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THE  
COMMON COLICS OF THE HORSE





*Frederick T. M. S.*  


# THE COMMON COLICS OF THE HORSE

Their Causes, Symptoms, Diagnosis, and  
Treatment

BY  
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LONDON  
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To

J. M'FADYEAN, Esq.

(M.B., B.Sc., F.R.S.E.).

*Principal and Dean of the Royal Veterinary College, London,*

AS A MARK OF RESPECT.



## P R E F A C E

AT the commencement of a volume, be it small or large, it is usual to make a few prefatory remarks. The custom is a wise one, for it enables the author to state the various conditions and circumstances that brought the book into being, to put forth clearly the object and general scope of the work, and to apologize, where need be, for the imperfections it contains. Lastly, it affords an opportunity to inform the reader of the sources whence the material for the work was obtained.

The conditions and circumstances that brought this little volume into existence are few but important. The practice into which I settled soon after qualifying was one in which cases of so-called 'colic' bulked very largely. Their extreme importance to the stock-owner, the large measure of anxiety and responsibility they give the veterinarian, and the short time the horse will suffer before succumbing, are all circumstances that render their accurate diagnosis and treatment a matter of the utmost urgency.

The gravity of the cases, and the urgency with which they impressed me, compelled me to look round in our literature for more than the ordinary text-book treatment. This I was unable to find, except by careful and wearisome plodding through masses of journals and

periodicals. Reported matter I found in abundance, but it required to be drawn up and put into a convenient space for easy digestion.

What I so pressingly needed myself, I judged others would need also. Consequently, though the work might well have been left to far abler hands than my own, I resolved to record the results of my readings and investigations, tempered with what experience I possessed myself, in the form this little book presents.

My first intentions as to the scope of this work were ambitious, and I commenced it under the title of 'The Equine Colics.' This I found was far too embracing, for it would have led me into a consideration and description of ailments that have been ably dealt with elsewhere—*e.g.*, the colic of hernia, the colic due to parasites, etc.

Finally, the title that now heads the book was selected. It will limit me to a consideration of those disorders with which I feel myself competent to deal.

Regarding the imperfections the book contains, they can be apparent to no one more than the author. The very failings of a work, however, will often set going a wheel of discussion and thought that no amount of foresight could otherwise initiate. That being so, I am content to leave it.

Lastly, I am to confess the source whence I gained my materials. That duty is easy. I have not scrupled to avail myself to the uttermost of anything I have heard or read. The man who sits himself down to write an original work, unless it be one of fiction, is handicapped at the very outset. The knowledge he is already possessed of he largely owes to former brains and other people's experiences. In medicine he is bound to provisionally accept what greater minds than his own have

been for generations establishing. If by one iota he can add to the knowledge already accumulated, he is a lucky man.

My plagiarism confessed, I feel no need to publish a list of the literature to which I am indebted. I would, however, particularly like to mention two names: The first, that of William Percivall, whose writings have fallen into an obscurity they certainly do not deserve; the second, Veterinary-Lieutenant-Colonel Fred Smith, from whose works I have very largely drawn, and whose contributions to this and allied subjects have been such as to place the veterinary profession under a deep debt of gratitude.

I would also mention that the courtesy of Professor M'Fadyean enables me to reprint from the *Journal of Comparative Pathology and Therapeutics* an article of my own that now forms the subject-matter of Chapter IX. Professor Macqueen has kindly allowed me to make use of his valuable experiments concerning the operation of laparo-enterotomy, and Mr. E. R. Harding, of Salisbury, has furnished me with his experiences relating to the stimulant treatment of intestinal impaction.

The attempt in Chapters IX., X., and XI. to differentiate varieties of subacute intestinal obstruction may be regarded as the main original portion of this work. For the present, I simply ask for that a careful reading.

This book, then, carries no pretence to being *entirely* original. It is a gathering together of observations that other minds have made, with just so much of my own experience as would enable me to weld the loose particles into one presentable whole. I am not without hopes that the manual will prove of help to the student,

and enable him to progress still farther on the road of independent thought, upon the commencement of which his present-day tutors so ably plant his feet.

To the practitioner I humbly trust this first effort of my pen will prove welcome. I ask him for his indulgence, and beg of him to remember that these pages were written in the moments of leisure afforded by a busy country practice. Should it be the means of bringing together such facts as will give the veterinarian a more accurate and dependable knowledge of the subjects under consideration, the main object of the book will be fulfilled.

H. C. R.

SPALDING,

*November, 1902.*



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# THE COMMON COLICS OF THE HORSE.

## CHAPTER I

### 'COLIC,' ITS DEFINITION

CONCERNING a disorder that has been recognised and treated for years beyond the memory of man, one would imagine that its name, and what that name conveyed, would be well known and understood. Such, however, is not the case.

The word 'colic' is derived from the Latin *colicus* or the Greek *kolikos*, signifying the colon, and, strictly employed, means a painful, spasmodic affection of the intestines, especially of the colon. Far from retaining such a simple signification, colic, in the horse, has for a long time served to designate innumerable and widely differing diseases, whose only point in common has been the evidence of abdominal pain. The term must necessarily be most vague when it attempts to offer any explanation of a particular case in which the symptoms are most largely those of pain in the abdomen. If we use the word in its most restricted sense, it should mean

only pain in the bowels, or enteralgia. This is an abnormal sensibility in the region of the plexus mesentericus, and, as such, is not often observed in our patients. In the widest possible acceptance of the term, colic will indicate—apart from this enteralgia—all painful affections of the intestines which are not consequent upon inflammation or textural change of the bowel walls.

It is quite plain that our first duty should be to tabulate, as far as possible, the different morbid conditions that may give rise to colic—using the word in its widest sense. This has already been done by that eminent and conscientious clinical observer, Professor Friedberger, of Munich. In his pamphlet, 'Die Kolik der Pferde, Sechs Klinische Vorträge,' he gives this table:

1. **True Colic**, proceeding from the intestinal canal, and stomach.<sup>1</sup>

2. **False Colic**, arising from a diseased state of the other abdominal organs. (Under this heading will come especially affections of the bladder and sexual organs, which give rise, in the first instance, to similar external evidences of suffering.)

**True Colic** is then taken and subdivided in the following manner:

<sup>1</sup> The addition of the words 'and stomach' is my own. Much though I dislike to interfere with the arrangement tabulated by Professor Friedberger, I cannot help but think that stomach troubles should be included under the heading of True Colic. Following the strict letter of all accepted definitions, I know it should be omitted. Nevertheless, the close manner in which many of the symptoms proceeding from the stomach simulate those arising from the intestinal canal, with the fact that anomalies of the former tend to the production of disorders of the latter, points conclusively to the necessity of carefully considering stomach ailments when treating of those of the intestines.—H. C. R

A. **Essential**, to which may be referred the under-mentioned causes :

1. Colic without material cause, as the so-called nervous cramp (or rheumatic colic).
2. Colic consequent upon anomalies of the intestinal contents. Such are :
  - (a) Colic produced by overfeeding.
  - (b) Colic brought on by flatulence (wind colic).
  - (c) The colic occasioned by stoppages in the intestinal canal. These obstructions may arise from fæcal accumulations, stones, concretions, etc.

B. **Symptomatic**. Such are :

1. The colic produced by worms.
2. The colic resulting from poisons.
3. Colic brought on by structural disease and changes in the relative position of the intestines ; colic occasioned by acute catarrh and croup affecting the delicate mucous membrane of the colon ; colic from carbuncular formations on the mucous membrane ; colic from dysentery, and from so-called internal cramp ; colic from wounds of the stomach and entrails, and colic from spontaneous laceration or perforation of those organs.
4. Colic resulting from morbid conditions of the abdomen and the covering of the intestines (peritoneum).

A mere perusal of this extensive and complete classification of the varieties of colic will serve to impress upon us the absolute necessity of looking for much more than the mere exhibition of pain on the part of our patient in

order to arrive at a diagnosis that will approach with any degree of accuracy to the truth.

The human surgeon, by clear and incisive reasoning deduced from the symptoms observed by himself, and the help afforded him by his patient, has the power of making such subtle distinctions in the different varieties of colic as to render his skill in diagnosis an object of admiration to the veterinarian.

One word of warning is necessary to the animal surgeon. His admiration of the human physician's diagnosis must not lead him to follow blindly those symptoms and treatments laid out in medical literature.

I am well aware that in very many diseases there is an extremely close analogy between the veterinary and human patient, both in regard to the symptoms and the treatment. That, however, is *not* the case with colic.

The ordinary text-book on human medicine seldom devotes more than a few pages to its consideration. Its treatment, unless it be the colic due to hernia or other equally serious cause, is comparatively simple, and occasions the physician no alarm. He administers an opiate, and, where occasion demands, combines the sedative with a brisk purgative.

That done, the case is comfortably dismissed from his mind. He is not unduly anxious about pains whose continuance is spread over three or four days—nay, even weeks.

Compare that with the twelve to forty-eight or sixty hours of anxious watching that so often falls to the lot of the veterinarian—a two days' hurried, anxious solicitude into which is crammed the diagnosis and treatment of three weeks. To illustrate my point, compare the cases of intestinal obstruction in the horse and the human patient.



Owing to circumstances which I shall endeavour to explain in a future chapter, one day's illness in the horse is practically of the same length as a week's suffering from the same ailment in man. The veterinarian is compelled to crowd into one day a diagnosis and treatment that the human medico may methodically and easily arrive at by a week's careful study of the symptomatology and history furnished by his patient.

This apparent digression is really a lengthening of the definition ; it is inserted for this reason. I desire to indicate as forcibly as lies within me one fact—human and equine colic in no material way bear likeness one to the other. My excuse for trespassing so far into the domain of human medicine in connection with this point is this : I have so frequently seen veterinarians attempting to base their treatment on knowledge derived from medical literature referring to man. I feel sure that nothing could lead them further from the truth.

'Colic,' so long as the horse exists, will always have a terrible significance for the practitioner of veterinary medicine. It still continues, in many of its aspects, to baffle the most careful and painstaking observer. It still claims annually many thousands of victims. Anthrax, tuberculosis, and other dire disorders still persist in carrying off their spoils, but it is doubtful to my mind whether any other ailment in the whole category of modern veterinary diseases is accountable for more loss, more anxiety, and more self-scouring than is 'colic.'

## CHAPTER II

### SURGICAL ANATOMY OF THE ABDOMEN

A THOROUGH knowledge of the regional anatomy of the abdomen is absolutely essential to the determination of a definite diagnosis. The man who has strongly insisted upon that, and devoted an enormous amount of time and thought to the subject, is Veterinary-Lieutenant-Colonel Fred Smith. It is the result of his work that forms the subject-matter of the present chapter, and I take this opportunity of thanking him for his kindness in allowing me to incorporate it with this volume. In his letter granting me permission to use it he says: 'The information in these few pages represents an immense amount of work. I do not remember, now, how many dissections I made in the upright position, but a large number.'

\* \* \* \* \*

For surgical purposes the abdomen is best divided into a superior and inferior zone by a line drawn horizontally from the hip-joint to the ribs. These zones are further subdivided into three parts by means of two vertical lines carried round the abdomen, one from the body of the first lumbar vertebra, and the other passing just in front of the antero-inferior spinous process of the ilium. By these means we have the abdomen mapped out into a superior and inferior zone, and each zone into

an anterior, middle, and posterior region; but in order to prevent confusion we will number these regions—thus, the anterior, middle, and posterior regions of the superior zone will be 1, 2, 3, whilst the same regions of the inferior zone will be 4, 5, 6 (see Fig. 1). Regions 1, 2 and 3 would be respectively the superior diaphragmatic, lumbar, and pelvic regions, whilst 4, 5, and 6 would be the inferior diaphragmatic, lumbar, and pelvic regions. The largest region is the inferior, and the smallest the

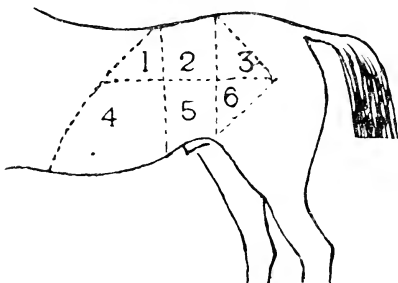


FIG. 1.—SURGICAL REGIONS OF THE ABDOMEN.

1, Superior diaphragmatic; 2, superior lumbar; 3, superior pelvic;  
4, inferior diaphragmatic; 5, inferior lumbar; 6, inferior pelvic.

superior diaphragmatic. We will find these landmarks of great use to us in studying the relation of the viscera to its walls.

The cavity of the abdomen is nearly ovoid; its long axis is directed obliquely from above downwards and forwards; it is bounded anteriorly by the diaphragm, posteriorly by the pelvis, laterally and inferiorly by its walls, and superiorly by the lumbar portion of the spine. In order to thoroughly comprehend the arrangement of the abdominal viscera, it is absolutely necessary to bear in mind the direction of this cavity and that of the diaphragm.

**The Peritoneum.**—The parietal layer is very loosely attached to the abdominal walls, which fact constitutes an important practical point in connection with operations performed in its vicinity. The parietal portion occasionally forms part of a hernial sac, but not always, as owing to its slight elasticity it more often ruptures. The posterior surface of the bladder and a portion of the rectum and vagina are all uncovered by peritoneum—points to be remembered in connection with the surgery of these parts.

**The Stomach** presents several details of great surgical importance: its small size, the presence of an arrangement usually preventing vomition, its position in the abdomen, and its shape, are all points of great interest to us, and have a direct bearing on many of the diseases affecting it. It is situated in the left hypochondrium, but under distension extends into the epigastric and right hypochondriac regions. The organ is suspended from left to right (cardia to pylorus), obliquely downwards, with the lesser curvature looking towards the right side; the stomach is situated principally to the left of the spine, in apposition with the diaphragm, and extends from near the last ribs on the left side to the upper surface of the colon on the right half of the body. To the right it is in contact with the liver, the left extremity being in apposition with the spleen, diaphragm, left kidney, and left prerenal capsule, whilst inferiorly it rests on the double colon at the sternal curve, which prevents the stomach, no matter what its state of distension may be, from ever being in actual contact with the abdominal walls. The œsophagus enters the stomach at the lesser curvature, and, owing to the peculiarity of its arrangement, prevents, under ordinary circumstances, anything from passing through it in the reverse direction.

The cardiac extremity of the œsophagus is very thick, the opening into the stomach small and filled with the folds of mucous membrane lining it, and the cardia itself surrounded by muscular fasciculi producing a powerful occlusion of the orifice. It is owing to these causes that the horse is usually unable to vomit.

From careful dissection I have found the following to be the arrangement of the cardiac fibres: Around the cardia and left extremity of the stomach are three layers of muscular fibres—(1) the external, running towards the pylorus and also over the left cul-de-sac; (2) the middle, running round the cardia, being a continuation of the circular fibres of the œsophagus, *and very thick at the portion situated in the lesser curvature*; (3) the internal, running in the direction of the long axis of the organ, passing as a loop round the left side of the cardia, *but leaving the right side, or that portion situated within the lesser curvature, without fibres*. It is this layer, in conjunction with the middle layer, which forms the so-called sphincter, for, owing to the arrangement of the fibres, the cardia is compressed on the left towards the right by the (looped fibres of the)<sup>1</sup> internal layer, and on the right towards the left by the middle layer. The pyloric extremity of the stomach is supplied with a sphincter, the so-called pyloric ring.<sup>2</sup>

<sup>1</sup> The insertion in brackets is mine.—H. C. R.

<sup>2</sup> Although the matter arrived at is essentially the same as described above, dissections I have made of the stomachal coats lead me to put their description in somewhat different words: (1) *A Superficial Plane*.—This is evidently a continuation of the longitudinal muscular layer of the œsophagus. It radiates obliquely over the left sac, which it completely covers. In the lesser curvature its fibres become somewhat abruptly lost, while the greater curvature retains them to the entire envelopment of the underneath surface of the right sac, on whose upper surface they

We believe that, in addition to the resistance offered to vomition by the cardia, the contraction of the œsophagus (at least, the posterior half of it) materially assists in preventing anything passing along it in the reverse direction, for we always find that where dilatation of the cardia has occurred so as to allow vomition that the œsophagus is likewise dilated and its walls are flaccid.

On examining a stomach and œsophagus after death, in a case where vomiting has occurred during life, we find the parts flaccid and easily dilatable; the fingers may be introduced with freedom into the cardia, the lining membrane of the œsophagus is no longer in apposition, and on dividing the gullet for the purpose of removing the stomach, no matter how far forward it is cut, the fluid contents of the viscus (that is if this organ be entire) will pour out. In a case of epilepsy which occurred in my practice, I found after death, although there had been no vomiting during life, the cardia and œsophagus in this condition. The cardiac and pyloric orifice of the stomach are not far apart; the

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become gradually obliterated. (2) *A Middle Plane*.—The fibres of this are again a continuation of the muscular coverings of the œsophagus—viz., of its circular coat. Running beneath the fibres of the superficial plane, it also envelops the whole of the left sac. Where the fibres of the superficial plane become indistinct in the positions of the lesser curvature and the pyloric end of the right sac, they appear on the surface, and are there plainly visible, aggregating themselves at the pylorus to form the pyloric sphincter. (3) *A Deep Plane*.—These fibres run somewhat obliquely in the direction of the long axis of the organ, wholly covering the left sac, and leaving the right sac free. Its fibres closely embrace, in the manner of a cravat, the neck, the left side of the œsophagus at a point where it enters the stomach, but leaves the right side of that canal (the portion situated within the lesser curvature) devoid of fibres altogether.—H. C. R.

pyloric is below the cardiac. A very singular and important arrangement of the pylorus and duodenum exists; dissection reveals that the duodenum, where it commences at the pylorus, is **S**-shaped and much dilated, forming an arrangement not at all unlike an **S**-trap used in drain-pipes (see Figs. 2 and 3). This direction of the duodenum appears to regulate the pace at which the ingesta should pass through; as soon as the trap is formed, the duodenum ascends towards the spine lying all the while on the colon. It is easy to see how simple

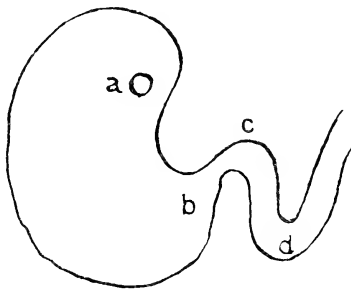


FIG. 2.—LONGITUDINAL SECTION OF STOMACH AND PYLORUS.

*a*, Opening of cardia; *b*, pylorus; *c*, commencement of duodenum; *d*, pyloric or duodenal 'trap.'

it is for a distended stomach and intestines to press upon the pyloric trap, and practically occlude it; this is the second factor in producing ruptured stomach.

**The Small Intestines** are divided by the anatomists of the present day into two portions, the *fixed* or *duodenal* and *free* or *floating*; they are about 70 feet in length. The duodenal portion commences from the pylorus, passes under the concave surface of the liver in a direction upwards and outwards, lying on the double colon and passing in apposition with the last rib, where it may readily be found at the lower part of its upper third, just

where the extremity of the transverse processes of the first lumbar vertebra reaches; it then passes immediately behind the right kidney opposite to the second lumbar vertebra, crossing the spine transversely behind the anterior mesenteric artery; it is then attached to the colon, and ter-

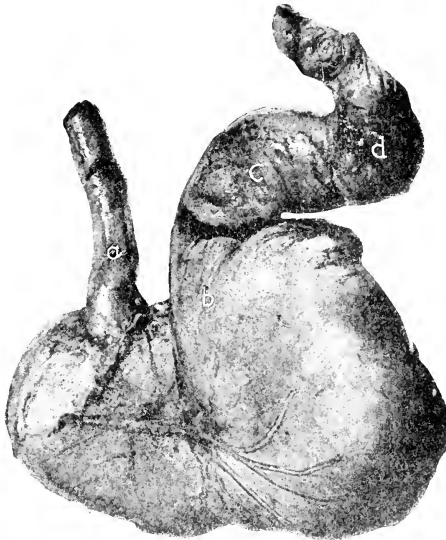


FIG. 3.—PHOTOGRAPH OF STOMACH TO ILLUSTRATE FIG. 2.<sup>1</sup>  
*a*, Œsophagus; *b*, pylorus; *c*, commencement of duodenum;  
*d*, pyloric or duodenal 'trap.'

minates in becoming continued by the floating portion in the left flank. Where the duodenum rests on the colon and passes under the last ribs on the right side is a practical point of considerable importance.

The free portion of the small intestines is suspended

<sup>1</sup> I have inserted this photograph to illustrate Colonel Smith's diagram. The stomach was removed from the abdomen, and the duodenal S-trap carefully arranged as it lies *in situ*.—H. C. R.



by means of the mesentery from the underneath portion of the spine in a spiral form ; owing to the length of the mesentery and this mode of attachment, volvulus of the bowels is, unfortunately, only too common. The small intestines hang well in the centre of the body, and lie in the curve formed by the double colon ; they terminate at the cæcum, crossing to the right side for this purpose, and opening into the gut close to the colon, but below it. This part is situated beneath the third lumbar vertebra, about 6 inches from its under surface.

**The Large Intestines** are represented by the cæcum, colon, and rectum ; they occupy a fairly regular position, and a knowledge of their disposition and course is imperative. The *cæcum*, or 'blind gut,' contains, on an average, about 8 gallons of fluid, and is over 3 feet in length. It usually occupies a position obliquely from above downwards and forwards, and presents superiorly a base, and inferiorly an apex. The superior extremity, base, or arch, or, as well designated by Chauveau, 'crook,' is situated in the right lumbar region close under the spine ; it is in relation with the right kidney, duodenum, psoas muscles, colon, small intestines, and pancreas. The crook or arch looks forwards, and in the concavity of the curve on its inside the small intestine opens and the colon begins. The inferior extremity is placed within the double colon at its sternal curve, the apex resting on the ensiform cartilage of the sternum ; at least, this is its usual position. The *colon* is divided into two portions, the single and double ; it is about 12 feet in length. For convenience of description the *double colon* is divided into four parts ; commencing from the crook of the cæcum, it proceeds forwards and downwards, passing beneath the right kidney (having the pancreas between it and that organ) to the diaphragm,

and, bending to the left, forms its *suprasternal flexure*; the second portion is continued from here, running backwards and upwards into the left flank, turning inwards opposite the pelvis and close up against the spine to form the *pelvic flexure*; now follows the third portion, running forwards above the second and attached to it by peritoneum: when it reaches the diaphragm it makes a curve to the right, the *diaphragmatic flexure*, followed by the fourth portion, which is attached by peritoneum to the first, and reaches posteriorly to the base of the cæcum, where it terminates in the *single colon*. This crosses to the left side beneath the first lumbar and last dorsal vertebræ, being attached by peritoneum to the crura of the diaphragm and the mesenteric vessels. The double colon at its origin is very small, but it quickly enlarges, and at the supra-sternal flexure is of considerable size; at its pelvic curve it is greatly reduced in volume, but at the diaphragmatic flexure it again enlarges, and close to where it terminates in the *single colon* attains its largest size, and then suddenly contracts to form the single colon. These differences in the volume of the colon are of direct practical interest. The pelvic curvature and the single colon are the most frequent seats of obstruction from calculi, gravel, etc., which have passed with ease along the more dilated portion of the canal.

**The Single Colon** lies in the left flank, is suspended from the spine by peritoneum, and extends to the pelvis, where it becomes continuous with the rectum.

**The Liver** is situated principally in the right hypochondriac region, and is placed obliquely from above downwards from right to left. Its anterior face is applied against the diaphragm, its posterior against the stomach and intestines. The upper extremity of the right lobe is in apposition with the right kidney at the space between

the sixteenth and seventeenth ribs; from here the liver extends downwards, inwards, and forwards, having between it and the costal walls the posterior lobe of the right lung and the diaphragm, and passing across the abdomen its middle lobe rests on the sternum. The right lobe extends as far forwards as about opposite the eleventh rib, as far back as the sixteenth or seventeenth, and reaches as low down as the inferior part of the middle third of the ribs. It is important to remember that, excepting at one small part (between the sixteenth and seventeenth ribs), the right lung and diaphragm are always between us and that organ, an anatomical fact which renders percussion almost useless in liver disease.

**The Spleen** is situated on the left side of the abdomen; it is attached superiorly to the left kidney and prerenal capsule, and anteriorly by peritoneum to the greater curvature of the stomach. The base of the organ extends to two or three inches behind the middle third of the last rib on the left side.

**The Pancreas** is situated on the double colon, to the right side of the spine. At its upper part it is beneath the right kidney and close against the vena cava. Its anterior border is in contact with duodenum and the lesser curvature of the stomach.

**The Kidneys.**—The *right* has its anterior border reaching as far forward as the sixteenth rib, where it is in apposition with the liver; its posterior extends back to the first lumbar vertebra, its inferior edge as low as the middle third of the last rib but one. To the posterior part of this gland the base of the cæcum is attached. The renal artery penetrates the organ immediately under the last rib. The *left kidney* has its anterior border reaching only as far forward as the last rib, its posterior to the transverse process of the third lumbar vertebra. It

lies up much closer to the spine than its fellow on the opposite side.

A knowledge of the situation and position of the various abdominal organs is essentially necessary to the surgeon, for he may at any time be called upon to perform operations in their vicinity. Take, for example, the simple one of 'puncturing the bowels,' in performing which, by entering the trocar too high up on the right side, the duodenum or right kidney may be wounded, or the left side of the spleen or the left kidney. Such serious complications, liable to arise out of even a simple operation, can only be averted by a clear and certain acquaintance with the anatomy of the viscera. It is particularly important to know the position they occupy in the *living* body; having to this end arbitrarily divided the abdomen into the various regions before noticed, we will conclude this chapter by stating, in tabular form, the contents of each.

RIGHT SIDE OF ABDOMEN.

Region No. 1, or superior diaphragmatic.	{ Anterior border of right kidney, prerenal capsule, and supero-posterior part of right lobe of liver.
Region No. 2, or superior pelvic.	{ Posterior part of right kidney, the base of the cæcum, termination of the ileum, commencement of the double colon, part of the duodenum, and, in the female, the right ovary, and upper part of right horn of uterus.
Region No. 3, or superior pelvic.	{ The base of the cæcum when distended.
Region No. 4, or inferior diaphragmatic.	{ The first and fourth portions of the double colon, part of the suprasternal and diaphragmatic flexures, the right and middle lobes of the liver, the inferior half of the cæcum, the pancreas, portion of duodenum, and right extremity of stomach.

## RIGHT SIDE OF ABDOMEN

*(continued).*

- |                                   |                                    |
|-----------------------------------|------------------------------------|
| Region No. 5, or inferior lumbar. | } Termination of the double colon. |
| Region No. 6, or inferior pelvic. |                                    |

## LEFT SIDE OF ABDOMEN.

- |  |   |
|--|---|
| Region No. 1, or superior diaphragmatic. | } Portion of left extremity of stomach.   |
| Region No. 2, or superior lumbar.        |   |
| Region No. 3, or superior pelvic.        | } Left kidney and prerenal capsule, base of the spleen, left ovary and horn of uterus in female, third portion of double colon. |
| Region No. 4, or inferior diaphragmatic. |   |
| Region No. 5, or inferior lumbar.        | } The pelvic flexure of the double colon.   |
| Region No. 6, or inferior pelvic.        |   |

The second and third portions of double colon, the suprasternal and diaphragmatic flexures, the greater curvature of the stomach, portion of spleen and left lobe of the liver.

Second and third portion of double colon, and coils of small intestines, part of the single colon, commencement of the rectum, and large part of the spleen.

Pelvic flexure of the double colon, and coils of small intestines.

## CHAPTER III

### HOW TO EXAMINE THE PATIENT

PRESUMABLY a simple matter, this is, nevertheless, a subject that requires the most careful consideration. When conducting an examination that is to lead to the diagnosis of a case of 'colic,' it should never be forgotten that it is always a case of the greatest gravity in the horse.

On first sight, the pains of colic may often appear to be of the most simple character, and yet terminate fatally after the expiration of a few hours. I have repeatedly seen cases where the main symptoms on a casual examination were those that occasioned me no alarm. Nevertheless, one hour afterwards I have foretold the animal's death. There is not the slightest doubt that the examination of the patient should always be of the most searching nature. If the examination is half-hearted and hasty, an entirely erroneous opinion will be arrived at, and the horse, as a result, will suffer.

Looking at the matter from a purely selfish point of view, the veterinarian should constantly have in mind the value of his reputation. By his clients, his standing as a clever, shrewd man of medicine will always be largely based upon the correctness and precision of his prognosis in the cases they entrust to his care. As much

of his precision in foretelling the termination of his case of colic will depend on the thoroughness of his first inspection, it is clear that the manner of examination must be of the greatest importance. Of such importance have I deemed it, that I have devoted a chapter especially to its consideration.

In the first place, I wish to lay the greatest possible stress on this fact. The examination must be a *lengthy* one; and my advice, especially to the young practitioner, is this: After your examination on the lines laid down in the following paragraphs, compose yourself, at any rate, for a wait of half an hour.

From the patient you have no verbal description of the seat of pain, neither have you any information as to its character. Nevertheless, the sufferer, dumb as he is, will show you much if you will but carefully watch him. It is not fair to suppose that the animal will hold out for your inspection all possible symptoms of his malady during the first five minutes you are in his box. Consequently, you must watch him patiently until all his postures for affording himself relief have made him run the entire gamut of the symptoms that evidence his complaint.

This careful watching should be followed by a systematic mode of inspection.

1. **All possible history** concerning the attack should be obtained from the owner or the attendant. The length of time the animal has suffered, the nature of his food, the manner of his attack, whether ushered in by shivering attacks or not, the nature of the water-supply, what emergency medicine has been administered, whether previously at work or rest, whether a quick or slow feeder, etc., are all important points in making the first inquiry.

2. **A rapid glance over the animal** should next occupy the veterinarian before attempting to handle his patient. This generally reveals some special symptom that the animal will not show so well when he gives himself up to control.

More especially is this latter advice to be followed when the patient is a young, unbroken colt, or an animal of an excitable, nervous temperament. Such patients, directly man commences interference, seem to possess the power of hiding the intensity of the pain they are suffering, and to stand so quietly as to fully deceive the rough and hasty observer. A few minutes' careful watching in these cases will be productive of facts of more real diagnostic help than the most thorough and painstaking after examination.

During this preliminary inspection such details as the following may be noted: The amount of injection of the nasal mucous membranes, the beat of the heart as counted by the jugular pulsations, the amount of tympany present, and the number and character of the respirations.

The respiratory movements are valuable. In extreme distension of the abdomen the chest and diaphragm carry on the breathing, the action of the abdominal muscles being suspended. In enteritis and peritoneal inflammation the same thing occurs. In rupture of the diaphragm the respirations are often similar to those of 'broken wind,' and, owing to the pressure on this muscle, the same appearance will be met with in extreme gastric distension. In all bad cases of abdominal disturbance the respiratory movements will be increased in number, sometimes enormously, and the character of each respiration altered from a noiseless movement to a gasping sob.

All this may be noticed in the few minutes' quiet



observation I have advised, and the beginner may believe me when I say that the owner of the animal is far more likely to be impressed with the man who makes a careful and systematic examination of this nature than with the man of rapid diagnosis. The latter he may admire, the former he will trust.

Now and again you may meet with a client who is visibly struck with the 'lightning diagnosis business,' and, whenever you see a chance, and a safe one, of exhibiting this ability yourself, by all means take advantage of it with that particular client. It is not, however, to be recommended as a usual plan of procedure. Methodical carefulness will tell the best in the long-run, and will lead you into fewer blunders.

3. **The actual examination of the patient** may now commence.

*The pulse*, that grand tale-bearer in these cases, should be carefully noted both in regard to the number of beats and its general character—constantly frequent, or its number of beats only increasing with each paroxysm of pain, etc.—wiry and thin, or full and bounding, etc.

While taking the pulse, the hand in the axilla should note the amount of perspiration present, and also ascertain the condition of the external temperature—whether the sweats are warm and comfortable, or chilly and deathlike.

*The rectal temperature*, though not alone of diagnostic aid, should always be taken; for, considered in conjunction with the pulse and number of respirations, it will sometimes prove of help in prognosis—*e.g.*, see the chapter on Subacute Obstruction of the Double Colon.

4. **The examination of the abdomen** should then proceed in the following manner:

(1) *By Palpation*.—This method of examination will

reveal to a very great extent the amount of tension or tympany present. In a bad case of intestinal trouble the whole of the abdominal muscles will feel hard and tense to the touch, conveying to one's fingers the sensation of a muscle in tetanus. Even in the flanks, where a certain amount of resilience is expected, the same tense condition is met with.

In some cases palpation exposes the existence of pain or tenderness, as, *e.g.*, in peritonitis and enteritis. In others the very reverse will be noticed, the pressure affording the animal an appreciable amount of relief. It is wise to add, however, that external pressure will not always cause the animal to exhibit signs that may be absolutely relied upon. It is often difficult to elicit symptoms of pain from our patients, but it is still more difficult to distinguish between pain produced by pressure and ticklishness, restlessness, and fretfulness, which may simulate pain when pressure is brought to bear upon any part, particularly the abdomen. Still, by palpation the surgeon will be able to deduce a large amount of information, favourable or unfavourable as the case may be.

(2) *By Auscultation.*—This aid to diagnosis should never be omitted. The sounds occasioned by peristalsis will sometimes be in abeyance or altogether wanting, and the appropriate remedy sufficiently pointed out. Or it may be that peristalsis is abnormally in evidence, as in the colic occasioned by the presence of fermenting foods. Both flanks should be auscultated, and also the region of the stomach. In the latter position evidence is sometimes obtained as to the condition—tympanitic or otherwise—of that organ. If unduly full, regurgitations will often be heard that are so slight as to be easily missed by a mere observation of the œsophagus in the region of the neck.

(3) *By Rectal Exploration.*—No grandiose affectation of *grandesse* should cause the surgeon to neglect this. Carefully and intelligently performed, it is one of the grandest means at our disposal for arriving at an accurate knowledge of the condition of the bowels. The bladder and a large portion of the posterior masses of intestines are well within reach, and the information gained by their examination will be found invaluable.

Notice should be taken as to the fulness or otherwise of the rectum, of the consistence of the fæcal matter removed, whether semi-fluid or hard and solid, whether the removed lumps are covered with mucus or not, and whether of normal odour or comparatively stinking and offensive.

It should be noticed also whether or not this organ is open ('ballooned') or exerting a clinging movement on the operator's arm. In cases of acute obstruction—calculi, fæcal matter, and twist—this clinging action will be particularly noticeable, and, with it, the operator will observe a painful straining on the part of his patient, together with the presence of tympanitic or impacted intestines in the pelvis. In many cases where this latter has been observed the obstruction has turned out to be in the single colon, and it may be taken as a general rule that in any case where the pelvis contains other bowels than the last portion of the rectum the practitioner has a case of a dangerous nature to deal with.

To the right the operator should feel the head of the cæcum and colon; their contents should not be hard, and on pressure the bowel should give; to the left and centre should be felt the pelvic flexure of the colon with its elastic contents, and to the centre may be found some of the small intestines. They should not be distended

with gas. No intestine, large or small, should exhibit pain or tenderness on pressure.

(4) *By Percussion.*—This is performed by tapping the abdominal walls with the tips of the fingers of the right hand, with or without the left hand interposed. It will yield evidence relating to the contents and size of the viscera. Percussion over an intestine filled with gas gives a clear sound ; over one containing solid matter a dull sound. Where the contents are fluid the sound is modified.

This will conclude the examination of the patient, and, although taking time to describe, its actual performance will be found to occupy but a very short time.

The veterinary fledgling should always follow some such line of systematic inspection as I have here laid down. In course of time he will find that it has become part of his nature, and will be able to rattle through it in so short a time as to convey no impression of painful plodding to the outside observer. If possessed of tact, he will manage to maintain a running conversation with the owner the while he is doing it. He will become fond of his work, find it both interesting and instructive, and give all satisfaction to his client.

## CHAPTER IV

### ETIOLOGY: GENERAL PREDISPOSING CAUSES

REGARDING his predisposition to colic, the horse stands apart from almost every other animal. A brief consideration of such predisposing causes as are mentioned in this chapter will be quite sufficient to make us marvel that cases of 'colic' are not of even more frequent occurrence. At any rate, it will reveal quite enough to account for the enormous preponderance of these cases in veterinary practice.

To commence with, there are several physiological and anatomical conditions, perfectly normal in themselves, which, nevertheless, are entirely favourable to the production of these disorders.

In the first place, the relatively small capacity of the stomach compared with the animal's size must be borne in mind, and, together with this fact, the normal process of digestion must be remembered. It is evident to the most casual observer that the small stomach of the horse cannot possibly contain the enormous amount of provender that he is able to consume at one meal. As a matter of fact, it has been proved to us that at a certain period of stomach digestion the amount of food passing out of the pylorus into the intestine equals the amount entering the stomach by the œsophagus. Notwith-

standing this provision of nature to avoid gastric impaction, it is easy to understand that a quick or greedy feeder may so bolt his food as to bring about one of two conditions: either impaction of the stomach with food insufficiently acted upon by the salivary fluids, or the pouring out into the intestine of a large amount of improperly digested material from the stomach. The mere fact of its being imperfectly digested in the stomach leads to other troubles in the intestines. The material there is unable to become properly assimilated, and the result is either a troublesome diarrhoea or, what is more frequent, a condition of stasis or obstinate impaction.

In addition to this, we may carefully consider the tremendous volume of the large intestines, their thin and delicate walls as compared with the enormous amount of bulky material they are called upon to deal with, and, finally, their great length. This done, we shall not be much astonished at a fairly frequent occurrence of gastric and intestinal disorders in the horse.

Again, notice what a careful dissection of the stomach reveals (page 9). It is an anatomical fact that its very build is a distinct bar to the act of vomiting. Consequently, no matter how sick the animal may feel, no matter the amount or irritancy of any deleterious matter he may have swallowed, there it must remain, or travel the whole length of the sensitive and absorbent surfaces of the intestines before gaining exit from the body. The anatomical facts that lead to that statement are as follows:

1. **The small size of the stomach and its want of contact with the abdominal walls.** This is a decided hindrance to its effectual compression.

2. **The narrowness of the œsophageal opening;** the thickened and contracted arrangement of the fibres of

the cardiac extremity of the œsophagus; the oblique manner in which the latter enters the gastric walls; the peculiar arrangement of the folds of mucous membrane lining its interior; and the presence of the cardiac sphincter, already described on page 9—these are all factors in bringing about complete occlusion of the œsophageal opening.

3. **The pyloric outlet**—comparatively distended—lying close to and below the sealed œsophageal inlet. That being so, it naturally follows that any compression of the gastric walls forces the stomach contents with equal strength towards both the œsophageal and duodenal openings. The contained material finds the readiest road of exit—the pylorus. The offending material, which may have given rise to inclination to vomit, is passed by adverse force of circumstance into the intestine.

Proceeding with the intestines themselves, we note first of all the formation of the so-called ‘duodenal trap,’ as illustrated on pages 11 and 12. In cases of distended stomach or intestines this S-shaped piece of intestine is compressed and its contents rendered stationary. This is undoubtedly another great factor in the production of gastric and intestinal obstructions, with their attendant colicky pains. Following this, we observe the differences in the size of the various parts of the colon, together with its several flexures, and note also the length and comparatively free location of this organ and the cæcum. Taken collectively, these circumstances, though quite normal in themselves, must still be held to be favourable to the production of colic.

Again, I think every practitioner will bear me out when I say that age is frequently a predisposing cause of these complaints. With advancing age there is not the amount of what is commonly called ‘tone’ in the system.

The teeth do not perfectly perform their proper function, and the food is passed on in a half masticated state, and without the requisite admixture of salivary fluid. The digestion is far from being so quick, and a large amount of bulky food is less easily disposed of. The circulation, too, is not so free, in consequence of which there is less gastric juice secreted—often not sufficient—and impaction is the result.

Here, also, attention may be given to the time occupied in the passage of food through the digestive canal of the horse.

Henry Jarvis, in 1872, in four experiments, observed the following :

Horse No. 1, fed on oats, performed half an hour's exercise, and passed oats in twenty-four hours.

Horse No. 2, fed on oats, performed a nine miles' journey, and passed oats in twenty-two hours.

Horse No. 3, fed on oats, kept quiet in stable, and passed oats in twenty-seven hours.

Horse No. 4, fed on oats, kept quite in stable, and passed oats in twenty-seven and a half hours.

These periods, I need hardly add, are comparatively short, and the average time has been estimated by other authors to be nearly four days. In either case the time is wonderfully short. This fact must be remembered in close connection with another: I refer to the nature of the horse's food. We know quite well that a very great proportion of his provender is of an indigestible nature, and that a very large amount of the material taken into his body is excreted unchanged. We know equally well that this excretion is going on with almost mathematical regularity throughout the day. In other words, the horse in health, requires to empty his rectum eight to ten, or twelve times during every twenty-four hours.



It requires but a few moments' consideration to discover what a great bearing this has upon the frequency of his attacks of colic. I have repeatedly seen cases where, without actual or complete stasis, the horse's bowels have performed only one evacuation daily. In every case so observed dull colic pains have supervened before the expiration of twenty-four hours.

Compare this with the human subject in health. The average man is able to comfortably rid himself of his twenty-four hours' excreta by the passage of one stool daily. This means that the horse's bowels perform in one day what those of a man perform in seven or eight, and that cessation of the act of defæcation for twenty-four hours in the horse is practically equivalent to a cessation of seven days in man. That is putting it at its lowest computation.

In view of that, it is easily understood why it is that pain follows so rapidly on apparently slight stasis of the bowels in the horse. We may now see how it is that cessation of the normal act of defæcation for twelve hours, or even less, is quite sufficient to bring on symptoms of pain, except under extraordinary circumstances. It is this that renders equine colics of such serious importance to the veterinarian. It explains in great measure the rapid and oftentimes fatal course they run, and impressively points out the urgent necessity for prompt and precise remedial measures. This, more than anything else, should induce the veterinary surgeon to carefully weigh his data before jumping at a diagnosis. *Above all, it should cause him to deliberately ponder, and perhaps stay his hand, before administering those agents which tend to kill pain, but, at the same time, tightly lock the bowels.* He may exhibit opiates or sedatives with the most humane of all objects—that of alleviating agonizing

suffering in a dumb animal—but he should never forget that his first duty is to preserve life. I have remarked thus fully upon this in order that I might point out as conclusively as possible this fact. Of all the predisposing causes to attacks of colic, this regular frequency with which the horse evacuates the contents of his bowels is to be looked upon as of supreme importance.

**Hereditary Predisposition.**—‘Are diseases of the bowels hereditary? Why not? Cannot an amount of susceptibility be transmitted from parent to progeny? May there not be a diathesis transmitted, by which the structure of the bowels is more susceptible to disease in some than in others? If cases were carefully traced back, might we not find that the sire or the dam had been subject to some disease of the bowels?’

These are questions asked by a practitioner in the *Veterinary Journal*. To all of them I can confidently answer in the affirmative. I have frequently been told, when attending a case, that the animal’s mother was always subject to colic. ‘Ay, and her mother died from it, too!’ is often the close of the owner’s remarks. Seeing that as many as 50 to 90 per cent. of the total cases in some practices are those of colic, it is no great argument, I admit, to say that because one patient’s mother died from colic the offspring of other victims of the disorder must necessarily inherit a fatal predisposition. Nevertheless, the point that has struck me is the frequency with which one hears the word ‘always’ inserted.

With a certain amount of hesitancy, I also put down ‘weather’ as a predisposing cause of these complaints. We all know the way in which the weather exerts an effect—baneful or beneficial—upon ourselves. It is only fair to add that these same influences are at

work among the lower animals. In short, every practitioner must have noticed the prolific crop of colic that speedily follows a spell of cold, showery weather, when previously all has been warm and dry.

**Temperament as a Predisposing Factor.**—This should really come under the heading of heredity. All I need add to what I have already said in that paragraph is that I have frequently noticed that animals of a sluggish, lymphatic nature are more liable to repeated attacks of colic than are others.

Last, but by no means least, in this lengthy category of predisposing causes comes a reference to the mucous membrane of the intestines. I think no one will deny that the delicate lining of the bowels in the horse is much more sensitive to deleterious matters than that of any other domestic animal. In proof of which, witness the agonizing pains that accompany the least disturbance of his alimentary tract, and the rapidity with which the animal succumbs. Witness, also, the rapid and fatal effects of comparatively small doses of irritant poisons: the animal's dejected and downcast demeanour, and his absolute indifference to everything except the torturing pain which is rendering his case hopeless and pitiable in the extreme.

This chapter, then, details some, though not all, of those causes that tend to the production of equine colic. The practitioner need not, however, be dismayed by their apparent infinity. Although, for anatomical and physiological reasons, the horse is fearfully liable to paroxysms of these agonizing pains, the veterinarian should endeavour to remember that many of these predisposing causes are often energetically helped into being active ones by the crass stupidity of the animal's attendant.

## CHAPTER V

### ETIOLOGY: GENERAL EXCITING CAUSES

IN this chapter I intend to briefly enumerate such exciting causes of colic as will render repetition unnecessary in future pages. As far as possible I shall describe those circumstances and influences that are commonly at work in the production of these disorders. It will save me the trouble, and my readers the annoyance, of repeating several times the same matter under different headings.

It matters but little in what district the practitioner of veterinary medicine may pitch his tent, he will be certain to find that far and away the most common cause of the equine colics is the one that may be best described by the single word 'domestication.' The horse, probably more than any other animal, is under man's control and at man's disposal. So long as he is allowed to roam the fields, gathering his food in a rough and scanty manner, taking his exercise as he himself sees fit, and resting when nature dictates, so long will he remain a picture of perfect health. Man steps in, and the colt's life of freedom is at an end.

The nature of his food, its quality and quantity, and the frequency with which he may be allowed to partake

of it—all these circumstances are entirely under man's control, often caprice. His manner of living may vary from several days per week of a constrained idleness in the stable—with its attendant evils of sluggish liver, swelled legs, uncalled-for corn, and unnecessary fat—to an enforced life of yearly labour far beyond his endurance, with a lack of proper maintenance, and a disgraceful neglect of his comfort when ailing. The ill effects of domesticating the horse, so far as they tend to the production of colic, I purpose describing under separate heads as follows :

(a) **Food.**—There are several reasons that lead one to look upon the food as a prominent factor in the causation of colic. In the majority of cases, unless the horse be one of a large stud, where the business of feeding is reduced almost to an exact science, this food is selected without any regard for the proper balance of its constituents as a suitable, easily digested, and economical diet. Even in cases where some little attention is paid to this essential by the owner, his well-meant intentions fail in that the animal's attendant will use far too much of the food so chosen, or, in others, the niggardliness of the owner prevents the requisite amount being given.

In my own district it is absolutely impossible to arrive at any just measure of the amount weighed out per diem to each horse. The owner will tell you one thing, the men another, and the horse, by his illness, contradict both. Oats, the food *par excellence* for the horse, is very seldom used even in country districts. It is sent in bulk to market, and maize purchased in its stead. In agricultural districts the maize has added to it whatever else may by chance be on the farm. More often than not this is wheat or barley—two notoriously bad foods for

horses. If these be not available, then bran is the next obtained. Bran mixed with maize forms much too laxative a diet for the horse in work; it is certainly not economical, and is, moreover, a frequent cause of an attack of colic.

Nor must we forget the enormous quantities of foreign feeding materials that are poured into our markets in these days of rapid trans-oceanic transit. It is principally the equine dwellers in our large towns that are likely to suffer from their introduction, and during the last decade we have had startling evidence of the ill effects of these materials in outbreaks of such serious importance as 'poisoning by muttars' and the conveyance of anthrax. Putting diseases of that nature on one side, it is a well-known fact that cargoes of such materials are notoriously full of dust and other foreign substances—*e.g.*, scraps of iron, sand, stones, etc.

In some districts it is a common practice to feed the animals once weekly with food that has been boiled, or, when making them up for sale, to diet them largely on it for several weeks prior to selling. Though probably more easy of digestion, I fear such food is often ravenously bolted, and in that way lays the foundation for colic.

The several questions bearing on the matter of food, its economic value, mode of administration, etc., are various and widely differing. In the hope of rendering this little volume of direct practical value to the practitioner of veterinary medicine and to the stock-owner, I have added an appendix entering more into detail on this matter; there is, therefore, no need for me to enlarge upon it here.

(b) **Water.**—Personally, I am not of the opinion that this can often be looked upon as a direct cause of colic. Unless it is sufficiently impregnated with the salts of

calcium to lead to the formation of calculi, which by their presence act mechanically as obstructive agents, I do not think we need often consider the water-supply when treating a case of colic. There is one exception of importance: cases where the water is likely to be contaminated by passing through new leaden pipes, or stored in leaden cisterns, or in tanks whose joints have been cemented with a putty composed largely of lead carbonate.

Since these statements forbid us to regard the water itself as a cause of colic, we are compelled to look deeper into the matter. We must endeavour to trace its ill effects, if any, to the manner or time of its administration.

Firstly, there is but one mode of allowing it that need be considered at all seriously. Should the water be given excessively cold to an animal greatly heated with exercise? As there is nothing definitely proved upon this point, it remains largely a matter of common-sense reasoning based upon experience. It must be remembered that an animal just returned from violent exertion has had his system greatly depleted of fluid. That this fluid needs replacing is beyond question. Personally, I am led to believe that while the animal is still warm is the best time to allow him to have it. The way I reason it is this: Prolonged muscular exertion has robbed the body of a large amount of combustible material; this certainly requires to be given back again in the form of food. The animal will not eat sufficiently until his thirst has been satisfied, therefore the water should come first.

Why not allow him to cool first, then water and afterwards feed him? That question may be answered thus: After violent exercise the body temperature rapidly subsides—at any rate, the feeling of warmth does; in other words, there is a corresponding reaction. If after this

reaction has set in—*i.e.*, when the animal begins to feel chilly—he is allowed to drink freely of cold water, his system is sure to feel its effects with double intensity, and a condition of the body will be induced decidedly unfavourable to the proper digestion of the feed to follow. The temperature and high degree of functional activity occasioned by the exercise should be utilized to raise the temperature of the requisite amount of water the system requires before reaction has commenced; the animal is then enabled to take in the necessary fuel for further combustion. These remarks do not apply to an animal that has returned to his stable in a state of great exhaustion or fatigue. In my own stables the above has been the custom for a great number of years. Never once have I been able to attribute to it any ill effects. It must not be forgotten, however, that custom in watering animals should never be quickly changed. Anyone who has accustomed his steed to a different procedure from that mentioned should not *suddenly* alter it.

Secondly, we come to the time of its administration. Should horses be watered before, between, or after feeding? This again opens up a question regarding which nothing is clearly settled. In an attempt to determine it, Professor F. Tangl, of the Veterinary College, Budapest, offers some interesting experiments and conclusions.<sup>1</sup> Without detailing his experiments, which would encroach too far on my space, it will suffice to give this gentleman's summary. He says:

‘Horses may be watered before, during, or after meals without interfering with the digestion and absorption of the food. All these methods of watering are equally

<sup>1</sup> *Journal of Comparative Pathology and Therapeutics*, vol. xv., p. 21.



good, and each of them may be employed according to circumstances. It is obvious that certain circumstances may make it necessary to adopt one or other method. I need only mention as an example that, after severe loss of water, such as occurs in consequence of long-continued exertion, the animal should always be allowed to drink before it is fed, as otherwise it will not feed well. Although all methods of watering are equally good for the horse, it is not desirable to change unnecessarily from one method to another. Animals, or at least some of them, appear to be not altogether indifferent to such a change. We observed in our experiments that whenever a change was made from the plan of watering after food to that of watering before, the appetite fell off for some days; not that they did not consume the whole of the food given to them, but for some days together they did not eat with the same avidity, and took a longer time to consume their rations completely. A similar effect was not observed when the change was from watering before to watering after food, or from watering after to watering during meals, or when the change was in the opposite direction to the last. It is possible that this method of watering before food, until the animal has become accustomed to it, produces a certain feeling of satiation. Further experiments would be necessary to show to what extent, apart from the bad effects of an excessive consumption of water, the plan of watering after meals acts injuriously on digestion in the case of foods that are difficult of digestion or tend to induce tympany, such as grains provided with an envelope.'

(c) **Errors in the Proper Distribution of Work, Rest, Watering, and Feeding.**—Of all the baneful effects of civilizing the horse that tend to the production

of colic by far the greater part will be found under this heading.

The small stomach of the horse offers a fair reason to suppose that it should be often filled during the day, in order that the amount of ingesta required by his voluminous intestines may be adequately provided. Observation of the horse's natural habits sufficiently point this out, and yet how often we see this teaching of nature grossly ignored. Percivall, with his usual terseness of argument, suggests that the natural habits, when changed for new ones, by confirmation of time and usage come to appropriately take the place of those ordinarily natural. He is evidently referring to the 'three meals a day' system of feeding the horse, which custom has come to substitute for the animal's constant grazing when at large and at pasture. Probably, if man were content to allow even these necessary three meals, and at regularly fixed hours, cases of colic would be far less numerous. Such, however, is not the case. Percivall himself goes on to remark: 'How often do we see horses, hunters especially, taken to work at eight or nine o'clock in the morning, and not returned to their stables before five, six, or seven o'clock at night.' He then proceeds to point out that the well-bred horse will endure this long fasting, and subsequent repletion, with comparative impunity; *that coarse-bred ones and cart-horses will not, but suffer, as a result, from stomach troubles.*<sup>1</sup> As an example of the way in which the animal's constitution is sometimes abused in this respect, I cannot do better than quote from a former article of mine referring to the feeding of horses in my own district:<sup>2</sup>

'Whether the horse be in hard, every-day work, or

<sup>1</sup> The italics are mine.—H. C. R.

<sup>2</sup> *Journal of Comparative Pathology and Therapeutics*, vol. xiii., p. 27.

out of harness altogether, he has at the customary hours the same quantity of food thrown into his manger. These hours, by-the-by, are only twice daily—one large, long feed at daybreak, and another large feed towards evening. Then, again, in Lincolnshire, the district I am speaking of, there is often one long spell of work from seven o'clock in the morning until three in the afternoon, during which time no break is made to refresh the animals; no water to drink; no nose-bag to their faces. A break they certainly get at eleven o'clock, when they stand in a profuse perspiration, still harnessed to the harrow or the plough in the middle of a field, their heads down, and a biting, cutting, cold east wind, from which in the Fens there is not a particle of shelter, blowing about them, while the man in charge, under lee of a close-cut hedge, sits stolidly munching his lunch. Again, without bite or sup, the horses resume their work and remain at it until three. Then, in a state of exhaustion and fatigue, when the powers of the digestive tract are probably at their lowest, the animal is placed in front of an enormous feed of indigestible, bulky food. After filling his stomach, he is allowed to drink heartily of the water he has perhaps been craving for all day. Every practitioner in this district must well know the Monday evening crop of colic. Sunday's rest, Sunday's gorging, and Monday's day of ceaseless work and fasting, all combine to produce the colic of Monday evening.

This is the state of things existing in the winter months, with, perhaps, the break in field operations occasioned by a spell of frost, which again only means another period of gorging in the stables. In the summer months the animals live the greater part of the time in the open, and the veterinary surgeon's sphere of usefulness, for a time, is limited, with one exception. It is

no uncommon thing for a farmer to take his nag straight away from pasture, give him a feed of corn, and drive him, full of grass, long-coated, ungroomed, and perspiring, six, eight, or ten miles to the nearest market town. Here he is allowed to stand huddled up with several of his fellows in a dirty and badly ventilated stable, from eight, nine, or ten o'clock in the morning, until three, four, or five in the afternoon, during which time he has not eaten or drunk a mouthful. He is then geared to the cart again and does the return journey. His reward for that, on reaching home, is an extra large feed of corn, given at a time when I unhesitatingly say he should have less; after which he is again turned out into the field for the night, to stand, perchance, the whole of the time in a pouring rain.

Referring again to Percivall's observed immunity of the hunter, it must not be forgotten that this animal, as compared with the cart-horse, has the advantage of the excitement of the chase. For him it has not been a day of ceaseless, unvaried toil. Every huntsman knows full well that the steed, as much as the rider, partakes of the exhilarating influences engendered by the sport. In other words, it is the matter of temperament, already referred to in Chapter IV.

**The Influence of the Time of Day on the Production of Colic.**—As far as I remember, Veterinary-Lieutenant-Colonel F. Smith was the first to point out the enormous number of colic cases that occurred after the hour of 2.30 p.m., as compared with those occurring earlier in the day. Following his example, I have tabulated my cases, and the table on p. 41 will show that the majority of cases in this district are attacked between the hours of 12 noon and 7 p.m. inclusive.

<i>Hour.</i>	<i>Cases.</i>	<i>Hour.</i>	<i>Cases.</i>	<i>Hour.</i>	<i>Cases.</i>
4 a.m.	0	12 noon	3	8 p.m.	0
5 "	1	1 p.m.	0	9 "	0
6 "	2	2 "	0	10 "	0
7 "	1	3 "	2	11 "	0
8 "	0	4 "	3	12 midnight	0
9 "	0	5 "	0	1 a.m.	0
10 "	0	6 "	2	2 "	0
11 "	2	7 "	2	3 "	0

In this district I account for the preponderance of cases after noon by attributing it to the long stretch of work without food, and the ravenous feeding on bulky, indigestible material immediately afterwards. I have also noticed that the great bulk of the cases occurring in the early morning—say from 4 or 5 a.m. until noon—are those that turn out to be fatal.

#### **Other and Various Exciting Causes of Colic.**

—Ingestion of food contaminated with sand or gravelly material, or containing substances (scraps of iron, wire nails, etc.) likely to form nuclei of calculi. Catarrh of the intestines often accompanies influenza and many respiratory affections, and animals convalescent from these maladies have a weakened digestive tube, and are prone to constipation and impaction. Aneurism of the anterior mesenteric artery, due to the presence of strongyles, frequently determines the impaction of fæces, owing to the interference with the blood-supply to the cæcum and colon. Pieces of the thrombus break off, and effectually plug smaller arteries supplying, mainly, parts of the cæcum and colon. In the anæmic area of bowel thus produced peristalsis is diminished, or perhaps altogether in abeyance. As a consequence we get great weakness, or even paralysis, of that portion of the bowel, with a tendency to stasis of its contents, and obstruction from fæcal accumulations. Other factors that, directly or indirectly, tend to produce constipation

and fæcal obstructions are : large quantities of omental fat, pressure of tumours, and repeated pregnancies, distending and weakening the abdominal parietes. For my own part, I am quite satisfied that the mere presence of the fœtus, in the later stages of gestation, is mechanically accountable for many of our cases of colic, particularly obstructive. Occupying, as it does, a large proportion of the abdominal cavity, it must interfere considerably with the actions and movements of the intestines; that is leaving out of the question entirely the fact that a large portion of the blood current of the mother is necessary for its development.

In these days, too, the rapid strides of bacteriology must not be forgotten. I should not be surprised at any moment to pick up one or other of our veterinary journals and read that some eminent scientist had discovered a specific germ for such of our cases of colic as run the rapid and fatal course of from twelve to twenty-four hours only. One would imagine that in cases of twist, for example, the pain, however agonizing, would not of itself be sufficient to kill the patient. To my mind there is only one solution that fairly fits the case—bacterial infection of the blood-stream commencing from the intestines. More especially do these remarks apply to what is known among veterinarians as ‘enteritis.’ That, however, I will deal with in the chapter reserved for its discussion.

In this chapter I think I have now indicated sufficient to direct the veterinarian’s attention to the errors he sees daily perpetrated around him. Customs vary in different counties, and it is sometimes only necessary to step across an imaginary boundary to see manners and usages totally unlike those to which one has been accustomed. It is, therefore, quite impossible that I can

discuss them all. It remains for the practitioner to take the initiative in his own district, and to fight strenuously and continuously against customs and usages which his better education and wider experience show him to be wrong.

## CHAPTER VI

### GASTRIC IMPACTION : (GORGED STOMACH, GRASS STAGGERS, OR STOMACH STAGGERS)

**Definition.**—Under this heading I purpose describing a disorder which is familiarly known to veterinarians as ‘stomach staggers’; and throughout this chapter I wish to indicate that I am referring to that state of the stomach in which it is overfilled or gorged with food. No tympany. In other words, it is a condition of affairs in the stomach comparable to, and agreeing in every way with, that state of the intestines known as ‘subacute obstruction,’ or ‘impaction.’

Williams, in his ‘Principles and Practice of Veterinary Medicine,’ looks upon this disorder as merely a symptom attending inflammation of the brain and its meninges, and concludes his paragraph on its definition in these words: ‘The most common form of congestion of the brain and its membranes, both in the horse and horned cattle, is that called stomach staggers, or grass staggers, a disease which sometimes rages as an enzoötic.’

I cannot say that I agree with him. Rather I prefer to turn to an older writer (Percivall), and quote again: ‘A stomach surcharged with food, without any accompanying tympanic distension, does not appear to occasion any



local pain, but operates that kind of influence upon the brain which gives rise to symptoms, not stomachic, but cerebral; hence the analogy between this disease and "staggers," and hence the appellation for it of "stomach staggers."

It may be that the total absence of colicky pains has led to the actual seat of mischief being overlooked, and the symptoms proceeding therefrom arrogated to some abnormal condition of the brain. It is not for me to deny that certain conditions of the brain or its coverings may give rise to symptoms simulating those aroused by a gorged stomach. Nevertheless, I feel it is only right to point out that in many cases a searching inquiry into the history will plainly indicate that many of these attacks have the origin of their symptoms in an abnormally gorged condition of the stomach. Unless we are fully decided upon this point, our treatment of a particular case is sure to be at fault.

**Causes.**—Remembering the inability of the horse to vomit, we shall not be surprised to find that excessive cramming of the stomach after a long fast is a frequent factor in determining this complaint. It is not, however, so much the quantity of food that needs consideration as its nature. A plentiful supply of succulent, easily-bolted herbage is the one food that is extremely likely to bring on an attack. It matters not whether the herbage be rye-grass, clover, vetches, or ordinary mixed pasture, this fact remains: An unlimited supply of tasty, succulent provender will cause some animals to go on feeding long after their actual wants are satisfied, and the result is an impacted state of the stomach with a mass of food it is unable, mostly mechanically, to deal with.

Regarding what has been written concerning some narcotic quality of over-ripe grasses (Dick), I am quite

prepared to grant that in some cases such may be the exciting cause. That admission, however, does not detract one iota from what I have already said. If one is to always accept that explanation of the case, how is one to account for those odd attacks occurring in the winter months, when the whole of the provender is dry corn and chopped wheat or oat straw? I have seen cases where the diet was wholly composed of the foods I have mentioned.

Again, how is it that one animal out of five or six, all eating the same food from the same manger, is sometimes seen to be attacked. No explanation of the latter case can be found save the fact that the animal under observation is a notoriously 'greedy feeder.'

**Symptoms.**—Percivall sagely remarks: 'The unnaturally filled stomach produces for the first time a sense of satiety; the horse grows heavy and drowsy, reposes his head upon the manger, falls asleep, and makes a stertorous noise.'

His whole appearance is dull and listless, and the abdomen is visibly distended, though not to the extent of causing pain. The pulse becomes full and bounding and its number of beats below the normal, while the respirations are heavy and slow. The bowels become more or less torpid, though the rectum is frequently found full of fæcal matter. The torpidity seldom or never runs the length of actual stasis or obstruction. Commonly the visible mucous membranes are injected and tinged with yellow. The mouth is dry and clammy, and its odour offensive. *There are no eructations of gas and no attempts at vomiting.* When urged to move the animal does so in a semi-unconscious manner, reeling and staggering in his walk, and blundering blindly into any object near him.

Allowed to stand, he remains quiet, with head down and eyes half closed, a sudden rousing causing him almost to fall to the ground.

**Diagnosis.**—Knowing that symptoms like the above may be the result of some lesion in the brain itself, the veterinarian is urged to make a careful inquiry into the history of his case. That done, the diagnosis becomes a comparatively simple matter. Receiving an account of an abundant feeding after a long fast, learning that the animal has been in a position to glut himself with food of which he is especially fond, or hearing that he is always a voracious and greedy feeder, will lead the veterinary surgeon to be on the alert. Either of these circumstances, together with the symptoms presented, will render any chance of error small. Proceeding further, and by negative reasoning placing aside this and that article of diet as containing no narcotic principle, the surgeon advances with his diagnosis, and finally arrives at a correct decision.

**Prognosis.**—My experience leads me to the conviction that this, in most cases, may be favourable. The absence of tympany and the continuance of peristalsis, though it be but slight, justifies that statement.

**Treatment.**—This must be mainly directed to the conservation and assistance of such favourable conditions as are present. It should be borne in mind that the occurrence of tympany would quickly lead to a rapid and fatal termination.

An agent which will be found to prevent that, act as an antiseptic, and exert an excito-secretory action on the intestinal tract, is to be found in sodium chloride. Should that be the drug selected, it may be given either in the form of a ball or a draught. Those who prefer it may use instead hydrochloric acid in small and frequently

repeated doses, taking care to keep it well diluted. The administration of these two drugs will be best followed by the exhibition of an oleaginous purgative. It will act beneficially in two ways, serving both to empty the overladen bowels and to counteract any irritant or corrosive effects of the salt or acid. The lethargy of the nervous system should, at the same time, be overcome by the judicious use of *nux vomica*, in this case preferably given in the form of the tincture, owing to the likelihood of its becoming more rapidly absorbed.

Another and perhaps more suitable line of treatment is the administration of an aloetic purgative, together with the use of the alkaline stimulants (*ammonia* compounds), which, while acting as cerebro-spinal stimulants and urging the circulatory and secretory organs into activity, also prevent the formation of gases.

In all cases, no matter what the medicinal agent employed, the animal should be well rugged down, in order to promote warmth and the action of the remedies adopted. At the same time, he should be kept slowly walking to overcome the lethargy and tendency to somnolence. The use of copious warm and stimulating enemata is beneficial, and should always be persisted in.

## CHAPTER VII

### GASTRIC TYMPANY: GASTRECTASIS, OR DILATATION OF THE STOMACH

**Definition.**—That condition of the stomach in which it is abnormally distended with gas, the result of fermentation of its contents or the introduction of air from without.

This disease, by no means a rare one, appears to have been but little noticed by veterinarians, if we may judge by the paucity of literature relating to it. A redeeming feature presents itself in that the reported cases, though few in number, are extremely well stated, and leave no doubt in the mind of the reader that the authors are well acquainted with the condition they describe, cognizant of the real nature of the complaint, and convinced of the dangers attending it.

Of all the gastric and intestinal disorders we are able to diagnose this is one of the most rapid, and, at times, one of the most fatal the veterinary surgeon is likely to meet with. The patient is in those extreme agonies of pain that quickly run on to death, and nothing but a prompt recognition of his complaint and the administration of suitable remedies will bring about a favourable issue. A few hours' indecision will place his chances of life, already small, beyond all hope. This latter statement is rendered the more important by the

fact that the attack is oftentimes treacherous at the outset, the mildness of the premonitory symptoms effectually masking all possibility of the fearful, agonizing spasms to follow.

Percivall, though including both this disorder and intestinal tympany in one description, still manages to steer clear of ambiguity, and leaves his reader fully informed that tympany of the stomach, and stomach only, is often to be dealt with in veterinary practice. He says: 'In the horse, however, *who has no rumen*, veritable *hove* is a rare occurrence. . . . I shall never, probably, see so many *blown* or *hoven*<sup>1</sup> horses as I witnessed in the march of the British army from Waterloo to Paris in 1815. A brigade of horses had been allowed to feed in a field of growing wheat, and the consequences were that several amongst them swelled in the body, and turned almost frantic with pain, and died.'

Other authors have also given excellent descriptions of this disorder. Mr. Henry Thompson, Cawnpore, India, under 'Rupture of Stomach' beautifully describes a case which had its starting-point in this condition. Here is his description: 'This horse was reported ill about ten o'clock in the morning, and, on examining him, I found that he was apparently suffering from *flatus*<sup>1</sup>. . . . Treatment was continued, but without any beneficial effect, and early in the afternoon the 'eructation' was noticed, the pulse rapidly assumed the 'running down' character, great prostration came on, and the horse died about eight o'clock in the evening. From the time when the eructation appeared no medicine was given, as from my experience in former cases I was as certain as it was possible to be that a rupture had occurred.'<sup>2</sup>

<sup>1</sup> The italics are mine.—H. C. R.

<sup>2</sup> *Veterinary Journal*, vol. iii., p. 259.

Mr. Alfred Broad, too, relates a case of acute gastric tympany followed by recovery.<sup>1</sup> It is noticed also by Messrs. E. Wallis Hoare, Cork<sup>2</sup>; John Young, Edinburgh<sup>3</sup>; and R. Shaw Craig.<sup>4</sup> These writers all distinctly recognise this condition of distended stomach.

**Causes.**—As is the rule with cases of equine colic, we may confidently look to dietetic errors as the main factor in the causation of this complaint. Those in country practice may expect the bulk of their cases from the hasty bolting of a quantity of young and succulent herbage, particularly clover, growing corn, lucerne, or vetches. Other cases will occasionally crop up where the animals have been allowed a large quantity of mixed ground corn. These attacks are frequent, too, in localities where animals are turned, fresh from a winter's stabling, on to a field of young spring grass, more especially if the pasture be marshy.

In some districts it is customary, immediately after harvest, to put by a number of unthreshed oat-sheaves, which are cut up and used as chaff, with or without the admixture of other seasoned hay. This, again, is a cause of numbers of cases of tympanitic stomach. The same may be said of newly-threshed oats.

Where such palpable causes as these are absent the practitioner must look with suspicion upon food that has been badly harvested—mow-burnt hay and mouldy corn. Personally, I am not an advocate for the use of boiled foods, and look upon them as a frequent cause of colic troubles. Such foods, unless the men are well superintended and the supplies kept fresh, will turn sour and inevitably give rise to fermentation when eaten. For the

<sup>1</sup> *Veterinary Journal*, vol. ii., p. 174.

<sup>2</sup> *Veterinarian*, vol. lxi., p. 794.

<sup>3</sup> *Ibid.*, vol. xlvi., p. 593.

<sup>4</sup> *Veterinary Record*, vol. ix., p. 214.

same reason the use of steeped barley or wheat is not to be advised, while wheat or barley in the unsteeped form may be looked upon as a poison.

This same complaint, though not in an acute form, may be occasioned by the vicious habit of crib-biting; the stomach and abdomen become visibly distended, colic pains following closely after.

Greedy feeding and imperfect mastication of food may also be put down as a cause. In Mr. Broad's case he distinctly states that it was the hasty swallowing of oats in an unmasticated state which produced indigestion, this giving rise to tympanites of the stomach and intestines. Mr. Broad also relates another case in which the most serious tympanites resulted from the eating of 'cinquefoil.'

Other and rarer causes may occasionally be found in some diseased state of the stomach, giving rise, in the first place, to indigestion, and, secondly, to fermentation of its contents—*e.g.*, the ulcerative condition occasioned by the presence of large numbers of bots, gastric calculi, etc.

Veterinary-Lieutenant-Colonel Smith, in dealing with this disorder, quotes from the pen of Mr. Gillespie to illustrate the dangers of mouldy food.<sup>1</sup> I cannot do better than repeat it here.

'On a certain morning I was called to see some horses of the 5th Punjaub Cavalry in camp, and on arriving at the lines, about 250 yards off, found several horses dead, and others apparently dying fast, and all extremely tympanitic. Either three or four had died during the night, and five or six more had been attacked, but some so slightly as to be fit to go to the lines after exercise.

<sup>1</sup> *Proceedings* of the Fifth General Meeting of the National Veterinary Association, p. 79.



‘I remember that one, when about to receive an enema, went down, and I thought it was all over with him, for he looked more dead than alive. However, to my great surprise, he showed a desire to get up, and, once on his feet, he was kept trotting until his bowels began to act, and he was saved. I think this was the only bad case that recovered. I blamed the grass at once, and got a sample, which, from mouldiness, was truly enough to set up any amount of fermentation in the internal economy; and be it known tympany was the sole cause of all this mischief.

‘I attended the post-mortem of all those that had died, and no sooner were the abdominal walls severed than the stomach, and sometimes the colon, exploded with considerable noise, scattering the contents for many yards around.

‘In some instances there were traces of congestion of the mucous membrane of the intestines (not confined to any particular point), and in one case there was a leaden colour of part of the ileum. I looked upon the immediate cause of death as being suffocation. The pressure on the walls of the stomach must have been enormous, for it split like a bubble, and so did the large intestine, but the latter only burst on a few occasions.’

**Symptoms.**—In most cases these will be fairly well pronounced before the arrival of the veterinary surgeon. Nevertheless, I must again warn the practitioner that the outset, even of a serious attack, may be comparatively simple. The horse is seized with colic pains soon after the offending feed. The pulse at first is but little quickened, and the respirations are not increased to any marked extent. As a consequence, the animal is treated in the usual way by the attendants before calling in skilled advice.

During this time the patient has been gradually getting worse, the pains have become more severe, and the tympany more marked. The owner eventually becomes alarmed and the veterinarian is sent for.

The symptoms now presented are of an excessively alarming nature. The unfortunate animal is in a bath of perspiration; his countenance is suggestive of the most agonizing torture; and, staggering blindly about, he is a danger to himself and those about him. His pains have rendered him unmanageable, and with the greatest difficulty can he be kept upon his legs. That is one state of affairs that meets the eye of the surgeon.

In other cases a totally different set of symptoms will be presented for his inspection. Instead of madly flinging himself down, only to rise and rush in frenzy round his box, the poor brute stands in patient agony. He appears now to have some God-given instinct that violence will only render worse his well-nigh hopeless case. He occasionally makes quiet crouching attempts to lie, but stands for the most part quiet. The distressed nature of his respirations, however, and the pinched, haggard expression of his countenance reveal the intensity of his suffering, as, with appealing looking eyes, he turns from one to the other of those standing by for help in his agony.

In both cases examination reveals an alarming state of the pulse and respirations. The pulse, weak in character, is found to be hammering frantically at a rate of 100 to 120 beats a minute, and the breathing of a painful, gasping, see-saw character—is accelerated from the normal to as many as 140 to 150.

Oftentimes the abdomen is found to be tensely tympanitic; rarely, it will be found to be about the normal, no noticeable distension, and peristalsis evident on auscultation. In those cases where abdominal dis-

tension is marked rectal exploration will sometimes reveal coils of distended intestines occupying the pelvis, and the operator's arm is met with painful straining efforts on the part of the patient. At times the rectum is found to contain a few hard lumps.

Distension of the abdomen, however, is not a constant symptom. It is sometimes almost entirely absent, in which case what tympany there is will be seen on the left side and fairly well forward. My experience leads me to the conviction that those cases in which the bowels are free from tympany are the ones that yield most readily to treatment.

When the case has occurred without previous feeding on green food, careful inquiries will elicit the fact that the passage of fæces has been fairly regular throughout the day, and that the pains only came on soon after partaking of a particular feed. The most striking and most diagnostic symptom is the frequent eructation of gas, and here one word of caution is necessary. I have called it 'eructation,' possibly giving my reader to understand that large volumes of gas are escaping by the œsophagus. I need hardly say that such is not the case, for, if that were happening, the animal would soon gain natural relief. In the great majority of instances the spasmodic contraction of the cervical muscles, the retching noise emitted by the patient, and the gurgling noises in the œsophagus serve to relieve the patient no further than the expulsion of quite a small quantity of gas, and, at times, a thin trickling of ingesta from the nostrils.

Should relief not soon be obtained the symptoms become worse still, and quickly post on to the end. The breathing becomes more and more distressed; the abdomen fills further and further with gas, and the small quantity of fluid ejected from the nostrils increases

in volume until it becomes a disgusting vomit. Saliva hangs in strings from the muzzle; the gurgling noise in the œsophagus becomes louder and more frequent, and is further augmented by the rattling of fluid ingesta that has gained entrance to the trachea; patchy perspirations bedew the body, and the whole appearance is indicative of the greatest concern and anxiety.

Later, the animal becomes pulseless, delirium comes on, and he staggers unconsciously round and round his box.

‘Doing the Dead March!’ mutters the veterinarian to himself, turning aside to hide his vexation.

Shortly afterwards the poor brute expires in convulsions, in his agony clutching the ground with his teeth, as he draws his final gasps. The eyes recede, the limbs stiffen, and the patient slave has finished his toil.

**Diagnosis.**—When the case is fairly well advanced this should offer no great amount of difficulty. As I have stated before, attacks of tympanitic stomach are somewhat deceiving at the outset, and the very mildness of the early symptoms may lead the veterinarian to look too lightly upon his case. At the most, however, from one to two hours will produce unequivocal symptoms, and the veterinary surgeon is able, with all confidence, to set about treating the case.

The manner in which the diagnosis may be proceeded with is something after this fashion: The veterinarian finds his patient so frantic with pain, so bedewed with sweat, and his pulse so quickened as to immediately suggest that dire disease ‘enteritis.’ He is relieved on that score by an examination of the conjunctiva. It is not of that ‘raw-beef’ redness so invariably associated with that fell malady. The respiration to his practised ear suggests, in addition to pain, something of suffocating

pressure on the diaphragm. While engaged in this, the examiner will often hear sounds of peristalsis, with sometimes the passing of a small volume of flatus per anum. He knows, again, that in enteritis these movements and sounds are almost always entirely absent. The eye, though expressive of excruciating pain, has not the haggard 'I'm done for' kind of expression that the animal in the fatal grip of enteritis always shows.

Having dismissed enteritis from his calculations, the field of error is considerably reduced. The pains are not those of ordinary impaction of the stomach or intestines; they are much too acute in character. Is it twist, volvulus, or strangulated hernia? In a typical case of the affection even these serious sounding suggestions are easily disposed of. The abdomen is not hard enough, tense enough, tympanitic enough to allow of such an idea being seriously entertained for long. It will not be forgotten, however, that, as previously stated, the abdomen *may* be tympanitic, so that, to assist him in his diagnosis, the veterinarian must look for signs more convincing still ere he comes to a final conclusion.

Perhaps he has punctured the abdomen, and still finds tympany remaining. In the positions in which he has operated he knows he should have encountered the cæcum and colon. He knows of no other bowel that is able to distend to the extent that his case presents. He is compelled, and rightly, to fall back on the stomach as the seat of mischief.

He is struck by the catchy, see-saw breathing, and the trickling fluid, small in quantity, running from the nostrils. He auscultates the trachea and obtains distinct evidence of fluid in that passage. The idea of an inspired drench is emphatically negatived by the owner and attendants; sometimes, even, one has not been ad-

ministered. The balance of evidence, even now inclining heavily towards 'stomach trouble,' is weightily dropped by the exhibition of a definite and characteristic set of symptoms on the part of the patient. There is an entirely involuntary regurgitation of the œsophagus, with a peculiar gurgling, bubbling noise in the chest, as, with a suppressed squeal of pain, and a slight depression of the head, the animal exudes a small quantity of ingesta-stained fluid from the nostrils.

The veterinary surgeon knows now he has a case of tympanitic stomach, and that a bad one, on his hands. Should it happen, however, that he is only partly convinced, he will be made more certain still by closely watching the animal's movements. The act of lying down is performed with care, and, should his case fortunately be uncomplicated by intestinal tympany, he will notice distinct signs of tympany right forward, under the last rib, on the left side. In addition to this, some practitioners have observed that the perspiration is confined to the left side, or more pronounced over the region of the stomach. I cannot say that I have noticed it.

One other symptom, and that a fairly diagnostic one, still remains. When down, the animal sometimes raises himself on his fore-feet, and sits, dog-like, on his haunches. Mr. Broad of Bath has declared that to be almost, if not quite, diagnostic of stomach affection. He says: 'Sitting on the haunches has its diagnostic value; it indicates the seat and nature of the pain evinced—that is, overdistension of the stomach and anterior part of colon, or both—the horse taking this position to relieve the diaphragm of their weight and pressure.'

With a set of symptoms like the above the veterinary surgeon should have no great difficulty in summing up

his case. Even should only one-half of them be exhibited, a right understanding should be arrived at.

There is another, and more grave condition, however, which may so closely simulate tympanitic stomach as to lead to serious error. I refer to twist of the double colon, at either its sternal or diaphragmatic flexure, or both. It is in the elimination of this possibility that the greatest difficulty in the way of a correct diagnosis lies. An animal in which that condition is present will, during the first pains arising from it, exhibit signs that even the most skilled may be excused for confounding with flatulent stomach. There is the same quick pulse, 80 to 90, or 120; the same catchy, see-saw breathing; the same signs of attempted eructation, and the same ingesta-stained fluid running from the nose. Everything seems in order, and the case is treated, as its symptoms appear to warrant, for gastric tympany.

Six to eight hours elapse, and the practitioner pays another visit. He finds the symptoms no whit abated, and recognises the case is a dangerous one. Even on his first visit he had been struck by the intense redness of the conjunctiva. This has increased now to a condition resembling that seen in the disease known as enteritis, and the pulse has grown weaker and faster than before. Still—and this is the circumstance that leads first to wonder, and then to an alteration in the diagnosis—the animal spends a great deal of his time in a recumbent position. Reared upon his chest, he lies in apparent half-comfort. Were it not for the redness of the conjunctiva, and the peculiar catching sob that is now taking place with each respiration, his position would indicate ease. In other words, his pains, on a first glance, would come under the category of ‘dull,’ and be thus correctly referred to the colon.

But why the stomach symptoms? They are there in alarming abundance, and the practitioner feels bound to treat them.

The third and fourth visits find the same symptoms present, but the animal visibly weaker. Twenty-four to forty-eight hours sees the end.

While writing this I have a case in my mind which ran an exactly similar course to the one described above. It was treated for gastric tympany, and its real nature unsuspected until the expiration of twelve to twenty-four hours. It was then apparent that some serious condition was impeding the egress of food from the duodenal end of the stomach, and the possibility of the presence of twist was suggested to the owner. It was even ventured to locate the seat of twist as the duodenum. The end of the second day saw the death of the animal, and a post-mortem examination cleared things up satisfactorily.

The double colon was twisted two or three times upon itself in the position of the sternal and diaphragmatic flexures, thus completely shutting off the second and third portions of the bowel from the first and fourth.

In that portion of the bowel immediately anterior to the twist was a huge mass of accumulated ingesta. This was lying in close apposition with and pressing on the stomach, accounting to some extent, no doubt, for the preponderance of stomach symptoms that presented so perplexing a part of the history of the case.

It will be seen from this that the utmost care is necessary when giving a diagnosis of, or foretelling the issue of a case of tympanitic stomach. In the majority of cases the symptoms I have described will lead the practitioner to a correct estimate of his patient's condition. He should never forget, however, the possibility of



twisted colon, and should take care that his examination of the sufferer is a long and searching one.

The only signs that will serve to distinguish the two complaints are the following: The palpable stomach symptoms must be laid aside for the minute, and a great deal of reliance placed upon the one symptom of the animal's desire to lie about for lengthy periods. In a typical case of tympanitic stomach that does not occur. The respirations, in addition to being catchy and see-saw in their character, are added to by a plain and unmistakable sob—not a gasp for breath owing to pressure on the lungs, but a sob of pain. Finally, the gradual increase of the conjunctival mucous membranes in redness and the fatal indications afforded by the quickened and fastly weakening pulse will lead one, a few hours after the commencement of the attack, to a knowledge of its true nature.

**Prognosis.**—It may be said that all cases of tympanitic stomach, especially when the tympany is of such an extent as to be easily diagnosed, offer a grave element of danger. Anatomical reasons already discussed in Chapter II. warrant one in that statement. When the tympany of the stomach is accompanied with impacted or tympanitic intestines, it is always wise to warn the owner that the case may have a fatal termination. When the tympany is confined to the stomach, the abdomen fairly flaccid, and the bowels acting, a more favourable issue may, with safety, be prophesied, always reserving the promise by indicating the likely finish, should tympany of the intestines supervene. A further reservation will also have to be made in the very early stages of the case when allowing for the condition of twisted colon. The owner may safely be advised that a few hours will settle the question. Either his case of stomach tympany,

under suitable treatment, will begin to mend, or the fatal and unequivocal signs of twist be in evidence.

Again, it is always policy, when dealing with a case of this description, to point out the probability of rupture occurring. The veterinarian may, with all justice, inform his client that vomiting is not necessarily a sign that such has already taken place. It is impossible to diagnose this lesion until its fatal signs are present (see Chapter VIII.), and the veterinary surgeon may confidently proceed to treat his case, promising to advise his client immediately symptoms of an alarming nature present themselves.

**Treatment.**—This offers to the veterinarian one or two interesting little problems. Primarily, the lines upon which he may start and upon which his treatment must be based are simple indeed. They may be succinctly summed up in these two immediate instructions: (1) Rid the stomach of gas already present. (2) Prevent the formation of any more.

Before attempting to dispose of the gases, it is necessary to know their composition. Recent experiments have shown that those which bulk most largely in the distended stomach are carbonic acid, carburetted hydrogen, sulphuretted hydrogen, and nitrogen, the nitrogen forming only a small proportion. As carburetted hydrogen cannot conveniently be absorbed by any vehicle which may be administered per orem, our remedial agents must be mainly directed against carbonic acid and sulphuretted hydrogen. We are again compelled to fall back upon what may be regarded as the veterinary surgeon's sheet-anchor in the treatment of the equine colics—ammonia. In this case, however, the success of the treatment will entirely depend upon what form of ammonia is used.

In this particular instance the use of the carbonate would be well-nigh fatal: and this is the reason. We may safely assume with a tympanitic stomach that we have an acid condition of its contents. That being so, the administered carbonate would, by the action on it of the acid, be caused to evolve carbonic acid, and add still further to the volume of that gas already in the stomach.

The form of ammonia indicated is the solution of ammonium hydrate (the liquor ammoniæ fort. of the pharmacopœias), because by its exhibition the carbonic acid gas present in the stomach will readily be absorbed (to form ammonium carbonate) while, with a suitable addition (as, for example, iron or bismuth) the sulphuretted hydrogen may also be combined, and caused to leave its gaseous form, thus greatly lessening the volume of gases in the stomach. Such an admixture is easily prepared as follows :

Ferri sulph. pulv.	-	-	-	ʒi.
Aqua (fervens)	-	-	-	Oii.
Liq. ammon. fort.	-	-	-	ʒiv. <sup>1</sup>

This mixture, with its resulting precipitate, should be administered at once. The freshly precipitated hydrate of iron combines with the sulphuretted hydrogen, while the free ammonia, still exerting its stimulant and anti-spasmodic actions, absorbs the carbonic acid.

This is the treatment I would recommend as the most suitable for disposing of the accumulated stomach gases. This done, it is wise to follow on with the exhibition of some form of mild antiseptic, one with stimulant pro-

<sup>1</sup> One word is necessary in order to explain the apparently excessive dose of liq. ammon. fort. An estimated 3 drachms of that goes to the formation of hydrate of iron, thus leaving really only 1 drachm of free ammonia for stimulant and antispasmodic purposes.—H. C. R.

perties preferred—*e.g.*, terebene, ol. tereb., or water strongly impregnated with ol. menth. pip. Either of these will tend to stay the fermentation going on in the stomach, and render the evolving of further gas from the mass unlikely.

It is usual with most practitioners to combine with the ammonia a carminative and sedative ; also to administer at the same time an aloetic purgative. As fair samples of the many drenches so given, I select the following :

1	Tinct. opii	-	-	ʒi.	2.	Terebene pur.	-	-	ʒii.
	Spt. ammon. ar.	-	-	ʒi.		Chlorodyne	-	-	ʒiv.
	Ether sulph.	-	-	ʒiv.		Spt. eth. nit.	-	-	ʒii.
	Aloes sol.	-	-	ʒvi.		Ol. lini	-	-	Oiss.
	Ol. lini	-	-	Oss.					

These two drenches are both open to serious objection, No. 1 more so than No. 2. In No. 1 the only medicine at all calculated to act on the stomachic gases is the spt. ammon. ar. The amount of free ammonia in that preparation, however, is not enough to work any beneficial result unless given in far greater doses than there laid down, while, if given in large doses, its greater proportion of contained ammonium carbonate will act adversely as before described.

Drench No. 2 offers us a useful antiseptic in the form of terebene. This, in all probability, will prevent the formation of any further gas than that already in the stomach. That it will effectually dispose of the volume already there, and so relieve the distended stomach, is, to say the least of it, highly problematical.

In these draughts the ingredients to which I take serious exception are the opium and the chlorodyne with its contained morphia and mixture of other and various sedatives. I most strongly advise all and every one to avoid, as they would avoid poison, giving sedatives to the

horse with colic—what form of colic matters but little, unless accompanied with *violent* purging.

By all means adopt any other part you wish of the treatment here laid down. Give aloes, even, if you are so inclined, though that is useless and unnecessary. But if you earnestly wish your list of successful cases to increase, if you wish to give satisfaction to yourself and to your client, give the widest possible berth to sedatives. Leave them severely alone. My reasons for this advice will be found more fully stated in the chapter on Intestinal Impaction.

Applying this advice to the disorder we are now discussing, we shall find the explanation simple enough, thus:

*We have a horse with his stomach enormously distended with gas. In all probability its distension is materially assisting in the closure of the duodenal trap (see Chapter II., Figs. 2 and 3) by the mere force of pressure. We have already shown (Chapter IV., p. 26) that the horse is anatomically unable to adequately relieve himself by way of the œsophagus. Ergo, the only natural relief we can possibly hope for is the unlocking of the duodenal trap by violent and energetic intestinal movements. And these movements the practitioner proposes to altogether restrict by administering a dose of opium. . . . Not only is that unreasonable—it is criminal. Were our patient a human being it would be considered, and rightly considered, slaughter.*

It is no mere fad of mine, this wholesale condemnation of the use of sedatives in equine colic. It is the outcome of many an unconscious experiment, the fruit of much bitter experience, and the careful weighing together of the data so obtained. I would ask all who seriously read my little volume to give the most weighty and thoughtful consideration to the paragraph immediately preceding this. The matter it contains is small in bulk, but offers much food for quiet reflection.

I have said that the only possible natural means of relief we can hope for is the unlocking of the duodenal trap by violent and energetic intestinal movements. Nature may be assisted in bringing that happy state of affairs about, and it is the veterinary surgeon's manifest duty to so assist her by giving his patient a dose of eserine and pilocarpine, or any other drug that will stimulate the involuntary muscle of the intestines into immediate action. For my own part, in whatever way I have treated the stomach gases by *per orem* remedies, I have always administered with the happiest results a simple hypodermic dose of eserine sulphate (2 grains to  $2\frac{1}{2}$  grains). When it acts, it is surprising to note, although the *abdomen* is previously not tympanitic, the immense volumes of flatus that are passed *per anum*. After only an hour's severe pain, its effect is complete and lasting relief. As illustrative of its beneficial action, I will quote the following case occurring in my own practice.

*September 16, 11 p.m.*—I was called to a farm 6 miles distant to attend a heavy cart mare. The following history of the case was quickly obtained. The patient had left the stable at 6.45 a.m. in her usual good health, had been at plough all day, and was returned to the stable at 3.45 p.m., and given a full feed of chopped new oat straw and Indian corn. Immediately after this she was put to work at a circular chaff-cutting machine, following upon which she was quickly taken ill. I found the poor brute in agonies of pain (far too bad to roll), pulse 120, respirations enormously quickened, and of a gasping see-saw nature, and a temperature of  $103^{\circ}$  F. The rectum contained a few hard lumps and was non-contracting; there was no abdominal distension; the other bowels were fairly empty, and auscultation gave

slight evidence of peristalsis. With each respiration there was a peculiar forward movement of the œsophagus, with, every now and again, distinct sounds of attempted eructation. There was no ingesta returning through the nostrils, and yet auscultation of the trachea revealed sounds of fluid in that passage. Inquiries elicited the fact that the animal was choked with the drinks administered before my arrival.

I diagnosed tympanitic stomach, with inability of the pylorus to pass it. Having administered the usual remedies, I resolved to at once empty the intestines, for, seeing that I had already obtained slight evidence of peristalsis, I apprehended no difficulty in so doing. To that end I administered a full dose of eserine sulphate ( $2\frac{1}{2}$  grains hypodermically), and prepared myself to watch results.

*September 17, 12.30 a.m.*—The end of half an hour saw full and frequent passage of tremendous volumes of flatus *per anum*, and by this time the mare was distinctly relieved, though still blowing hard from the effects of the inspired drenches. The attempts at eructation were far less frequent, and I saw that I had now overcome the stomach trouble. I gave a guarded prognosis, however, not knowing how the tracheal disturbance was likely to end.

*September 17, 10.30 a.m.*—Mare picking at provender. Entirely free from colic pains, but causing grave anxiety on account of the pulmonary congestion. The usual remedies were administered, and, though ailing some days, the animal made an uninterrupted recovery.

I have now laid down a simple and rational treatment for combating this distressing disorder. Before closing the chapter, however, it is my duty to mention two other means which are sometimes discussed, but seldom or

never practised. I am referring to the use of a trocar and cannula on the stomach, and the passing of an œsophagus-tube.

I think that most veterinarians will agree with me in saying that puncturing the stomach is not without a grave element of danger, and therefore not to be advised. However, should tympany of the intestine also be present, the operation of puncturing the bowels should be the first consideration. It is simple, unattended with serious risk, and immediately effectual in affording instant relief.

The use of the œsophagus-tube is hardly likely to come into vogue. It was first suggested by Percivall, and afterwards advocated by Veterinary-Lieutenant-Colonel Smith. That it would afford relief if introduced no one would attempt to deny. As Colonel Smith's writings, however, so far as I can trace them, leave the instrument yet 'imperfect,' the veterinary surgeon must either experiment in that line himself, or wait until someone has further improved upon this mechanical means of treatment. It is not likely to be adopted by the average practitioner as a principal line in his treatment for these reasons: It is rather cumbersome, adds to his impedimenta, and can only be required in quite a small percentage of the cases of 'colic' he is called upon to attend. Whatever treatment the practitioner has decided to adopt, let him carefully remember one detail of the utmost importance. When he has with certainty diagnosed tympany of the stomach, it is his duty to emphatically warn the owner and attendants of the danger the horse runs if allowed to roll. It is extremely likely to bring about the lesion I describe in my next chapter, rupture of the stomach.



## CHAPTER VIII

### RUPTURE OF THE STOMACH: GASTRO-RHEXIS

**Definition.**—A breach or disruption, complete or incomplete, of the tunics forming the walls of the stomach, with consequent escape of the contents of the organ.

**Causes.**—Principally we may regard this lesion as a direct result of the disorder considered in the previous chapter, the mere mechanical pressure of the accumulated gases being sufficient to bring it about. More for that reason than that it offers any particular medical problem have I seen fit to insert its description here. Rupture may also result from ordinary impacted or gorged stomach (Chapter VI.), though it is well to add that the number of cases following upon that condition are not nearly so frequent as those succeeding acute gastric tympany. It will naturally follow that those causes enumerated as giving rise to tympanitic stomach might be again stated here as indirect factors in the production of gastric rupture, laying special stress on the overfeeding with young green stuffs, and the excessive use of boiled or steeped foods, with a period of work immediately on the full stomach. What I have already advised under that heading will bear repeating here: ‘Never allow the

horse with a tympanitic stomach to indulge in rolling.' There can be no doubt whatever that the violent strains and falls the frantic animal inflicts upon himself when in the paroxysms of acute gastric tympany are directly accountable for many of our cases of rupture.

Cases are also on record where rupture of the stomach has been accompanied with, and no doubt preceded by, a thinned and ulcerated condition of the stomach walls, occasioned by the presence of large numbers of bots (*Æstrus equi*), giving rise, in the first place, to imperfect digestion of food, with its concomitant process of fermentation, resulting in tympany and pressure.

Sometimes a sudden heavy fall is responsible for the lesion. Mr. Broad instances that as follows: 'An aged horse, in a very weak condition, fell while at work, and was with difficulty made to rise. He again fell on reaching a stable close by, and died almost immediately. The coats of the stomach were attenuated and ruptured.'<sup>1</sup>

Other and rarer causes of this lesion may be found in the atrophy of the stomach walls produced by the vice of crib-biting, or in the ravages produced by the *Spiroptera megastoma*.<sup>2</sup>

I shall not concern myself here with a consideration of the nature and size of the rupture, nor its position or pathological appearances. Our interests will be mainly confined to its relation to colic, and the way in which it affects our diagnosis of the various disorders we are discussing. It is, therefore, from that standpoint that I shall conclude this chapter.

**Symptoms.**—I have already indicated that this lesion

<sup>1</sup> *Veterinary Journal*, vol. ii., p. 178.

<sup>2</sup> *Proceedings* of the Fifth General Meeting of the National Veterinary Association (Smith).

may occur with the stomach wall in one of two conditions. Either the tunics are in a state of health, or they are suffering from the ulcerated and atrophied condition occasioned by the inroads of parasites.

We may take it from this that when the stomach walls are weakened by previous disease an attack of simple colic may be quite sufficient to bring about the rupture. In the paroxysms of pain the animal flings himself violently to the ground, and the mischief is done; in which instance the case, though finally diagnosed as ruptured stomach, is primarily looked upon as simple in its nature, owing to the regularly intermittent character of the pains. It is, in fact, first put down as, what it really is, a simple attack of colic, the rupture occurring afterwards. At times in his career every practitioner is bound to make that—I was almost calling it ‘mistake.’ He knows himself that it was a correct statement of the case as it first presented itself to him. When rupture suddenly changes his case from a simple to a fatal nature, it depends entirely upon his standing with his client and his amount of ready tact whether the veterinarian retires from the situation in ignominy or emerges therefrom with credit. I have not much hesitation myself in declaring this to be one of the *rare* causes of this lesion. Nevertheless, it occurs with sufficient frequency to confound our carefully-laid prognosis in other cases.

In those instances where the rupture is primarily produced by previous enormous tympany, the pains, almost from the very outset of the case, are agonizing and continuous.

Our case of ruptured stomach, then, may be ushered in with either intermittent or continuous pain. Once established, however, rupture of the stomach offers

symptoms only too painfully diagnostic in their character.

**Diagnosis.**—‘There exist two cogent reasons for wishing to be able to pronounce at once upon a case of ruptured stomach: the first is, the preservation, if not enhancement, of the medical attendant’s reputation; the second, the saving of solicitude on his part, and the annoyance on the part of his patient, of administering anything under such hopeless circumstances.’<sup>1</sup>

Difficult to describe, it is the character of the pulse that gives the experienced veterinarian his first warning of the fatal nature of his case. During the early stages—that is, before rupture has occurred—the pulse is full and firm in its beats; contracted to a thread only during the paroxysms of colic; again becoming full and bounding in the intervals of comparative ease. With the appearance of rupture its whole character is altered, and it grows small, frightfully quick, and as frequent as 90 to 120. I cannot better describe ‘small’ than by saying it is that kind of pulse the novice has difficulty in detecting at all—the vessel is not fully distended. The respirations become accelerated, and the conjunctiva slightly injected. The pains increase in violence, and the patient becomes almost ungovernable. Later, the unfortunate animal is bathed in sweat, trickling in drops down the face, running down the mane, coursing in streams down the inside of the arms and thighs, and splashing in drops from the belly. Violent tremors shake the body, the tail is outstretched and quivering, and the extremities are deathly cold. The hand that takes the pulse in the brachial region is withdrawn with a shudder; the signs conveyed to it lead to an almost instinctive dread, a significant intuition of fast-coming dissolution.

<sup>1</sup> Percivall’s ‘Hippopathology,’ vol. ii., p. 24.

The patient may now sit for several minutes at a time on his haunches, or, as is more general, may stand quietly, giving the uninitiated the appearance of greater ease. His countenance, however, is still indicative of his condition. It is almost 'sardonic' in the expression it conveys. The ears droop, the angles of the mouth are retracted, and the teeth protrude in a ghastly grin.

It is now that the vomiting—the much discussed vomiting—begins to occur. Every now and again the fluid-like ingesta of the stomach is ejected with or without symptoms of vomiting on the part of the patient, and the administration of medicines only tends to aggravate his suffering. In some cases the emesis is but an involuntary, though constant, dribble from the nostrils; in others it is an act of distinct and painful retching, accompanied with all the equine phenomena of vomiting. One other symptom there is which, if only constant, would lead to diagnosis always being absolute. I refer to the escaped ingesta being detected in the peritoneal cavity when exploring *per rectum*. It is unfortunate that this evidence is not constantly obtainable.

The pulse now becomes more and more imperceptible, the muscular tremors increase in severity, the breathing is a shivering sob, and the legs are propped out wide apart to keep the unfortunate animal from falling. When he drops it is all over, for a very few seconds then ends the scene, and the poor brute usually expires with the ingesta gushing in streams through his nostrils.

These symptoms are the ones that may fairly be taken as diagnostic—that is, as far as we are able to diagnose this affection. They will lead to a correct diagnosis in the majority of instances. In addition to the signs here given, however, the young practitioner must remember that all the usual symptoms of 'colic,' as described in

other chapters (Tympanitic Stomach, for instance), may be shown in gastric rupture.

The reader will have gathered from the foregoing that we have no really diagnostic symptoms of ruptured stomach. Veterinary-Lieutenant-Colonel Smith sums the matter up thus : ‘ Diagnosis of this affection is anything but easy ; *we have no diagnostic symptoms*, and no two cases of this lesion present the same appearances. I think the symptoms on which we can place the most reliance are : paroxysms after the administration of medicines, extreme anxiety of countenance, in some cases the presence of particles of ingesta in the peritoneal sac detectable on exploration *per rectum*, running down pulse, cold sweats and rigors, with coldness of the surface ; and should vomiting and sitting on the haunches occur in conjunction with these, it only strengthens the diagnosis, *but their absence in no wise weakens it.*’

**Prognosis.**—Once positively diagnosed, the case, of course, is hopeless. The question the veterinarian is most likely to ask, however, is this : ‘ What dependence am I to place on the symptom of vomiting ? When vomiting occurs, am I to positively declare my case one of rupture ?’ Owing to this vomiting question being a much vexed one, several facts stand out with greater distinctness than they otherwise would have done. For instance, it is certain—

1. That cases of rupture occur in which vomiting is a most marked symptom.
2. That cases of rupture occur in which vomition is altogether absent.
3. That cases of vomiting occur, followed by speedy recovery, from which we may reasonably infer that there was no rupture.

It follows from this that vomition is not absolutely

diagnostic of rupture. It is only fair to add, however, that it is so frequently an accompaniment of that lesion as to render it of great value when summing up our case. Even when vomiting is present in alarming degree, it is the veterinary surgeon's duty to persist in treating his case for gastric engorgement, gastric tympany, or whatever he may have decided it is, reserving all his statements by saying 'that it is just possible rupture may occur,' and declining to advise his client of the advent of rupture until all or most of its absolutely fatal signs are present. Taken singly, there are no diagnostic symptoms of ruptured stomach. Collectively, however, the evidence obtained from the patient should, in most cases, allow of a prognosis being given. Needless to say, it is a fatal one.

**Treatment.**—Beyond prophylaxis, the treatment of ruptured stomach is out of all question. Means for its prevention, however, may be discussed with advantage. Nevertheless, it is not my intention to enlarge on them here. They are so largely dependent on common-sense reasoning, deduced from the causes of other stomach troubles, that it would be but tedious repetition on my part to mention them in detail again.

We may take it that the reader of this volume will gather sufficient information from the chapters on The Predisposing Causes of Colic, Gastric Impaction, and Gastric Tympany to enable him to appropriately point out the suitable preventive measures likely to guard against the occurrence of this most distressing and fatal lesion.

## CHAPTER IX

### SUBACUTE OBSTRUCTION OF THE DOUBLE COLON: IMPACTION OF THE INTESTINES, IMPACTION OF THE COLON, STOPPAGE OF THE BOWELS

**Definition.** — Intestinal impaction or obstruction, if loosely used, is a term which will cover a multitude of widely differing disorders, and I cannot help but think that the time is now ripe for an attempt to separate a few of them from their confusing surroundings, and essay to consider them singly. I am not without hope that in so doing a more dependable knowledge of their peculiarities will be gathered—a knowledge which must inevitably lead to a more correct diagnosis, and a corresponding improvement in the particular line of treatment adopted for each. To further that end I have, somewhat arbitrarily, I admit, and yet not without a due amount of just reason for so doing, divided the subacute intestinal obstruction into three separate and distinct forms—viz., subacute obstruction of the small intestine, subacute obstruction of the double colon, and subacute obstruction of the single colon.

Taking the three forms of intestinal obstruction I have mentioned in their correct anatomical order,



‘subacute obstruction of the small intestine’ should properly have been described first. I have my reasons, however, for giving the obstruction of the double colon prior place. Among them is the fact that it is this particular variety that occurs most often in practice, and has led to the terms ‘impaction of the bowels’ and ‘stoppage of the bowels’ being so loosely applied to other and distinct types. The word ‘subacute’ is purposely inserted in order to exclude such acute occlusions of the bowels as partial or complete twist, strangulated hernia, intussusception, etc. That being done, we are compelled to a consideration of such disorders as are brought about by any circumstance that causes a stationary or torpid condition of the bowels, or the surcharging of the intestinal tract with bulky, indigestible food.

The present chapter, then, is given over to the description of all obstructions of a subacute type that occur in any position in the large or double colon, with which, until differential means of diagnosis present themselves, I include typhlitic or cæcal impaction.

Before coming to its actual description, it will be necessary to further continue this definition. A reference to Professor Friedberger’s table in Chapter I. shows plainly enough that it comes under the second division of the essential form of true colic—*i.e.*, colic consequent upon anomalies of the intestinal contents. The question, then, arises, Will it be (*a*) the colic produced by overfeeding, or (*b*) the colic occasioned by stoppage in the intestinal canal? In my opinion, the definitions thus indicated are, to a very great extent, interchangeable, for in the colic I am about to describe (that occasioned by stoppage in the intestinal canal, known commonly as impaction of the intestines) there can be no doubt that overfeeding is responsible for a great majority of the cases.

There may, or may not, be colic pains with the overfeeding, and yet the overcharging of the horse's intestines may give rise to impaction, or stoppage—fæcal accumulation. To make myself plainer, we may have overfeeding and yet no symptom of colic, until it has become really a case of impaction or stoppage. That is really what always occurs in the great majority of cases of so-called impaction of the intestines, the only premonitory symptoms (prior to constipation or stoppage) being dullness. No exhibition of abdominal pain whatever.

Then, again, take (*b*), or the colic brought on by flatulence. Here, also, it is evident that it may arise merely as a result either of overfeeding or of obstruction. So that, to sum up, we may say : 'The (*a*) form of colic—viz., that produced by overfeeding—may or may not be accompanied by flatulence, and may or may not be productive of obstruction, again with or without flatulence.' That is what one really sees if notes are taken of a series of cases, and I will endeavour to make my statement still clearer directly. I do not wish to convey that there is no such thing as a pure type of flatulent colic ; in fact, Chapter XIV. is solely reserved for its consideration. I merely wish to point out that in a great many cases the flatulence is solely dependent on previous conditions that are in themselves another and distinct variety of colic.

**Causes.**—For these I must again ask the reader to refer largely to Chapters IV. and V. He will find there an enumeration of such general predisposing and exciting causes of colic as will render my work in this particular section very short. I would, however, ask him to particularly remember what I have written regarding the anatomical reasons for expecting the horse to be peculiarly liable to attacks of 'colic': the small size of his stomach, the great length and complicated

distribution of his intestines, together with their comparatively fragile structure and the enormous loads they are called upon to carry, and the natural bars to vomiting. His judgment should also be guided by a due consideration of such physiological reasons as the short length of time the food requires to remain in the digestive tract, the matter of age and defective teeth, hereditary predisposition, and the question of temperament. I would also enjoin on him not to forget the effects of change of climate, all those little errors resultant on the horse's domestication: the matter of correct feeding and proper watering, the length of his hours of work and rest, and the number of times he is fed in the day. Among all these will be found numberless causes of obstructive colic. More particularly still would I request him to bear in mind such causes as the collection of sandy or gravelly deposits in the colon from the ingestion of fodder so contaminated, the weakening and lowering of tone of the intestinal muscles consequent on debilitating diseases, aneurismal interference with the blood-supply to various portions of the digestive tube, and the presence of the foetus in animals heavy with foal.

Of these and others fuller details will be found in the chapters mentioned. All are likely, in their turn, to have a preponderating influence in determining an attack of 'intestinal obstruction.' Nevertheless, we may correctly sum up by declaring that a very great majority of the causes of intestinal impaction are directly referable to errors in diet.

**Symptoms.**—These will be found to vary, in greater or less degree, in nearly every case the veterinary surgeon is called upon to attend. Before proceeding, however, it will be wise to remind the reader that I am not dealing with acute intestinal obstruction (under which head

would come partial or complete twist of the bowels, etc.). In those cases the character of the pain is acute and agonizingly persistent, and the disease runs a rapid and fatal course of from twelve to twenty-four hours. I have made a second notice of the acute disorder here in order to firmly impress on the mind of the veterinarian that it will be absolutely necessary for him to negative the idea of his case being of that description before a suitable and proper treatment can be adopted. I do not imagine for one moment that this conclusion may be arrived at by a hasty and half-hearted examination of our patient; for, as a perusal of the table of cases at the end of this chapter will show, we may be deceived by the symptoms, the pulse, the temperature, or the respirations, or we may be misled by all combined, if our examination be not a lengthy and a searching one.

*Dull Subjective Symptoms.*—The symptoms of a sub-acute attack will be in main what are nearly always, and I think correctly, described by practitioners as ‘dull pains.’ They are so plainly of a dull character as to lead the owner to treat the case lightly and to neglect sending for assistance at the outset. Frequently he allows twelve or even twenty-four hours to elapse before sending for skilled advice. The animal is dull and listless, perhaps refuses his food, or picks a little now and again. At this stage the pulse, temperature, and respirations are but little altered. These, however, change as time goes on, and the animal begins to show signs of uneasiness and pain, such as walking round the box and smelling at the bedding. Otherwise he leans heavily with his hind-quarters against the nearest post or wall, with an occasional pawing movement of the fore-limbs or an irritant stamp of the hind. Perhaps the animal even ventures to lie down, and, if so, only after repeated and

careful crouching movements. As he stretches himself out, he emits a long-drawn sigh, or a slight but lengthy groan, and then lies out at full length, for, it may be, an hour at a time. While down, his pain is manifested by his occasionally bringing the head round to the side, and looking with anxious and troubled countenance towards his flank. Also, the breath is held after the act of inspiration, and retained until the voluntary muscle is overcome by the deoxygenated state of the blood in the vessels of the brain. After lying for some time, he will get up and exhibit the same set of symptoms again from beginning to end.

*Dull Objective Symptoms.*—Examination per rectum will generally show that bowel to be empty, or containing at the most a few small, hard, and mucus-covered lumps. The bowel is sometimes, though not always, what is termed ‘ballooned,’ and we may or may not notice violent straining and attempts on the part of the animal at defæcation. It may be, however, in some cases that the rectum is not empty, but full, to a state of impaction, with material varying from a semi-fluid to a solid consistence. The bladder is usually empty, and nearly always other portions of the intestines can be felt crammed to their full with impacted fæcal matter. Auscultation of the abdominal walls reveals not the slightest sign of peristalsis. Sometimes there is an accompanying slight tympany, and during auscultation we may then hear a peculiar metallic tinkle, caused by some feeble attempt of the bowel at peristalsis. Contrary to many, I attach no grave importance to that sound—rather the reverse. The extremities are cold, and the mouth clammy and fœtid. When hereafter I allude to ‘dull’ pains, I am referring to the symptoms described above. Often, however, we may have symptoms much more violent and alarming.

*Acute Subjective and Objective Symptoms in Subacute Colic.*—It will appear odd, I confess, to talk of the occurrence of acute symptoms in subacute colic, and yet we must be prepared to admit that the frequent and *rapid* recovery of animals showing acute symptoms sufficiently negatives the idea of their ailment being of such an acute variety as twist, etc. Without attempting to argue that spontaneous recovery from twist, or other serious condition, is impossible, we may, with every regard for logic, allow that symptoms of an acute nature may be observed in subacute colic. The pain becomes much more violent. The animal walks round and round his box. The ears and extremities grow deathly cold. Cold, patchy perspirations bedew the underneath surface of the abdomen, and break out between the forearms and thighs, while the expression becomes anxious to an alarming degree. Tympany becomes much more noticeable; the animal reels in his walk, and casts himself down with such violence as to almost resemble a fall. The pulse is increased in frequency, and is not so full to the fingers. The visible mucous membranes become injected, and appear of a deep red hue. Frequently, too, in this special form of colic, the membranes are tinged with yellow, reminding one of the early stages of jaundice.

Such are the usual symptoms of intestinal impaction, and their average duration may be anything from twelve or fifteen to twenty-four hours. The longest period that I myself remember an animal suffering, and ultimately recovering, is eight days. In fatal cases forty-eight to thirty-six hours usually sees the end.

**Diagnosis.**—I am fully persuaded that this is the most easily diagnosed of all our cases of colic, and concerning it a mistake ought seldom or never to be made. Such a thing, however, as a diagnostic symptom is not

to be looked for. It is only by a complete and orderly analysis of the whole of the history, and by a proper weighing up of all the signs, that a correct diagnosis can be arrived at. Nevertheless, upon one fact I wish to place the greatest possible emphasis. The value of taking the indications of the pulse, temperature, and respirations *collectively*, in order to avoid error in prognosis, cannot be overestimated. I never look upon a case as approaching dangerous unless I get a full warning from all three. A reference to Case No. 7, at the end of this chapter, will explain what I mean. Here was an animal which had been rolling in violent pain before my arrival, but was now standing perfectly quiet. An alarming state of the pulse was evident, hammering away at the rate of 108 to the minute. The temperature, however, was only 101° F., and the number of respirations 12. The animal recovered.

Take, again, Case No. 6. The respirations here were a continual sob of 32 to the minute, and the horse was in a bath of perspiration for over an hour. The pulse was only 48, and the temperature 101.4° F. The animal recovered.

Or take Case No. 3. The temperature, 96.6° F. (which may be taken as subnormal in shire horses), was counterbalanced by the pulse (48) and the respirations (13). This animal also, after a lengthy illness, recovered.

Here I will take the opportunity of stating that I believe it to be absolutely impossible to diagnose 'straight away' even this, the most easily diagnosed and best understood of all our cases of colic. No committing statement ought to be made, and no large amount of drugs exhibited, until the case has been closely watched for some time. For example, witness Case No. 13. Judging from my foregoing remarks, the irregularity of the respirations and temperature in this case should

certainly have merited a bad prognosis. Still, I was tempted to hold out hopes, for the reason that we had a perfectly normal pulse—normal in tone and normal in number. The conclusion of that case alone warrants me in giving the advice to take the pulse, temperature, and respirations collectively, for an hour later saw the character of the pulse enormously changed for the worse. I was compelled to give a fatal prognosis, and the animal died nine hours afterwards. The attentive reader will notice that this case was really one of acute gastric tympany. It was, however, inserted with this list of cases of obstruction to illustrate more forcibly the remarks I have just made. This special attention paid to the character of the pulse in conjunction with the temperature and respirations, the symptoms I have given well weighed, and his own powers of observation brought well into play, should leave the veterinarian in a fair way to satisfactorily come to a right conclusion.

**Prognosis.**—The subacute obstructive colics are the ones among these many disorders that allow the veterinarian ample time in which to judge pretty accurately of the probable termination of the attack.

Having diagnosed his case, and ascertained that he has a fairly normal pulse, he may, with every confidence, rely upon the great majority of his patients recovering, if not too seriously hampered by the administration of unsuitable drugs. He should in most instances carefully explain the nature of the complaint to the owner; point out the fact that the condition of the pulse is such as to occasion him no alarm; advise him that an alteration in the pulse will be the first sign of a likely fatal conclusion; and pledge himself to immediately warn his client should such alteration unfortunately occur. So long as the pulse remains good, the patient's strength is maintained,



and his system responds readily to the action of stimulants, so long may a favourable prognosis be indulged in, and the medical attendant need not necessarily be alarmed at the continuance of pains spread over a period of three or four days. In fact, the comparative cessation of pains, if unaccompanied by an action of the bowels, may sooner be regarded as an unfavourable sign. The time at which the circumstances look their blackest, when the pains are most severe, and the uninitiated lookers-on the most anxious, is often the turning-point in the case, and it is at such moments that I would carefully caution the worried veterinarian to rigorously hold himself in check, and arbitrarily abstain from the exhibition of sedatives. Could he but bring himself to do so in a few successive cases, he would soon come to look upon the pain, distressing to witness no doubt, as only a necessary factor towards a complete and rapid resolution, and would be able, even in that anxious time, to hold out to the solicitous owner still further hopes of a near recovery.

**Treatment.**—My ideas concerning this are somewhat unorthodox. I cannot, therefore, detail my own without first giving that more generally practised. Probably the most common of all is the administration of an aloetic ball, the dose varying from 6 to 7 or 8 drachms, according to the size and age of the animal. Those who follow this usually administer at the same time antispasmodics and anodynes. Others there are who discard the aloes, and rely simply upon the exhibition of the anodynes.

**For the aloes it is said** that the colic in this case is due to a collection of irritating food in the intestine, and that the rational treatment is the administration of a purgative to remove the offending substance.

**The antispasmodics and anodynes** are exhibited for the relief of spasm. Those who so treat their cases

appear to regard spasm as a condition standing alone. Percivall even goes so far as to describe finding spasmed portions of bowel after death. He says: 'The seat of spasm, in common, is the small intestines; in particular, the jejunum and ileum. I have seen the duodenum, however, contracted as well; in one case, a few inches from the stomach, its canal appeared to be perfectly impassable. I have also, in three or four instances, met with it in the large guts; in one all three of them exhibited evident marks of spasm; the cæcum was exceedingly distorted by contraction; . . . even the rectum had manifestly been spasmed.'

If spasm, as spasm only, is what we are to treat in these cases, then the exhibition of a suitable anodyne is doubtless the most correct treatment. Nothing more need be given. Opium in the crude, as a watery decoction, or in the form of a tincture, was usually resorted to. Modern treatment, however, calls for the administration of morphia, or morphia and atropine, hypodermically. Extract of *cannabis indica*, too, has crept to the front a great deal during the last few years. It is said not to derange the stomach and intestines to the extent that opium does; that it relieves spasm and pain as quickly and more permanently, and without arresting the action of the bowels. Chloral hydrate, also, is a favourite drug with those who adopt this treatment.

Even when the more simple explanation of uncomplicated spasm is denied, and the case admitted to be one of obstruction, practitioners still continue the administration of sedatives or anodynes for a different reason. 'It is the pain,' they say, 'that will wear the animal out.' We are not, therefore, to administer a purgative, and simply wait for its operation. We must at the same time alleviate the animal's sufferings. Those who

follow this line of reasoning will, therefore, administer some such remedy as Percivall's :

Aloes sol.	-	-	-	-	-	ʒii.
Tr. opii	}	-	-	-	-	āā ʒii.
Spts. eth. nit.						
Aq. fervens	-	-	-	-	-	O.ss.
Misce fiat haust.						

In the treatment of to-day that would resolve itself into the administration of a 7-drachm ball of aloes, 6 to 8 grains of morphia hypodermically, and about 2 ounces of spts. eth. nit., in a drench.

In addition to the administration of sedatives alone, or combined aloes and anodynes, enemas are frequently thrown into the rectum. Many also advocate the use of hot fomentations to the belly, in order to promote peristalsis. So long as the case lingers on, the exhibition of sedatives in decreasing doses is persisted in; and if the practitioner be particularly bold, the aloes is supplemented by a dose of linseed-oil. It is common, also, to find oil of turpentine administered to prevent the rise of fermentation and tympany.

It cannot be gainsaid that the above line of treatment is successful. At any rate, it has been continuously adopted by a large number of practitioners for a great many years. If anything new is to be introduced, it must show advantages over the old. Whether or no the treatment I am about to advocate will do that can only be judged from experience. For my own part, it has caused me to entirely cast aside the aloes and anodynes in its favour. Several years' experience of a solely stimulative treatment has led me to believe it a great deal more rational than either of those described, and certainly more successful. I have also found it wise to refrain from using aloes. A treatment based upon these lines I shall, therefore, next describe,

**The Stimulant Treatment.**—When first I came to rely mainly upon stimulants in the treatment of equine colic, I naturally turned to what literature I had, in order to see how far I was justified in so doing. This surprised me. Having properly and correctly diagnosed a disease, I used to think that its treatment would follow naturally. A long plodding through the annals and records of veterinary medicine has shown me, however, that such is not the case with this particular disorder. In no single disease, I should imagine, have so many and widely differing drugs been given. From the most potent sedative we know of to the most drastic purge or powerful stimulant the Pharmacopœia possesses, they have all been given. Not only have they been given in the treatment of like disorders in different patients; they have been indiscriminately mixed in single cases.

Now, I do not believe in giving purgatives and stimulants with one hand, and administering sedatives with the other. Above all things, whether the occasion demands the exhibition of aloes, the administration of stimulants, or the injection of morphia and atropine, let us abide by the one treatment we have decided the case merits.

So far as we have gone, our summing up stands thus: In the treatment of subacute intestinal impaction many practitioners rely wholly upon sedatives; others always combine the sedatives or anodynes with aloes; while a few advocate the use of stimulants. So long as matters remain so, a description of any particular treatment of this disorder should be accompanied with fairly sound reasons for its recommendation. I have therefore made the few following pages as argumentative as possible. Without wishing to disturb the routine of those who have for many years practised a particular method with a reason-

able amount of success—a method which, perhaps, the need of their district calls for—I would still wish to appeal strongly to those who are yet wavering.

To commence with, provided we have diagnosed our case, and are certain that we have purely a condition of subacute intestinal obstruction to deal with, we cannot do better than ask ourselves the following questions :

1. *What is the exciting cause of the attack ?*
2. *What is the cause of the pain ?*
3. *What is the actual condition we are called upon to treat ?*
4. *What part of the animal system is it best to operate through—the digestive or the nervous ? Or should our attack be directed mainly upon the offending substance itself ?*

1. *What is the exciting cause of the attack ?* To that question I answer, Undoubtedly in the great majority of cases it is the nature, bulk, or mode of administration of the horse's food. Whether of an indigestible nature, given in too large a quantity, or whether given in such a manner and at such a time as not to admit of a free action upon it by the gastric and intestinal fluids, the result remains the same—viz., impaction of a certain portion, or portions, of the alimentary tract with a mass of improperly digested food.

2. *What is the cause of the pain ?* The pain, I think we may safely answer, is brought about by active peristalsis, followed by spasm of the bowel, either on both sides of, or before, or behind the point of obstruction. This pain, of the severity of which we may judge by noting the animal's symptoms in the most acute case of obstruction we have—viz., twist—we may designate as cramp. This explanation of 'cramp,' however, does not altogether meet the case when we are talking of obstructive colic in its subacute form. Here, in the

majority of cases, we have a state of impaction from end to end of the alimentary tube. What, then, will be the cause of the pain now? It may be, and is partly, due to pressure on, and consequent irritation of, the delicate nerve-endings in the bowels themselves. When, however, we consider that the bowels, already crammed to their full with half-digested matter, are sometimes further distended by the evolution of gases from the accumulated faecal masses, we may confidently assert that we have another and totally different condition of the bowels to reckon with. I am alluding to 'tonic spasm.' When a muscle or its motor nerve receives an abnormal number of vibrations or is overstimulated, instead of contraction being followed by relaxation, permanent contraction or tetanus ensues. The bowels, distended beyond a certain point, are retained in a state of tonic cramp in their ineffectual attempts to deal with the enormous masses they contain. That this is so is fully proved by the entire cessation of peristalsis in many of our cases, as witnessed by auscultation. Call it tonic spasm, atony, paralysis of the bowel, or what we will, it still remains that we have a torpid and stationary condition of the bowels to treat. It is this state of tonic spasm of the whole of the intestinal tract that has, in my opinion, been so generally overlooked in the treatment of veterinary obstructive colic.

3. *What is the actual condition we are called upon to treat?* The favourite, but evasive, reply of the practitioner of veterinary medicine to that question is, 'Remove the cause, and the effects or actual condition will cease,' and, accordingly, in every case he gives a dose of physic. That physic is invariably aloes. I maintain, however, that, before we proceed in an attempt to empty the bowels by such a mechanical method as the adminis-

tration of aloes, we ought rather to stay and ask ourselves: 'Can we by any other means put the tetanized wall into a state approaching its normal condition, and so enable it itself to deal with the offending obstruction?' I think we can, and, reserving my reasons for so saying, will conclude my remarks on this question by stating that, in my opinion, it is the tonic spasmodic seizure of the bowel itself which is the actual condition we are called upon to treat in obstructive colic.

4. *What part of the animal system is it best to operate through—the digestive or the nervous? Or should our attack be directed mainly against the offending substance itself?* The whole crux of the argument concerning the treatment of obstructive colic lies in the answer to these questions. For my own part, I believe that the treatment of the nervous division of this ailment should receive our almost undivided attention; and I further believe that the administration only of drugs that act wholly or mainly on the digestive tube itself, and not on its nervous supply, are unproductive of good, if not altogether harmful. Remember, we cannot depend on the physiological action of the drug being sure to ensue in this case. We are putting our drug into contact with a diseased organ, and must not expect that organ to take up, assimilate, and respond to that drug as the same organ would do in health. In this case the disease of the organ is its atony, spasm, or paralysis. Relieve that, and the bowels will relieve their impaction themselves.

Intestinal movements are dependent on the ganglia of Auerbach's plexus, situated between the longitudinal and inner circular layers of muscle. Secretion is believed to be influenced by Meissner's plexus, lying in the sub-mucous coat. Both of these ganglia, however, are con-

trolled by cerebro-spinal centres and nerves, notably the vagi and the splanchnics. Here, then, is pointed out a ready and open road to a correct treatment, and one which may be followed without the aid of a single dose of purgative medicine. Give a large enough dose of a cerebro-spinal stimulant, and theoretically the case should at once begin to mend. Practice in this case, I can confidently state from experience, only bears the theory out. To make my standpoint clear, I must analyze a few of the actions of the more important drugs used in everyday practice in the treatment of this disorder. As in this chapter I determine to direct attention to what I believe to be the dangerous practice of giving aloes, and to the greater success following a nervous stimulant treatment, I shall confine myself to a few drugs under those headings, concluding with a brief paragraph on the use of anodynes and sedatives.

(a) **Aloes.**—*Reasons advanced in favour of its administration*: It causes a purge, not only of the bowels, but also of the blood. While in contact with the intestine it produces secretion peristalsis. It also increases the flow of bile.

*Reasons why it should not be used*: 1. The length of time it takes to act (sixteen to twenty-four hours) is much too long to have to wait in the horse for an action of the bowels. That must be evident to everyone in view of the short time that is occupied in the passage of the food through the digestive organs.

2. We are waiting then for a something only problematical; for oftentimes it never acts at all, but is excreted wholly by the kidneys, causing hyperæmia of those organs and diuresis.

3. The drug is always more or less nauseating.

4. Its effects are confined mainly to the large intestine;



consequently, if atony of the small intestine exists, it may never reach the position in which its action will be the most marked.

5. It needs to be saponified and emulsified by bile before its prompt solution can be counted upon.

These last two reasons may be considered a little more in detail. It is they that have already made me refer to the action of aloes as 'mechanical.' In face of statements Nos. 4 and 5, no one will dispute that two purely mechanical processes have to be gone through before we can confidently calculate on a dose of aloes creating a purge. It has to pass *almost* passively through the small intestines before it can reach the large, and it requires also to be mechanically mixed with bile before its solution can be expected. Unfortunately, in subacute obstructive colic these very two processes that are necessary for the prompt action of aloes are not at all likely to come about. Regarding the first, I have already pointed out that there is very little movement of the bowels in this form of colic; consequently, the drug may remain almost stationary in the stomach, or at the most gain the first few feet of the small intestines.

With regard to the second process comment is well-nigh useless. In subacute obstructive colic there very frequently is considerable jaundice and torpidity of the liver, in which case the aloes cannot act, or, to say the least, its action is most certainly delayed, owing to the fact that the bile necessary for its prompt emulsification and solution is deficient or altogether wanting.

6. Finally, in the horse there is always a danger of superpurgation, followed by enteritis, laminitis, or possibly death. This ought never to be overlooked.

I am sure that every practitioner who has been in the habit of exhibiting aloes in this disorder must have

sometimes been grievously disappointed and mortified—disappointed and annoyed to see his case recover from the disease he has been treating it for, only to turn round and die in a few short hours, as a result of the treatment itself. Truly, that treatment was worse than the disease. I say here that, if there is a possibility of that occurring in only 1 per cent. of our cases, then aloes ought never to be used. As a matter of fact, when aloes is regularly given, it happens very much more often than that.

(b) **Ammonia.**—Although there are many more to choose from, the drugs I have used as stimulants, and more particularly as nervous stimulants, have been ammonia and nux vomica.

For ammonia, and especially the carbonate, I have a particularly strong penchant. That I am not the only one so inclined, I will show by a few remarks extracted from an article on ‘Ammonia and the Stimulative System of Treatment in Disease.’ This was written by the late Principal Walley, in 1879; but, I may add, I had arrived at almost similar conclusions long before reading his opinions. He says :

‘Physiologically ammonia acts as a powerful stimulant, but does not, like alcohol, increase mental activity, nor does it to the same extent increase the force of the circulation. Its action as a stimulant—owing to its being quickly excreted—is as fugitive as it is rapid, but it does not produce much secondary depression. . . . It is, too, a powerful stimulant to all the glands of the body, as well as to the mucous surfaces generally, acting upon the mucous membrane of the alimentary tract, upon the kidneys, the skin, and the liver. Its effects as a general gland stimulant are well seen in those cases where the pulse is firm, the skin dry, the kidneys in-

active, the mucous membranes icteric, the bowels sluggish, and the fæces coated with mucus, with a hot, dry, and furred condition of the mouth. A few doses of ammonia here will, by stimulating gland function, rapidly alter these conditions. In the stomach and intestines ammonia acts as an antacid and antitympanitic. It is useful in acute or subacute indigestion in horses and cattle when purgatives have failed to act, and the animal shows signs of exhaustion, alternated with strychnine or nux vomica. In the early stages of tympany, the liquor or the carbonate unites with the liberated carbonic acid, and fixes it, and in any stage is beneficial by stimulating the mucous membrane to increased activity, by rousing nervous energy, and by assisting in preventing decomposition.'

Like Professor Walley, I can speak from experience as to the beneficial actions of this drug in subacute indigestion, and I prefer the carbonate for these reasons: it is less volatile and rather more permanent in its actions than the hydrate; also it is more easy of administration, as it may conveniently be given in the form of a bolus.

(c) **Nux Vomica.**—I consider the use of this drug to be specially indicated in the treatment of subacute obstruction. It is a gastric, vascular, and nervous tonic, and antiparalysant; and considering that I have already pointed out that the condition we are to treat in this disorder is mainly one of nervous atony and spasm of the bowel, it must be apparent to everyone that none but the most favourable results will follow its administration. I must not finish my remarks on this drug, however, without a brief reference to two articles in the *Journal of Comparative Pathology and Therapeutics* (vol. v.). Two cases are reported there of salivation caused by the administration of nux vomica in ʒi. and ʒii. doses respectively.

The dose I am about to advocate exceeds this by 6 or 7 drachms, and I can confidently assert that in no single case have I observed anything of a similar nature.

(d) **Turpentine.**—It will be seen, on referring to the section on Posology, that in every case I advocate the use of turpentine combined with linseed-oil. I have chosen that drug on account of its antiseptic and stimulant actions. I have given it mainly to satisfy local prejudice, which thinks that no medicine can be a medicine unless in the form of a drench, and have selected it particularly as conforming closely to the lines on which my treatment is based—viz., stimulative.

(e) **Eserine or Physostigmine.**—Regarding the use of this preparation, I have nothing to say that is not in its favour. I regard it as the most valuable of all recent additions to veterinary medicines. Should we give it to pregnant animals? In vol. ii. of the *Veterinary Record* Horner describes two cases of mares in advanced pregnancy receiving one-tenth of a gramme of eserine and aborting soon afterwards. That should be sufficient to point out that its use must be tempered with caution. Only after all other means have failed, and it becomes not only a question of the life of the foal, but of that of the mother, should it be given. For my own part, I have given it to in-foal mares repeatedly, and have not met with an untoward result yet. With this one exception, I firmly believe that it may be administered advantageously in every case of subacute obstructive colic.

To those who complain of its action being uncertain and unreliable, I would reply in the words of one of our greatest veterinary writers: 'Give a dose sufficiently large, and you will not be disappointed.' It will, when all our other efforts have proved futile, restart that

peristalsis, which means life to our patient, and whose cessation means death. I do not, however, believe a full dose to be always necessary, and have seen doses of 1 grain do all that the most fastidious would require. That dose is sufficient to incite the bowels to action in most cases, and that without an exhausting and painful evacuation of large volumes of fæces. If it fails, it may safely be repeated later in an increased quantity—say, 2 grains, beyond which it is not wise to push its administration.

(f) **Sedatives.**—Our choice of these is a large one, but before saying more I would ask: ‘Should we give sedatives at all in obstructive colic?’ Personally, I think we should not. I know that in saying so I am opposed to a large number of practitioners, but still, after the experience of a very large number of cases, such is my conviction. In the horse I am convinced we have a type of colic to deal with that can in no way whatever be compared with the same disorder in the human subject; and when reading the report of a case, nothing gives me greater annoyance than to find the veterinary writer trying, in conclusion, to bolster up his theories, arguments, and treatment with extracts from books on human medicine. As a profession, we are undoubtedly largely indebted to the medical for much kind help afforded us in the first tottering steps of our babyhood. Now, however, we can and must stand alone. We have here a subject that fairly allows us to do so. It needs a distinct and totally different line of thought from that the medical profession can supply us with in order to enable us to properly grapple with it. There is still room for special research of the most painstaking order. What is wanted is a long array of consecutive cases, with notes and remarks taken on the

spot, and not afterwards altered and enlarged in order to fit in with some preconceived idea. In the tabulation of cases, points invariably strike one that would otherwise be missed—points of value and interest that only a method like that will show up.

Think for a moment. Think that immediately we give a sedative, especially if that sedative be opium, peristalsis is hindered, if not stopped altogether, for a while. Think, again, that cessation of peristalsis, if only of a few hours' duration, is to the horse a very grave and serious matter. It is no use blinding ourselves with the idea that, if aloes has previously been given, we may safely lull the pain while the aloes continues to act. Remember that 'lulling the pain' to a very great extent means also 'lulling the physic,' and that lulling the bowels in the horse suffering from subacute obstruction, with bowels already stagnant, means lulling him to death. Although I do not advise it, to those who must and will use a sedative, let me recommend to them the use of chloral hydrate in 1-ounce doses in preference to opium. It is antiseptic in its action; there are not the after bad constipating effects of opium, there is not that mad delirium, and there is not the amount of dangerous tympany that opium invariably calls up. It is safe to use, its action is soon apparent—usually well within ten minutes—and if its effects are somewhat transient, why, then the same dose may safely be repeated after a short space of time. It is not followed by nausea, and, compared with opium, it does not seriously interfere with the peristaltic movements, and does not hinder intestinal secretions. Here, again, I have notes of a case in front of me where the veterinary writer states that medical men pooh-pooh the idea of chloral being of any use in these cases. Well, let them do so. They are not in the

habit of prescribing for the horse, they are not acquainted with his internal anatomy, and they certainly are not largely experienced in the action of drugs upon him. That chloral is not an anodyne in the strict sense of the word I know. I know that it does not act as a sedative to the periphery of sensory nerves. It acts, however, in an indirect manner through the nerve-centres, and almost invariably induces sleep. Compare the stretched-out, comfortable sleep of the griped animal under the influence of chloral with the mad delirium so often seen with opium, and one can no longer remain in doubt as to the superiority of the former in treating equine colic.

Here are a few of Mr. Hunting's remarks on the use of sedatives in colic, and with them I must close. He says: 'It was argued that in the human subject they administered sedatives with the intention of alleviating the pain, and when they had once stopped the spasm there was no fear of impaction. After the spasm was got rid of, that the normal condition of the bowels would be resumed, and the indigestion pass away. Personally, he (Mr. Hunting) believed that, so far as the horse was concerned, that was arguing upside down. He held that the impacted food was the cause of the spasm or pain, and that the proper thing to do was to remove the cause, even if they inflicted a little more pain. He could say honestly and fairly that he had had a greater number of recoveries under the aperient and stimulant treatment than under the sedative treatment alone.'

I can emphatically endorse all that Mr. Hunting says there. The same good results immediately followed when I refrained from giving sedatives. I am able, moreover, to assure the practitioner that the number of his successful cases would further increase if he also

discontinued the use of aloes, and substituted linseed-oil.

**Posology.**—Provided the animal is suffering from a bad attack of the disorder, with all the symptoms well marked, and the least possible chance of error in diagnosis, I exhibit the following :

R. Ammon. carb. pulv. - - - ʒii.  
 Nucis vom. pulv. - - - ʒi.  
 Sapo mollis - - - q.s. ut fiat bol.  
 Misce; fiat bol. iv.

Sig. : The four balls to be given at once.

R. Ol. tereb.            } - - - - āā ʒii.  
 Spt. ammon. ar. }  
 Ol. lini - - - - - ad O.i.  
 Misce; fiat haust.

Sig. : The drench to be given at once.

This treatment, with the exception of the nux vomica, I repeat again at the expiration of three to four, five, or six hours if the animal is still in pain. In the meantime I throw up frequent enemata of hot water, with sometimes the addition of 4 to 6 ounces of ordinary soap liniment. Should the case tend in any way to become protracted, and if the pulse is strong and not too frequent, I inject hypodermically eserine sulphate, 1 grain. If on the next occasion of my seeing the case there has been no action of the bowels, and peristalsis is still in abeyance, I repeat the eserine in larger quantities—viz., 2 grains.

The preparation of eserine that I have found to be the most reliable is the following :

R. Eserine sulph. - - - - grs. viii.  
 Aq. chloroformi - - - - ad ʒi.  
 Dose, 1 to 2 drachms.

I would recommend every practitioner to prepare this himself. He will have the satisfaction of knowing



exactly the strength of his injection, and he may rely on that preparation keeping practically for any length of time. It should be made in fairly large quantities (say 12 ounces), and, during the handling of the raw drug, it should be remembered that it is highly hygroscopic.

So long as the animal remains ill, I continue the administration of ammonium carbonate, this time combined with zingib. rad. pulv. in place of nux vomica. In fact, it may be taken as a general rule that from the commencement of the pains until relief is obtained ammonium carbonate may be given at intervals of three hours in 1 to 2 ounce doses.

The only modification to be made is when treating a very young cart animal or a nag. In this case the dose of nux vomica should be reduced to half an ounce.

Should the reader think these doses too large, I would ask him to remember that the results embodied in the writing of this chapter are the outcome of several years sole practice of the treatment here laid down, and that nothing but the marvellous and striking statistics following its adoption have led me to give to it the prominence I have done in the past few pages.

To anyone who might feel disposed to adopt it I would offer a few words of caution. If carried out in a half-hearted manner—the doses reduced by one-half to guard against accident, or the administration of eserine deferred until the patient is in a state of collapse—then he may look for nothing but failure. Having diagnosed his case, the veterinarian must be possessed of the courage of his convictions, and be prepared to push them to their ultimate and right conclusion.

Should he doubt, should he waver, I am able to honestly assure him that I have seen no case in which

the apparently excessive doses have proved in any way harmful. On the contrary, after the experience of a long array of cases, I am able to declare the exact opposite to be the fact, and am thereby led to insist so strongly on the correctness of the treatment. In the whole of my practice for certainly the last five or six years I have had no occasion save one to give aloes. That occasion is included in the list of cases at the end of this chapter, and I may say that, even then, I had serious cause to regret its administration. This section on posology is the one I would ask the reader to ponder over most. If my description of the disorder is correct, there can be no doubt that the treatment is right in every detail.

To further set at rest the mind of those who think the doses of ammonium carbonate beyond all reasonable limit, I may state here that one animal, in addition to the usual doses of nux vomica and ol. tereb., received considerably over 1 pound of that drug—1 pound in 2-ounce doses spread over a period of thirty hours. I need hardly say it was an extreme case. It is the occurrence of cases like that which has proved to me the value of the treatment—cases that, under the old treatment of aloes and sedatives, invariably used to die. Only a few trials will convince any unbiassed mind of the splendidly beneficial action of a solely stimulative treatment.

Although very much more might be written on this subject, I feel that already this chapter is lengthy enough. My main object has been to point out what I believe to be the dangerous though common practice of administering aloes or sedatives to the horse suffering from intestinal obstruction in its subacute form. One can always see more, feel more, and know more than one can write. It is not easy to gather up, classify, and tabulate

all the facts, theories, and circumstances that lead one to a certain conclusion. It is still less easy to so arrange those facts as to carry conviction to the minds of others. If I have failed in that, I have failed in a good cause. If I have been successful, I am conscious of having performed a good work for my brother veterinarian, for the stock-owner, and for our equine patients.

## REPORT ON EIGHTEEN CONSECUTIVE CASES OF

<i>No. of Case.</i>	<i>Date.</i>	<i>Time.</i>	<i>Subject and Age.</i>	<i>Pulse.</i>	<i>Temp.</i>	<i>Resp.</i>	<i>Conjunctiva.</i>	<i>Since how long Ill.</i>	<i>Diet.</i>
1	Oct. 10, 1898.	7.30 p.m.	5-years-old cart gelding.	70	101'6	14	Injected.	7 a.m. same day.	No green meat. A mixture of maize, boiled potatoes, and barley meal; soaked linseed cake.
2	Oct. 11.	8.45 p.m.	13-years-old brown cart gelding.	88	103'4	36	Highly injected.	11 a.m. same day.	Ground maize, new oats, and cut new oat straw; soaked linseed cake.
	Oct. 12.	10 a.m.	—	—	—	—	—	—	—
3	Oct. 12.	2.30 p.m.	22-years-old black cart mare; had been used largely for breeding; barren.	48	99'5	13	Highly injected and yellow.	6 p.m. of 11th.	New oats, cut oat straw, old hay, kohl rabi; soaked linseed cake.
	Oct. 13.	10.30 a.m.	—	43	99'6	13	Do.	—	—
	Oct. 14.	10.30 a.m.	—	88	101	13	Do	—	—

## SUBACUTE OBSTRUCTIVE INTESTINAL COLIC.

<i>Water-supply.</i>	<i>Previous Medicine.</i>	<i>Medicine given.</i>	<i>Symptoms, Remarks, etc.</i>
Rain.	Nil.	At 7.30 p.m. Ammon. carb., 2½ oz. Nucis vom. pulv., 1 oz. Sapo mollis, q.s. M.; ft. bol. iv.  At 9.30 p.m. Ol. tereb., 2 oz. Spt. ammon. ar., 1 oz. Ol. lini, 1 pint. M.; ft. haust.	Dull pains at intervals. Lying quiet. Standing quiet. Eating occasionally. Rectum empty and ballooned. I watched this case three-quarters of an hour before pain was evinced at all, and nearly left the farm declaring to the owner that I had been called out for nothing. I did not see the case again, and it afterwards did well.
Drain (dyke).	Ol. lini, 1 pint.	Ammon. carb. p., 2 oz. Nucis vom. pulv., 1 oz. Sapo mollis, q.s. M.; ft. bol. iv.	General dull pains, with excessive straining attempts at defecation at intervals. Symptoms somewhat masked, owing to pneumonia (congestive stage) set up by the inspired linseed-oil given by the owner. Impossible, or rather unwise, to drench. The rectum contained a few hard lumps covered with mucus, and the bowel was ballooned.
—	—	—	Animal quite well in all respects.
Drain (dyke).	Nil.	Ammon. carb. p., 2 oz. Nucis vom. p., 1 oz. Sapo mollis, q.s. M.; ft. bol. iv. Injected hypodermically: Eserine sulph., 2 grs.	Dull heavy pains the whole time. Never violent. Impossible to drench owing to awkwardness. Rectum empty and ballooned. Other bowels, as far as could be felt, impacted. No peristalsis on auscultation.
—		Treated exactly as on previous day, with exception of eserine. Enemata given.	Mare much weaker, and evidently, owing to old age, unable to stand against the attack. Rectum still empty and ballooned. No fæces had yet been passed.
—		Treated as on 12th, with the addition of a hypodermic dose of eserine, 3½ grs.	Still no fæces had been passed, and still no evidence of peristalsis could be gained by auscultation. The temperature, however, was decidedly improved; and the pulse, having gained in strength and become more full to the touch, indicated that the mare would still stand active treatment. Accordingly, I repeated the previous treatment, and also ventured on another and larger dose of eserine sulphate, with the happiest results. The bowels answered to the stimulus, and the case afterwards did well.

## REPORT ON EIGHTEEN CONSECUTIVE CASES OF

<i>No. of Case.</i>	<i>Date.</i>	<i>Time.</i>	<i>Subject and Age.</i>	<i>Pulse.</i>	<i>Temp.</i>	<i>Resp.</i>	<i>Conjunctiva.</i>	<i>Since how long Ill.</i>	<i>Diet.</i>
4	Oct. 14.	10.15 p.m.	6-years-old in-foal chestnut cart mare.	68	101'4	13	Injected.	3.30 p.m. same day.	Soaked split maize and new oats, with bran, cut oat straw, old hay, and linseed cake.
5	Oct. 15.	10.45 p.m.	7-years-old cart gelding.	48	101'4	A continual sob of 32 per minute.	Injected and yellow.	7 p.m. same day.	Green clover, bran, wheat sharps, and cut hay and straw.
	Oct. 16.	8 a.m.	—	—	—	—	—	—	—
6	Oct. 17.	10.45 a.m.	14-years-old nag gelding, property of a miller.	52	101	13	Injected and yellow.	7 p.m. of 16th.	Wheat chaff, maize, and bran.
7	Oct. 27.	6.30 p.m.	24-years-old brown cart gelding.	108	100	12	Injected and yellow.	3.30 p.m. same day.	Maize, cut oat straw, wheat chaff, soaked linseed cake.
	Oct. 28.	7.30 a.m.	—	50	100'2	12	Injected.	—	—
8	Nov. 17.	7.30 p.m.	5-years-old roan nag stallion.	70	101	13	Injected and yellow.	6 a.m. same day.	Out at pasture, but receiving twice daily two feeds of maize, oats, and wheat chaff.
	Nov. 18.	10 a.m.	—	62	101	13	—	—	—

SUBACUTE OBSTRUCTIVE INTESTINAL COLIC—*continued.*

<i>Water-supply.</i>	<i>Previous Medicine.</i>	<i>Medicine given.</i>	<i>Symptoms, Remarks, etc.</i>
Dirty drain.	Ol. lini, 1 pint.	Ammon. carb. p., 2 oz. Nucis vom. p., 1 oz. Sapo mollis, q.s. M.; ft. bol. iv.	Usual dull pains. Animal subject to these attacks, and with difficulty rallied from one in August, 1896, when I treated her with aloes and anodynes. I did not see the case again, but the owner afterwards informed me that the mare did well.
Drain (dyke).	Ol. lini. Ol. tereb. small quantity.	Ammon. carb., 2 oz. Nucis vom. p., 1 oz. Sapo mollis, q.s. M.; ft. bol. iv. Spt. ammon. ar. } āā 2 oz. Ol. tereb. } Ol. lini. 10 oz. M.; ft. haust. Hypodermically: Eserine sulph., 2 grs.	Pains violent. Animal almost ungovernable. Ears and extremities cold. Cold sweat bedewing underneath surface of abdomen, and between the forearms and thighs. Expression anxious. Rectum empty, ballooned, and dry. Bladder empty. I watched the case for an hour, during which there was not one moment of ease. I left her in pain.
—	—	—	Mare quite well. I learned from the owner that the animal gained ease at 3 a.m., and first passed at 7 a.m. a large mass of yellow mucus weighing 3 pounds, together with a few hard knots of fæces, which were saved for my inspection.
Soak or surface-well.	Ol. lini, 1 pint.	Ammon. carb., 2½ oz. Nucis vom. p., 1½ oz. Sapo mollis, q.s. M.; ft. bol. iv. Ol. tereb. } āā 3 oz. Spt. ammon. ar. } Ol. lini, 12 oz. M.; ft. haust.	Usual dull heavy pains. Rectum contained a few hard mucus-covered lumps, and was ballooned. Other intestines (colon) could be felt impacted. Bladder empty. Did not see the case again. Did well.
Soak or surface-well.	Nil.	As Case 4.	Had been in violent pain, but on my arrival was standing perfectly quiet. The countenance, however, looked anxious, and I was, to say the least of it, alarmed at the state of his pulse.
—	—	Did not treat.	All symptoms of pain absent.
Drain (dyke).	Ol. lini, 1 pint.	Ammon. carb. p., 2 oz. Nucis vom. p., 1 oz. Sapo mollis, q.s. M.; ft. bol. iv. Ol. tereb. } āā 2 oz. Spt. ammon. ar. } Ol. lini, 12 oz. M.; ft. haust.	Usual dull pains. No evidence of peristalsis on auscultation. There had been no evacuation of fæces all day, but the rectum was full of a semi-fluid dark-green mass. This I removed, and gave enemata.
—	—	Repeated the same treatment, with the addition of eserine sulphate, 2 grs.	Rectum again full, but there had been no voluntary evacuation of its contents. The case subsequently did well, and there was no purging.

## REPORT ON EIGHTEEN CONSECUTIVE CASES OF

<i>No. of Case.</i>	<i>Date.</i>	<i>Time.</i>	<i>Subject and Age.</i>	<i>Pulse.</i>	<i>Temp.</i>	<i>Resp.</i>	<i>Conjunctiva.</i>	<i>Since how long ill.</i>	<i>Dict.</i>
9	Nov. 23.	10.30 a.m.	Aged (15?) in-foal cart mare.	57	101'4	12	Injected.	Found ill at 5 a.m. same day.	Cut oat straw, wheat chaff, maize.
	Nov. 23.	12.30 p.m.	—	—	—	—	—	—	—
	Nov. 23.	7 p.m.	—	46	102	12	—	—	—
10 <sup>1</sup>	Nov. 30.	7 p.m.	5-years-old chestnut cart gelding.	62	101	17	Normal.	6 a.m. same day.	Bran, maize, linseed, cut oat straw, and wheat chaff.
	Nov. 30.	10 p.m.	—	—	—	—	—	—	—
	Dec. 1.	7 a.m.	—	—	—	—	—	—	—
11	Dec. 5.	9.20 p.m.	5-years-old nag mare; barren.	65	101	15	Injected.	12 noon same day.	Maize, bran, ground wheat, cut oat straw.
	Dec. 6.	12 noon.	—	—	—	—	—	—	—
	Dec. 7.	12 noon.	—	—	—	—	—	—	—
12	Dec. 22.	11.30 p.m.	2-years-old cart gelding.	44 to 74, according to pain.	104'4	28, sobbing	Injected.	3 p.m. same day.	Cut oat sheaves, bran, maize, mangels.

<sup>1</sup> On the night of November 30 I had also two other cases of a similar nature. Circumstances did not permit



SUBACUTE OBSTRUCTIVE INTESTINAL COLIC—*continued.*

<i>Water-supply.</i>	<i>Previous Medicine.</i>	<i>Medicine given.</i>	<i>Symptoms, Remarks, etc.</i>
Dyke.	Nil.	Ammon. carb., 2½ oz. Nucis vom. p., 6 drs. Sapo mollis, q.s. M.; ft. bol. iv. Drench as for No. 8.	Periods of dull pain. Violent at intervals. Slight tympany. Rectum empty and ballooned.
—	—	Injected hypodermically: Eserine sulphate, 2 grs.	No change whatever.
—	—	—	Mare quite easy. One hour after the injection of the eserine and during the day there had been several evacuations of feces of a normal consistence, accompanied by the discharge of much flatus.
Dyke.	Nil.	Same as No. 8, with addition of eserine sulph., 2 grs.	Dull pains. Rectum ballooned and containing a few hard mucus-covered lumps. Colon impacted. No signs of peristalsis on auscultation. Tympany very marked. This I tried to relieve with the trocar, but, failing twice, desisted at owner's urgent request.
—	—	—	The eserine had greatly increased peristalsis, but as yet there had been no passage of feces.
—	—	—	Horse quite easy. Slightly purging. Case did well.
Surface-well.	Nil.	Ammon. carb., 2 oz. Nucis vom., 1 oz. Sapo mollis, q.s. M.; ft. bol. iv. Spt. ammon. ar. ) Ol. tereb. ) ãã 2 oz. Ol. lini, 10 oz. M.; ft. haust.	Sharp pain at intervals. For the most part remaining dull. Eating at intervals. No tympany. Rectum full of a semi-fluid, half-digested material, resembling more, both in smell and appearance, the contents of a stomach.
—	—	I was in this case tempted by the owner to give a dose of aloes, 7 drs.	The mare continued dull all day. Purged towards evening. This purging I could not attribute to the aloes, as it was too soon after its administration.
—	—	—	Mare still continued dull and listless, but picking a little. Dung of a normal consistence. She then purged again towards evening (this time, I think, from the aloes), and caused me no little anxiety for some few days, fearing superpurgation as a consequence of the already irritated bowels.
Dyke.	Nil.	As Case 11, but no aloes. One hour later, eserine sulph., 2 grs.	Pains violent and almost incessant. Perspiration in patches, but animal warm. Anxious, distressed look. Mouth dry, clammy, and hot. The horse got relief at 3.30 a.m. on 23rd.

These were treated on identical lines with the foregoing, and did well. of my reporting them in full.

## REPORT ON EIGHTEEN CONSECUTIVE CASES OF

<i>No. of Case.</i>	<i>Date.</i>	<i>Time.</i>	<i>Subject and Age.</i>	<i>Pulse.</i>	<i>Temp.</i>	<i>Resp.</i>	<i>Conjunctiva.</i>	<i>Since how long Ill.</i>	<i>Diet.</i>
13	Jan. 27, 1899.	3 p.m.	22-years-old brown cart gelding.	54	98'4	35, hurried, short, and gasping.	Injected.	12 noon same day.	16 pounds of material per diem, consisting of maize (3 parts), wheat (1 part), oat straw and wheat chaff.
14	Feb. 7.	5 p.m.	13-years-old in-foal half-strain mare.	52	99'2	20	Injected and yellow.	12 noon same day.	1 stone or more per diem of maize, bran, and wheat sharps, with cut oat straw. One-third of the mixture was wheat.
	Feb. 7.	10.30 p.m.	—	48	100	13	—	—	—
15	Feb. 8.	8 p.m.	4-years-old cart gelding.	40	100	16	Normal.	6 p.m. same day.	$\frac{3}{4}$ stone of mixture of maize, oats, and ground wheat. Oat straw, hay chaff, and carrots.
16	Feb. 13.	7 p.m.	4-years-old brown cart gelding.	50	101'4	20	Normal.	3.30 p.m. same day.	1 stone or more per diem of oats, with oat straw and cut hay.

SUBACUTE OBSTRUCTIVE INTESTINAL COLIC—*continued.*

Water-supply.	Previous Medicine.	Medicine given.	Symptoms, Remarks, etc.
Dyke.	Ol. lini, 1 pint.	As Case 11. No eserine. In this case the bowels had been greatly emptied by repeated evacuations of small quantities of fæces before my arrival.	Started work at 7 a.m. Continued well until 12.30. Received the mid-day meal, immediately after which she was ill. Bathed in perspiration. Pains violent and incessant. No tympany of bowels. Rectum and colon, as far as could be felt, empty. Rectum flaccid. Continually looking round at stomach (not flank). Medicine returning through nose. Regurgitations in œsophagus. Pulse gradually got higher in number and weaker in tone, and one hour after my first arrival I diagnosed tympany of stomach, with possible rupture and death. Death occurred at 1 a.m. of 28th, and I much regret that circumstances did not allow of a post-mortem being made. There was no rupture of stomach. This case shows that too great a reliance must not be placed on the indications of pulse, temperature, and respiration in the first stages of colic.
Surface-well.	Nil	As Case 11, but no aloes. At 6 p.m. injected eserine sulph., 1 gr.	Pains dull when animal was down. Violent when up. With difficulty could keep mare on her legs. Much groaning and painful attempts at defæcation. Rectum empty and ballooned, but mare had passed a few hard lumps of mucus-covered dung during the day. Slight tympany, but no sign of peristalsis on auscultation. Animal was at work from 7 to 11 a.m.
—	—	—	Mare quite easy. Drank water greedily. Picking her bedding. Food withheld until morning. Had passed immense quantities of flatus and one large heap of fæces.
Surface-well.	Nil.	Ammon. carb., 2 oz. Nucis vom., 1 oz. Sapo mollis, q.s. M.; ft. bol. iv. Spt. ammon. ar. } āā 2 oz. Ol. tereb. } Ol. lini, 10 oz. M.; ft. haust.	Animal had been at work in the morning. Dull pains. Rectum ballooned and containing three or four fairly soft dung-balls. Other bowels could be felt impacted. Bladder empty. Case did well.
Rain collected in vat and soak-well.	Gin, opium, and linseed-oil.	As Case 15.	Dull pains. Groaning when lying. No peristalsis on auscultation. No tympany. Rectum full; flaccid when emptied. Case did well.

## REPORT ON EIGHTEEN CONSECUTIVE CASES OF

<i>No. of Case.</i>	<i>Date.</i>	<i>Time.</i>	<i>Subject and Age.</i>	<i>Pulse.</i>	<i>Temp.</i>	<i>Resp.</i>	<i>Conjunctiva.</i>	<i>Since how long Ill.</i>	<i>Diet.</i>
17	Mar. 26.	3.30 p.m.	5-years-old brown cart gelding.	72	101'2	13	Injected.	10.30 a.m. same day.	Maize, cut oat straw, mangels, and linseed cake.
	Mar. 26.	9.30 p.m.	—	50	101	13	—	—	—
	Mar. 27.	10.30 a.m.	—	65	101'2	13	Normal.	Pains again commenced at 5.30 a.m.	—
	Mar. 27.	5.30 p.m.	—	46	101	13	Normal.	—	—
18	April 1.	10.30 p.m.	10-years-old cart mare; barren.	72, intermittent.	103	17, sobbing.	Normal.	3 p.m. same day.	Wheat chaff, cut oat straw, oats, linseed cake, mangels.
	April 1.	11.45 p.m.	—	—	—	—	—	—	—
	April 2.	8 a.m.	—	63	101'2	15	Normal.	—	—
	April 2.	12.45 a.m.	—	—	—	—	—	—	—

SUBACUTE OBSTRUCTIVE INTESTINAL COLIC—*continued.*

<i>Water-supply.</i>	<i>Previous Medicine.</i>	<i>Medicine given.</i>	<i>Symptoms, Remarks, etc.</i>
Drain.	Nil.	As Case 15, and eserine sulph., 2 grs.	Dull pains. No tympany. No peristalsis. Rectum ballooned, and containing a few hard, mucus-covered lumps.
—	—	Enemata and repeated smaller doses of ammonia and nux vomica.	Slight peristalsis. Animal apparently easy, but no action of bowels.
—	—	Ammon. carb., 2 oz. Nucis vom., 1 oz. Sapo mollis, q.s. M.; ft. bol. iv. Ol. lini, 1 pint (haust). Hypodermically: Eserine sulph., 2 grs.	Rectum still empty and ballooned. Peristalsis quite absent. Usual dull pains. No tympany. Animal was quite easy all night, but pains commenced again at 5.30 a.m. After giving the medicines and injecting the 2 grains of eserine, I left the case until 11.40. During my absence of a little under an hour the horse had evacuated several copious lots of semi-fluid fæces, preceded by one or two mucus-covered hard quantities. Seeing the eserine was still in operation, and that a sufficient action had been arrived at, I injected an ordinary dose of morphia and atropine.
—	—	No treatment.	Animal standing up eating a bran mash and apparently comfortable. Case did well afterwards.
Drain.	Nil.	Ammon. carb., 2 oz. Nucis vom., 1 oz. Sapo mollis, q.s. M.; ft. bol. iv. Spt. ammon. ar. } $\bar{a}\bar{a}$ 2½ oz. Ol. tereb. } Ol. lini, 1 pint. M.; ft. haust. Eserine sulph., 2 grs. Hypodermically.	Dull pains. No tympany. No peristalsis. Rectum ballooned, containing a few hard, mucus-covered lumps. Straining attempts at defæcation when hand was introduced.
—	—	Injected hypodermically, morphia and atropine, to stay excessive action of bowels from eserine.	Still in pain, but bowels acting freely.
—	—	Gave boli, as before.	Animal in pain and peristalsis again in abeyance, owing to the sedative. Did not this time give eserine, but relied solely on ammonia carbonate and nux vomica.
—	—	—	Animal easy and picking a little food. Case afterwards did well.

The stimulative treatment advised in the foregoing pages was first published in 1900. Since then it has been favourably mentioned by Mr. E. R. Harding, M.R.C.V.S., of Salisbury, who made it the subject of an address delivered before the members of the Southern Counties Veterinary Medical Society in 1901. The subject of Mr. Harding's remarks was the 'Treatment of Intestinal Impaction.' For his words I am indebted to the report contained in the *Veterinary Record*.<sup>1</sup> They are as follows :

'My reason for choosing this subject was, not that I have anything original to offer you, but rather the reverse. It is to give you my experience of the treatment advocated in a very able article by Mr. H. Caulton Reeks, F.R.C.V.S., of Spalding, Lincolnshire, which appeared in the *Journal of Comparative Pathology and Therapeutics* for March, 1900.

'The disease is a common one to practitioners in agricultural districts, owing mainly to the domestic mismanagement of the farmer's horses. The system which prevails in the district in which I practise seems to be pretty general. The horses have their first meal about five o'clock in the morning. It consists of a small portion of corn, generally soaked maize ; in some cases half maize and oats. With this is mixed a large quantity of wheat or oat hulls or cut straw chaff. After they have been feeding on this for an hour and a half, they are turned out to drink, then harnessed, and start for work at seven. They are kept at it, with but very few exceptions, without more food or water, until between three and four in the afternoon. They certainly have a rest about noon, when the men get their lunch, but they have to stand in their harness, mayhap, in the hot sun or cold

<sup>1</sup> *Veterinary Record*, vol. xiv., p. 108.

wind and rain. When they return to the stable they have a similar large feed to the morning one—if anything, a little more—without any water until after they have finished. They are then turned out to the trough, and we can imagine the quantity they drink after eating such a large meal and working all day. In a few cases nose-bags are provided for them at noon, and on those farms “colic” cases are not so frequent.

‘The exciting causes, then, may be said to be the long intervals between feeding and the large amount of indigestible food given them at each meal.

‘The symptoms of a subacute case are those which do not give rise to any alarm on the part of the owner or attendants. The animal looks dull, refuses food, lies down in the natural position, and remains quiet for some little time, with the exception, perhaps, of looking round to his flanks. He will then get up and pick a few mouthfuls of straw. After standing for some little time, pawing occasionally, he will gradually make up his mind to lie down again. There may be little or no tympany, the pulse, temperature, and respirations practically normal; examination per rectum will reveal that bowel to be almost empty, while other portions of the intestines will be found to be full of a mass of dough-like fæces. There will be an entire absence of abdominal sounds. If relief be not afforded, the symptoms will soon become more alarming. The animal will be up and down constantly, and, when down, rolling; in fact, not still a moment. The tympany becomes much greater, and he breaks out in patches of sweat; pulse and respirations accelerated. Oftentimes we are too late to watch the subacute symptoms, but on our arrival the patient is in a desperate condition, perspiration literally pouring from him, great tympany, pulse nearly 100, respirations much accelerated,

nostrils dilated, an anxious expression—in fact, apparently dying.

‘I should like here to quote a paragraph from Mr. Reeks’ article. He says: “I cannot lay too great a stress on the value of taking the indications of the pulse, temperature, and respirations collectively, in order to avoid error in prognosis. I never look upon a case as approaching dangerous unless I get a full warning from all three.” Then he refers to a case in which the animal had been rolling in violent pain before his arrival, but was then standing perfectly quiet with a pulse hammering away at 108. But the temperature was only 101, and respirations 12. The animal recovered.

‘**Treatment.**—In my younger days this consisted of aloes and opium or belladonna, with warm water enemas. This was successful to a certain degree, but there was frequently two days’ purging. About twelve or fourteen years ago eserine was introduced, and I have used it ever since, and, with Mr. Reeks, I have nothing to say of it which is not in its favour. *But it is his nervous stimulant treatment to which I wish to draw your attention.*<sup>1</sup> I must quote from him again. He says: “The bowels, distended beyond a certain point, are retained in a state of tonic cramp in their ineffectual attempts to deal with the enormous masses they contain, and then we have a torpid and stationary condition of the bowels to treat.”

‘The treatment he advocates is a large dose of a cerebro-spinal stimulant, and he chooses carbonate of ammonia and nux vomica. I must admit to being astonished at his dose, viz., 2 ounces ammon. carb. and 1 ounce nux vom., made into four balls and given at once—that is to a big agricultural horse, with well-marked symptoms. This is followed by a draught consisting of 2 ounces of spts.

<sup>1</sup> The italics are mine.—H. C. R.



tereb. and spts. ammon. arom. and a pint of ol. lini. He repeats the ammon. carb., substituting pulv. zingib. for nux vomica in three to four, five, or six hours, if the animal is still in pain, and in the meantime gives frequent hot-water enemas. Should the case tend to become protracted, and the pulse is strong and not too frequent, he injects hypodermically eserine sulph. 1 grain, and if on the next visit the bowels have not acted, he gives eserine sulph. 2 grains, still continuing the ammon. carb.

*'I have adopted this treatment with a little modification with great success.'*<sup>1</sup> The patients recover much more quickly, and without the nausea and purging occasioned by aloes. I at once inject hypodermically 2 grains of eserine, and give the dose of ammonia and nux vomica in three balls, and leave the draught to be given in two hours. In many cases this has effected a cure, but if there is no improvement in six or eight hours I repeat the ammonia and sometimes the eserine. If the horse is very tympanitic, I puncture the bowel with the trocar and cannula before injecting the eserine. In several cases in which the first dose of eserine did not give the required result I have repeated the 2 grains in two hours with excellent results. *I never give aloes nor opium now.*<sup>1</sup> . . . Since I have adopted this treatment the horses get better much more quickly. It used to be two or three days, but now I seldom have a case last more than thirty-six hours.'

The reading of Mr. Harding's paper led me to write asking him to favour me with a short report of some of his cases. He was kind enough to forward the following history of three selected cases of obstruction :

<sup>1</sup> The italics are mine.—H. C. R.

MR. E. R. HARDING'S REPORT ON THREE CASES OF SUBACUTE  
INTESTINAL OBSTRUCTION.

Case.	Date.	Time.	Subject and Age.	Pulse.	Tempera- ture.	Respirations.	Conjunctiva.	Since how long ill.	Diet.	Water supply.	Medicine given.	General Remarks.
1	Nov. 20.	6 p.m.	Cart geld- ing, 9 years.	60	101	14	Injected.	About noon	Mixed: maize, oats, peas, barley, and beans; cut wheat straw.	Well.	Ammon. carb., 2 oz. Nucis vom., $\frac{1}{2}$ oz. Sapo. moll., q. s. M.; f. bol. iii.  Also hypodermic dose of eserine, 2 grs.  Chloral hyd. Aqua ad, 1 pint. M.; f. haust.	Dull pains, mostly lying down. Abdomen full, but not much tympany. No evidence of peris- talsis. Rectum empty. Small quantities of hard faeces had been passed at short intervals. By nine o'clock a large quantity of faeces had been evacuated; the pain more acute; sweat- ing in patches; respiration hurried. The chloral was given to subdue this, although it is the usual result of eserine; but it was getting late, and I wanted to get home. I did not see the horse again.
2	Dec. 2.	2 p.m.	Cart mare, 12 years.	80	102.4	30	Injected.	About an hour.	Soaked maize and oats; wheat hulls and straw.	Well.	Eserine sulphate, 2 grs., injected hypodermically.	This mare was brought to my infirmary in an alarming condition — sweating and blowing. Tympany very great. Peristalsis was soon much increased by the eserine, and much flatus was passed at short intervals. In two hours the mare was quite easy and all tympany gone, and she was looking about for food.
3	Dec. 17.	1 p.m.	Cart mare, 6 years.	54	100	13	Yellow.	Taken ill at work same morning.	Soaked maize, wheat hulls, and straw.	Well.	Ammon. carb., 2 oz. Nucis vom., $\frac{1}{2}$ oz. Sapo. moll., q. s. M.; f. bol. iii.  Eserine sulph., 2 grs. Injected hypo.  Eserine sulph., 2 grs. Injected hypo.	Usual dull pains; little tympany; rectum empty; other bowels full. Eserine induced evacuation of flatus only. At three o'clock she was no better, and tympanites returning, so gave second dose of eserine. This produced copious evacuation of faeces, at first hard, but quite soft later. I left her at 4.30, still in a little pain, but quite thin. Was told that she soon got better after I left.

## CHAPTER X

### SUBACUTE OBSTRUCTION OF THE SINGLE COLON

**Definition.**—Obstruction or stoppage of a subacute type occurring in the single or floating colon, or in the rectum. For my purpose in this chapter I have considered the rectum as, what it really is, the last portion of the small colon, and shall therefore refer to rectal impaction under this heading.

**Causes.**—Without referring the reader to any general cause other than those already mentioned in Chapters IV., V., and IX., I would ask him to remember one or two peculiar to this disorder only. Anatomically the build, and physiologically the function, of the floating colon offer two fairly powerful predisposing incentives to obstruction, and that of a rather dangerous type.

Firstly, the sacculated nature of this viscus is such that it compresses the fæcal matters into rounded or oval-shaped masses, peculiarly fitted to form obstructive lumps when other causes favouring impaction concur.

Secondly, the function of this intestine is largely to complete the absorption of the fluid matters of the aliment, and we may easily understand, when this absorption of fluid is carried on to an abnormal extent (as, to offer a simple instance, in a case of acute and prolonged

febrile disturbance) how that the accumulated lumps of faecal matter become so hardened by the withdrawal of moisture as to seriously prejudice their chance of effectual displacement by normal intestinal movements.

Also, regarding this portion of the intestinal tract, some little attention should be paid to the consideration of nervous trouble as a primary cause. I do not wish the reader to imagine anything obscure in its nature or of comparatively rare occurrence. It is something quite simple to understand, and of more or less every-day happening. Everyone is aware of the fact that a nerve is paralyzed—its function temporarily inhibited—by being in contact with an overworked or tired muscle, a muscle that is impregnated with effete materials that its long continuing work has left it too fatigued to rid itself of. It may be, perhaps out of sympathy, perhaps by a process of absorption whereby it takes up a certain amount of the poisonous muscle waste, that nerves or nerve-centres in close apposition with such overworked muscles become paralyzed, and fail temporarily to perform their proper function.

In this manner the posterior mesenteric plexus (formed in great part by the lumbar portion of the great sympathetic system, and furnishing branches for the supply of the small colon and the rectum) may often be so induced to a state of dangerous lethargy. The lumbar portion of the sympathetic, lying as it does in close contact with the psoæ muscles, and being largely covered by the posterior vena cava, would be almost the first nerve-centre supplying the intestinal tract to feel the ill effects of the waste materials from the muscles of the hind limbs and the loins. At any rate, whatever the explanation may be, it is certain that prolonged and excessive work, especially that of a heavy hauling nature, telling

principally on the muscles of the lumbar region, has a peculiar depressive action on the urinary apparatus and the last portions of the bowels—a depressive action that effectually tends to a torpid and stationary condition of the bowel contents.

We are not to be greatly surprised, then, that the effects of a long day's heavy carting are likely, from a constipating point, to settle themselves in the small colon or rectum.

Apart from this temporary derangement of the nervous system, the practitioner will occasionally—very occasionally—meet with cases of total paralysis of the rectal walls, which, until noticed and correctly treated, will again lead to subacute obstruction.

**Symptoms.**—All the usual symptoms of colic will be found in evidence here. There is the usual getting up and down, the anxious looks round to the flank, the patchy perspirations, and the common changes in the temperature and respirations. The pulse, almost from the very commencement of the case, is weak, or, rather, undecided, in character, at one moment filling the artery to a comfortable firmness, at another dwindling down to an indistinctness nearing the imperceptible. This may all occur within a few seconds and during one observation, and its number of beats will vary from 70 to 80 or 90 per minute.

Compared with the other two forms of obstructive colic, there is not that period of total ease so frequently occurring between the paroxysms of pain. In obstruction of the double colon, for instance, we commonly have periods of ease in which the pulse drops to a normal condition, both regarding its tone and number of beats.

In obstructions of the single colon that seldom or

never occurs. What does happen, however, is so misleading to the casual observer and of such importance to the careful inquirer as to merit special attention. The patient, certainly for some few minutes, will stand, to outward appearances, quiet. If the judgment is hurried, this will be confused with the usual period of ease in ordinary colic. The case will be dismissed as 'nothing dangerous.' The pulse tells a different tale. It is still maintaining a troubled, fluttering beat of 70 to 80, and is evidence enough of serious conditions within. The conjunctiva is reddened, though not to such a degree as the continuous pains would at first appear to point, while the perspirations mentioned above do not incline to become cold or clammy.

If not relieved, towards the end of the first twelve hours the animal shows more or less tendency to stand in a stretched-out condition, as though attempting to urinate. The marked frequency with which this stretching occurs in this form of colic is a warrant sufficient for pointing it out as a special symptom.

Later, the periods of apparent ease become fewer and farther between, and the animal is in more or less constant pain. Another symptom, frequent to a point approaching the diagnostic, is violent straining, which is persisted in with such force as to move the onlookers to fear for the patient's safety. During the straining the patient emits a series of painful groans, and the mucous lining of the rectum is often everted to the extent of several inches. If a mare, and especially if she be with foal, the vulva is in like manner everted, and the pains sometimes of such a severity as to suggest the act of foaling.

The hand inserted in the rectum is met by a violent expulsive action of the bowel, accompanied by straining

efforts on the part of the patient, while the bowel itself exerts a peculiar glove-like clasp upon the arm.

The pelvis is found to contain portions of bowel beyond its normal contents : if small intestines, empty ; if single colon, more or less impacted with ingesta. Sometimes it fortunately happens that the very portion of bowel giving rise to the trouble is well within reach of the operator's arm. If so, no further doubt as to the exact nature of the case he is treating need remain in his mind.

In different cases the obstructed bowel varies in shape and size from a small portion resembling a large cocoon to an impacted length of from 6 to 12 inches. That this impacted portion is the actual cause of trouble is fairly evidenced by the symptoms induced by its manipulation. Pressure on it, even if of a careful and tentative nature, will cause the patient to evince unmistakable signs of pain. Swerving from side to side, he endeavours to escape the inserted arm ; and, persisted in, the manipulative movements will bring him with successive crouching gestures to the ground.

In most cases, contrary to what one would imagine, tympany is absent ; and it is only towards the end of the attack, when the case is approaching a fatal termination, that it occurs to any appreciable extent. Enemas introduced with a nozzle of ordinary length are not retained, but forcibly ejected almost immediately after their injection.

Should the case be one of rectal impaction, its nature will at once be apparent directly the hand is introduced into the rectum ; and, so far as the purposes of this chapter are concerned, a consideration of its other symptoms are unnecessary. Provided the animal is healthily strong prior to the attack, and his end is not hastened by the exhibition of sedatives or violent purga-

tives, the case is of a somewhat lengthy nature, and may not near its conclusion until the third or fourth day.

**Diagnosis.**—In some cases this is remarkably simple ; in others just as difficult. After all is said and done, there can be but one absolutely diagnostic symptom, and that is the detecting, by manipulative measures in the rectum, of the offending portion of bowel.

It will be seen, however, that I have carefully refrained from giving symptoms which might be truthfully described as general, from which I wish the reader to infer that such few as I have related I wish to be regarded as reasonably diagnostic. That being so, I will conclude this paragraph by simply summing them up again in brief.

The continuousness of the pain, as evidenced by the state of the pulse, without definite concomitant symptoms pointing to a more grave condition, as, for example, enteritis, twist, or rupture ; the tendency to stand in a stretched-out posture, with ejected penis and quivering tail ; the gradual increase in the severity of the pains if not soon relieved ; the violent straining attempts at defæcation, and the clinging, clutch-like grasp of the rectum on the operator's arm ; the violently expulsive action of the rectum on anything introduced *per anum*, and the presence in the pelvis of distended or flaccid coils of intestine—all these are symptoms requiring careful consideration when summing up for a diagnosis.

Without rashly venturing the opinion that these manifestations may be relied upon to furnish a correct verdict in every case, I am, nevertheless, fully decided that many of these attacks will thus be absolutely differentiated from other forms of colic, and a corresponding improvement in the treatment be the happy result. In course of time this should lead to the report of further cases by



other veterinarians, and an increase of information on this particular subject should be engendered by the working upon it of more than one set of brains.

**Prognosis.**—In a former chapter of this book I have definitely stated that any case of colic is to be regarded as serious if distended coils of intestine are to be found in the pelvis. A consideration of such cases of obstruction of the single colon as have fallen to my share leads me in no great degree to deviate from that earlier-formed conclusion. I therefore feel myself justified in advising the veterinarian to offer his client a cautious and guarded explanation of the state of affairs. Should the day fortunately arise when operative interference with the horse's abdomen becomes a more frequent occurrence, then this particular form of colic will be the first to benefit thereby, and so yield a prognosis of a more favourable type. If the case is one of rectal paralysis, pure and simple, then the prognosis must be even more guarded still. These cases are generally insidious in their onset, and usually unaffected by therapeutic measures.

**Treatment.**—*Taking the case of total paralysis of the rectal walls* first, we may dispose of it very briefly by saying that a trial should be given to a long course of nervine tonics—*e.g.*, strychnia, which tonic is well accompanied by potassium iodide as a resorbent. The application of a smart blister to the lumbar region should be advised, and the patient's daily comfort should be insured by removing from the rectum several times per diem the accumulated fæcal matters.

*Concerning the impaction of the colon*, I would, as for the other forms of subacute obstruction, advocate the adoption of purely stimulative measures; in which case the balls of ammonium carbonate and nux vomica may

be administered as for the colic treated of in the last chapter. These should again be followed up by the regular administration (every two, three, or four hours) of boli of zingib. rad. pulv. and ammonium carbonate, together with the exhibition of copious oleaginous draughts combined with ol. tereb. and ether meth., ol. menth. pip., spt. eth. nit., or any other diffusible stimulant that may suggest itself.

Although it is not my own practice, I would also mention that a dose of aloes is not seriously contra-indicated. In fact, in this instance there is only one argument that can fairly be advanced against it, and that is the fact that in some cases aloes does not act at all, but passes off by the kidneys. Should that happen, the veterinarian unfortunately receives no intimation thereof, and is thereby restrained (by fear of causing superpurgation) from pushing on that vigorous stimulative treatment which his own common-sense would immediately suggest were he only positively certain of the non-acting of the drug upon which he has placed reliance.

After the expiration of ten to twelve hours, should the case show no improvement, it will be necessary to seriously consider the advisability or otherwise of administering a hypodermic dose of eserine, regarding which I have a remark to make. I do not pretend to offer any explanation of the fact, but I do most confidently assert that in this particular form of obstruction eserine does not show itself to its happiest advantage. To my mind that points out a satisfactory solution of what was to me at one time a serious problem. I could not understand veterinarians of experience rising to their feet at various meetings and emphatically declaring eserine to be of no value in colic cases: that it did not

act as it was said to do. In the light of fuller experience I am able to see an adequate reason. They had not used eserine on suitable cases. In spite of my opinion that this is not its happiest *forte*, however, it still remains a fact that eserine does act occasionally, even in *posterior* obstruction of the colon; and, after other remedies have been given a trial of from ten to twelve hours, its exhibition should no longer be delayed. The dose should not be a large one. Should it fail to act, as I have already said it may do, then the active peristalsis set up in the intestines anterior to the seat of obstruction is extremely likely to lead to a fatal lesion of the intestines or the mesenteric bloodvessels. There is, however, no risk in the administration of a *small* dose, say one grain.

In view of what I have said concerning the likely nervous causation of this disorder, no one, I should imagine, will expect me to advocate the use of sedatives. If it were possible to do so, I would denounce their administration in even stronger terms than I have already used. I find it impossible to do so, however, and must content myself with the simple statement that their use is undoubtedly most strongly contra-indicated.

If the obstruction is within comfortable reach, the veterinary surgeon should carefully knead it with the knuckles of his closed fist through the rectum, endeavouring to crush it between his hand and the floor of the pelvis. It may, and does, cause pain, but it is also productive of good results.

It goes without saying that, in addition to whatever treatment is being adopted, copious enemas should, at the same time, be freely indulged in. In fact, the apparatus for so doing should be left with the attendants if the veterinary surgeon is unable himself to frequently attend. The water should be used as hot as regard for

the animal's safety will allow, and with it should be included, at intervals, some good stimulating agent. Whether detached pieces of fæces come away with the ejected water or not, the rectal irrigation should be persisted in, and the attendants should be firmly impressed with the idea that it is the constant warmth that tends to do good.

Should all these means prove futile and the case still linger on, the long rectum-tube of Smith should be passed into the gut and, if possible, while a stream of water is passing through it, inserted for the whole of its length. It is important to keep a constant flow of water, at a fairly high pressure, through the tube, in order that it may find a ready and correct road. In case the tube should not be available, a similar length of garden-hose of suitable stiffness will answer tolerably well. The only drawback to the use of the rectal tube is the need of a forced water-supply. To those resident in a country district that obstacle to a correct treatment is in most cases an insurmountable one—unless the animal is walked to the nearest market-town to the veterinary surgeon's establishment.

Finally, if all the efforts of the veterinary attendant are in vain, he may, if his position will bear the shock of a serious failure, and the age of the animal and its market value warrant him, talk to his client of operative measures. But of that more in a future chapter.

## CHAPTER XI

### SUBACUTE OBSTRUCTION OF THE SMALL INTESTINES

**Definition.**—In spite of the fact that post-mortem records have not yet described a case of obstruction of the small intestines. I feel led, by the clinical evidence I have obtained, to give it, or at any rate the possibility of its occurrence, a place of description. Clinical evidence, as I hope this chapter will show, offers for our consideration a form of obstruction whose position in the intestinal tract is certainly far forward in the double colon. Whether further forward still, and obstructing the small intestines, only future records will show. What evidence *is* obtainable appears to point strongly to the fact that obstruction of the duodenum does sometimes occur, and that ‘stoppage’ pains are not always to be precipitously referred to the single or double colon. The only argument against that statement is the one—‘post-mortem records have *not* shown it.’ Purely negative evidence, however, is seldom really satisfactory; and I hope that the symptoms hereafter described will substantiate my statement that obstruction of the small intestines, most probably of the duodenum, has sometimes to be reckoned with.

**Causes.**—Regarding the causes of colic, I am afraid

that I have ran almost to the end of my tether—or, rather, have already enumerated them—and must again refer my readers to former chapters, allowing them to use their own discretion in each particular case as to which special causative factor they should give prominence. Still, there are one or two circumstances that merit special mention.

Foremost should come consideration of the duodenal S-trap. It is not hard to conceive of the possibility of this being a likely position for obstruction. Pressed, as it sometimes is, between the stomach and a distended colon, it would be remarkable if obstruction did not occur. Neither is it difficult to imagine that food imperfectly masticated and passed on in a half-digested or acid condition from the stomach, and consequently unfit to be acted upon by the bile, should tend to stagnate in the duodenum.

Following this, those morbid conditions of the liver that are instrumental in bringing about these disorders should be given attention. I, in common with many others, have noticed that prolonged feeding on rich nitrogenous foods will bring about a plethoric condition of the body that makes its first appreciable appearance in some disturbance of the liver functions. The animal becomes bilious. Congestion of the liver, or the diminished flow of bile from any cause, may, then, be put down as a factor in the production of duodenal obstruction, for, with a lessened flow of bile, the digestion is imperfect, and a tendency to stasis is occasioned.

**Symptoms.**—Almost invariably the pains that accompany this disorder are those of an extremely dull type—even more dull than those that have already been described as dull pains. Pain of a degree there certainly is, but a certain amount of time must be given over to its

consideration before it can be accurately traced to its correct source.

For some days prior to the exhibition of signs of uneasiness, the animal has been heavy, has not performed his work with activity and brightness, has appeared unusually dull and drowsy. When down he lays quiet for a considerable time, and only occasionally manifests the seat of trouble by a quiet look round at the flank. Rectal exploration reveals the presence of a few small, hard fæcal lumps, which are abnormally dark in colour. *The colon, and such of the bowels as can be felt, are not abnormally full, neither is there any undue fulness or tympany of the abdomen.* The pulse is raised a little beyond the normal, and is firm and full to the fingers. The temperature shows slight signs of febrile disturbance, and the conjunctiva is *plainly stained a muddy yellow*, more so, even, than is seen in that form of colic that is plainly referable to the great colon. The mouth is dry and sticky, and the odour of the breath abominably offensive, while the tongue and buccal mucous membranes are stained in like manner as the conjunctiva.

It is not common, however, for the veterinary surgeon to be called in at this stage. When first he sees the case, the symptoms are more after this description :

The pains have become a great deal more noticeable, but still remain under the category of 'dull.' The getting up and down has become more frequent, although fairly long intervals of ease are even now common. The pain, when it does come on, is most intense just after the expulsion of a watery and extremely offensive purge, but rapidly subsides immediately after the first few minutes succeeding the evacuation. While the surgeon is watching his case this purge may be repeated two or three times within the hour.

Called in at this stage, the young practitioner, unless extremely wary, will be tempted to treat his case as one of simple diarrhœa, and administer astringents and sedatives. Needless to say, he commits a grave error. If, on the other hand, he is possessed of caution, and first explores *per rectum*, he will find a state of affairs there that do not fairly substantiate his first surmises. Certainly he will find the rectum, and probably also the single colon, *with their contents, in a fluid condition*. In addition, however, he will discover other portions of the intestines *still containing fecal matter in a state of solidity*—proof positive that the purging has not been in existence for long, and equally positive proof that the purgation is not accountable for the dull pains that the carefully elicited history of the case has spoken of. Immediately on noting this, he will, if his clinical training be good, also observe that the pains the animal is showing are not of the kind that usually accompany the colic from excessive purging (see Chapter XV.). There is not the tucked-up condition of the flank; there is no excessive peristalsis on auscultation; there is no great alteration in the number of respirations nor their character, and the pulse is not in that weak and fluttering condition so commonly coexistent with colic from superpurgation. *Neither will the animal show desire for the water offered him.*

This affords a suitable opportunity for mentioning a symptom, which, until now, has been carefully omitted. It is a well-known fact that the horse suffering from obstructive colic cannot, except in very rare cases, be persuaded to drink. In this particular instance it is almost proof that the animal is suffering from the pains of obstruction, *and not those occasioned by an excessive purge*. If it were the latter, he would be eagerly looking round



on every rattle of a bucket, and, permitted, would drink to an alarming excess.

If the veterinarian is of the same mind as myself, having decided that the purging is not directly accountable for the pains, he will refrain from giving the animal sedatives. . . . He will treat the case purely as obstruction, and persist in a solely stimulative treatment. Should he do so, he will, on his next visit to the case, have every reason to be delighted with his judgment. If it is his first case of this description, he will be quite anxious to learn whether or no the purging has stopped unaided. He is pleased to find that such is the case, and to hear that the animal has passed nothing for four, five, or six hours.

Even now there may be an element of doubt, and the concerned thought is that the excreta is so thin as to be running through the bedding and so escaping notice.

The dry tail does not point to it, and rectal exploration again settles the question. The interior of that bowel is quite dry, and sometimes contains chippy pieces of dried fæces. And still the animal is in pain—dull pain—still peristalsis is in abeyance.

The veterinarian knows now by rectal exploration and the evidence of his senses (to wit, the sight of the purging) that the last portions of the intestines—the single and double colons—are comparatively empty. The stoppage or obstruction must lay further forward. It is not likely to be in the floating portion of the small intestines; that he knows from post-mortem experience. It must, therefore, be situate in the duodenum, and the excessive biliary staining of the mucous membranes is now somewhat accounted for. Holding back from administering sedatives has left him in a position to treat his case on rational and not empirical lines.

Correctly treated, the animal may begin to mend in a few hours, or the pains may last for as long as seven or eight days. Commonly it is only a day or two before the animal is, to all appearances, fully recovered.

In every case I have yet seen the critical symptom appears to be the voiding of a huge mass of fæces (clay-like, both in colour and consistence) from the anterior end of the intestinal tract. The offensive smell from this can only be fitly described as 'disgusting.' From that time onward the pains of obstruction vanish, and after a few days' careful dieting and nursing, the animal is out of danger.

**Diagnosis.**—Much of the matter under this heading is often but a reiteration of facts related under the symptoms. Little thus remains for the writer but to emphasize in brief such symptoms as he regards as diagnostic.

Primarily, we must consider the long period of general dulness noticed by the attendants before skilled advice is sought; the comparative absence of fulness of the abdomen as revealed by rectal exploration, and the non-appearance of tympany; the biliary staining of the conjunctiva, and the clammy, fœtid condition of the mouth, with the yellowness of the buccal membranes. These may all be regarded more or less as premonitory diagnostic symptoms, and it is not until the more noticeable colic pains come on and the offensive purge commences that the veterinarian is able to fully satisfy himself as to the correct nature of his case.

The character of the purge is doubtless due to want of sufficient bile in the intestines. The bile exerts certain antiseptic effects on the intestinal contents, and when it is withheld extreme fœtor of the fæcal matters is a consequence. Thus, the fœtor may, to a certain extent, serve somewhat in locating the seat of trouble—may, in fact, in this case, be relied on as a diagnostic.

When the purge has commenced, and the veterinary surgeon is able to accurately judge that this purge is not the actual cause of the colic, it is time he looked round for some other explanation of the pains. When, later, the purge ceases in a natural manner, without medicinal help, and the pains still remain in continuance, it is a fairly reasonable conclusion that obstruction, in some position or other, is still to be looked for.

The emptiness of the abdomen generally and the absence of tympany compel the veterinarian to place it far forward, and, admitting the fact that it is unlikely to be in the floating coils of small intestines in the left flank, the diagnosis, so far as we are yet able to settle it, is complete. We have summed up our case, and 'duodenal obstruction,' with congestion of the liver as a primary cause or after complication, is the verdict.

**Prognosis.**—I cannot say that my experience of these cases leads me to regard them at all unfavourably. They may, as I have before stated, linger on for several days, but never during that time do they offer alarming symptoms. One visits the case every four or six hours, or, should it prove protracted, twice daily, and each examination reveals the animal strong and the pulse good. The only untoward symptom of any gravity—one which I have never yet seen—would be a steady continuance and increase in the purgation. This being the case, the owner may, with every safety, be assured of a favourable issue.

**Treatment.**—Broadly speaking, the treatment of this disorder must be conducted in two ways: Firstly, the obstruction in the intestine should be removed; secondly, such medicines should be administered as will bring the liver to a healthy and normal condition, and so prevent a recurrence of the attack.

Those who have carefully read the preceding portions of this book will see no great difficulty in carrying out the first of these directions. Again, I do not advise the administration of aloes ; at any rate, not as a dependable agent. The mere fact of the bile being thrown back in sufficient quantities into the blood-stream to stain the visible mucous membranes is ample evidence that it will not be found freely enough in the duodenum to assist in the solution of the administered aloes. Assuming that the obstruction has set up such inflammatory changes as to cause a diphtheritic closure of the bile-duct, and that there is collected bile in the intestine, should calomel be given in order to hasten its expulsion ? I am of the opinion that no great amount of good is to be derived from that, unless the system is at the same time helped by suitable stimulant treatment in order to first remove the obstruction.

That statement brings us back again to the ammonium compounds as our sheet-anchor—again advantageously combined with *nux vomica* or other nerve stimulants. Consequently, for the treatment I may, with one exception, refer the reader to that advised for obstruction of the double colon. The exception is the hypodermic injection of *eserine*. I do not believe, in this particular form of colic, its administration is called for. At any rate, any idea of using it may be safely postponed until the case has been treated on other lines for some few days.

Once more, I earnestly caution the practitioner to avoid sedatives. Even when the purging breaks out he should still persist in a solely stimulative treatment, for it is not until the obstructive mass in the duodenum is removed that he may regard his case as out of danger.

When, after the period of purgation (which always seems to accompany these cases), the physician has once

obtained a normal action of the bowels, he may continue with calomel in small doses to clear the intestine of the accumulated bile. He should, at the same time, put the animal upon a course of such medicines as are known to favourably influence liver functions, and so increase the bile secretion.

Probably the most suitable remedy in this case is one of the mineral acids. Before reaching the circulation, *acids must pass through the liver*, where they appear to set free biliary acids, and stimulate expulsion of bile from the liver and gall-bladder.<sup>1</sup> The acid to be preferred is nitric or nitro-hydrochloric, and the following draught should be administered twice daily for three or four days:

R. Acidi nitrici dil.    -    -    -    -    ʒi.  
 Aquam    -    -    -    -    -    -    ad O.i.  
 Misce; fiat haust.

Should the practitioner decide not to administer the acid, he may, now that the obstruction is removed, employ aloes with advantage. Prescribed in ʒ-drachm doses once daily for three or four days, combined with ginger, gentian, or other vegetable tonics, it will exert a mild cathartic action, removing the bile from the intestines and stimulating the liver into activity.

These attacks of duodenal obstruction, when the liver is to any great extent implicated, appear always to leave the animal in a state of great weakness and prostration—perhaps better described as want of tone and general lassitude. An easily digested diet is therefore called for, and the animal should be treated as convalescent for some considerable time. The simpler the diet, the better—bran with a few crushed oats and a liberal supply of good hay being all-sufficient. What water he

<sup>1</sup> 'Veterinary Medicines' (Finlay Dun), p. 178.

has should be medicated with 2 or 3 ounce doses of magnesium sulphate, and the kidneys may be induced to carry off their share of the accumulated effete materials by judicious doses of potassium nitrate, either in the drinking water or the patient's food.

This chapter I will conclude with a very brief account of two cases, which will serve to illustrate what I have already written. In their description I do not intend giving a daily account of the symptoms; that would take up much of my space to but little advantage. The reader will have read the symptoms of this disorder for himself, and will understand that my relation of them has been based upon these and other similar cases. Consequently, a daily record of the symptoms would be but the most fulsome repetition.

#### CASE No. I.

*January 30, 1902, 3.30 p.m.*—The subject of this case was a five-years-old cart mare (barren). I attended the owner's farm, some five miles distant, and received a history of general dull pains spread over the previous day. The pains had appeared somewhat worse (never violent) during the morning of this day, and were accompanied several times by a nasty purge. This had led the owner to send for me. The pains the mare was showing did not appear to be proceeding from purgation; they were rather the ordinary dull pains of obstruction that I have mentioned so often throughout this book.

To make assurance doubly sure I explored the rectum, and found that bowel containing a quantity of dirty liquid fæces, the odour of which was offensive in the extreme. Shortly after this manipulation the mare again voluntarily evacuated a large quantity. As, however, I was unable to detect the usual symptoms of superpurgation (see Chapter XV.), I diagnosed the case as one of obstruction, and proceeded to treat it on those lines. I thereupon administered the balls and drench as advocated in

Chapter IX., p. 100, and left draughts containing diffusible stimulants for after administration, requesting the owner to let me know on the following day if the pains had not ceased.

*January 31, 3.30 p.m.*—My attendance was again requested, and I found the mare exhibiting much the same symptoms as on the previous day, with the exception that the purging had ceased since early the evening before. Accordingly, I repeated the stimulant treatment, and left further medicines of a similar nature. The case was showing no extreme urgency, and I did not propose seeing it again until the following day.

*February 1, 10.30 a.m.*—The pains had now ceased, and the mare inclined to pick daintily at a little hay. The critical discharge of a mass of clay-like, offensive-smelling fæces had taken place. I still continued the frequent administration of stimulants, now in smaller doses and combined with vegetable bitters and tonics, leaving these to be given by the farm attendants.

*February 2.*—No visit.

*February 3.*—Mare still convalescent, but doing well. Had several times passed normal-sized heaps of fæces, healthy in colour and smell, and was now feeding fairly well. Advised the continuance of the tonics and a few days' rest. The case subsequently did well.

## CASE NO. 2.

This case, one of the most remarkable in my experience, was treated some eighteen miles from home. It is astonishing to me as showing the length of time it is possible for a horse to suffer from the pains of obstruction and then recover. I need hardly say that it is one of those exceptions that go to prove the rule.

*February 21, 1900, 12 noon.*—The subject was a six-years-old cart gelding. The owner, a client of mine, came and informed me that he had a horse ill at M——. I had never attended there before on account of the distance, but was persuaded in this instance, as the owner urged that the animal was a valuable one, that he was not satisfied with the treatment the horse was receiv-

ing, and that he was unable to procure skilled advice nearer.

On my arrival I found that the animal was being attended by one of the quacks of the old school, and gathered that he had been suffering from the ordinary pains of colic for some three or four days prior to my being called in. I could not gain much information from the empiric himself, but learned that he had been administering sedatives and aloes.

I immediately insisted on having sole charge of the case, and commenced a vigorous stimulative treatment. I knew that, in addition to the obstruction, I had to fight against previously administered sedatives, and determined to run the risk of creating superpurgation by actively inciting the aloes to action. Accordingly, I administered in the form of balls the usual quantities of ammonium carbonate and nux vomica, in 1 and 2 ounce doses respectively, and the oil of turpentine and aromatic spirits of ammonia in 1-ounce doses, with linseed-oil as a draught. That done, I left the man in charge of the nursing with sufficient balls of ammonium carbonate and vegetable tonics to carry him on until the following day.

*February 22, 9.30 a.m.*—The administered stimulants had had the effect of restarting the peristalsis that had been stayed by the sedatives, and the animal was now purging. Following a similar line of reasoning as is described under the section devoted to diagnosis, I was able to ascertain that, in spite of the purging, obstruction was still present, and persisted in the exhibition of ammonium carbonate and stomachic tonics, together with draughts of ol. lini, ol. tereb., and spt. eth. meth.

*February 22, 6.15 a.m.*—Save that the purging had now stopped, the animal was in much the same condition as in the morning, and, after administering the usual balls and draughts, I injected 2 grains of eserine sulphate under the skin of the neck. Beyond putting the animal in a little more pain, its action was unnoticeable.

*February 23, 9.30 a.m.*—Seeing that there was still no action of the bowels, I again administered the usual draught and six of the ammonium carbonate balls, after



which I ventured on a further hypodermic dose of eserine sulphate. It was again unproductive of good, and I now decided to use it no more upon this particular animal, but to maintain a regular administration of such stimulants as could readily be given *per orem*.

*February 23, 6.15 p.m.*—There was still no alteration in the symptoms, save that the animal had been induced to drink a little thin linseed tea. With no alteration of importance the stimulative treatment was continued.

*February 24, 9.30 a.m.*—The case, to all appearances, was in the same condition as when left the evening previous. The same treatment was continued. Tiring somewhat of the case, being so far from home, and the train service wretchedly bad, I decided to see it no more that day, but left the man in charge a full supply of medicine, with instructions to desist in their administration should the animal turn easier and attempt to eat.

*February 25 (Sunday).*—No service of trains. Decided to leave the case unseen until the Monday morning.

*February 26, 9.30 a.m.*—Animal weak, but recovered and free from pain. Feeding delicately. Appears to have suffered eight months rather than eight days. On the Sunday he had passed the usual mass of offensive dung, which had been saved for my inspection. Save the careful nursing and dieting the animal caused no further anxiety, and made an uninterrupted recovery.

I have described this case with extreme briefness. Lest he should miss the point, I wish the reader to clearly understand that, at intervals of about every six hours, the horse received 2-ounce doses of ammonium carbonate for the whole of the four days I attended him, to say nothing of the frequent administration of draughts containing ol. tereb., spt. ammon. aromat., or spt. eth. meth., as my judgment led me. What the termination of the case would have been had the old empiric's sedative treatment been continued I leave my reader to judge for himself.

This concludes my somewhat lengthy description of the intestinal obstructions. Imperfect as I yet feel it to

be, I hope I have now written enough to lead other observers to the more exact differentiation and diagnosis of these troublesome disorders. I also hope that the foregoing descriptions will have justified me in daring to thus arbitrarily subdivide and suggest new names for the time-honoured (yet, I venture to affirm, out-of-date) title 'Impaction of the Bowels.'

## CHAPTER XII

### INTESTINAL IRRIGATION IN OBSTRUCTIONS OF THE COLON

THE subject of *per anum* irrigation of the intestines is of such great importance as to merit further description than the bare mention in Chapter XI. Particularly in the subacute varieties of colic I have been describing will it be found of value. Needless to say, it is obstructions of the colon that will be best benefited by its use. I am not referring simply to the passing into the rectum of a few pints of water with the ordinary enema syringe, but the injecting of several gallons by means of a forced water-supply, and a tube that may be inserted for at least 4 to 6 feet. It is again to Veterinary-Lieutenant-Colonel Fred Smith that we are indebted for this further addition to our knowledge.

Once or twice in this volume I have referred to impacted coils of intestine being found in the pelvis. Whether the obstruction be in the small colon or the large, I have no hesitation whatever in saying that forcible irrigation of the intestines with large quantities of water will do more than anything else to save the patient's life.

If the obstruction is in the small or single colon the impacted mass is comparatively small in size, usually

about the diameter of a large cocoanut (see Fig. 4). Should the obstruction be in the large colon, its relatively larger size at once denotes that fact. When felt through the rectum, it gives to the hand the impression of a huge fœtus forced close to the pelvic outlet. Unless soon relieved, cases of this description quickly put the implicated portion of bowel into a state of obstinate paralysis.

That being so, if the usual stimulative treatment fails to give early good results, intestinal irrigation should be at once commenced. Only one or two trials will convince the operator of the great value of the treatment.

The only apparatus really necessary is several yards of ordinary rubber garden-hose of about  $\frac{1}{2}$  to  $\frac{3}{4}$  inch in diameter, fixed to a forced water-supply. My own method of procedure, however, I will leave for the time. So far as I am able to trace, Veterinary-Lieutenant-Colonel Smith was the originator of this treatment, and that behoves me to give his case prior place. It is reported in the *Proceedings* of the Fifth General Meeting of the National Veterinary Association, and runs as follows:

‘F. 54, 12th Royal Lancers, a grey gelding, five years old, was admitted at 4 p.m. on April 26, suffering acute abdominal pain. He threw himself down with great force twice before means could be taken to prevent it, and to avoid a rupture of the stomach or intestines I placed him in slings, or, rather, attempted to, for he no sooner felt the sling under him than he lay like a log in it. He was lowered carefully to the ground, and quickly hobbled, and a great source of anxiety was at once removed. Before I saw him he had passed a quantity of loose fæces, and the usual medicine had been administered, but he was getting worse. The pulse was quick and small, respiration greatly increased, conjunctiva injected. Examination *per rectum* revealed

nothing. I at once gave morphia grs. viii. subcutaneously, and administered aloes  $\bar{v}$ . in solution; applied mustard to the belly, and ordered copious enemata every hour at least. He was quiet for fully half an hour after the morphia, and at 9.30 p.m. I considered I might let him rise with safety. He was still in pain, but not so acutely, was kept on his legs, hot rugs applied to the abdomen, and mustard to the legs, as they were cold. His pulse was 60, soft and compressible; respiration 34; temperature  $102.6^{\circ}$ ; conjunctiva injected. He remained in pain all night.

'April 27.—Delirious, head continually going to and fro, eyes more injected; pulse 60, very weak; respiration 40; temperature  $103^{\circ}$ ; still in pain, has passed urine, a little flatus, but no action of the bowels; on rectal examination these are found distended with gas; continue the enemata, repeat the morphia, and constant application of hot rugs. Towards mid-day, the morphia not having the least effect, I administered ext. cannabis indicæ  $\bar{z}$ i., and this kept him quiet for a few hours.

'Evening.—Looks very wild, eyes glaring, continually throwing his head up and down and from side to side, wants to walk round the box; pulse 48, temperature  $103^{\circ}$ ; 12 p.m., still in pain, repeat the Indian hemp, and give ol. lini. Oi.; hot rugs to abdomen all night, and the usual enemata.

'April 28, 4 a.m.—In great pain, nothing passed; injected morphia grs. viii. 6 a.m.: The last dose of morphia had no effect, temperature  $105.6^{\circ}$ , pulse almost imperceptible, conjunctiva scarlet and spotted, respiration 20, very delirious and suffering great pain. 10 a.m.: Gave morphia grs. xvi., it had not the least effect, wandering continuously, head to and fro, passed a few small pieces of fæces and strains. The case is most serious, and the horse will certainly die of pain, if he does not from the impacted colon. He got worse during the day, and at 5 p.m. I gave him ext. cannabis indicæ  $\bar{z}$ ii., ol. lini., Oii. The hemp, had, as usual, an immediate and lasting effect; he stood quietly with his head between his fore-legs for two or three hours. The enemata administered with the ordinary pipe I considered so utterly useless, and

feeling certain that the impaction was in the colon and only required to be reached, I passed my long rectum tube (kindly made for me by Messrs. Arnold and Son). I first passed it up about 4 feet, and threw in about 27 gallons of cold water—3 or 4 gallons of this remained in; what was rejected brought away a few small pieces of fæces. 11 p.m.: There is great dulness over the double colon at the epigastrium, and also in the left hypochondrium; I believe it is in these portions where the obstruction exists; I again passed the long tube this time 6 feet, and threw up several more gallons of cold water—a large amount of this was retained. He was kept thoroughly under the influence of the hemp, pawed occasionally, still off his head, but much quieter.

‘April 29, 5 a.m.—Passed the long rectum tube to its full extent—6 feet—into the bowels, and threw in 13 gallons of cold water, which were retained for a long time. The horse is quieter, temperature  $102^{\circ}$ , pulse stronger, but very quick, about 60; the conjunctiva is clearer; the dull sound of the epigastrium and left hypochondrium is considerable, but a welcome loud gurgling is heard. 11.30 a.m.: Repeated the enema with the long tube; slobbering from the mouth, and so weak that he has to stand with all his legs apart; the pain suffered is insignificant. 5 p.m.: Repeated the enema; temperature  $100^{\circ}$ , pulse stronger, conjunctiva clearer; am very pleased with his appearance, and confidently expect his bowels to act shortly; give, however, ol. ricini. Oii. Stood quiet all night. The delirium entirely disappeared.

‘April 30, 4 a.m.—Repeated the enema; straining greatly, but passed nothing. 6 a.m.: Passage at last effected; passed a large quantity of fæces, mixed with sand, gravel, and stones; temperature  $100^{\circ}$ . During the day took a bran mash; passed more fæces, with gravel and sand, mid-day and evening. Evening: Pulse fuller, eye brighter, removed to another box and walked very tottery.

‘The record of this case need not be continued, for from this time he did well; he passed the gravel for a few days, and it then ceased; he lost so much flesh through

his few days of intense suffering that it took two months' nursing to replace.

‘The interest in this case is centred in the long rectum tube. From a considerable experience in bowel complaints, I came to the conclusion some time ago that if I could throw an enema into the colon I would accomplish two objects: (1) Would act directly on an obstruction seated far forward, and (2) would place the enema beyond the expelling powers of the patient, and so enable the water to act mechanically on the contents of the bowel, and also restore the tone of the gut. I accordingly sent to Messrs. Arnold a description of the tube I required; it was to be 6 feet in length, made of gum elastic, the same calibre as the ordinary Read's enema tubing, and was to fasten on to this tubing when the ordinary wooden nozzle was unscrewed; its extremity was to be round and perforated. Messrs. Arnold sent me the exact article, which I have no hesitation in saying saved the life of the horse whose case I have just detailed. There is no difficulty in passing it; having been well oiled, with gentle pressure it finds its way along the course of the rectum, and when it refuses to go further no force should be used; all that is required, should it be necessary to pass it further forward, is to pump in a gallon or so of water, which dilates the bowel in front of it, and the passage is accomplished. It is fair to state that I have had cases where I could not get more than half that distance up, probably owing to an irritable condition of the gut, but even in these there is an immense advantage gained over the ordinary wooden nozzle, which is only put in for a few inches. I have constantly made experiments with the ordinary apparatus on the dead subject in an erect attitude, and find that with it no enema can go more

than 4 or 5 feet into the rectum, so that for obstruction in the colon it is useless. My long tube throws an enema with ease into the single colon, and probably into the double one. If while the enema is being given the ear be applied to the left flank, the water may be heard rushing along the intestine. The tube only requires to be used in a case of obstinate obstruction from gravel, fæces, etc., to prove its great value. Before I was supplied with the instrument I now possess, I used as a substitute the tubing that is found on Read's enema syringe, removing, of course, the wooden nozzle.'

Thus runs Colonel Smith's report of his case. Two facts in it I wish to point out to the reader: First, the apparent uselessness of large doses of sedatives to thoroughly allay pain in a serious case of obstruction, and the evident increase in alarming symptoms they give rise to. Secondly, the almost immediate effect of the cold water irrigation in reducing the temperature.

I was led myself to adopt this treatment as a result of the experience of a fatal case of obstruction of the single colon that occurred in my own practice. In brief, the case was this:

*June 10, 6 p.m.*—I was called to attend a six-years-old gray cart-mare suffering from colic. I found her showing all the usual symptoms of impacted colon, and was confirmed in my opinion by finding a distinct impaction in the pelvis. As is my usual practice, I gave four balls containing ammonium carbonate and nux vomica, and administered a draught of ol. lini. Oi., ol. tereb. and spt. ammon. ar., of each  $\zeta$ ii. Beyond the fact of finding the impacted coil of intestine in the pelvis, I was unable to detect any alarming symptoms. The pulse was good and the pains not excessively violent. After watching her for some time, I injected hypodermically 1 grain of eserine sulphate, and left her for a few hours.

*10.30 p.m.*—The symptoms showed no abatement.



The eserine had failed to act. The pulse was slightly quicker, and the impacted intestine in the pelvis still present. I again repeated the ammonium carbonate balls, minus the nux vomica, and administered a further pint of oil. At the same time I injected copious warm enemas, medicated with soap liniment.

*June 11, 7 a.m.*—I was disappointed to find that the case showed no improvement. The pulse had risen to 80, and the mucous membranes were becoming injected. No ease had been shown since my last visit. The case was undoubtedly becoming worse. I again repeated the balls and stimulating enemas, and injected a further dose of eserine.

*12 noon.*—The eserine had again failed to act, and all the symptoms were becoming gradually aggravated. There were constant straining efforts to defæcate, and enemas were quickly expelled, as clear as when injected. In my own mind I recognised a dying case, though I still persisted in giving stimulants and oil.

*10.30 p.m.*—Animal gradually succumbing. I had now reached the end of my tether, and, more as a forlorn hope than in any other spirit, I injected a further and larger dose of eserine—this time 2 grains. I gave the owner a fatal prognosis, and promised to call again in the morning.

*June 12, 7 a.m.*—The case had slowly gone from bad to worse, and the mare was now evidently dying. No further treatment was attempted, and the animal expired some time shortly after noon. I made arrangements with the owner for a post-mortem to be held the same day.

**Autopsy.**—The knowledge gained from this was simple enough, though painful in the extreme. Every portion of the intestinal tract appeared healthy. In no part could be found fæces of more than a semi-solid consistence—save, of course, the impacted portion—neither were the bowel contents abnormally excessive. The impacted intestine was quickly withdrawn from the pelvis, and turned out to be a portion of the single colon

distant some 7 or 8 feet from the anus. The obstruction was nearly round, approaching the oval, about the size of a cocoanut, and, seeing that it was composed entirely of dung, extremely hard. It presented the appearance depicted in the accompanying photograph :

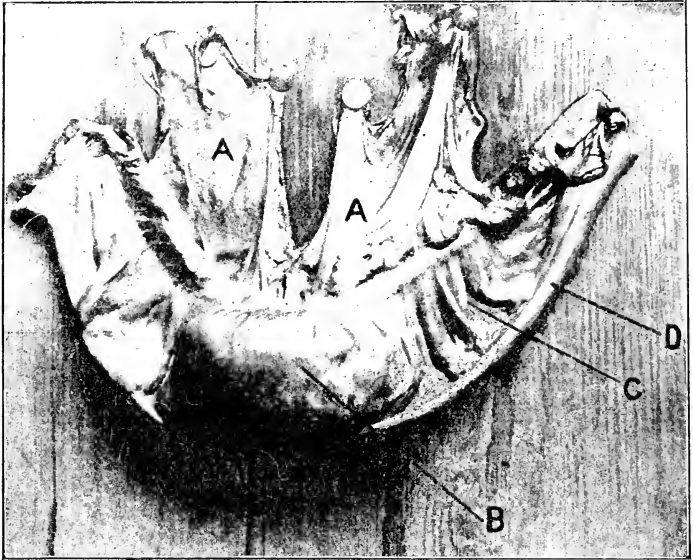


FIG. 4.—IMPACTED PORTION OF SMALL COLON SUSPENDED BY MESENTERY.

A, mesentery ; B, the obstruction ; C, sacculated folds of intestine ; D, longitudinal band of intestine.

No other suspicious circumstance was present. The case was clear enough both to myself and the bystanders. Except for a few bright red patches quite near to the obstruction, the coats of the intestine were clear and clean.

**Remarks.**—I need hardly explain to the reader how

annoyed I was that the impaction was so small. In every probability, had the mare been operated on during the first day's illness and the obstruction removed, she would have lived. Still more probable would her recovery have been if constant intestinal irrigation had been persisted in. The fatal obstruction was *actually within reach of* a tube that could have been passed a few feet.

Had I given aloes, would the issue have been different? I cannot whip myself with the thought that it would. Against the argument that aloes would have moved the obstruction is the fact that the contents of the whole of the intestines in front of the stoppage were in a semi-fluid state. We had, in fact, by using the oil and the nux vomica, created a purge actually washing the surface of the obstructing lump. My only regret is that I did not then know the value of the long rectal tube and a bountiful supply of water.

The next case, the first in which I adopted intestinal irrigation, was followed by recovery :

**History.**—The patient was an aged black cart gelding, used for heavy hauling purposes—coal carting. He had been at his usual work all the week until late on the Saturday afternoon. He ate his usual feeds on Sunday morning and at noon, and was found in pain about 6 p.m., when the men went to give the evening meal.

*Sunday, 6.30 p.m.*—I found him exhibiting the following symptoms: Pain slight, but constant, and manifested by a ceaseless pawing with one fore-limb. Pulse about 68, but inclined to be fluttering and weak. He had previously been rolling, but now showed no inclination to do so. Circumstances did not permit of a rectal examination. So far as could be gathered from the appearance of the abdomen, there was no trouble in the large intestine. That was surmised from the complete absence of tympanites. Diagnosis was withheld until a rectal

examination had been made. I administered the usual balls of stimulants, but was quite unable to get a draught down him. Left word with the owner to send him up to my own stables if he did not get easier before 9 p.m.

9 *p.m.*—He was admitted into the infirmary and the rectum explored. My former surmise was wrong, for a huge mass of intensely impacted intestine—evidently the large colon—was found forcing itself right into the pelvis within 6 inches of the anus. I again repeated the balls, and failing, owing to his awkwardness, to administer a drench, gave a warm enema, containing a large quantity of turpentine liniment, in the hope that some of the turpentine would become absorbed, and so excite the bowel to action. The pulse still maintained the same number of beats, but had improved somewhat in tone. As the animal was now lying down, and appeared fairly comfortable, I decided to let him remain until the morning before attempting further measures.

*Monday, 7 a.m.*—Patient still in the same condition. Administered hypodermically  $1\frac{1}{2}$  grains of eserine sulphate. This put him in slightly more pain for about an hour, after which he again grew easier. During the hour he passed a few small quantities of fæces. This I judged was only from the single colon, for rectal exploration still revealed the presence of the impacted coil of larger intestine.

12 *Noon.*—Still failing to induce him to take my usual doses of linseed oil, I had no other alternative but to fall back on aloes. I administered 3 drachms only. The torpid condition of the bowels, however, promised little hope of its acting; that being so, I decided to irrigate the colon with cold water.

4 *p.m.*—Connected the hose with the ordinary town water-supply, and forced into the intestines *per rectum* several gallons of cold water. I found it impossible to estimate the exact quantity, for during the first few minutes of passing the tube there was a fairly constant flow of water outwards from the rectum; then, as the bowel in front of the injecting-tube expanded owing to the pressure of the water, and the tube found its way further in, the flow from the rectum partially ceased,

until the quantity being injected must have far exceeded that dribbling out. At this period of the injecting, the ear applied to the left flank could plainly hear the water running in. What was more pleasing still to hear was a loud rumbling and disturbance of the intestines.

After keeping the stream going for about ten minutes, during which time several gallons must have found a way into the colon, the tube was withdrawn. Beyond a slight shivering of the haunches, no ill effects were noticed. Indeed, the reverse was the case, for the pulse dropped to near the normal in number, and gained decidedly in tone. The animal appeared more cheerful, and even partook of a small feed. After doing so, he again showed dull pains, but the general condition was distinctly improving.

The quantity of water injected could now better be estimated by the frequent evacuations made by the animal. From the time of the injection at four o'clock until as late as six or seven he passed out at frequent intervals a stream of water. At first this came away quite clear; later it was stained a muddy yellow; later still there came with it long strings of pale yellow mucus and choppy pieces of ingesta. Nothing further was done with the animal that night.

*Tuesday, 10 a.m.*—Animal still showing dull pains. A rectal examination was again made. Even now, after the lapse of seventeen or eighteen hours, the rectum was found full of a *fæces*-stained fluid. The obstruction was still present, *but perceptibly softer*. The irrigation was repeated in the same manner, and followed by the same results.

*4 p.m.*—Patient decidedly easier. Repeated the irrigation, and administered a stimulant to promote warmth. The animal was then left for the night.

*Wednesday, 9 p.m.*—Horse quite easy. He had eaten a good feed, and passed several heaps of *fæces* of normal consistence. From this time he made an uninterrupted recovery.

**Remarks.**—The striking feature in these cases is the impunity with which large quantities of *cold* water may

be injected without bad effects. As the foregoing case illustrates, it appears rather to be productive of *good*. The rise of febrile symptoms is effectually kept down, and the rectum is prevented from attaining that degree of horrible dryness that so commonly associates itself with this type of colic. If not directly reached by the in-running stream of water, the obstruction appears to become softened by the large amount of fluid remaining in the rectum immediately over it.

In obstructive colics, occasioned by the accumulation of masses of undigested food, veterinarians have constantly bewailed the fact that the patient will not drink. Here is a ready means of pouring into his system the fluid he will not voluntarily take. In addition to the mechanical aid it gives, we have the welcome signs of active peristalsis, induced by the excitant action of the cold water on the intestine itself. Now that I know its value, it surprises me that no one seems largely to have adopted the treatment. It is not a great deal of trouble, and its beneficial results are at once apparent.

## CHAPTER XIII

### THE SURGICAL TREATMENT OF INTESTINAL OBSTRUCTIONS

AT times, in his treatment of colic, the veterinarian is on the horns of a dilemma. He feels confident that he has successfully diagnosed intestinal obstruction of such a nature, and in such a position, as to render surgical interference reasonably warrantable.

Should operative measures be advised early on in the case? Should expectant treatment be first adopted, and the operation be only advised as a *dernier ressort*? If the first is decided on the patient *may* die from the effects of the operation, and the owner be accordingly annoyed. Adopting the latter procedure, the patient, in a state of rapid collapse, will not offer great possibilities of the operation being successful.

Thinking so, the veterinarian has been apt to let matters rest, and it was not until 1895 that Professor Macqueen, of the Royal Veterinary College, put the matter upon a more satisfactory basis. This gentleman's experiences, coupled with his exhaustive searches into veterinary literature, led him to the belief that penetration of the equine peritoneal cavity was not so highly dangerous after all, and that operations involving that step were quite safely within the bounds of possibility.

For the benefit of his brother veterinarian, Professor Macqueen converted his beliefs into undeniable facts by the performance of several interesting experiments. Horses were cast and anæsthetized. Suitable antiseptic precautions were taken, and, in each case, a small portion of the floating colon was exposed. An incision was made through the bowel wall, its contents removed, the wounds sutured, and the animal allowed to recover. Reserving my remarks on its practical utility for the end of the chapter, I will allow Professor Macqueen to give the details of this operation in his own words:

‘*Materials, instruments, etc., required.*—Four large and twelve small Turkey sponges, for use inside the abdomen and about the bowel. Twelve yards of tarlatan, cut into two-yard lengths, for packing round the bowel brought outside the wound. Four sponge cloths, for laying on abdomen and thighs to catch dust during the operation, to wipe the skin, and for rougher work *outside* the wound.

‘Three enamelled iron trays to hold instruments, ligatures, and needles. Four zinc pails to hold hot water, sponges, lotions, etc. One small bucket marked in pints to measure hot water for making solutions, etc. Some 20 per cent. carbolic soap for washing hands and flank and for shaving. One aseptic scalpel and a razor. Two elbowed scissors, sharp and blunt pointed, to divide muscles, open peritoneum and bowel. Two sponge-holding forceps. Two Thornton’s T-shaped forceps to stop bleeding from skin or muscle. Two Wells’ catch forceps, and one or two spring and dressing forceps. A few straight and curved suture needles. Twenty milliners’ needles, straws No. 5, for stitching the gut. Chinese twist for all sutures—No. 1 for the gut, No. 3 for muscles, and No. 6 for the skin. A fine trocar and cannula, to puncture, if necessary, distended bowel. A



convenient supply of hot water, and a piece of fine muslin, several layers thick, for use as a sieve for water to be used for lotions or for irrigation. Chloroform and an inhaler with sponge, and some pure carbolic acid in a graduated bottle. For dressing the wound the following should be ready: Iodoform and tannin, 1 to 3; antiseptic cotton-wool and tow; carbolized gauze; a piece of calico, 6 yards by 9 inches; roller bandages, and a few safety-pins.

‘*Preparation.*—The small sponges may be obtained ready for use from any wholesale druggist. They are known as Milne’s aseptic sponges. Probably the large sponges can be purchased in the same condition. I prepared my sponges in this way: After beating out the sand the sponges were placed for four or five days in cold water, which was changed daily, then transferred to a solution of hydrochloric acid, an ounce to the gallon, where they remained for twelve hours; from this they were placed under the cold-water tap, and turned about under a constant stream for an hour or two; then each was thoroughly washed in plenty of hot water, squeezed as dry as possible, and finally placed in 5 per cent. carbolic solution.

‘The tarlatan, cut into two-yard lengths, was washed in hot water containing Hudson’s powder, then thoroughly rinsed, and placed beside the sponges in carbolic. The sponge cloths were boiled, rinsed in cold water, soaked in 5 per cent. solution of carbolic, and then dried.

‘The Chinese twist was stretched by winding each skein on a bit of wood (3 inches by  $1\frac{1}{2}$  inches), plunged in hot water, and boiled for ten minutes; then stretched again by winding on another bit of wood, and finally placed in a wide-mouthed bottle containing 5 per cent. solution of carbolic acid.

‘The scissors, forceps, needles, scalpel, etc., should be kept together in a sheet-iron case, which may be placed on a stove or near a fire.

‘After operation the sponges, instruments, etc., must be cleansed. The sponges and tarlatan are placed together in cold water, which is frequently changed; then the sponges are transferred to hot water containing washing soda—4 ounces to the gallon—and left there for a day. From this they are placed under the cold-water tap, then washed separately in hot water, dried in the sun, divested of hairs, and again placed in 5 per cent. carbolic. The tarlatan is washed as before with Hudson’s powder, dried, and placed beside the sponges. For keeping sponges and muslin a 2-gallon pail, with hinged lid, will be found very convenient. The sponge cloths, after soaking in water, are boiled with soda, rinsed, and dried. The instruments are scrubbed and washed in hot water containing Hudson’s powder, dried, and enclosed in the iron case, which is then placed near a fire.

‘*Preparation for Operation.*—Before casting the horse, the flank from spine to groin and from haunch to sixteenth rib is clipped and washed. When the horse is under chloroform the flank, within 2 or 3 inches of the boundary marked by clipping, is shaved and disinfected. While these preliminaries are proceeding, the pails and trays are arranged and filled. All the solutions must be warm, and the water used in their preparation passed through muslin. Pail No. 1 is filled with 5 per cent., and pail No. 2 with  $2\frac{1}{2}$  per cent., solution of carbolic acid. The trays are filled with hot solution of the same strength as pail No. 2. The sponge cloths are placed in No. 1, and kept there until required. The sponges and tarlatan, after having been squeezed as dry as possible,

are placed in No. 2. In one tray are placed the milliners' needles, twelve of which are threaded with twist No. 1; another tray contains scissors, forceps, and scalpel; and the third contains reserve instruments, suture needles, and twists Nos. 3 and 6. Pail No. 3 is

Position of first incision through the skin and across the fibres of the external oblique.

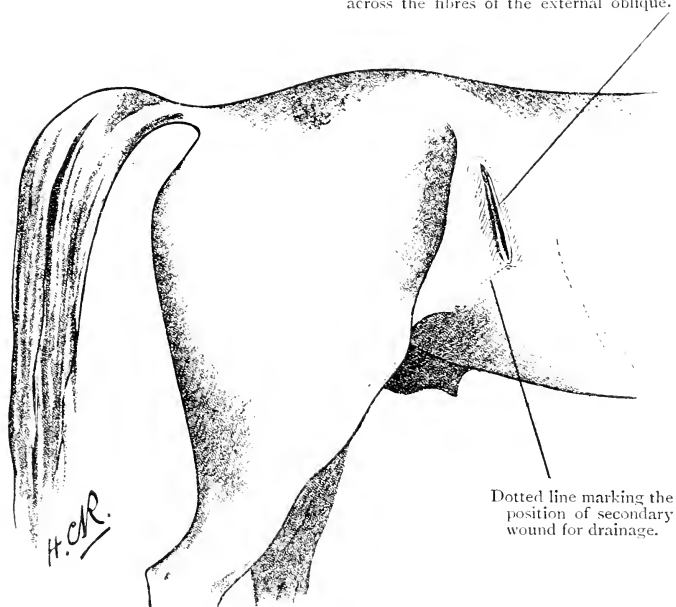


FIG. 5.—SEAT OF LAPARO-ENTEROTOMY (MACQUEEN'S OPERATION).

filled with hot water for rinsing hands and instruments; and pail No. 4 is filled with boiling water, which is protected from dust and allowed to cool. This water will be required to wash the bowel after suture.

*Abdominal Incision.*—The linea alba offers the least vascular and shortest route to the interior of the

abdomen. Through an incision of the white line any organ within the cavity can be felt, the small and large intestines in part can be seen, and to some extent

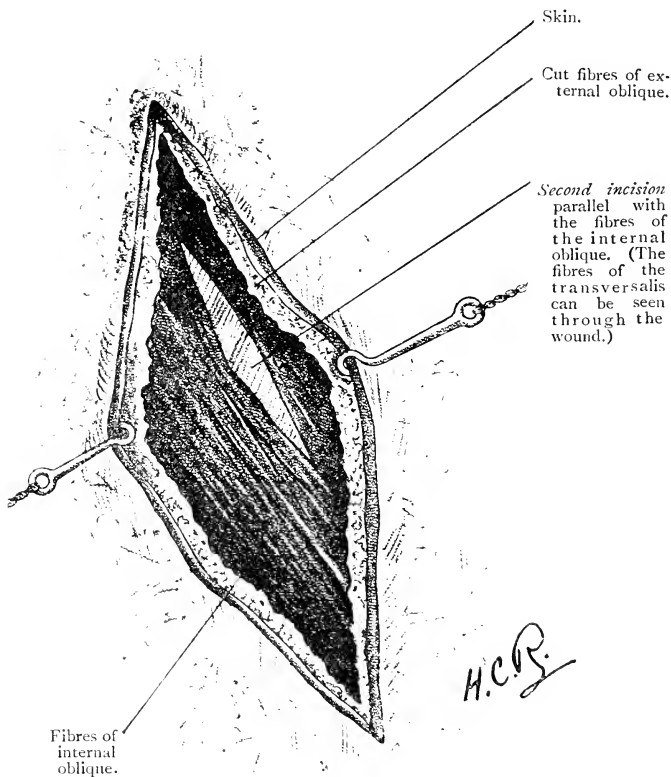


FIG. 6.—OPERATION WOUND (LAPARO-ENTEROTOMY).

Showing the *first incision* through the skin and across the fibres of the external oblique. (Enlarged from Fig. 5.)

portions of these viscera can be withdrawn; but the colic mesentery is too short to permit the first part of

the floating colon to pass through the wound. Besides, if the incision is made at this point the wound does not heal rapidly, and adhesion between its peritoneal surface and omentum or bowel is a probable complication. In the horse, incision of the abdomen an inch or two to the right or left of the linea alba is equally objectionable. When the floating colon has to be opened, I prefer to reach the bowel through the flank (see Fig. 5, p. 159). In opening the flank I make three wounds before touching the peritoneum. The first divides the skin, fascia, and *external oblique muscle*; the second the *internal oblique*; and the third the *transversalis* (see Fig. 6, p. 160). The first starts at a point 4 inches below the lumbar transverse processes, midway between the angle of the haunch and the last rib, and passes downwards and forwards for 7 or 8 inches. The forward direction of this incision is opposed to all teaching, but its advantage is conceivable. The upper hind limb is unhobbled and drawn backwards. The wound gapes and exposes the internal oblique muscle, which is then cut with scissors in the direction of its fibres. A similar opening is made in the transversalis. The third wound exposes a layer of fat which is lined by peritoneum; this is pierced with the finger, and the opening is enlarged with scissors in the direction of the transversalis wound.

*Incision and Suture of the Bowel.*—So far I have only opened the bowel at the middle of the longitudinal band, where the wall appears strongest and most capable of supporting sutures (see Fig. 7, p. 162). With sharp-pointed elbowed scissors the gut can be punctured and the wound extended without the slightest difficulty. The wound is closed with sutures of prepared Chinese twist No. 1. There are many methods of suturing bowel wounds, but Lembert's is the only one of which I have experience. Sutures applied by Lembert's method pass

through both the serous and muscular coats; the mucous membrane must not be punctured. The needle enters  $\frac{1}{4}$  inch from wound, passes through muscle for  $\frac{1}{8}$  inch, then pierces serous  $\frac{1}{8}$  inch from the edge of the wound. It is then carried across the wound, re-inserted  $\frac{1}{8}$  inch from edge, passed through muscle for  $\frac{1}{8}$  inch, and brought out  $\frac{1}{4}$  inch from the wound. A glance at the diagram (Fig. 7) will enable anyone to understand the course of

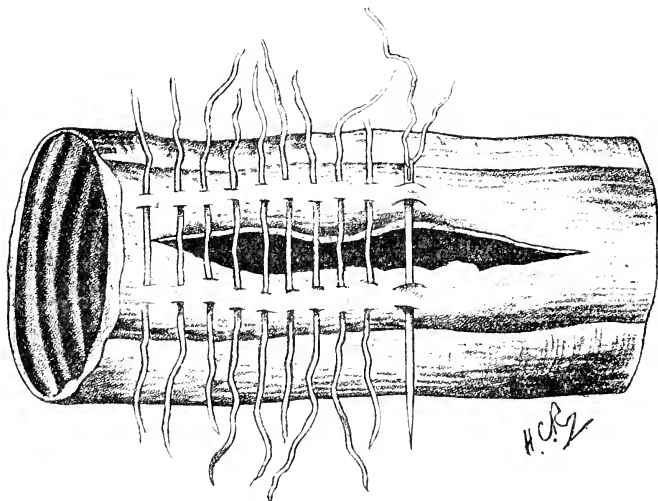


FIG. 7.—LEMBERT'S SUTURES (IN SMALL COLON).

the needle. The sutures are placed  $\frac{1}{8}$  inch apart and tied separately. The ends are shortened to within  $\frac{1}{4}$  inch from the knots. Degive has improved this method by making the sutures continuous.

*Operation.*—Cast the horse on the left side and give chloroform. Wash, shave, and disinfect the flank. Spread sponge-cloths, wrung out of carbolic lotion (5 per cent.), in front and behind area of incision. Incise skin

and external oblique; unhobble upper hind limb, draw it backwards, and fix to a post or wall. Douche wound with warm carbolic lotion ( $2\frac{1}{2}$  per cent.), and stop bleeding from skin and muscle. With elbowed scissors slit internal oblique muscle in the direction of its fibres, trim the edges, and stop bleeding. Snip transversalis with scissors and extend opening with finger, taking care not to puncture fatty layer or peritoneum. Examine wound and check bleeding. Sponge with warm carbolic lotion ( $2\frac{1}{2}$  per cent.) and remove excess of fluid. When satisfied that the wound is "dry," rinse the hands, push the finger through fat and peritoneum, and enlarge opening with blunt-pointed elbowed scissors. Pass a large sponge, wrung out of ( $2\frac{1}{2}$  per cent.) warm carbolic solution, into abdomen, and get tarlatan ready. Pass the hand into abdomen, bring out the bowel, and hold it gently until assistant has placed pieces of tarlatan, moistened with warm carbolic lotion ( $2\frac{1}{2}$  per cent.), round the wound. This done, let the assistant take the bowel between his fingers applied like clamps, the hands resting one in front, the other behind the wound. Incline the bowel towards the horse's thigh, and slit the free border with scissors. Remove contents and wash its mucous lining. With a fresh sponge clean the edges of the wound, and apply Lembert's sutures. Place the stitches  $\frac{1}{8}$  inch apart, and insert two or three beyond the wound at each extremity. Pass all the sutures before tying any. Wipe the edges as tying proceeds, and shorten the suture ends to  $\frac{1}{4}$  inch from the knot. When the wound has been closed, pull the bowel well out of abdomen, and let assistant renew his hold. Carefully sponge off clots, hairs, and suture ends, and douche with boiled water that has been allowed to cool to about  $106^{\circ}$  F. Remove packing from round the

wound, let the bowel slip into abdomen, and withdraw the sponge. Look inside, and, if necessary, pass in a fresh sponge to take up clots or fluid. Adjust the edges of transversalis wound, and excise protruding fat. Pass two or three sutures (twist No. 3) through internal oblique muscle, and sponge the surface with carbolic lotion. Re-hobble upper hind limb, and bring edges of external oblique together with a few fine sutures. Close the external wound with strong (No. 6) twist sutures passed through skin and muscle, tied in front or behind the line of union. Then slit skin and fascia downwards and backwards to 2 inches from lower end of first incision. This will drain the operation wound. Sponge the surface with carbolic lotion, and let the horse rise. Dust the flank with iodoform and tannin, insert aseptic tow in drainage wound, and cover the whole with carbolized cotton, protected with four layers of gauze. Support the dressing by winding calico round the body, and roller bandages secured with safety pins. Muzzle the horse for five or six hours, but leave his head loose. Encourage, but do not force, exercise. For a few days restrict his diet, which ought to be somewhat laxative. Dressings should not be renewed until oozing occurs, then re-dress, but do not plug the drainage wound. The dressings might be substituted with advantage by pitch plaster or a mild blister.'

Following closely the lines advocated, Professor Macqueen operated on (*a*) an aged brown pony gelding, (*b*) an eight-years-old chestnut pony gelding, and (*c*) an aged brown nag gelding, at one of which operations I had the good fortune to be present.

So far as could be ascertained, these animals were healthy before the experiments.

Animals (*b*) and (*c*) were allowed to live sufficiently



long after the operations—twenty-two and thirty days respectively—to prove the success of the undertaking. They were then chloroformed to death, and post-mortem examinations made of the carcasses. In each case the result of the autopsy was gratifying.

The brown pony gelding (*a*) was slaughtered on the seventh day following the experiment. If I remember rightly, he showed somewhat peculiar symptoms shortly after the operation. It was difficult, in fact, to say whether he was suffering from an ordinary sporadic attack of pneumonia, or whether the pneumonia was of a septic nature, caused by absorption from the operation wounds. I think that I may say the result of the autopsy on the seventh day rather justified the assumption that the pneumonia was sporadic in its nature, and that the operation was not the cause of it.

We have here three operations of a serious nature. The end result of one may be classified 'doubtful,' with a leaning towards 'favourable'; while the remaining two may be termed in the highest degree 'successful.' The surgeon has shown us that, so far as the operation itself is concerned, we have nothing to dread.

Can it be turned to practical account? One case only is on record of the operation being successfully performed for the removal of a calculus or obstruction that was actually giving rise to dangerous colic. This was by Felizet in 1849. The position of the calculus was the commencement of the small colon. Several other cases are on record where the same operation has been attempted, the animal, unfortunately, dying in each instance. It appears that in each case the failure of the operation was directly attributable to its having been too long delayed.

Several years have now passed since Professor Mac-

queen performed these experiments. Their practical utility can only be judged of by what has transpired. So far as I am able to trace, no successful removal of an obstruction with the complete recovery of the patient has since been placed on record. Either the present-day veterinary surgeon, in spite of Professor Macqueen's able assurance of success, is not possessed of the boldness of the old-time Felizet, or he has deemed the operation, not exactly 'impossible,' but 'inadvisable.' I am loth to put the paucity of recorded cases down to apathy and want of boldness, and can only conclude that the veterinarian has not seen it *practicable* to put the operation into every-day use.

The man who first diagnoses a suitable case, afterwards operates in good time, and is rewarded by the subsequent recovery of his patient, will have to be possessed of an amount of foresight and will-power far beyond the ordinary.

In the first place, he will have to be able to decide quickly that the obstruction he is dealing with is not likely to surrender to milder measures. Surely a difficult task. Again, he must be convinced that the percentage of deaths from obstruction of the single colon is heavy enough to warrant the operation being immediately advised in each and every case that is diagnosed. The equine patient does not live long enough with obstruction to allow of *any* delay, no matter how short. Untoward conditions in the bowel soon make their appearance, and place its wall in an unfit state for surgical interference. If the veterinarian waits until the symptoms frighten him into the operation, he has waited too long. Coupling this need for immediate decision with the fact that nearly all veterinary operations must be regulated by strictly economic principles, it is not surprising to learn that

a major operation of this description—one for which a large fee must necessarily be demanded, and one which will make or mar a great deal of the operator's reputation—is severely relegated to the background of 'possible,' but 'inadvisable,' remedial measures in cases of equine intestinal obstruction.

To my own mind there is only one of the intestinal obstructions described in this volume that is at all likely to warrant this extreme step being taken: that is the obstruction occurring in the small colon. That conclusion is fairly justified by the following considerations:

1. Professor Macqueen has covertly admitted that the small colon is the most suitable bowel to operate upon, its comparatively thick longitudinal band offering a suitable position for the incision and the after-placing of the sutures.

2. In the present state of our knowledge, the diagnosis of these obstructions is not sufficiently clear to justify us in operating unless the obstruction has been positively felt *per rectum*. I have already shown, in Chapter X., that the obstruction felt *per rectum* is most likely to be in the small colon.

3. Should the obstruction be demonstrated to exist in the large colon, we have to face two serious factors largely operating against the chances of successful surgery: (a) The extreme likelihood of the obstruction being of so large a size as to necessitate a very large incision in the bowel wall. (b) The comparative thinness of the walls of this portion of the intestinal tract, which would render the placing of safe sutures a matter of considerable difficulty.

When all is said, the veterinarian may remember this much with safety: Whatever may be his doubts concerning his diagnosis, whatever anyone else may urge to

the contrary, he may be perfectly assured—thanks to Professor Macqueen—that the incising of the flank and opening of the bowel (laparo-enterotomy) is attended with no grave risk in the horse—that is, if conducted strictly under modern antiseptic precautions, and with a patient still free from symptoms of collapse.

As illustrative of a suitable case for operative measures, I would refer the reader to a reported case of Mr. E. R. Harding, M.R.C.V.S., of Salisbury :<sup>1</sup>

**‘ Peculiarly-shaped Large Calculus in the Small Colon of a Mare.**—The mare was taken ill on a Sunday. An examination was made by Mr. Harding. The large bowels were found full of fæces, and the animal showing signs of colic. The pain was not acute, and the temperature very little disturbed. The animal was given 2 grains of eserine without its having the slightest effect on the colic or in producing defæcation. Aloes was not given, but the case treated with stimulants. During the first four days she had intervals of pain, while at other times she was quiet. At no time was the pain acute. After Tuesday the animal appeared to have no pain whatever for a week, but she ate nothing, and there was no movement of the bowels. *The only medicine administered was stimulants,*<sup>2</sup> and warm-water injections five or six times a day. This went on for eighteen days, when the mare died during the night. A post-mortem revealed a large calculus in the colon, and showed that the actual cause of death was ruptured colon, while an enormous mass of ingesta was found in the bowels. The calculus was 3½ pounds in weight, and seemed composed principally of fæcal matter. The animal had been in the owner’s possession four or five years, and had not been ill before.’

There are two things that appeal to one in the report of that case. The first is the marvellous manner in

<sup>1</sup> *Veterinary Record*, vol. xiv., p. 682.

<sup>2</sup> The italics are mine.—H. C. R.

which it points to the advantages of a solely stimulative treatment. It would be hard to imagine an animal with obstructive colic being dosed with sedatives and then lingering on in the same manner for so long a time as eighteen days. The fact of the matter is this: The

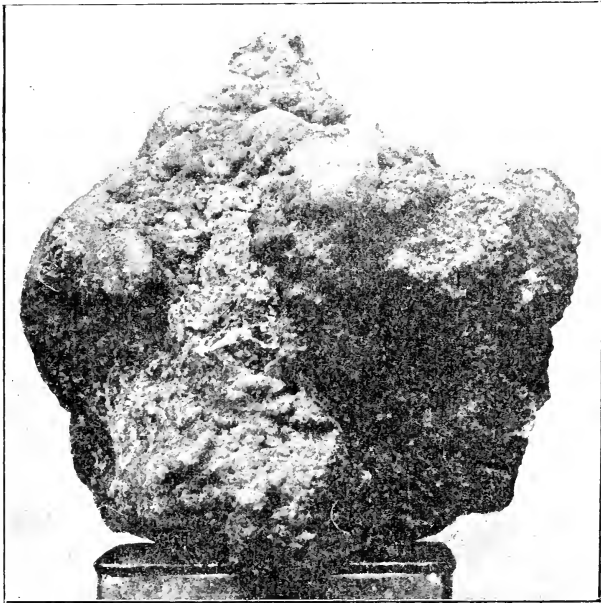


FIG. 8.—CALCULUS OBSTRUCTING SMALL COLON (MR. HARDING'S CASE).

general abandonment of sedatives in veterinary equine practice would undoubtedly lead to the better diagnosis of colic troubles. I feel that it has already increased my own powers in that respect, and what it will do for me it will do for others.

Secondly, one is forcibly struck by the grand opportunity this subject would have afforded for operative measures if only a successful diagnosis could have been made during life.

I would fain hope that in this way the future success of laparo-enterotomy lies. It may be that a long series of colic cases treated without sedatives will eventually lead to a greater and more frequent exactness in the diagnosis of these obstructions; that being done, the operation will follow naturally. This cannot be expected until a solely stimulant treatment is adopted by a large number of veterinary surgeons, and the information derived from their cases carefully chronicled.

## CHAPTER XIV

### INTESTINAL TYMPANY: WIND COLIC, FLATULENT COLIC, HOVEN, TYMPANITES, ETC.

**Definition.**—That condition produced by the evolution of gases in abnormal amount in some part of the intestinal canal, with consequent over-distension of the portion in which it occurs. In the horse, the common seats of tympany are the stomach and the large colon. The former we have already disposed of in a previous chapter, and it now remains to give a fuller consideration to this particular condition when confined to the intestines.

**Causes.**—These I have already enumerated at length in Chapter VII. On that account, no mention here beyond a brief summary is necessary. Dietetic errors again come to the front. Probably the most common cause of all is the gorging with young herbage when the animal is first turned out in the spring after a winter in the stable. Young growing corn, clover, vetches, and foods excessively mouldy may all be regarded as dangerous. One of the worst cases I have encountered myself was brought about by the owner feeding the animal on raw potatoes. The use of new oats, wheat, and steeped foods that have been allowed to go sour, are also common causes of this condition. Reports of cases

also show this disorder to sometimes be occasioned by animals eating large quantities of mangolds, swede turnips, or other roots. Putting to work too soon after a heavy meal, or watering and feeding too freely when exhausted, are also likely factors in its causation.

A dangerous form of this derangement is often met with by those who live in marshy districts. The coarse grasses and succulent forms of herbage that flourish down by the water's edge appear peculiarly liable to bring on an attack. When half dried, these marshy grasses seem even more dangerous still, and many a case of severe intestinal tympany is directly traceable to a meal of what is commonly known as 'dykeings'—heaps of partly-dried vegetation mown from close to the water-side during the process of cleaning the drain.<sup>1</sup>

Williams, in his description of this complaint, says: 'Tympanites may arise independently of any cognizable extrinsic cause. Occurring during the progress of another disease, it is always to be looked upon as indicative of a very grave condition, that the animal powers are so exhausted as to be bordering upon dissolution, and becoming amenable to chemical laws. Tympanites also occurs in obstructions of the intestinal canal from calculi, tumours, or other mechanical causes, and generally indicates the approach of death.'<sup>2</sup>

**Symptoms.**—The veriest tyro cannot fail to appreciate at their true value the indications of abdominal tympany. As might be expected, the most prominent symptom is a manifest, drum-like enlargement of the belly. The skin and abdominal muscles become enormously tense, and resonance is obtainable on percussion. In addition to

<sup>1</sup> In the Fens drain is simply another word for 'dyke,' or artificial water-course. In no way does it signify sewer.—H. C. R.

<sup>2</sup> 'Principles and Practice of Veterinary Medicine,' p. 555.



this, all the usual symptoms of 'colic' are well in evidence. The animal walks round and round, paws alternately with the fore-feet, and makes frantic kicks at the belly with the hind.

In a mild case the tympany is plainly most noticeable in the right flank. When, however, the abdominal enlargement is great, it is difficult indeed to fix it in any particular position. When distension is extreme, rolling is not freely indulged in, and the animal lies down only with great care. Other manifestations show the pain to be extreme. The breathing is tremendously accelerated, coming and going in short, fitful gusts, broken every now and again by a short-drawn sigh. The nostrils are dilated, the pulse small, weak, and greatly quickened, and the visible mucous membranes highly injected. The temperature is commonly raised about 2° F. The ears and extremities grow deathly cold. Patchy perspirations cover the neck, the shoulders, and the flanks, and the whole condition indicates a case of the utmost gravity. It is plain to even the most ignorant that unless the animal be given speedy relief he will soon succumb. Even now the accumulated gases are pressing heavily on the diaphragm, and seriously impeding the acts of respiration. The consequent deoxygenated and gas-poisoned state of the blood renders the bodily tone bad indeed, and points to no sign of spontaneous recovery on the part of the animal economy itself.

**Diagnosis.**—This is simple. The abdominal enlargement and the evidence it yields on percussion sufficiently point out the nature and seat of the trouble. It must be remembered, however, that tympany, when restricted solely to the stomach, will also give rise to apparent intestinal distension—the abdomen in both cases is swollen. Nevertheless, its true nature is quickly ascer-

tained. When the flatulence is confined to the intestine, there will, of course, be an entire absence of such symptoms as I have put down as diagnostic of gastric tympany. The regurgitations of the œsophagus, the attempts at vomition, the trickling ingesta from the nostrils, and the gurgling noises in the region of the trachea, are all wanting. Should there be doubt, which I do not for a moment think possible, a rectal examination will soon dispel it.

**Prognosis.**—Unless it be a concomitant of some more serious condition, a favourable verdict may usually be indulged in—that is, if the case is seen early. It is well, however, to hold back one's prognosis of these cases until the operation of puncturing the bowel has been performed and its results noticed. The extreme pain, the suffocating pressure of the distended intestines upon the diaphragm, and the semi-intoxication induced by the absorption of the gases, all tend to mask the significance of the pulse and other symptoms. Once the greater part of this is relieved by the trocar, the veterinary attendant is in a far better position to give a correct forecast. If, after this operation is performed, the pulse still continues a running down character, and the symptoms of pain do not abate, the case is to be regarded as serious.

**Treatment.**—Taking the remedial measures in the order of their importance, I think prior place should be given to surgical interference. Considering its value and comparative simplicity, it is surprising that the operation of puncturing the bowel—technically known as 'enterocentesis'—should have fallen into the desuetude it did. From almost the earliest times of which we have any record it has been recommended by first one writer and then the other. Vegetius, in the fourth century, advises

its adoption, giving minute instructions as to the seat of the operation—in this case, the *linea alba*, four fingers breadth behind the navel—and suggesting the instruments to be employed. Again, I find mention of it in an old volume I have before me as I write, written by one, Leonard Mascall, in the time of good Queen Bess, and published in 1600. These are the words :

‘ For a horse that is swolne with much wind in his body. Some horse with eating certaine windy meate or such herbs, will be so swolne there with as though his belly wold burst, and then he will eat no meat, but stand and hang downe his head, ready to fall, and so die, if he have not speedie help. When ye shall see any horse so, the next remedy as I can learne, is : ye shall take a sharp-pointed knife, or bodkin, and arme it so with some stay, that it go not too deep, for piercing his guts. Then strike him therewith through the skin into the body, before the hollow place of his haunch bone, halfe a foote beneath the backe bone, and the winde will come out thereat. Then if ye put a hollow quill therein (or some feather to keep it open awhile), the winde will voyd the better and so heale againe . . . this hath bene proved the best remedie to save your horse or ox.’

In 1656 mention is made of it by Markham, and in 1776 we find it practised for the relief of intestinal tympany by Roem of Dresden. The years 1781 and 1834 reveal the operation as still in existence.

Coming to more modern times, we find it revived in this country by Stewart of Glasgow, in 1836, and meet with reports of successful cases in 1877 and 1879 by T. H. Merrick of Northampton; Alexander Harthill, Louisville, Kentucky; and the late Captain Russell of Grantham. As a matter of fact, I think I may say with safety that it is only quite within recent years that enterocentesis

has received the amount of attention it merited, and been admitted into the ranks of useful, every-day operations. Even now I am afraid that there are not a few who look upon this simple means of affording relief with a certain amount of awe.

Personally, I have been in the habit of using the trocar and cannula in these cases for several years. As a result, one untoward case has fallen to my lot. The animal afterwards developed unmistakable symptoms of peritonitis. Fortunately he recovered. In one way the case was a lesson to me. I had, in consequence of constantly employing it, grown to hold the operation in a certain amount of contempt, and must confess to having grown somewhat careless as to the matter of cleanliness. That case pointed out to me the absolute necessity for a scrupulous care of the trocar and cannula. It is not sufficient to have it apparently clean—it must be antiseptically spotless.

No matter what care is taken of the instrument, a rather more common sequel to this operation than the above occurs in the appearance of a small abscess at the seat of puncture. Probably even the occasional appearance of this small trouble would also be done away with if the spot to be punctured were first rendered aseptic, in like manner to the instrument, a procedure that the exigencies of the case do not always allow of.

With regard to the seat of operation, there is a general consensus of opinion favouring the right flank, at a point equidistant from the last rib, the anterior angle of the ileum, and the transverse processes of the lumbar vertebræ. As a matter of fact, any position in the right or left flank that offers resonance on percussion may be tapped with benefit. Preference, however, should always be given to the right, as the mere fact of the colon and

cæcum being fixed there renders that position always the most likely to give certain results.

Failing to obtain flatus on the right side, the left should next be tried. Unrewarded by a rush of air from one spot, it sometimes happens that a second puncture in the same region, only 1 or 2 inches removed from the seat of the first, is followed by a ready and voluminous outrush. That being so, when once the surgeon has diagnosed tympany, he should not desist from his attempt to give the gases outlet until he has punctured both the right and left flanks—if necessary, in more places than one.

The trocar should be at least 6 to 8 inches in length, and the cannula vary from  $\frac{1}{8}$  to  $\frac{3}{16}$  inch in diameter.

Considerable difference of opinion exists as to the portion of intestine punctured. I do not think there is much room for doubt. In the vast majority of cases it is certainly some portion of the large colon.

As illustrating the relief afforded by puncturing the bowel, I give a digest of a case reported by Mr. T. H. Merrick, of Northampton :<sup>1</sup>

‘On July 10, about noon, I was summoned to a cart-mare. The messenger informed me that she was in great pain, and very much “blown.” I found her to be suffering from an acute attack of tympanites, the abdomen being greatly distended. The mare was first observed to be unwell in the morning about four o’clock, when the horse-keeper went to fetch her from the field. She was in so much pain that it was with difficulty that he got her home. On my arrival the mare’s pulse was very weak and indistinct, and numbered 80 per minute; the mucous membranes were much injected; the surface of the body and extremities cold; quickened respiration, and great uneasiness. I administered the

<sup>1</sup> *Veterinary Journal*, vol. v., p. 316.

usual remedies, but failed to give her relief; indeed, she got rapidly worse, and became so distressed and helpless that I was afraid she would fall. I therefore determined on puncturing the intestine. The accumulated gas rapidly escaped, and the abdomen quickly subsided. The relief afforded in a few minutes was most satisfactory. All symptoms of pain immediately ceased. In the course of two hours the pulse became distinct, and the mare commenced to feed.'

The usual course in the development of the abscess following this operation is well described by the late Captain Russell, of Grantham.<sup>1</sup> He says:

'On November 20 my attention was directed to the post horse at the George Hotel, upon which I had operated for tympany on October 26, as he had lately appeared stiff in his movements and out of sorts. On my seeing him and removing his clothing, I perceived a large swelling upon his flank, about where the first puncture of the trocar had been made. On examining this swelling, I fancied I could feel deep-seated fluctuation, and feeling sure I had an abscess to deal with, I ordered it to be well fomented for a day or two to endeavour to get it to point externally. On the 23rd, however, finding it made no progress externally, I examined it with an exploring needle, when at a depth of 2 inches I came upon pus. Having made a good opening, about a quart of creamy pus escaped. The case has gone on well, and the animal was discharged to-day, December 6, convalescent.'

Having removed the gases present in the bowel, we have two other matters to consider: Firstly, the prevention of the further evolution of gases; secondly, the removal of the cause.

The first of these is to be brought about by introducing into the bowel some form of antiseptic, or rather anti-

<sup>1</sup> *Veterinary Journal*, vol. viii., p. 4.

zymotic, in order to prevent further fermentation. If the colon followed immediately upon the stomach, the treatment already recommended for gastric tympany would do equally well here. It must be remembered, however, that all remedies administered *per os* will first have to pass through the small intestines before they can reach the seat of mischief, and that the presence of large quantities of food in the stomach and fore part of the intestines will proportionately nullify their action. It follows from this that administration of the antizymotics by the mouth is not the readiest route, and that their direct injection into that part of the intestine visibly affected would be far more likely to be followed by good results.

This is the method of operating: The bowel is first punctured, in the region of the flank, with an ordinary trocar and cannula. After the escape of the gases, the antizymotic determined on is injected, by means of Toope's injection cannula, directly into the intestine. This generally proves effectual in staying the re-forming of gas, and the further treatment of the case will run on ordinary lines.

Useful antizymotics for this purpose are carbolic acid, Jeyes' fluid, boracic acid, hyposulphite of soda, turpentine, lysol, etc.

Probably the most simple and effective of these is carbolic acid, and it may safely be injected in 1 to 6 or 8 drachm doses, when freely diluted with water. Four drachms to the pint will be found a serviceable solution. When used in stronger solutions, or injected cold, it is likely to set up a somewhat alarming attack of shivering. Even this, however, appears to quickly pass off, and leaves no after ill-effects. In addition to its property of staying fermentation, the carbolic acid acts

somewhat as a local anæsthetic, and, without exerting a general sedative action, serves to allay pain in that portion of bowel with which it comes in contact.

Professor O. C. Bradley, while in charge of the New Veterinary College Infirmary, reports three cases in which this treatment was adopted. Two of these I give below :

1. '2 *p.m.*.—Bay cart gelding admitted. Colicky symptoms, much tympany. Punctured, and injected 4 drachms of carbolic acid in 1 pint of water.

'3 *p.m.*.—Much better. No recurrence of tympany, pulse 65.

'4 *p.m.*.—Still improving, colicky symptoms have disappeared, pulse and respiration normal; continued improving.'

2. '6 *a.m.*.—Black cart mare admitted. Great pain, very tympanitic; pulse weak, respiration much accelerated. Punctured, and injected 2 drachms of carbolic acid in solution. Morphine hypodermically.

'6.30 *a.m.*.—Easier. Pulse 70

'8 *a.m.*.—Again tympanitic and very restless. Punctured again, and injected 3 drachms of carbolic acid in 1 pint of water.

'9 *a.m.*.—Better. Pulse 60 and stronger, respirations slower. Has stopped walking about.'

The removal of the cause is clearly to be brought about by the administration of a purgative. The fermentation has evidently been occasioned by the ingestion of unsuitable, mouldy, or imperfectly masticated food. The sooner this gains exit from the body the better for our patient. Personally, I am not always disposed to wait for the action of an ordinary cathartic. Having disposed of the gases already present, and ascertained that the patient's condition will allow of it, I prefer to inject hypodermically  $1\frac{1}{2}$  to 2 grains of eserine sulphate. The bowels soon respond, the offending materials are quickly



voided, and the patient, after the lapse of an hour, is left free from the probability of another attack.

Frequently this is all that is necessary, and the need for intractintestinal injections of carbolic acid is thus done away with. Should the eserine fail to act, and the gases commence to reaccumulate, there is then time for the carbolic acid injection to be administered.

From what I have written, I do not wish the reader to infer that I absolutely discountenance the administration of remedies by the mouth in this form of colic. Sooner, I consider it better to 'have two strings to one's bow,' and, even whilst adopting the lines I have recommended, to still continue administering the usual stimulants and antispasmodics in the form of balls or drenches.

Again, however, this time in company with others, I place the most severe strictures upon the use of sedatives. The cause of the tympany is the presence of fermenting materials in the intestine. There is no just reason for locking them there by the injudicious use of anodynes. The reverse is the case, and every medicine administered, save such as is purely antizymotic in its action, should be, in some form or other, essentially stimulative. The use of enemas is again indicated, and the patient should be well rugged down in order to promote warmth. Treated on the above lines, ordinary cases of intestinal tympany will quickly respond, and offer no great amount of anxiety.

## CHAPTER XV

### ENTERITIS: INFLAMMATION OF THE BOWELS

**Definition.**—Colic resulting from a morbid condition of the intestinal coats, manifested by extreme and continuous pain, and characterized by its rapid course and great fatality.

Regarded in the light of a simple inflammation, the term ‘enteritis’ is evidently a misnomer, so far as our knowledge of equine cases leads us. The post-mortem examination of the intestines tends more to point to the fact of its being a general bacterial infection of the bloodstream, commencing from the intestines.

What draws us to this conclusion? I can better lead up to it by quoting at length from a paper by Mr. Cunningham, of Slateford:<sup>1</sup>

‘What is this inflammation,’ he asks—‘this hæmorrhagic inflammation of the bowels? A favourite cob has been working hard, he is laid off lame, and your man is very kind to him, and at night you are suddenly summoned to find that the cob that has carried you so long, and which you know has never had a touch of colic in his life, posting on in two short hours to its end. A farmer buys a horse, young and cheap, in poor condition;

<sup>1</sup> *The Veterinarian*, vol. lix., p. 45.

he is good to it ; it does well and thrives. He is proud of his bargain, and suddenly on the road it takes ill, and in a couple of hours you tell him to prepare for the worst, for though his horse will live to the morning, it will certainly die. A horse passes your place with his load at nine o'clock in the morning, goes three miles, is seized, returns, and by twelve o'clock lies a carcass in your box, after a few hours' ceaseless agony. This is worse than cholera. What is this disease? You examine the carcass, and find the veins, superficial and deep, filled with black, fluid, tarry-looking blood ; the abdomen quarter full of thin, watery, dark-purple, or rusty-coloured serum ; the stomach and bowels with considerable contents, but not more than many a healthy horse in full feeding. The mucous membrane of stomach congested, and its villous portion inflamed and eroded ; the secretions sour and acid, and their contents acrid and high-coloured. Rectum not much amiss, but the cæcum and colon tell another tale. Purple-looking, black, and dirty-coloured inside, thickened and swollen to  $\frac{1}{2}$  inch or 1 inch in thickness, with contents partly solid and partly fluid and purple-coloured, we find in them the true seat of this hæmorrhagic inflammation.

‘Take a piece of healthy large intestine, examine it carefully, and you find it is about  $\frac{1}{8}$  inch thick, the muscular and peritoneal coats are firmly attached and adherent to each other, while the internal mucous is loosely attached by cellular tissue to the muscular, with a considerable amount of fat interposed, forming a sort of cushion or bed, in which the lacteals and blood-vessels may lie and ramify. All the three coats are pale and destitute of high colouring.

‘Take an inflamed piece of large intestine, dissect it carefully. You find  $\frac{1}{4}$  or  $\frac{1}{2}$  inch, or even 1 inch in

thickness, firm and dense, and almost hard to the feel. The peritoneal and muscular coats still adhere closely, but they are thickened and swollen, and soaked with effusion. Still they do not appear to be acutely or actively inflamed. The mucous coat is black or dark-purple coloured, the seat of the most intense and evidently acute (or it may be passive) inflammation, but still not much thickened; its inner lining is black and dirty-coloured, studded with minute openings, while the space between the mucous and muscular layers is filled and gorged and swelled with effusion, the chief cause by far of the increased thickness of the bowel, and the effusion is clear, not dark-coloured at all; while in the peritoneal folds, connecting the divisions of the gut, lymph, watery but clear and amber-coloured, as from a pleuro-pneumonia lung, may be found in abundance.

‘If this is simple acute inflammation, where in the animal economy have we another example of such rapid, fatal, and extraordinary results in the space of a few hours from simple, pure, acute inflammation, and nothing else?’

‘Is it due simply and solely to the presence and mechanical irritation produced by large quantities of indigested material in the organs? Then, surely, a horse with a 13-pound dust-ball, or one packed with fodder beside, should be its readiest victim. But we know that such is not the case. Is embolism the cause? I believe, in one or two instances, one might be justified in saying so. Is it anthrax? I do not think the lesions justify that conclusion. Is twist or displacement the key to the mystery? I believe in some this does supply the key, and that some of the so-called cases of inflamed bowels are simply cases of twist or displacement; but, on the other hand, of the many cases I have examined

after death, only a few, comparatively, have I been able to trace any distinct twist, intussusception, or strangulation.'

**Causes.**—Seeing that nothing is clear, we can only reason by analogy. We know that in at least one other disease such appearances as are revealed in a post-mortem of a case of enteritis are certainly caused by a bacterial invasion of the intestinal bloodvessels. We also know that the symptoms closely correspond, that the pain is just as agonizing, and that the illness is just as fatally rapid. I am referring to anthrax.

When, after the experience of such a case, one meets with another in which the onset is similar, the symptoms almost identical, the issue just as much a foregone conclusion, and the post-mortem appearances hardly distinguishable, one may be excused for referring to it a similar cause. In the first case the cause has been carefully and indisputably shown to be anthrax.<sup>1</sup> In the second, the most painstaking search fails to reveal its presence. We know that the second case is not anthrax, for the methods that revealed it once should expose it a second time, and are therefore able to assume that its cause must be a rapid invasion of the lacteals and bloodstream by some germ or other as yet undemonstrated.

Allowing this to be the fact, it does not, for a moment, detract much from what other writers have put down as the usual causes. Take, for instance, such commonly quoted causes as over-fatigue, cold from exposure, and washing the belly with very cold water when the animal

<sup>1</sup> I am able to vouch for the truth of that statement from the experience of a case that occurred in my own practice. The animal died, showing every symptom of so-called enteritis. The case was diagnosed as such and treated as such. As a result of the post-mortem I was able to definitely demonstrate the presence of the *Bacillus anthracis* in the blood.—H. C. R.

is heated. It is conceivable that either of these factors would tend to lower the body vitality, and that any predisposition there may have been would be hurried into an attack by their aid, such predisposition being the presence of the necessary virus in the intestinal tract, and some condition of the bowel wall (irritation from calculi, impaction, etc.) favouring the entrance of the germ.

At any rate, whatever may be the real explanation, it is simply madness for anyone to imagine that any such trivial cause as cold, over-fatigue, etc., is sufficient *per se* to bring on an attack. As Williams rightly enough puts it, 'It is very true that impaction, constipation, intussusception, volvulus, the presence of calculi, or the action of irritant poisons, may cause great congestion and inflammation of the intestinal membranes; but the disease to be described originates *sui generis*, and very often without the occurrence of an immediate and recognisable cause of direct irritation.'

Although in practice we are somewhat inclined to hold out to our clients the possibility of a case of 'colic' terminating in enteritis, I should imagine that it is simply a case of 'digging a large enough hole to clamber out of' should the animal unfortunately die. I do not think that any one of us honestly believes it likely to happen in any great number of cases. We are far more likely to inwardly admit that the case we have misdiagnosed as 'simple colic' is, in reality, one of twist, intussusception, etc.

That being so, and taking Williams' statement, 'that the disease originates *sui generis*,' to mean that there is some specific cause, then there is no other solution that fairly satisfies the problem save the one I have suggested—that of bacterial infection.

**Symptoms.**—Unfortunately, these are too well known to need any lengthy description. The history of the case invariably points to the attack having been ushered in with rigors. In the language of the stable, ‘the animal is taken with a shivering fit.’ The appetite fails, the breathing becomes quickened, and the bowels show signs of commencing irritability by frequently ridding themselves of small quantities of *fæces*.

Following this, the symptoms of abdominal pain commence, and, gradually increasing in intensity, remain until near the end of the case. All indications of the most severe suffering are present. The animal strikes at the belly with his feet, casts anxious and dolorous looks towards the flanks, and commences alternately rolling and rising to his feet, and sometimes biting madly at his sides. The pulse is increased in number, hard, wiry, and quick, up to 120 beats a minute, and often scarcely to be felt, except at the radial. The belly is usually normal in size—no tympanites—and appears more or less tucked up, owing to the contraction of the abdominal muscles, while pressure on it, in some cases, appears to cause pain. Profuse perspirations bathe the body, and the ears and legs grow deadly cold.

All the time the pain has been continuous. No moment’s remission from suffering has eased the agonized patient and relieved the veterinarian’s mind. No second of quiet has occurred to break the dread hurrying forward of the fatal symptoms. The animal gradually grows worse and worse, and every symptom here mentioned appears to become aggravated. The countenance becomes pinched and haggard in the extreme; the sweats become slowly colder, suggesting to the touch the nearness of dissolution, and causing the hand to be withdrawn with a shudder; the visible mucous

membranes are an intense livid red; the nostrils are widely dilated, and the breath coming and going in short, painful sobs. The getting up and down has resolved itself into a ceaseless circular tramp around the box; the pulse has become more imperceptible still, but yet maintains its speedy beating, and the belly is growing tympanitic.

Later still, all symptoms of pain quickly subside. The bowels, so lately the seat of the most agonizing spasms, have become gangrenous, and consequently dead to feelings of pain. The animal then stands quiet, and will even drink and endeavour to feed. The owner is pleased, and anticipates recovery. Not so the veterinarian. He knows too well that it is but the beginning of the end.

The haggard expression of the face still remains; the pulse continues thready and imperceptible; the extremities are even more cold than before; the mouth is cold, clammy, and fœtid, and the body is shaking with involuntary tremors. The eyes grow amaurotic; the lips hang pendulous; the legs are widely propped apart to keep the staggering, half-unconscious brute upon his feet, and a nervous, anxious whinny greets a passing equine friend.

But a short time further sees the end. The stagger gives way to an aimless blunder forward; the limbs collapse, and the tortured animal sinks to expire in convulsions. What was, perchance, but six short hours before a handsome specimen of the equine race, with beauty, health, and strength depicted in each line of his glossy, well-kept body, now lies a dirt-besmeared, worthless carcass.

**Diagnosis.**—Once seen, I do not think that enteritis is often likely to be misdiagnosed. As a boy, I



remember committing to memory a tabular arrangement of the differentiating features of enteritis and ordinary colic. I found it in one of those old-fashioned works that, in one volume, deal with the whole 'art and practice of farriery,' as necessary for 'all those who have the government of cattle.' Somewhat too precise and over-condensed it may appear to modern minds, and yet it is not without its merits. This is how it ran :

*Colic*

1. Sudden in its attack.
2. Intervals of rest.
3. Pulse only becomes frequent in the paroxysms of pain. In intervals of ease is normal in number of beats, but evidently fuller.
4. Legs and ears of the natural temperature.
5. Relief obtained from rubbing the belly.
6. Relief obtained from motion.
7. Strength scarcely affected.

*Inflammation of the Bowels.*

1. Gradual in its approach, with previous indications of fever.
2. Constant pain.
3. Pulse continuously frequent, but small, and often scarcely to be felt.
4. Legs and ears cold.
5. Belly exceedingly tender and painful to the touch.
6. Motion increasing pain.
7. Rapid and great prostration.

Really that table offers the major points to be considered when forming an opinion. To it I would add that the circumstance of the conjunctiva being so highly injected, and the fact of the pulse, temperature, and respirations all three immediately participating in the unfavourable indications, are all manifestations of a highly dangerous condition.

Almost all writers appear to agree in stating that the belly is tender to the touch. Allowing that it is, it is always difficult to judge, for one never knows how much of the flinching and resentment should be put down to restiveness.

After all is said, Percivall's summing up remains as good now as on the day on which it was written. 'The surest diagnosis between colic and enteritis,' he says, 'is to be found in the history of the case—in particular, in the *manner* of the attack, in the intermissions, in the state of the pulse, and in the progress of the case.'

**Prognosis.**—Once certainly diagnosed, enteritis offers but little hope of recovery. It is so commonly fatal as to warrant an unfavourable opinion being expressed in every case.

In ordinary cases of colic, as, for example, impaction, irritation by calculi, diarrhœa, etc., there is no doubt that we often get a condition that properly comes under the term we are now in all probability misusing. . . . We get a limited enteritis. . . . The occasional slight rise of temperature in these cases is sufficient to point that out. Such of these cases as yield to remedial measures may be rightly classed as recoveries from enteritis. The name 'enteritis,' as signifying the disease I have been describing, has become such a well-known part and parcel of veterinary nomenclature that I have not dared to head this chapter by any other term. Had not such been the case, I should have suggested for this disorder some such appellation as 'intestinal septic infection,' 'intestinal septicæmia'—in short, any other suitable name that would have left the word 'enteritis' to be properly applied to those conditions it more fitly describes. That the disorder we have described *is* an enteritis, or inflammatory condition of the bowels, I do not attempt to deny. I simply maintain that its manifestations are so peculiar to itself as to point to a specific cause—that it is a disease by itself—and ought, therefore, to be given such a name as would definitely distinguish it from those comparatively minor

complaints covered by such an all-embracing term as 'enteritis.'

The statement with which I have headed this section would then need qualification. Recovery from the limited enteritis attending other and less dangerous forms of colic is not only possible, but a matter of every-day occurrence.

On the other hand, resolution in a case of 'intestinal septicæmia,' if I may, for a moment, be allowed to so call enteritis, will occur with about the same frequency as recoveries from the intestinal forms of anthrax. Knowing that, the practitioner will appreciate my statement, 'enteritis offers but little hope of recovery,' at its true value.

**Treatment.**—I must confess myself to looking upon this as hopeless. Once established, I do not think that enteritis—at any rate the enteritis I have described—is in the slightest degree affected by anything we may pour into the animal's body. Though not affecting the issue of the case, humanity points to a manifest duty. It should be our care to render, if possible, any aid that will mitigate the animal's sufferings. To that end, the most potent anodynes and sedatives should be employed. Even should we succeed in inducing a state of delirious drunkenness, that is manifestly better than allowing the patient to succumb in agonizing tortures.

Should the practitioner deem this advice too dogmatic, and conscientiously feel that other remedial measures should be attempted, he will find plenty to his hand in other and well-known volumes. Personally, I do not think that our knowledge of the etiology of this disorder justifies us in thrusting upon the already tortured animal drugs the action of which, in this particular instance, must be highly problematical. This is one case in which

we may safely take the advice of a cynic, whose name I do not remember, and 'refrain from pouring medicines of which we know little into a body of which we know less.'

Rather should the attention of those among us who have a natural liking for investigation be strenuously devoted to searching for a well-defined and certain cause. We may then be better directed towards devising a suitable treatment. All this indicates most strongly that the practitioner of veterinary medicine should be quite certain of his diagnosis before he commences the merciful administration of anodynes.

In spite of the most careful reasoning, and in spite of the most painstaking examination and observation, cases of colic occasionally crop up in which the symptoms are, for a time, dangerously alarming. Enteritis immediately suggests itself to the practitioner's mind, and he commences the exhibition of sedatives. Before he does that, I would earnestly advise him to wait until his somewhat tentative opinion has become an absolute conviction. If he has not the courage to commence a stimulative treatment at the outset, at any rate let him adopt harmless expectant measures. Should the case turn out to be enteritis, he may confidently assure himself that anything he might have done would have been useless.

On the other hand, should the alarming symptoms begin to abate, and the matter resolve itself into some more simple form of colic, he will then have the advantage of being able to push stimulative measures on a system that has not been previously placed outside the pale of hope by the undue administration of sedatives. He will find the average of his cases of so-called enteritis considerably diminish in the course of a twelve-months' reckoning, and, greater boon still, he will find his powers

of diagnosis in colic enormously on the increase. That, at any rate, has been my own experience.

To my mind, it is largely this dread of enteritis, and the idea the practitioner has that he may be able to ward it off by the use of sedatives, that has tended to paralyze any forward movement towards the better differentiation and diagnosis of cases of veterinary colic.

## CHAPTER XVI

### SUPERPURGATION

**Definition.**—That form of colic induced by the inordinate action of a purgative.

Referring to Chapter I., and consulting Professor Friedberger's table, we find that this particular form of colic would come under the heading 'symptomatic,' and that further classification would lead us to the fact that it is colic resulting from the administration of a poison. . . . We must either dub aloes 'a poison,' or inform Professor Friedberger that his table is incomplete, and that he has made no mention of a form of colic resulting from the administration of a harmless drug. For my own part, so far as the horse is concerned, I regard aloes as a poison. The astounding fact to me is that it has not been so called before.

Williams, in his 'Principles and Practice of Veterinary Medicine,' devotes a chapter to the consideration of this condition, admitting that it is of frequent occurrence, and yet not advising the more restrained use of aloes.

Surely it is an astonishing thing that a drug which will commonly give rise to such dangerous symptoms as to call for a separate chapter concerning its antidotes should not be regarded as highly dangerous. Why is it that other drugs have not elevated other conditions to a

position of the same fatal prominence? Why is it that aloes, above all other drugs, should be singled out in this manner? Simply because it is dangerous!

If a new drug were introduced to-morrow, with only one-half of the possibilities of danger already inherent in aloes, its use would be indignantly scouted by more than two-thirds of the veterinary profession. And yet, I venture to say, there are but a very few who would dare to assail aloes in the same manner.

Regarding the medico-legal questions involved in its use, Williams says:

‘The occurrence of superpurgation after the administration of a simple and moderate cathartic by the veterinarian is one of great importance. In no case where due caution has been taken, where the dose has not been more than the necessities of the case required, . . . should the veterinarian be made responsible.’

Personally, I should consider a man deserving of any trouble that might accrue therefrom who systematically uses aloes in his practice without urgent calls for its administration. Physicking after grass, to get into condition, to remove a tendency to swelled legs, . . . all these I look upon as foolish and useless fads—practices which the intelligent veterinarian will endeavour to root out from those of his clients who are amenable to reason.

**Causes.**—Although giving aloes the foremost position among the causative factors of this dangerous condition, it must not be forgotten that other and more simple purgatives will bring about a like result if improperly administered, or if due care is not afterwards taken of the patient.

In a case of pneumonia, for instance,  $\frac{1}{2}$  pint of some

simple bland oil—*e.g.*, that of linseed—will be quite sufficient to cause it. Or, again, if the animal is put to work during the operation of even a simple cathartic, or is exercised too soon after its 'setting,' the same dire results are likely to follow.

This only shows the extreme susceptibility of the horse to the action of purgatives, and, if anything, serves to still further discountenance the common use of such a drastic purge as aloes.

**Symptoms.**—Should the purgative act in an easy manner, but little disturbance of the system will be noticed. The pulse becomes a little weaker, less full, and its frequency increased. When the purging is about to commence the coat will be staring, and occasional tremors present themselves. The animal at this stage is nauseated, appears restless, refuses his food, and shows a slight increase in the number of respirations.

Following this comes the increased action of the bowels and the evacuation of their contents. If everything goes well, a few hours will see a gradual return to the normal. The breathing becomes more tranquil, the pulse grows fuller and more quiet, and the appetite again returns.

Should the dose have been unsuited to the patient, however, or should some adverse circumstance have been in operation, the symptoms rapidly grow more alarming. For example, if there has been any previous slight symptom of fever, if the animal is allowed to drink large quantities of cold water, or if he be exercised or over-excited in any way, an excessive action of the drug may assuredly be expected.

It is not always, however, that a large dose of aloes is needed to bring this about. It is not always that any other adverse circumstance need be in simultaneous



operation to bring about a fatal result. It is in these last two facts that the danger of using aloes exists. Every veterinary surgeon, I might say without exception, is aware of them, and he still persists in an indiscriminate use of the drug.

Williams himself says : ‘ Superpuration does not always depend upon the strength of the dose. In some instances as little as † drachms have been followed by fatal consequences. Again, horses in an obese condition . . . are easily acted upon by purgative medicines, and are apt to sink from superpuration.’

Be that as it may, whether a large dose is necessary or not, or whether any predisposing circumstance at all is needed, it still remains that often the purge does not cease, but gives rise to the following and more aggravated symptoms :

The appetite fails to return ; the discharge becomes more fluid, more frequent, and extremely offensive, and the mucous membranes become injected. The mouth is dry, furred, and fœtid, and the respirations hurried. After each evacuation the animal shows evident colic pains, manifesting them by crouching movements, and occasionally lying down. Usually, however, he stands quiet, and only exhibits his pain by wandering round the box or pawing with one foot on the ground. The pulse has become thready, weak, and quick, and prostration becomes alarmingly evident. The extremities turn cold, and the belly appears abnormally tucked up—in some cases tympanitic. Everything points to a speedy collapse. The practitioner is only too painfully aware of the danger of his case, and understands full well that the most prompt and energetic measures are necessary to combat the condition.

**Diagnosis.**—The history of the case and the evidence

of one's own senses leads one quickly enough to the truth. More than that need not be said.

**Prognosis.**—To a great extent this must always be guarded. Even should the pulse and other symptoms point to nothing really alarming, the practitioner must always bear in mind the only too probable sequels of this condition.

Many cases, unfortunately, end with some such serious trouble as pneumonia; others in a long and severe attack of laminitis, leaving the animal a useless cripple.

Taking these as only of occasional occurrence, no one will attempt to deny the susceptibility of the horse to enteritis. That alone should lead us to endeavour to explain to the owner the risk the animal is running, and prepare his mind for the probability of the patient rapidly sinking under an exhaustive inflammation of the bowels.

**Treatment.**—Called in at the commencement of doubtful symptoms, the best and most simple treatment is a dose of chloral.

R. Chloral hydratis - - - - - ʒi.  
 Aq. fervens - - - - - ad ʒx.  
 Misce; fiat haust.

Sig. : To be given in a pint of thick, cold gruel.

It is unusual, however, for the veterinary surgeon to be summoned early. He is not called in until the symptoms have become really dangerous. He finds his patient with quick and feeble pulse, abdomen drawn up, and extremities cold.

Again I advise the administration of the chloral, this time accompanied with a hypodermic injection of from 3 to 5 grains of acetate of morphia. This will tend to allay the irritability in the intestines, and induce a comfortable sleep. At the same time the animal should be well rugged down and kept perfectly quiet.

If the flagging system appears to demand it, a stiff dose of some diffusible stimulant will be found beneficial. Ten to fifteen ounces of good brandy, or a suitable dose of spirits of nitrous ether, methylated ether, or the aromatic spirits of ammonia, will do all that is needed.

The combined effects of the purging and the taking of the sedatives will sooner or later cause an intense desire for drink. Advantage should be taken of the animal's thirst to induce him to swallow small quantities of wheaten-flour gruel or other emollient drink. This I have always found better to give cold, for oftentimes the drinking of only a few mouthfuls of something cool and refreshing will tempt the animal to pick a little solid food—a few handfuls of hay or a small quantity of corn. This will go far to bring the stomach and intestines to their normal tone, and stay the purging.

Some practitioners pin their faith to opium. Unless the case is one of great urgency, I do not recommend it. Following its administration we are often immediately jumped from the extreme of violent purging to the height of absolute stasis and tympany. It is hard indeed to say which is the worse condition of the two.

In conclusion, I feel it necessary to remind the reader that this chapter has not pretended to treat of acute diarrhœa arising from other causes, as, *e.g.*, the ingestion of irritating or fermenting foods. In those cases the extreme sedative treatment I have recommended is not to be advised. The action of the bowels should not then be checked too rapidly. Rather, if the patient's strength will admit, should they be aided in ridding themselves of the offending materials.

No fixed rules for the treatment of ordinary purging can be laid down with any safety—so much must be left to the good sense and judgment of the medical

attendant ; so much will depend upon the history of individual cases, and the patient's idiosyncrasies. As old Francis Clater clearly enough puts it, 'Nothing so much distinguishes the man of good sense from the mere blunderer as the treatment of purging.' There is no reliable 'rule of thumb' method in medicine. Each case must be treated upon its own merits.

## CHAPTER XVII

### THE TREATMENT OF YOUNG, UNBROKEN ANIMALS

WHAT I am about to write of now may more concern the student and beginner than the staid man of practice. Nevertheless, I did not feel this little volume to be complete without some mention of the matter now under consideration.

**Yearlings and Two-year-olds.**—There is nothing so difficult, even to the practised veterinarian, as the correct diagnosis of ‘colic’ in an unbroken colt. In many instances the animal is, perhaps, at pasture. He is seen to be lying or rolling about, and is driven up into the yard for treatment. If he is fortunate enough to have received no pulling about or forcing of medicines upon him by the owner, the patient will give a tolerably clear account of his trouble to the skilled attendant. More often than not, however, he will have been haltered and twitched, and some patent ‘cure-all’ thrust upon him. In that case the excitement of his new surroundings, and the exertion of fighting against restraint, will have led to a perplexing set of symptoms. He is, perchance, in a bath of sweat, his conjunctiva injected, his respirations enormously hurried, and his pulse beating at a frantic rate. All this may be due to the treatment he has

received, and may not always be taken as evidence of pain. Prognosis—nay, even diagnosis—should be extremely guarded in such a case.

If, on the other hand, the animal has been allowed to remain without interference in the place in which he was taken ill, the veterinary surgeon will start with a 'clean slate.' That will give him great facilities he should not fail to take advantage of. On no account should the animal be immediately haltered and handled, for most certainly that will effectually mask what symptoms he may be presenting. He should be quietly watched, and the few signs he shows carefully estimated. The information likely to be derived from this preliminary observation I have already detailed in the chapter 'How to examine the Patient.' Even then the veterinary surgeon must take into consideration the class of horse, and probable temperament, with which he is dealing. In a high-bred, nervous animal, the unusual position in which he finds himself (that of unknown, and to him unaccountable, pain) and his natural timidity make him in many instances altogether hide his distress. He may be suffering untold agonies. Yet he stands quiet, and only reveals the intensity of his torment by such signs as may be noticed by this introductory 'look round.'

Our next patient, with nothing really serious ailing him, may roll and smash about to an alarming degree, is more subdued when caught and handled, and lends himself well to manipulative examination.

These are the two extremes. There are all gradations between the two, and the veterinary surgeon must in each instance judge the case from its own standpoint. Care should be taken to notice the way in which the patient takes a drench. If he is at all restive and inclined to fight against it, it should be withheld, and the

after-treatment carried on by means of balls, hypodermic injections, and suitable enemas. If this precaution is not taken, and forcible drenching is persisted in, the veterinary surgeon will have a much worse case on his hands in the shape of a severe attack of pneumonia, caused by the aspirating of the liquid.

To the beginner, with his first case of 'colic' in an unbroken colt, I would advise this: 'Put your case down half as bad again as your diagnosis has led you to imagine, and you will be nearer by far to the truth of the animal's condition.'

**Foals.**—In these days of extensive breeding of high-class stock, with the increase in value of their progeny, the foal will demand a large share of our attention. Those resident in or near a large breeding centre know full well the many annoyances and disappointments met with in treating these delicate animals. The veterinary surgeon's position is rendered the more difficult in that every foal, when he is dropped, is looked upon with loving eyes and watched with careful tenderness, as a probable future money-mill in the shape of a successful stallion, or the winner of substantial money prizes at the agricultural shows.

There is not one in fifty that fulfils the hopes so centred on him by his owner, and, when he becomes a raw and ugly yearling, or a comparatively worthless two-year-old, the veterinary surgeon may treat him without anxiety. Still, as a foal he is an unworked gold-mine. He is regarded as such by his owner, and, as a consequence, his case must be treated with every solicitude by the veterinarian.

Paradoxical though it may appear, the treatment of 'colic' pains in foals is both simple and difficult. It is simple in that the best remedies are those usually affected

by the owners themselves—the cases partaking more of the nature of a baby and its nurse than of the adult patient and his medical man. They are difficult in that our powers of diagnosis concerning them are as yet but limited.

*Diarrhœa.*—Probably the most common form of colic in the very young foal is that occasioned by diarrhœa—‘scouring,’ as it is commonly termed. If the case has not been long about, and the young animal is fairly strong, by far and away the best initial treatment is a suitable dose of castor-oil. This is best given in the form of an emulsion. The following is a good mixture for the purpose :

R. Ol. ricini	-	-	-	-	-	-	-	ʒi.
Liq. potassæ	-	-	-	-	-	-	-	℥xxx.
Ol. menth. pip.	-	-	-	-	-	-	-	℥v.
Aquam	-	-	-	-	-	-	-	ad ʒii.

Misce; fiat haust.

If the foal is but a week or so old the above quantity will be found sufficient. If at all older and not weakly, double the quantity may safely be given. In many cases, where the symptoms appear to demand it, a suitable stimulant may be added in the shape of spts. ammon. ar., spts. eth. nit., or a small dose of brandy. Very often, after the lapse of only a few hours, this dose of castor-oil will have stayed the purge. Should it have failed, it will then be necessary to follow it up by the administration of combined astringents, antacids, and sedatives. The following is a very old-fashioned recipe, and yet one of the most suitable :

R. Catechu pulv.	-	-	-	-	-	} ā ā ʒiii.
Cretæ preparatæ	-	-	-	-	-	
Spt. ammon. ar.	-	-	-	-	-	ʒii.
Tinct. opii	-	-	-	-	-	ʒi.
Aquam	-	-	-	-	-	ad ʒxii.

Misce; fiat mist.



This may be given in 1 or 2 ounce doses as the case demands, mixed with a little of the mare's milk. Following the administration of the sedatives, careful as we may be with the dose, it often happens that we have to face a case of intestinal stasis. This must be carefully treated by means of the castor-oil emulsion, this time combined with a small quantity (say, ℥ xxx. to ʒi.) of tinct. nucis vom. Perhaps a rather more suitable line of treatment, however, is to combine the castor-oil with glycerine, thus :

R. Ol. ricini	-	-	-	-	-	-	-	ʒi.
Glycerini	-	-	-	-	-	-	-	ʒss.
Ol. menth. pip.	-	-	-	-	-	-	-	℥x.
Aquam -	-	-	-	-	-	-	-	ad ʒii.
Misce ; fiat haust.								

These cases of scour are often very troublesome, and much will depend upon the good judgment and careful attention of the nurse—not the veterinarian. The foal should not be dosed standing, but thrown on its side.

When attending a case of colic in a very young foal in which there is no definite sign or history of scour, the veterinarian must be extremely careful. There are at least two conditions which may seriously mislead him in his diagnosis—viz., *accidental bruising of the intestine* and *scrotal hernia*.

*Injured Intestines.*—This, I think, is far more common than is generally supposed, and is probably accountable for many of the deaths ascribed to 'colic.' It is occasioned by the mare treading on the abdomen of the young animal when it is stretched at sleep. I have seen more than one case of the sort where the cause has clearly been traced, and it leads me to think that often it may occur and not be noticed. After the infliction of the

injury the foal is soon taken ill. The pains are slight but constant, and the young animal is nearly all the time down. If there is no history of the hurt, a mistaken diagnosis is really quite excusable, for these small creatures show no symptoms definite enough to lead to the truth. When present, however, one symptom is almost, if not quite, diagnostic—blood-stained fæces. It is not that dark, coffee-coloured stain so often found coating the dung-balls of an adult animal in a case of obstinate impaction, but distinct strings of coagulated blood mixed with the excreta.

When diagnosed, little can be done save warn the owner of the indefinite state of our knowledge (we have no means of ascertaining whether or no the intestine is actually *ruptured*), and then to rest the animal and the bowels as much as possible by the use of sedatives. As it may be necessary to continue the sedatives for a day or two, it will be found advisable to resort to a combination of several, and not maintain the administration of one drug. Chlorodyne will be found a very good agent. Even this, however, may be objected to on the ground that it contains such a stimulant as *tinct. capsici*. Perhaps the safest way is to give alternate doses of *tinct. opii*, *chloral hydras*, and *ext. cannabis indicæ*. As far as is deemed wise, the foal's diet should be restricted by milking the mare.

As the foal grows older he is not so likely to allow himself to get trodden on in this manner, and yet may sustain a similar injury in a different way, *e.g.* :

One case has come under my notice where the animal, when allowed to run out for the first time or two, has slipped up violently on to his side during his first preliminary gambol. This again has produced enteritis and led to fatal results. Colic pains always accompany the

injury, and nothing but a careful inquiry into the history will serve to distinguish them from pains proceeding from a more simple cause.

*Intestinal Impaction.* — Later in the season, as the foals grow older, and begin to nibble for themselves, uncomplicated cases of subacute intestinal obstruction will be met with, occasioned by impaction with improperly digested food. A fairly frequent cause of this impaction in foals is the peculiarly dirty habit these animals appear to have, when first they begin to pick for themselves, of nibbling at mounds of decaying litter, dried or rotting vegetation, or even the mare's excreta. This should always be kept in mind, and care taken to prevent it where likely to occur.

It is now that sedatives may be dismissed from the veterinarian's mind, for his case will progress better under a stimulative treatment. The animal has attained a reasonable size, and his strength will readily allow of more active measures being persisted in. With due allowance for the dose, he may now be treated exactly as the adult—viz., by means of oleaginous purgatives, nuxvomica, and stimulants. No matter what the diagnosis, an enema should always be given for the purpose of ascertaining the state of the rectal contents. It is, of course, impossible to insert the whole of the hand, and it is doubtful whether digital exploration gives information enough.

The necessity for always using the enema syringe was forcibly driven home to me some years ago when treating a four months' old foal. He was showing ordinary dull pains. I administered the usual medicines, and, more to please the owner than with the idea of doing good, proceeded to give an enema. The rectum was in a state of great impaction. With the injection of each syringeful

of water, there came away a most abnormal quantity (for so small an animal) of hard pellets of fæces. What was more to the point, instant relief was thereby afforded. What would have occurred had sedatives been given to ease the pains, and the rectum left unexplored, because the animal was so small?

*Strangulated Hernia.*—Lastly, one word of caution to the beginner. When called to a case of colic in a young colt foal, always lay him down, have the top hind limb drawn back, and examine the contents of his scrotum. If suffering from hernia, it happens sometimes that the portion of bowel in the scrotum becomes impacted. It is thus unable to pass its contents along, and finally becomes strangulated. When present, the rupture should be carefully manipulated in order to judge of the state of its contents. Should any doubt exist, everything in the scrotum should be gently pressed back into the abdominal cavity.

These few scattered remarks on this last subject do not pretend to be even an epitome of the treatment to be adopted. They simply offer a groundwork on which the veterinarian must build up his own methods of practice. The subject is yet too indefinite to lay down any dogmatic rules upon, and much may be done by future writers in contributing to this branch of our literature.

With this, my small work on 'Colic' is finished. I do not claim that it is exhaustive, but I do hope that I have been successful in placing some matters in such a light as to lead to newer lines of thought and fuller investigation.

If we are ever to better our means of diagnosis in these troublesome and vexatious complaints, and lead the way to a fuller understanding of the more fearsome-sounding conditions among them, it will only be by commencing

at the very beginning. Those cases which are of practically every-day occurrence, and which thereby come to be treated by somewhat 'rule of thumb' methods, should be the first to receive our attention. A fuller knowledge of their peculiarities would, perhaps, prove the stepping-stone to something greater.

Do not, immediately a horse begins to roll, call it 'spasm,' and forthwith administer an antispasmodic, or call it 'pain,' and cover it up with a sedative. Something more than that is required of the modern veterinary surgeon, if he is to enhance the reputation of his profession. Nothing should be thought too small, nothing deemed too insignificant, to aid him in his endeavour for honest advance. No amount of theoretical knowledge should cause the practitioner (especially the veterinary practitioner) to neglect the 'apparently trivial' — the habit of clinical observation. Even as in the time of Percivall, the greatest possible facilities for the furtherance of our education are to be found in the sick-box. There is still room for careful research, still the need for much patient recording of cases, and still a large amount of useful knowledge to be acquired concerning the Common Colics of the Horse.

## APPENDIX <sup>1</sup>

THE composition of various foods, as judged by their analyses, is usually given in the following terms :

Moisture	-	-	-	-	-	}	per cent.
Fat	-	-	-	-	-		
Nitrogenous substances	-	-	-	-	-		
Carbohydrates (soluble)	-	-	-	-	-		
Fibre	-	-	-	-	-		
Ash	-	-	-	-	-		

A brief description of the above may be of some use :

**Moisture** refers, of course, to the water which may be volatilized at a temperature of 100° C. (212° F.).

**Fat** includes the solid and liquid glycerides of fatty acids, composed of carbon, hydrogen, and a little oxygen. Fats are soluble in ether.

**Nitrogenous Substances** is a broad term, used to indicate (usually) all the compounds of a food which contain nitrogen. Under this heading are included the albuminoids or proteids which have a high feeding value, and also frequently the amides, which have only slight nutritive properties. They are composed of carbon, hydrogen, oxygen, nitrogen, and sulphur, and contain about 6·25 per cent. of nitrogen.

**Carbohydrates (Soluble).**—Under this heading all

<sup>1</sup> For this appendix I am indebted to my friend Mr. E. Wightman Bell, F.C.S., District Agricultural Analyst for the Holland Division of Lincolnshire.—H. C. R.

those compounds of carbon, hydrogen, and oxygen which are soluble in dilute acids and alkalies are included, such as sugar, starch, mucilage, pectin, etc.

**Fibre.**—The remaining organic constituents which are not soluble in the diluted acids or alkalies used by the analyst are classed as fibre. The whole of this fibre is not indigestible, but the amount capable of digestion is very variable, and fibre is consequently usually classed as of no feeding value.

**Ash.**—This is the mineral or incombustible part of food, composed of inorganic salts, a portion of which is used for the formation of bone, etc.; but by far the greater portion is passed out in the excreta.

Nitrogenous substances are frequently called ‘flesh-formers,’ whilst fat and carbohydrates are designated ‘fat or heat formers.’

**Chemical Composition of Certain Foods.**—From analyses made by the writer and other analysts, the following table shows the

AVERAGE COMPOSITION OF CERTAIN FOODS.

	Moisture.	Fat.	Nitro- genous Substances.	Carbo- hydrates (soluble).	Fibre.	Ash.
*Wheat -	15.56	1.63	11.47	67.55	2.16	1.63
*Barley -	18.23	1.90	10.50	64.10	3.24	2.03
*Oats - -	15.71	4.81	13.13	55.45	8.00	2.90
Maize - -	11.12	5.20	10.40	69.35	2.32	1.61
*Peas - -	16.45	1.83	23.62	50.00	5.04	3.06
*Beans - -	16.25	1.66	26.25	47.36	5.71	2.77
*Potatoes -	75.90	0.15	2.60	19.56	1.12	0.67
*Mangels -	89.35	0.22	1.32	6.95	0.91	1.25
Carrots -	87.21	0.20	1.20	8.99	1.45	0.95
Meadow hay	13.20	2.61	8.60	42.99	26.75	5.85
Clover hay -	15.67	2.90	11.85	39.56	25.40	4.62
Bran - -	14.50	3.18	13.68	53.25	9.21	6.18
Straw (cereal)	14.19	1.53	3.35	36.60	40.00	4.33

\* Analyses by the writer.

In comparing the feeding value of different foods (apart from their 'balance'<sup>1</sup>), it is useful to calculate the food units which are contained in them. In calculating the food units, it is assumed that the moisture, fibre, and ash are of no feeding value. Experiments have shown that fats and albuminoids produce (practically) two and a half times the heat that carbohydrates do; therefore, to obtain the food units, we add the percentages of fat and nitrogenous substances, multiply the sum by  $2\frac{1}{2}$ , and add the percentage of carbohydrates. The result is the number of food units.

As an example, let us calculate the food units of oats and beans from the composition given in the previous table :

	Oats.	Beans.
Fat . . . . .	4·81	1·66
Nitrogenous substances-	13·13	26·25
	<hr/>	<hr/>
	17·94	27·91
Multiply by - . . . .	$2\frac{1}{2}$	$2\frac{1}{2}$
	<hr/>	<hr/>
	44·85	69·77
Add carbohydrates -	55·45	47·36
	<hr/>	<hr/>
Food units - . . . .	100·30	117·13

It will thus be seen that, if all were digested, the feeding value of oats and beans is in the ratio of oats 100 and beans 117—that is to say, beans have about one-sixth more feeding value than oats; or, 6 pounds of beans will produce as much heat and energy as 7 pounds of oats.

As these calculations of food units are taken on the composition of the food, it follows that the whole of the constituents are included, whether digested or passed out as manure, their use both as foods and fertilizers being taken into account, for, with ordinary care, what is not used as food is utilized as manure.

**Digestive Coefficients of Foods.**—The composition

<sup>1</sup> *I.e.*, the ratio of nitrogenous to non-nitrogenous foods.



of a food as ascertained by chemical analysis is of great value in the comparison of foods, and especially of foods *of the same class*. It must not, however, be assumed that an animal is capable of digesting the whole, or, in many cases, anything approaching the whole, of the nutritive constituents.

The amount digested varies (1) with the kind and age of the animal ; (2) with the class of food. Ruminants naturally digest more of the so-called indigestible fibre than horses, so that such foods as grass or hay are of greater feeding value for sheep and oxen than for horses. In the case of cereals and the leguminous foods, the power of digestion of both classes of animals is very similar. The following table, drawn up from various sources (especial use having been made of the investigations of Dr. E. Wolff), shows the

AVERAGE PERCENTAGE OF DIGESTIBLE CONSTITUENTS  
IN FOODS.<sup>1</sup>

	Albuminous Compounds.	Carbohydrates.	Fat.
Wheat - - -	11·0	64·0	1·0
Barley - - -	7·5	57·5	1·5
Oats - - -	8·0	45·0	4·0
Maize - - -	8·0	68·5	4·0
Peas - - -	20·0	52·0	1·5
Beans - - -	22·0	50·0	1·5
Potatoes - - -	2·0	20·0	—
Mangels - - -	1·0	7·0	—
Carrots - - -	0·5	7·0	—
Meadow hay - - -	5·5	40·0	1·0
Clover hay - - -	6·5	35·0	1·5
Bran - - -	10·5	44·5	2·5
Straw (cereal) - - -	1·5	40·0	1·0
Linseed cake - - -	25·0	30·0	9·5
Locust meal - - -	2·5	72·0	1·0

<sup>1</sup> In the above table the figures are only carried to the nearest  $\frac{1}{2}$  per cent. It may be noted that in some cases the amount of

It has been ascertained that the best balanced diet for the horse is one which has an albuminoid ratio of about 1 to 8.<sup>1</sup> That is to say, the amount of albuminous compounds should be about one-eighth of the carbohydrates and fat, the latter having been multiplied by  $2\frac{1}{2}$ , as stated under food units.

As an example, let us calculate the albuminoid ratio of oats. Referring to table of digestible composition (p. 213), we find oats contain :

Fat, 4 per cent.; carbohydrates, 45 per cent.; and albuminoids, 8 per cent.

$4 \times 2\frac{1}{2} + 45 = 55$ , which, divided by 8 (albuminoids), = 6.9 (nearly). The albuminoid ratio of oats is therefore very nearly 1 to 7.

Experiments have further shown that a horse of 1,000 pounds weight, when at rest, requires 8 pounds of dry digestible food constituents to maintain it. The amount necessary is, of course, considerably increased when a horse is at work, and as the average cart-horse will weigh over 1,000 pounds, we may put the average requirement as :

When at rest, 10 to 12 pounds digestible constituents.

When moderately worked, 16 to 18 pounds digestible constituents.

When heavily worked, 22 to 24 pounds digestible constituents.

Having an albuminoid ratio of 1 to 8.

How seldom is the diet varied according to the amount

carbohydrates is in excess of that given in the first table; this is due to digestible fibre being added to the carbohydrates in this table.

<sup>1</sup> This is about the ratio given by good quality hay.

of work to be performed! A common daily feed for cart-horses in South Lincolnshire is in winter composed of:

Corn <sup>1</sup>	-	-	14 pounds.
Cut straw	-	20	„
Mangels	-	21	„

What digestible matter is furnished by a diet of this description? To calculate this (and as it is of frequent use it may be as well to state it fully) we refer to the table of digestible constituents (p. 213), and, taking each constituent separately, multiply the percentage by the number of pounds of food taken, move the decimal point two places to the left (*i.e.*, divide by 100), which will give the number of pounds of that particular constituent in the weight of food given.

For instance, how much digestible albuminous matter is contained in 7 pounds of maize?

$$8\cdot0 \times 7 = 56\cdot0 \div 100 = 0\cdot56 \text{ pound.}$$

Working in this way, we find that the diet named above has the following feeding value:

	Albuminous Compounds.	Carbohydrates.	Fat.
7 pounds maize - -	0·56	4·79	0·28
7 pounds bran - -	0·73	3·12	0·17
20 pounds straw - -	0·30	8·00	0·20
21 pounds mangels -	0·21	1·47	—
	1·80	17·38	0·65 × 2½
		Plus carbo- hydrates -	1·62
			17·38
	1·80		19·00

<sup>1</sup> This is a mixture of indefinite composition, often consisting of equal quantities of bran and maize.

This diet, therefore, gives a total digestible feed of 20·8 pounds, having an albuminoid ratio of about 1 to 10·5. An average-sized cart-horse, doing a fair day's work, is therefore receiving about the correct quantity of total food ; but the balance is not good, the albuminoids being insufficient.

An approximately correct diet may be compounded as follows :

	Albuminous Compounds.	Carbohydrates.	Fat.
3 pounds beans - -	0·66	1·50	0·04
4 pounds maize - -	0·32	2·74	0·16
7 pounds bran - -	0·73	3·12	0·17
20 pounds straw - -	0·30	8·00	0·20
21 pounds mangels -	0·21	1·47	—
	2·22	16·83	0·57 × 2½
		Plus carbo- hydrates -	1·42 16·83
	2·22		18·25

This gives 20½ pounds digestible food, with an albuminoid ratio of about 1 to 8·2. It is, therefore, nearly theoretically correct, and, being of a compound character as regards class of foods, would be an excellent diet.

It should, however, be noted that these rations should be very considerably reduced on non-working days, as they are under those circumstances very wasteful, being much in excess of the requirements of the animal, and thus giving the horse more work to do to digest it.

In conclusion, it may be pointed out that it is a very simple matter to arrange a diet from the tables given to suit any particular case, all that is necessary being to work

out from the table the composition of the food suggested to be given, and to alter it according as whether it be too rich in carbohydrates (in which case a more albuminous food should be substituted), or if of too albuminous a character, then look out a suitable food of a more starchy nature to take the place of one which contains a greater quantity of albuminoids or proteids.

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