those of facility and safety to the operator some general anæsthetic or deep narcotic should always be used. Ovariotomy is one of the major operations of abdominal surgery, and must of necessity, if no anæsthetic is used, be accompanied in the mare by a good deal of shock and pain; besides which, the violent straining which takes place when the operation is performed without anæsthesia is liable to cause (either at the time or afterwards) expulsion of a quantity of bowel.

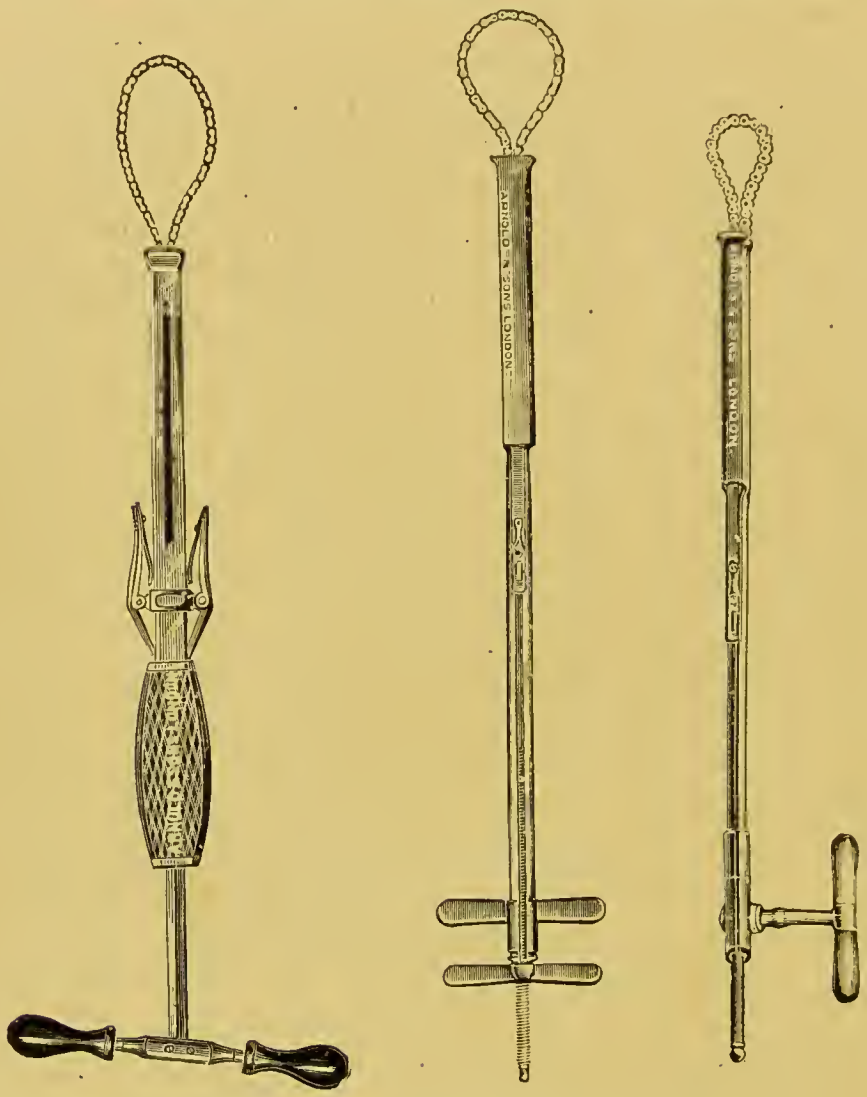
It is astonishing, when chloroform is used and the operation has been done under modern antiseptic precautions, how very little notice the patients take of it. In a large proportion of the cases summarised in the Appendix, page 89, the subsequent report made by the veterinary surgeon in charge said: "the mare feeds well and looks as if nothing had ever been done to her." Anæsthetics unquestionably lessen nervous shock, and should be used wherever possible in all cases in which it is necessary to inflict pain.

If chloral is used it is generally administered *per rectum*. Four to eight drachms of chloral, mixed with mucilage and water, are given as an enema about half-an-hour or an hour before the operation is done, the rectum having been previously emptied. This produces dulness and stupor, and it is in this latter stage that the mare is secured with side lines or put into the trevis.

Morphia, about eight or ten grains, injected subcutaneously, may be used for the same purpose.

Chloroform is, however, undoubtedly the best for the patient, both at the time and afterwards.

Instruments Required; Preparation for Operation. — The



1 2 3

FIG. 28.—Different patterns of écraseur.
1. Chassaignac (extra long). 2. French pattern. 3. Author's pattern.

instruments required are a clean enema syringe, a specially made knife with guarded blade,[1] and an écraseur[2] or some

[1] Messrs A. Munro and A. Holburn have in two cases successfully improvised an ordinary scalpel with the blade partially concealed by antiseptic tow. ("Veterinary Record," Vol XV., page 213).

[2] It is always wise to be provided with two chains in case of accident (see Appendix, Case 2).

instrument for excision of the ovaries. A speculum is also advised by some operators, but it is not a necessity. The knife and écraseur, or torsion forceps, together with all cotton wool to be used in the interior must be carefully sterilised, either by boiling or by immersing for some considerable time in a reliable solution of some disinfectant. The enema syringe must be a clean one, and may be either of Higginson's pattern or an ordinary metal one of sufficient size and calibre.

Preparation of the Operator's Hands and the Patient's Genitals.—The operator's hands, nails and arms should be carefully scrubbed in hot water containing some reliable antiseptic (such as creolin, chinosol, perchloride of mercury, carbolic, etc.), and afterwards washed again in fresh antiseptic with ether or ether soap, care being now taken that the hand and arm which must enter the abdomen shall not afterwards touch anything which could contaminate it. At the same time an assistant similarly washes the under surface of the mare's tail, the vulva, anus and perineal region, drying it with sterilised wadding or a clean cloth. Care must be taken to cleanse the interior of the lips of the vulva, as smegma is often present there and is apt to soil the hand or arm when entering.

The vagina is filled with warm antiseptic solution—creolin (1-50), or chinosol (1-500)—and this is allowed to come in direct contact with the interior of the vagina for at least ten minutes. The hand is then introduced and moved to thoroughly agitate the fluid, which is now aided to escape. Afterwards, with sterilised cotton wool and fresh chinosol solution, the vagina is swabbed out and dried. The patient is now quite ready for the operation.

It is necessary to attend carefully to the above details because sometimes the vagina, especially in troublesome œstral mares, contains a lot of slimy mucus adherent to its walls, and mere syringing is not sufficient to remove it. In special cases where a discharge has been observed for some time, and especially where it has been found purulent, the vagina should

be syringed with antiseptic three or four times a day for several days previous to operation.

Surgical Anatomy.—On introducing the hand between the lips of the vulva one passes through a constricted portion into a hollow cavity—the vagina itself. At the far end of this, a little nearer the roof than the floor, is to be felt the mouth of womb. This may be tightly closed or sufficiently open to admit the end, or even the whole length, of a finger. Immediately above this, when the mare is in a standing position, is the spot selected for the incision; it is here that the blood vessels of the vagina are fewest in number and of the least importance. Upon introducing the hand, with the palm downwards, into the abdomen one feels a soft smooth body just on the other side of the *os*. This is the body of the uterus, and by following this along the operator can, if he has not at once found the ovaries, readily discern each horn, and eventually reach the ovary which is at its extremity. The ovaries hang, one on each side, under the loins just behind the kidneys, attached by a fold of peritoneum. In disease they vary in size from a small walnut to a large cocoanut, and in shape they are very much like one or other of these fruits, although the external surface is not always regular. To the touch they may feel very hard or soft and cystic. They receive their blood supply through the ovarian arteries, and are plentifully supplied with veins. It is a wise plan for an intending operator to make himself acquainted with the external form and feel of ovaries from different subjects beforehand.

The rectum is situated just above the uterus, and the coils of intestine are all around it, so much so that when the mare is cast for operation great care must be taken not to include a small piece of this in the loop of the écraseur chain.

Description of the Operation.—The operator, having attended to the cleansing of his hand and arm, kneels or lies down behind the mare's hind quarters, whilst an assistant holds the tail out of the way. If a speculum is used (it is not at all essential) it is fixed in position now. Compressing his hand into as small

FIG 29.

Anatomical situation of the ovaries, the intestines having been removed.[1]

1. Diaphragm. 2. Liver. 3. Stomach with spleen attached. 4. Left kidney. 5. Portion of rectum. 6. Body of uterus. 7. 7. Right and left ovary at the extremity of their respective horns.

[1] For this sketch (taken from the body of a virgin mare, twelve years old) I am indebted to Mr C. C. Abram, M.R.C.V.S.

a space as possible, he takes the knife (with the guard closed) in the hollow of his hand and passes it slowly and steadily into the vagina as far as the *os uteri*. This may cause a little straining on the part of the patient, and, if so, a momentary interval should be allowed. The blade of the knife is placed against the mucous membrane of the vagina (in a position which would be vertical if the mare was on her feet) above the *os*—*i.e.*, between the *os uteri* and the spine—and the guard withdrawn. Some operators advise that the puncture shall be

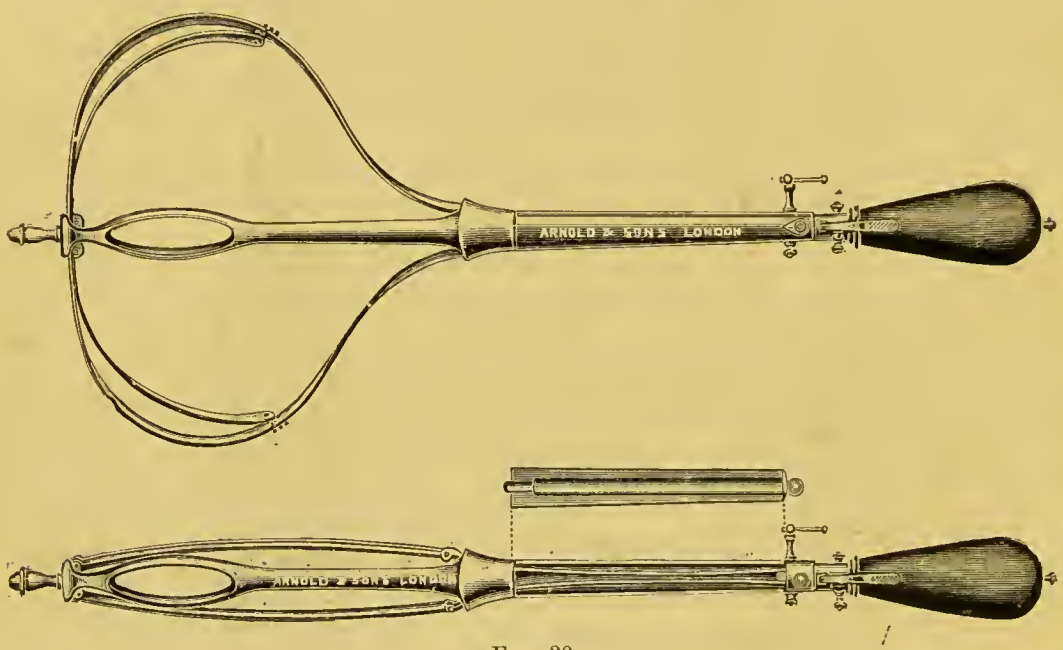


Fig. 30.
Vaginal speculum.

made below the *os*.[1] I have tried both situations, but (unless the space above the *os* is abnormally small) prefer this position, as there is less likelihood of intestinal protrusion afterwards. The chief thing to be said in favour of the lower puncture is that the plunge of the knife is made at a further distance away from the aorta and rectum than when made above. When she is perfectly still a short sharp plunge is made in a forward and slightly downward direction, the object being to merely

[1] Lukes. Proceedings of the National Veterinary Association at Plymouth, 1899. ("Veterinary Record," Vol. XII., page 261.)

puncture the whole of the coats of the vagina without injuring any of the abdominal organs or vessels. It is important to ensure incision of all the coats with the knife, as, if an attempt is made to puncture the peritoneal lining with the finger, this covering may recede and give rise to the formation of a pouch with, perhaps, unpleasant sequelæ.[1] The guard is then replaced and held in position whilst more of the knife is inserted to lengthen the incision. This instrument may then be dispensed

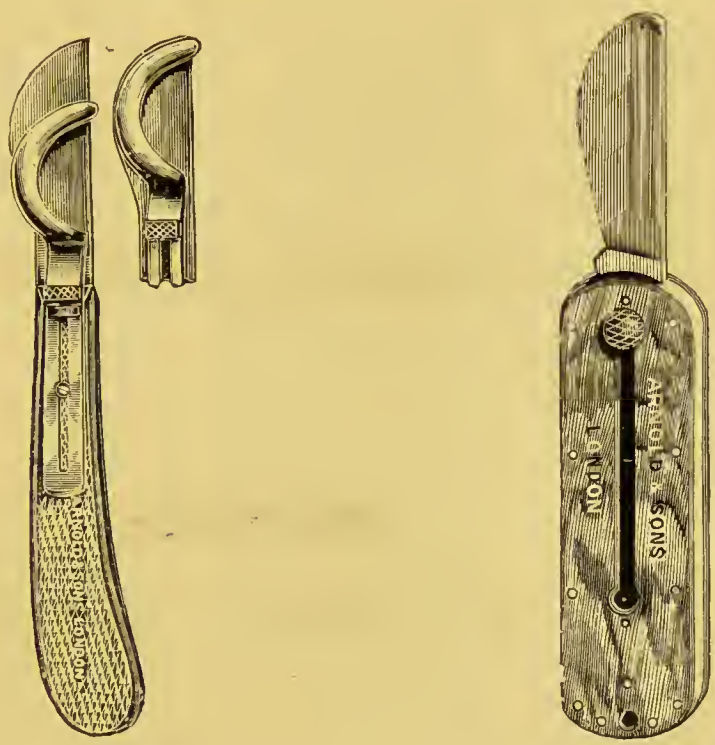


Fig. 31.
Two patterns of knife with guarded blade.

with, and may be either withdrawn altogether (the safer plan) or allowed to fall on the vaginal floor. With the fingers, inserted one at a time to commence with, then two or three together held wedge-shaped, the opening is made sufficiently large to admit the whole hand. It is better to tear the wound open in this way than to lengthen it with the knife, as there is less danger of severing any of the arteries of the vagina.

[1] See Appendix, Case 25.

The ovaries are then sought for. In size they may vary from a walnut to a large cocoanut, and to the touch they may be hard and cartilaginous or soft and cystic. They hang dependent from the spine within easy reach of the hand when just passed through the vagina as far as the wrist, and, if any difficulty exists in finding them, can be readily discovered by manipulation towards the extremities of the horns of the uterus. Taking one ovary at a time, the organ is held in the palm of the right

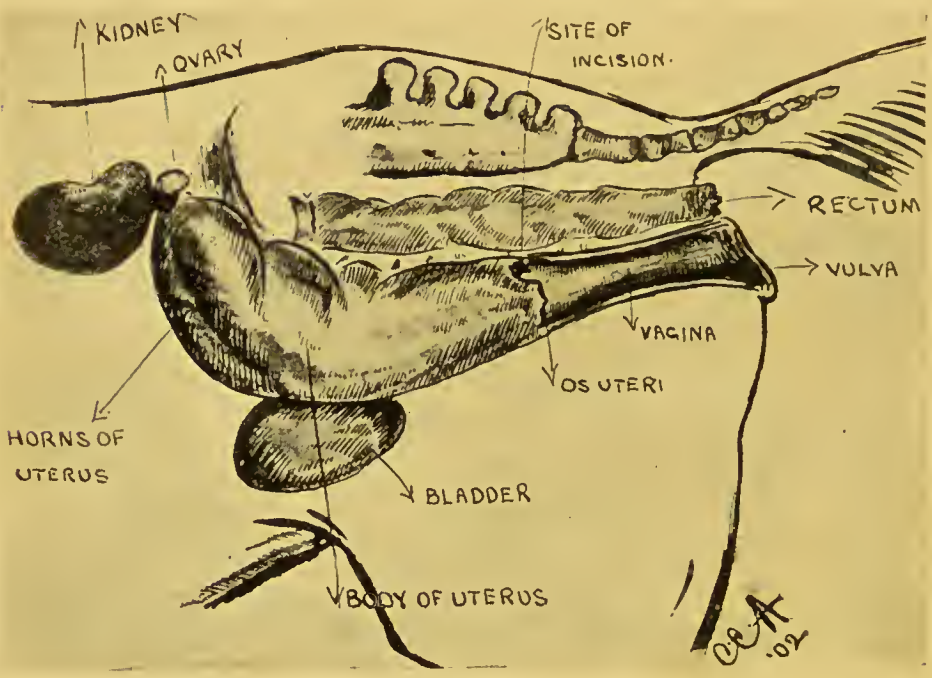


FIG. 32

Diagram shewing the relative position of the pelvic organs and the site of operation.[1]

hand whilst the operator, with the left, passes the écraseur into the vagina and abdomen, using the right arm as a guide. The écraseur chain is then looped carefully over the ovary (which is retained in the hand) and tightened very slowly by an assistant until the organ is pinched or torn off. The chain is left on for a few moments to ensure absence of hæmorrhage, and the same process is repeated with the other. It is not generally necessary to withdraw the écraseur until both have been taken off, but

[1] For this sketch I am indebted to Mr C. C. Abram, M.R.C.V.S.

each ovary should be completely withdrawn as it is detached or it may be lost in the abdomen. The vaginal mucous membrane is again swabbed out (not syringed) with sterilised cotton wool which has been wrung out in chinosol or some other antiseptic solution, and the operation is complete.

Care must be taken not to remove a piece of bowel by mistake or to injure any of the abdominal organs. Bowel, if empty, has a soft, pultaceous feel totally different to that of ovary, and if full can be distinguished by the presence of a succession of lumps of fæces in a continuous row. Care, too, must be taken not to excise the ovaries too high up or otherwise unnecessarily injure the uterus, nor to include anything beside the pedicle of the ovary in the chain at time of excision. If the écraseur chain is a good one and not sharp, and the operation passes off properly, there is scarcely any blood whatever to be seen either at the time or afterwards.

Prognosis and After-treatment.—If the operation has been done antiseptically and under chloroform the result will be excellent. As a rule the mare, except for a little trembling and raising of the tail during the next twenty-four hours, does not show the slightest deviation from health. A reference to some of the cases in the Appendix, (page 89) will clearly show this, especially Case 14, in which the owner, a veterinary surgeon (Mr C. Hartley), rode the animal hunting on the sixth day afterwards, and no ill effect followed.

Unless something untoward occurs, no special after-treatment is necessary. It is astonishing how quickly the vaginal wound will unite. On no account, if the patient appears all right, should any swabbing or syringing of the vagina be attempted; the vulva and external genitals alone being daily sponged with antiseptic and kept clean.

A clean loose box or stall and good hygienic arrangements are of course essential. Diet should be sparing and laxative, as the collection of hard fæces in the rectum causes a certain amount of soreness and pain for a few days during evacuation.[1]

[1] See Appendix, Cases 20 and 25.

Walking exercise should be given on the third day, and the mare can be put to gentle work in a fortnight or three weeks.

She may be immediately cured of all her bad habits,[1] or they may persist for a few weeks or even months, disappearing gradually.[2] Sometimes they will not have completely gone until after the following spring, and in other instances it is a good plan to turn the patients out to pasture to give a little time in which to get in good condition and forget their vices.[3]

If the troublesome habit has existed for less than six months a satisfactory prognosis can generally be anticipated. If the mare has been a confirmed kicker for years the result is uncertain.

Between 1888 and 1893 Professor Cadiot states[4] that he operated upon eighteen nymphomaniac mares. Eight became cured, three improved, in five cases there was no change, and the remaining two were lost sight of.

M. Schwendimann reported[5] statistics of sixteen vicious mares belonging to the Swiss army. In seven cases complete cure resulted, and in four others there was an improvement.

It has been said that a spayed mare will get fat and lazy; probably improper feeding and want of exercise have a great deal to do with this; up to the present the result of the thirty cases in the Appendix has not tended to support the statement. They have all been well looked after and observed closely; several were operated upon four years ago, and in no single instance at present has undue obesity ensued, although several of them which could not be got into condition before the operation are now looking well and sleek.

The removal of one diseased ovary may even allay a mare's sexual irritation sufficiently to allow her to afterwards breed a foal.[6]

[1] See Appendix, Cases 5, 7, 11, 13, 17, 18, 19, 20, 22, 27, 28 and 29.
[2] See Appendix, Cases 6, 8, 13, 15 and 16.
[3] See Appendix, Cases 15 and 16.
[4] "De l'ovariotomie chez la jument et chez la vache," por P. J. Cadiot.
[5] Foreign abstract (translated by H. G.), "Veterinary Record," Vol. XI., page 145.
[6] "Veterinary Record," October 1902, page 210 (Page and Hobday). Appendix, Case 10.

Abnormalities.—These are practically confined to three conditions, viz.: deviation from the usual position; secondly, an exaggerated cystic condition whereby the ovary may have become so large that the usual size of écraseur chain cannot be passed over it[1]; or, thirdly, some difference in shape or cystic attachment, as illustrated by Fig. 33.[2] If the second above-mentioned condition has existed for some time the

FIG. 33.

Loose cyst, with long pedicle, hanging from the wall of the ovary (Appendix Case 30).

weight of the ovary may have so lengthened the pedicle as to make it a difficult matter to guide the organ itself through the loop without including some portion of intestine. If the ovary is too large the fluid must first be removed. This may be done either by puncturing with a sharpened canula, to which a rubber tube is attached, the contents of the cyst then escaping through

[1] See Appendix, Case 29.

[2] For details, see Appendix, Case 30.

the vagina, or by rupturing the wall with the finger nail. When the latter is done the contents may fall into the abdominal cavity, but, if not septic or purulent, need give rise to no alarm.[1]

Influence of Age and Time of Year.—In regard to the safety of the patient the age does not appear to be of material importance, but it has some considerable bearing upon the ultimate success in curing the vicious propensities; although

FIG. 34.
(1) An ovary of normal size. (2) An abnormally large and cystic one. (Appendix Case 29).

the length of time these have existed is a much more important item. The operator may talk of a successful sequel in a mare under eight or nine years with much more confidence than in one over that age. As a rule, if an old mare becomes an inveterate kicker, even when the primary cause has been removed, the habit still persists.

The season of the year to some extent influences the periods of œstrum, and it is better, if possible, to operate when the

[1] See Appendix, Case 29.

mare is not in that condition. It is not a matter of vital importance, but as there is always more congestion at these times in the blood-vessels of the genitals there is more risk of hæmorrhage especially if the ovaries are removed rapidly. In many instances the continual "period" makes it impossible to operate except during the time the animal is in this condition, and many of the cases in the Appendix were in full œstrum when operated upon. They did not in any way show systemic disturbance in consequence. Beyond this factor the weather need not be taken into consideration, so long as the patient is afterwards placed under good hygienic conditions.

Untoward Sequelæ.—The untoward sequelæ to be feared are those of surgical shock, injury to (and even removal of) a piece of bowel, protrusion of the intestine through the vaginal wall, eversion of the rectum, hæmorrhage, colic, the formation of a serous swelling or an abscess at the seat of operation, and peritonitis.

When done under chloroform the danger of bad effect from surgical shock seems practically *nil.* Should it occur and the patient refuse food, etc., the symptoms must be treated as they arise.

Sometimes a mare's bad habits will be cured and her spirit appear broken,[1] but this is rather the exception than the rule.

To avoid injury to the intestine great care must always be taken during the introduction and manipulation of the écraseur. The inclusion and removal of a piece of intestine would inevitably result in death.

Protrusion of the intestine through the vaginal wall is much more likely to occur when the operation is done without an anæsthetic, and especially if the operator has made a large wound in the vaginal wall. It is also more liable to occur when the vaginal wound is made below the *os uteri*, as when made above this organ partly occludes it if the intestines are forced up against the vagina from below. In the event of such an occurrence the intestine must be cleansed with antiseptic

[1] See Appendix, Case 19.

and returned. The operator need not despair of success even then, as it has occurred, and been successfully returned.[1] It may be necessary to fill the vagina with sterlised wadding or tow, care being taken that none of it falls through the wound into the abdominal cavity.

Similarly with eversion of the rectum. Violent straining, when no anæsthetic is used, may lead to this, and it may even become irreducible.[2] If, after reduction, it again protrudes, sutures should be inserted across the anus or some form of pessary improvised.

Hæmorrhage should not occur if the écraseur chain is a blunt one and the removal of the ovary is effected very slowly. One must not forget the possibility of puncturing the aorta when making the vaginal incision. Such an eventuality would be almost certain to lead to a fatal result.

Bleeding from other vessels, if considered sufficiently serious, might be stopped by the application of small artery forceps which could be removed after about fifteen or twenty minutes. If aseptic and left on altogether they would probably become encapsuled. Such a condition has been recorded by Professor M'Queen.[3]

If colic occurs it is treated on the usual lines, drugs (such as large doses of opium or cannabis indica) which quieten peristalsis being especially indicated, and warm enemas given to keep the contents of the rectum soft and to soothe the pelvic organs.

A serous swelling may result as the consequence of hæmorrhage into a pouch between the vaginal coverings,[4] but, unless causing severe pain, should not be lanced. Warm irrigations will hasten its absorption, and opium should be added to the water.

If an abscess forms and bursts internally the probability is that the patient will die; but if it is lanced or the contents

[1] "Le Bulletin Vetérinaire," No. 58. "Veterinary Record," Vol. XV., page 213 (Munro and Holburn).

[2] C. Pieree: "Veterinary Record," Vol. XIII., page 242.

[3] "Proeeedings of the National Veterinary Association," 1894.

[4] See Appendix, Case 25.

escape into the vagina this must be irrigated or swabbed out with antiseptics. Its presence is indicated by loss of appetite, pain and general uneasiness, accompanied by high temperature. Careful vaginal or rectal (or both) exploration should be made, the abscess being detected as a soft palpitating body under the fingers. It should be lanced as soon as is considered expedient, and the surrounding parts kept clean by syringing or swabbing with an antiseptic.

Peritonitis should be treated immediately by the internal administration of antiseptics and opiates, and by the external application of hot rugs covered with waterproof sheeting and affixed to the body with surcingles. If only local, and not due to septic causes, it need give no alarm. The vagina should be kept clean with warm antiseptics.

In connection with peritonitis and the formation of an abscess it is worth while to bear in mind that, in a mare with a wide vagina, air will sometimes be heard to rush into the abdomen. It is always possible, if the bed upon which the animal is cast is made of some dusty material or the air is otherwise infected, that this may prove a source of infection, and care should be taken to avoid it as much as possible.

It will be noticed that two of the cases (see Appendix, Cases 6 and 22) died of twisted gut within a short time afterwards. Whether this can be attributable to the operation or was merely coincidence it seems hard to say definitely. Further statistics may perhaps help to decide the point, which is worth noting. I have no recollection of having punctured the omentum in either case.

Concluding Remarks.—Considering the apparent severity of the operation it is really remarkable what very slight (if any) systemic disturbance occurs when it is performed under anæsthesia and with strict adherence to antiseptic precautions. These are, however, essential to an uninterrupted series of successful results. In opening such an important cavity as the abdomen one must not forget that a septic infection cannot take place without the presence of septic organisms, and that under

natural healthy conditions these are not present. If, therefore, a septic peritonitis takes place after an operation the operator must be prepared to satisfy himself, at all events, that something connected with his hands and instruments was not the primary source of infection. *Scrupulous surgical cleanliness is the first essential to success in all major operations, and it is absolutely necessary when any of the cavities of the body have to be opened.* The presence of disease of the uterus or vagina, especially if accompanied by discharge, must make the operator rather more cautious in giving prognosis, and, of course, in each case an assurance should, as far as possible, be obtained that the mare is not pregnant.

VETERINARY MEDICAL SOCIETY GLASGOW

APPENDIX.[1]

HEREWITH is appended a list of thirty consecutive cases in which one or both ovaries were removed from troublesome mares, with brief details of each and a summary traced up to December 1902.

No. 1. 22nd July 1899.—Light van mare, ten or twelve years old. A confirmed kicker in harness, especially when wearing a breech-band. She had smashed several vehicles, and was especially bad when in œstrum; at any time it was dangerous to approach her hind quarters. An ounce of extract of Indian hemp was given in bolus at 2 P.M., followed by another half ounce at 3.30, the idea being to stupify her sufficiently to enable the operation to be done painlessly in the standing posture. At 4 P.M., however, as there appeared to be no marked effect, she was cast and chloroformed, and the ovaries removed. Upon getting up and recovering from the chloroform, she strained a little, but about six o'clock ate a fair meal, and afterwards lay down comfortably. She was now very drowsy, and this we attributed to the effects of the Indian hemp.

Recovery was uneventful, and on the 29th she seemed so well that the owner (on his own initiative) rode her about, and also had harness put on her. She objected to this latter procedure very much on this and several immediately subsequent occasions, and was turned out to the grass for a month. On the 12th September I received a letter to say that she had

[1] The major portion of this appeared as an article in the "Journal of Comparative Pathology and Therapeutics," Vol. XV., page 155.

been driven in harness, and went tolerably well, but on the 19th another communication reported that she was still a bit of trouble. On the 24th October a letter said: "The mare is looking very well, and is quiet in harness, but still kicks badly when being taken out and put in." On the 21st November: "She has not entirely given up her bad habits, but is at work regularly on a farm ploughing."

The ovaries were examined by Professor M'Fadyean, and were larger in size than normal; one weighed three ounces and the other two. Each contained a number of Graafian vesicles with pasty looking contents, the vesicles varying in size from a Barcelona nut to a large filbert (*see* Fig. 25, the larger ovary).

No. 2. 26th November 1899.—Cart mare, nine or ten years old, in present owner's possession about four months. A very good worker except when in œstrum, and as this objectionable period was practically continuous she was almost worthless. She would kick and squeal whenever brought near another horse, and even at times when another horse passed her on the road. She had been served by the stallion on more than one occasion, in the hope that if she proved in foal she might get quieter. There was no appearance or even suspicion of pregnancy, and the owner was so very positive upon this point that I allowed myself to be misled.

Unluckily, when operating, the écraseur (a long Chassaignac) chain broke, and as I had not a second chain the ovaries were removed after very considerable difficulty with a small one of "Farmer Miles" pattern. One of the chains of this instrument broke too, but, fortunately, the veterinary surgeon with whom I was in consultation had a second, and with this they were ultimately got away. Partly owing to this, perhaps, and probably also more to the fact found upon *post-mortem* examination that she was in foal, the mare died on 1st December. The ovaries were sent to Professor M'Fadyean; they weighed $1\frac{1}{4}$ ounces each, and were cirrhotic.

No. 3.[1] 27th December 1899.—Hackney mare, nine or ten years old, had been in owner's possession five years. Fairly quiet when once in harness, but very dangerous to put in or to get the crupper, etc., on; she lashed out when touched on the hindquarters. When in œstrum she was not so bad, but would lie down on the shaft or against anything near at hand. Would squeal and urinate even when looked at in the stable.

The ovaries were removed, and she ate a meal almost immediately afterwards. She strained now and again during the next twelve or fifteen hours, but otherwise there was nothing noticeable. Recovery was quite uneventful. On the 10th of May 1900 I received a note to say she was "looking well and doing her work, but squeals and kicks just as much as before. The driver assures me that she is in no way different to what she was before." She looks well and has no tendency towards obesity or laziness (December 1902).

Professor M'Fadyean examined the ovaries, about which there was nothing very abnormal.

No. 4. 17th December 1899.—Thoroughbred mare, three years old, not at all vicious, but the owner did not wish her training to be upset by periods of œstrum.

The ovaries were removed under chloroform; recovery was perfectly uneventful, and the operation has had the desired effect. She has not, however, proved fast enough for racing purposes, and has therefore been used since as a hack. The ovaries were quite normal. She is still in regular work and shows no tendency to obesity or laziness (December 1902).

No. 5.[2] 27th April 1900.—Carriage mare, five years old, described by the veterinary surgeon in charge as "very troublesome when in season, this condition being continuous in hot weather"; and by the owner as "free from vice, but in the spring of the year, during her periods, most objectionable."

[1] Proceedings of the Lancashire Veterinary Medical Association, 7th December 1899. "Veterinary Record," Vol. XII., page 359.

[2] "Veterinary Record," Vol. XIII., page 229.

The ovaries were removed and sent to Professor M'Fadyean, who described each one as cirrhotic and smaller than normal. Recovery was quite uneventful, and even during the next few days there was a perceptible improvement in her behaviour with other horses. Before the operation she would, when near them, behave very objectionably; now, however, she did not take the slightest notice of them. On the 4th of May she was ridden out to exercise. On the 15th of June the owner wrote: "The operation on my mare has been a complete success. She is now perfectly quiet at all times with the other horses, and from the moment the operation was performed never showed the slightest symptom of pain or distress from it."

On the 23rd of July 1901 the owner wrote: "The operation has been a perfect success. Before it was performed, when her periods were on, it was impossible to drive her in double harness, or even to put her in double harness at all. Since the operation she has become absolutely quiet, and the cure is complete. I may add that there has been no diminution of the mare's power or spirit whatever." At the present time (December 1902) the mare is regularly at work, and there is nothing by which one could tell any difference between her and any entire member of her sex. She shows no tendency towards obesity or laziness.

No. 6. 19th July 1900.—Carriage mare, ten or eleven years old, in owner's possession about two years. Had always shown œstrum in the spring and summer, but a few days ago kicked the front of the brougham. She was always worse when œstrum was coming on or going off.

The ovaries were removed and recovery was uneventful, the animal being exercised on the 23rd. After this she was regularly ridden, in some cases for long gallops, until the middle of August, when she was put back to carriage work. The objectionable œstrum ceased, and the mare's habits were decidedly better, but an unfortunate attack of colic and twisted intestine terminated her existence on the 25th of September. Just about the time of

her illness the owner, a medical man, wrote: "Her nervous irritability is decidedly diminished, but she is still inclined to lift her heels occasionally when the weight of the vehicle presses upon her going down a hill."

A *post-mortem* examination was made, and no trace of the operation beyond the absence of the ovaries could be detected, nor could any reason be assigned as the cause of the twist. The ovaries were larger than normal, and contained a lot of Graafian vesicles just ready to burst.

No. 7. 10th September 1900.—Hunter mare, seven years old, in owner's possession one and a half years. Sluggish and troublesome when in the hunting field amongst other horses at period of œstrum; very often in œstrum.

Ovariotomy was performed under chloroform, and recovery was perfectly uneventful. On the 24th I received a note to say that the mare had been driven twenty-five miles the previous day, and that there was a distinct improvement in her method of going. On the 28th of November: "She will jump and face anything, even in cold blood. Without doubt there is a decided change for the better in her character and temper"; and on the 24th of January 1901: "The mare is simply splendid, and I have had some good sport on her." Since then there has been no return of the objectionable symptoms. This improvement has been maintained and there is no special tendency towards obesity or laziness (December 1902).

The ovaries were examined by Professor M'Fadyean; the right one was small and cirrhotic, the left one normal in consistency and containing a lot of Graafian vesicles.

No. 8.[1] 16th October 1900.—Hunter mare, thirteen years old, continually in œstrum and very objectionable. When touched with the heel she would urinate profusely. Very dirty in her coat, and never could be got to look in condition. She had got

[1] "Veterinary Record," Vol. XIII., page 567 (Bloxsome and Hobday).

much worse lately, so much so that the owner, a lady, had been unable to ride her.

Recovery was quite uneventful after the operation. On the 17th of November: "The mare squeals as badly as ever when touched behind the saddle, but I fancy is not quite so much inclined to kick." She is coming into condition, and the last time I saw her ridden with spurs (a fortnight ago) she certainly let the water fly from her when she was touched to make her extend herself. On the 19th of December the owner wrote: "No water comes now"; and on the 10th of January the veterinary surgeon for whom I had operated wrote: "The operation is a decided success." On the 26th of March 1901: "She has ceased to exhibit any of the unpleasant symptoms complained of before the operation, and has been hunted all the season by a lady." The mare is going well at the present time (December 1902).

The ovaries which were smaller than normal, were examined by Professor M'Fadyean, who merely stated that they were unduly firm in consistency.

No. 9. 16th February 1901.—Valuable American trotting mare, three years old. Troublesome when in œstrum, and unreliable for racing purposes on this account.

This mare showed some pain at intervals, especially when made to turn round, and had a higher temperature than normal, but she appeared to recover, and was sent home three weeks later. She had not been there many days before she developed pneumonia, with signs of gangrene in the right lung. She again appeared to rally, but became very much emaciated, with œdematous swellings in various parts. Death took place in the middle of April, the veterinary surgeon who made the *post-mortem* stating that there was ample evidence of the pneumonia, with a gangrenous area which had become partially encapsuled, thus showing that the disease must have been present for some considerable time. There was nothing abnormal to be noticed at the seat of removal of the ovaries, and the point of incision

in the vaginal wall was somewhat thickened. It was unfortunate that this illness should have occurred so soon after the operation; and personally, I do not consider that the operation had anything to do with the death, as it was known that the stable in which she was placed was (in the words of the practitioner who treated her) "a stable in which American horses were placed upon landing, and essentially a pneumonic centre." This opinion was borne out, too, by one of the veterinary surgeons who saw the operation performed and attended the patient when taken ill.

Professor M'Fadyean examined the ovaries and reported: "The ovaries are abnormally small, and decidedly cirrhotic in texture."

No. 10.[1] 9th March 1901.—Thoroughbred mare, six years old. She had had a foal by Perigord in 1889, but had been barren since. Her perinæum had at some time or other been badly torn. Insemination had been tried without success. She was always in œstrum. A practitioner who had examined her had diagnosed extensive disease of an ovary, but as to which one I could not get a definite opinion. The owner wished this removal in the hope that he might get a foal subsequently. Upon gaining access into the abdomen it was found that both were undoubtedly diseased, being hard and cirrhotic. The right one appeared to be the worst and was removed, the left one remaining in its proper place.

On the 11th I received a letter saying "the mare seems quite her old self again and is feeding." On the 30th and at subsequent periods she appeared in œstrum again and was served twice. The first time she "missed," but on the second occasion she "held," and the result was a fine healthy foal.

At the present time (December 1902) mother and foal are looking well, and she is again, so far as one can tell, pregnant.

No. 11. 3rd April 1901.—Carriage mare, eleven years old,

[1] "Veterinary Record," Vol. XV., page 210 (Page and Hobday).

had been in owner's possession six years, and very troublesome during the last two years when in œstrum. She had been much worse during the last few months, and had once lately kicked the brougham. She regularly lay on the pole and against the other horse, and was very objectionable as soon as she stood still, showing œstrum, etc. After the operation recovery was uneventful, there being absolutely no indication whatever by which one could tell that any operation had been done. The animal has worked regularly ever since (December 1902), without the slightest relapse into her former indecent behaviour, and the owner has several times expressed his delight at the result. She is much cleaner in her coat than she used to be.

Professor M'Fadyean examined the ovaries, and stated that they were slightly cirrhotic.

No. 12. 12th July 1901.—Chestnut carriage mare, thirteen years old, always in œstrum, and very much worse during the past twelve months. She used to behave very objectionably, urine coming away from her. On one occasion she had started kicking. Recovery was uneventful. The ovaries were cirrhotic. The animal was put into harness again on the 23rd, and was driven from Balham to Brighton on the 29th. She has been in regular work ever since, and as recently as October 1902 I received a note from the practitioner in consultation with whom I had operated to say that "there was no tendency to obesity or laziness, and that the operation had unquestionably converted a dangerous brute into a useful animal."

No. 13. 1st August 1901.—Omnibus mare, seven years old, a very troublesome beast. She had recently commenced to kick viciously, and was quite unmanageable in single harness or saddle. She could sometimes be driven in double harness, but was very uncertain and unsafe. Always in œstrum. The left ovary was much larger than the right; both were cirrhotic. Recovery was uneventful, and the mare has since been worked regularly and with every satisfaction.

No. 14.[1] 17th October 1901.—Hunter mare, about nine years old, and in the words of the veterinary surgeon who called me in consultation, "frequently in œstrum, squeals, goes off her food, strikes out (apparently at nothing), urinates when put at a jump or when kicked with the rider's heels." Recovery after the operation was uneventful, and she was in the hunting field on the 23rd of the same month. There has been no return of the troublesome symptoms.

Professor M'Fadyean examined the ovaries and stated that they were "unduly fibroid in consistency, and each contained two or three small Graafian follicles or cysts."

No. 15.[1] 17th October 1901.—Cart mare, eight years old, a vicious, kicking, squealing brute. About a week or ten days after the operation she was turned out to grass, and left there for a few weeks. When tried in harness again she took to it quite kindly, and has worked quietly and regularly ever since.

Professor M'Fadyean examined the ovaries and stated that each contained a considerable number of cysts or Graafian follicles of quite unusual size, one as large as a pullet's egg.

No. 16. 26th October 1901.—Thoroughbred mare, seven years old, in owner's possession for six months. She was bought as a squealer and kicker both in harness or saddle. Recovery was uneventful, the words used by the practitioner in charge in a letter dated 29th October being, "the mare is going on first-rate; in fact, to all appearances she is well." She was afterwards turned out to grass for a few weeks, and when brought up became gradually quieter, the ultimate result being a perfect success.

Both ovaries were cirrhotic, the left one especially so.

No. 17. 9th December 1901.—Hunter mare, seven years old, in present owner's possession about twelve months.

[1] Proceedings of the Lincolnshire Veterinary Medical Association, 17th October 1901. "Veterinary Record," Vol. XIV., page 306.

Always in œstrum, and latterly a great nuisance. Squealing and passing urine continually, and lately showing a tendency towards using her heels. Recovery from the operation was uneventful.

On the 20th January 1902 I received a letter to say, "As far as I am able to judge the operation on my mare has been completely successful . . . she does not appear to have suffered from the operation at all. I hunted her yesterday for the first time, and she carried me as well as ever. She was no trouble whatever after the operation." In October 1902 I saw the owner and he informed me that the result had been a perfect success.

No. 18. 9th December 1901.—Hunter mare, six years old, a kicker. The ovaries were cirrhotic and about half normal size. On the 26th I received a note saying, "The mare has made a perfect recovery, and has been at work a week. She never showed the least outward symptom of having been operated upon." The kicking propensities have all vanished, and she has since been sold for £100.

No. 19. 8th February 1902.—Polo pony, aged, excellent at her work, but squealed, kicked, and urinated profusely. Her tail swished continually from side to side, she was always in œstrum, and sometimes very unwilling and troublesome. The right ovary was about twice the normal size. Both contained a lot of Graafian vesicles. She became perfectly cured of all her bad habits, but was never so good again at polo. In the words of the owner, a very hard rider, "it seems to have knocked all the stuffing out of her."

No. 20. 22nd March 1902.—Brougham mare, eleven years old, in owner's possession six years. Worked satisfactorily until a year ago, when she commenced to kick, squeal, and urinate when put in harness. During the last three months she had been quite unmanageable, and at the present time it was

only with difficulty that she could be approached in the region of the hind quarters. It was impossible to harness her.

25th March.—Quite quiet to approach and handle. Progress uneventful so far.

9th April.—She was put in a jobmaster's "brake" and went quietly. On the 10th she had an attack of obstinate constipation, the body temperature on the 11th reaching 105° and the pulse 120. The cause was probably due to voluntary retention of fæces owing to soreness in pelvic region, and warm enemas, sedatives, and laxatives soon put matters right. Exploration of the vagina revealed the presence of a scar at the seat of incision and thickening of the tissue around it.

In a few days the mare recovered and was put to work in double and single harness, giving every satisfaction. There has been no relapse into her former bad habits.

The ovaries were sent to Professor M'Fadyean, who pronounced them abnormally small and cirrhotic.

No. 21. 18th April 1902.—Polo mare, eight years old, a splendid mare at her work, but very vicious and a dangerous kicker. She was a perfect brute and could not be approached in the stable even to be fed without danger, except by one groom. She would lash out furiously even when looked at. She had been like this for some time. Her ovaries were badly cirrhotic.

In this case the operation was a complete failure as, although she never took the slightest notice of the operation and was used at polo afterwards, she had not, up to the present time (November 1902), lost any of her bad habits.

No. 22.[1] 22nd June 1902.—Omnibus mare, eight or nine years old, in the present owner's possession two years. She had been troublesome for about ten months, squealing and kicking, and for the last six months too dangerous to use. She was now so dangerous that, before she could be approached it was the custom to throw a slip noose over her head and pull her to the

[1] "Veterinary Record," Vol. XV., page 248 (Routledge and Hobday).

box door. She was condemned to be destroyed if ovariotomy proved useless.

The operation was performed under chloroform ; both ovaries being badly cirrhotic and cystic (M'Fadyean).

On the 26th I received a note to say that the mare had never missed a feed. On the 23rd she swished her tail a little, on the 24th stamped her foot and squealed in a half-hearted way, but when her head was held she could be stroked, patted, or even rubbed over with a brush, without causing any serious signs of irritation.

On the 2nd of July she was sent to work, being perfectly quiet in harness and to clean and handle about the legs. She still squealed and struck out with the forefeet in a half-hearted way when the bridle was put on so that this had to be done over the box door, but in harness and to be harnessed she was quite manageable. She worked regularly until the 12th when, during the afternoon (this was Sunday and she had been at rest all day) she was suddenly seized with violent abdominal pain and died on the 13th of twisted gut.

The *post-mortem* revealed a very large number of ascarides in the small intestine and cæcum. The ovarian stumps had healed perfectly.

No. 23. 1st August 1902.—Bay hunter mare, eight years old. When in œstrum she was very irritable and uncertain in temper, she would squeal and kick, urine squirting away involuntarily. She had got much worse during the past twelve months, and was now too much of a nuisance at these times to take into the hunting field. The ovaries were cirrhotic and cystic.

On the 6th August she was exercised. On the 30th I received a note from the veterinary surgeon by whom I had been consulted, to say that "the mare made quite an uneventful recovery after the operation. She ailed nothing at all and the owner is now riding her about his farm as usual. She has not yet quite got over her indecent habit, but the owner tells me she is not so bad as she used to be."

On the 17th of October: "The mare has improved very much in temper and is quieter to ride, but still squirts out urine when touched. The owner is very pleased at the result and we hope this other habit will disappear in time."

No. 24. 26th Sept. 1902.—An aged mare, an excellent hack, but a bad kicker in harness. The right ovary was very cystic, the left appeared normal. Recovery from the operation was quite uneventful. She has not yet been tried in harness.

No. 25. 15th October 1902.—Thoroughbred racing mare, eight years old, of a nervous disposition but unreliable when excited by the shouting of the crowd, at which time, especially if in oestrum, she would completely give up trying to win. Both ovaries were found by Professor M'Fadyean to be cirrhotic. She was not in any way prepared, but was operated upon whilst in hard training. In making the incision the knife blade did not puncture the peritoneum and this covering was ruptured with the finger nail, but the procedure was made somewhat difficult as my nails were short and blunt and the peritoneum receded very considerably. I am inclined to think that on this account a large blood clot found its way between the vaginal coats and, as some considerable hæmorrhage occurred, gave rise to a subsequent swelling in the vagina, causing the patient a good deal of pain.

17th October.—Mare dull and listless, refused food.

22nd October.—Pulse 70, temperature 103°, very dull.

26th October.—Temperature 101·5°. Mare stretching out hind legs and straining frequently. An examination *per vaginam* revealed a jagged ulcerating place about the size of a shilling where the mucous surface had not healed although there was no communication into the abdomen. The edges of this, and the parts adjacent, were carefully cleaned with antiseptics. Sedatives were administered by the mouth and the patient kept as quiet as possible. Exercise gave rise to a good deal of pain. A fine trocar and canula was inserted and about half a pint of clear serous fluid withdrawn.

7th November.—Between 26th October and this date the swelling gradually became larger again, the mare being continually in pain, but on the 8th a lot of slimy discharge came away from the vagina, so that I surmise the swelling bursted, as from that date it gradually became less. Antiseptic irrigations were used and recovery was practically uninterrupted.

After the middle of the month all evidence of pain disappeared, and she was put to work again on the 25th.

The racing season being now over (December), it is at present impossible to say until next year whether her propensities in this direction will be benefitted or not.

No. 26. 15th October 1902.—Thoroughbred racing mare, eight or nine years old, frequently in œstrum.

Both ovaries were somewhat cirrhotic (M'Fadyean). Progress was absolutely uneventful, and on the 26th I received a note to say that she had been regularly ridden each day since the 24th and appeared all right.

No. 27. 1st November 1902.—Hackney mare, eight or nine years old, troublesome during the past two years when in œstrum. She had kicked the trap on several occasions, and was now considered very untrustworthy, as during the past three months she has been constantly in œstrum, and unreliable in the London traffic.

Both ovaries were cirrhotic.

The subsequent report said: "There has been no constitutional disturbance whatever, the mare has behaved as if nothing whatever has ever been done to her."

Recovery was quite uneventful, and she was put to work in a fortnight.

The latest report says: "The mare has worked regularly, and has apparently lost all her objectionable habits. She can now be fed generously, whereas before we had to keep her low in diet. The owner is very pleased."

No. 28. 21st November 1902.—Irish hunter mare, four years old, a very vicious troublesome brute; continually squealing and urinating; a dangerous kicker, and difficult to approach even in the stable.

The ovaries were cirrhotic (M'Fadyean).

Recovery from the operation has been quite uneventful, and her viciousness in the stable has quite disappeared. It is rather early to venture a positive opinion, but she looks like being a perfect cure.

No. 29. 5th December 1902.—Cart mare, nine and a half years old. She had had one foal six years before. During the past nine months she had been in œstrum about every fortnight, and very vicious during the "period." In October, when going down a hill, she became suddenly hysterical, kicking violently, and becoming unmanageable. A serious accident resulted, and the owner (who had the matter under consideration for some time) now decided that she must be "spayed" or shot.

The left ovary, when removed, was cirrhotic and about normal in size; its weight was $1\frac{3}{4}$ ounces. The right ovary was much enlarged and cystic, being quite as large as a swan's egg. It was too large for the loop of the écraseur chain to be passed over it, and this weight had lengthened the pedicle upon which it hung to such an extent that it was very difficult to manipulate. The exterior, too, was very tense and smooth. Eventually, with the finger nail, the wall of the largest cyst was ruptured, and the contents allowed to escape into the abdominal cavity. The ovary then collapsed to an extent sufficient to permit of the passage of chain over it, and removal was readily effected. When examined afterwards it was found that there were two enormous cysts, one of which (as accurately as could be estimated by filling with water) would hold 3 ounces, and the other 2 ounces of fluid. The collapsed ovary (without the contents of either cyst) weighed 6 ounces.[1]

On the 22nd of December I received a letter saying: "The

[1] See Fig. 34.

mare never 'looked back' in the least from the operation, and feeding well and heartily as though nothing had ever occurred. She has only worked in the chain gears up to now, but with perfect manners so far." Since then a further communication states: "The mare is behaving very well, putting on flesh and working either in shafts or chains without showing the least trouble, so that we may therefore consider the operation a complete success."

No. 30. 10th December 1902.—Cob mare, seven years old, in present owner's possession about three months, but known previously to be of uncertain temper. She was almost continually in œstrum, and during those periods would kick unexpectedly and violently in harness. She was very dangerous to approach in the stable, kicking at the groom most viciously.

Both ovaries were cirrhotic. The left ovary was slightly different to normal in that it had a pendulous cyst,[1] with a pedicle about an inch long, attached to one edge. This puzzled me for a few moments, as I was not quite sure what it might be, but eventually it was included in the chain loop and removed. A small piece of omentum, about an inch square, was removed at the same time, it having been pushed into the chain covering the surface of the ovary.

Recovery from the operation has been quite uneventful, and the mare has been put to work. She is, however, still troublesome in harness, but there is a marked improvement in her behaviour in the stable. She can be approached and handled without displaying viciousness. The owner proposes to give her a couple of months' run in the hope that she may settle down and forget her bad habits now that their presumed cause is not there to give rise to sexual irritation. (See also Cases 15 and 16).

[1] See Fig. 33.

SUMMARY OF THE FOREGOING THIRTY CASES.

From the foregoing thirty consecutive cases it will be seen that, under strict antiseptic precautions and chloroform anæsthesia, the operation of ovariotomy is one which can be performed with comparatively little risk from peritonitis, the great bugbear of old-fashioned surgery. The immediate after effects, too, were practically *nil*, as in a large proportion of the cases the words used in describing the mare were, "The animal looks as if nothing had been done to her." It is quite a major operation, of abdominal surgery too, and yet the patients took not the slightest notice of it in any but the two instances (Case 2, in which the mare happened to be in foal, and Case 25). That Cases 1 and 17 were ridden within seven and ten days, respectively, clearly demonstrates the fact of the very slight ill effect.

Case 10 illustrates the fact that the removal of one ovary only will not cause œstrum to cease or prevent future pregnancy.

Case 29 is an excellent illustration of the aseptic condition of the cystic contents in, at all events, some cases.

The above cases were taken consecutiously just as they presented themselves. Considering that no selection was made the proportion of cases may justly be considered good. Of the failures, most of them were aged animals, in whom the habit of kicking had been confirmed for some considerable length of time.

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