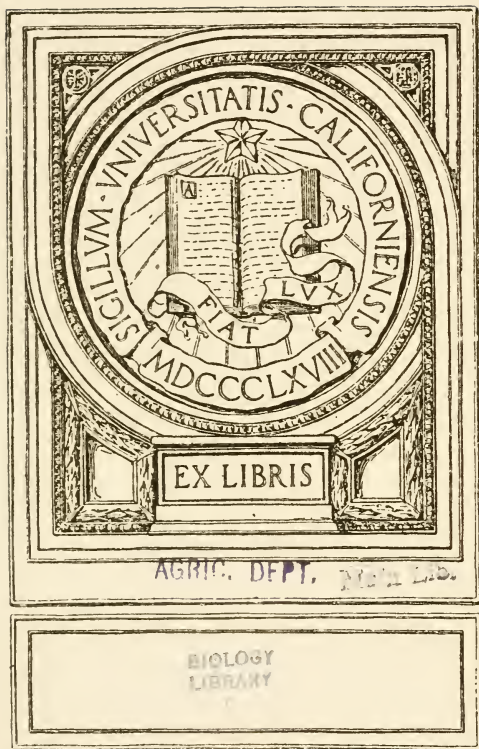


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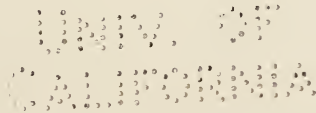
No. 3

COLICS AND THEIR TREATMENT

Edited by

D. M. CAMPBELL, D. V. S.

Editor, American Journal of Veterinary Medicine



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Preface

This little volume appears because of the need for the material which it contains in a readily accessible form. An examination of the articles in this work will convince anyone that they are too important, too valuable to the practitioner and too much needed by most of us to remain in the more or less inaccessible files of any periodical. Therefore, the customary apology for the issuance of a publication, that usually begins its preface, is wholly unnecessary here.

Many veterinarians apologize for the use of the word "colic" and deplore its introduction into the nomenclature of diseases. But such a view seems hardly justified. It appears best to recognize that the meaning of this term has traveled far beyond its logical, etymological restrictions and has come to include a great, though definite, group of ailments, which bear some degree of relation to one another in cause and in effect. Various substitutes for the word colic have been suggested by writers on veterinary medicine but as yet none of the terms offered is so comprehensive and at the same time so exclusive—none includes all of the ailments which it is desirable to place in this class, and at the same time omits those that do not properly belong in it. Therefore, "Colics" is selected as the most significant title available for this work.

May, 1914.

THE EDITOR.

Importance of Clinical Reports

“**C**AREFUL observation makes a skilled practitioner, but his skill dies with him. By recording his observations, he adds to the knowledge of his profession, and assists by his facts in building up the solid edifice of pathological science.”—William Hunting, F.R.C.V.S.

Contents

	Page
Introduction	11
D. M. CAMPBELL	
Differentiation of the Various So-Called Colics....	15
R. P. LYMAN	
Stomach Lavage in Acute Indigestion of the Horse..	37
D. O. KNISELY	
Surgical Treatment of Colics in Horses.....	53
L. A. MERRILLAT	
Impaction of the Cecum in the Horse.....	85
A. T. GILYARD	
Colics in the Horse.....	101
DAVID S. WHITE	
Medicinal Treatment of Colic in the Horse.....	113
E. L. QUITMAN	

Introduction

Unlike most other ailments of animals, the treatment of colics in horses has undergone relatively slow change in recent years. The immense forward strides in our knowledge of the science of bacteriology has, within a generation, revolutionized prophylaxis and surgery, and materially changed the accepted methods of diagnosis and treatment of infectious disease; but before the problem of preventing, diagnosing or treating the colics of the horse bacteriology stands helpless. Epizootiology knows no means of forestalling an attack of colic, the scientific laboratory knows of no reaction that will reveal its presence and biologic therapy offers no aid in its treatment; all this notwithstanding this ailment occupies more of the time and attention, and makes greater demands upon the skill of the average practitioner of veterinary medicine than any other.

Just a decade ago Reeks' valuable treatise on colics appeared, and marked the beginning of the substitution of stimulants for sedatives in the treatment of this ailment. That many of the followers of Reeks went to extremes in their neglect of sedatives in the treatment of colic is certain, and it is equally true that Reeks advises the use of stimulants in excessively large doses, but on the whole his teaching constituted a great advance in our therapy.

The use of the stomach tube in the treatment of colics of the horse was another improvement upon exist-

ing methods fully as great as that originated by Reeks. The credit for the introduction of the stomach tube and its popularizing among the profession of America is chiefly due to Dr. D. O. Knisely, of Topeka, Kansas, who by his continuous and persistent advocacy of stomach lavage, in the *American Journal of Veterinary Medicine*, at all seasons and at all times, has made it a recognized treatment for colics in nearly every veterinary hospital in the land. Indeed there are but few practitioners in this country who do not possess a stomach tube.

Unfortunately, Doctor Knisely has not been able to convince the profession in Europe of the advantages "of removing the cause of the trouble at its source expeditiously, safely and surely," and the stomach tube is now, ten years after its introduction, almost wholly unknown and unused by any but American veterinarians.

It is hoped that the detailed description of the *modus operandi* of stomach lavage, given in this work, will improve the technic of many whose success with this method of treating colics has not been as great as it should be when properly carried out, and that others who have not as yet employed this all but indispensable contrivance in the treatment of colic will be induced to use it by the preponderance of testimony to its efficacy.

The third material advance in the treatment of colics during a generation was the introduction of "E. L. Quitman's vest-pocket stomach tube," as it is popularly named; i. e., the administration of an antiferment that is really effective in the stomach and intestines—salicylic acid. This treatment is not employed as generally as its value merits and if this volume accom-

plishes nothing more than to extend widely, a knowledge of this treatment its existence will have been amply justified.

The description of surgical methods for the relief of colics in horses contains much that is new to many practitioners, yet these methods have all received careful study by Dr. L. A. Merillat, who by personal experience has demonstrated their success or failure. Their adoption as advised by Doctor Merillat will lead to a material improvement in the general treatment of colics.

D. M. C.

Differentiation of Various So-Called Colics of the Soliped*

BY RICHARD P. LYMAN, B. S., M. D. V. (HARV.)

Dean of Veterinary Science, Michigan Agricultural College,
East Lansing, Michigan

It is not my purpose, nor is it considered essential in an article of this character, to consider the classical etiologic factors, general symptomatology, or routine therapeutics. The omission of all preliminaries affords an opportunity to turn at once to the subject, and allows us to reason out first the "whyfor" of the words, "so-called colics," before launching into the real issue.

SO-CALLED FALSE COLICS

Probably no word is more commonly used by the laity, and also (through force of circumstance and habit) by the veterinarian, in referring to animal diseases, especially diseases of the horse, than the word "colic." It is used to indicate a condition characterized by certain evidences of pain that is by no means always correctly attributed to a disturbance within any one group of organs; we find "colicky" manifestations associated with perverted respiratory, urinary, reproductive and digestive functions, with disturbances of the muscular system and also accompanying certain specific and general systemic diseases. When purely of enteric origin, colic is classi-

*Reprinted from the May, 1912, issue of the *American Journal of Veterinary Medicine*.

cally known as *enteralgia*, this is "true colic." Other forms, or the "false colics," on the whole are less intricate, and these will first occupy our attention. Remember that we are dealing essentially with differentiating facts, all else being largely omitted.

Diseases Manifesting Colicky Pains.

Among the array of diseases or disturbances coming more especially under the arbitrary classification of "false colic" may be cited laryngeal, pharyngeal, and esophageal troubles, pleurisy, strangles, purpura hemorrhagica, influenza, tetanus, ruptured stomach or diaphragm, calculus, or obstruction of the urethra or ureters, bladder disturbances, pregnancy, azoturia, pyemia, chemical or vegetable poison, hepatic ailments, peritonitis and enteritis, hernia, anemia, etc.

Many of the aforementioned diseases—strangles, equine pleuro-pneumonia, pyemia, equine pernicious anemia (swamp fever), influenza, purpura hemorrhagica, tetanus and other infective maladies—manifest abdominal pain usually of secondary character and comprise a class which it seems unnecessary to discuss further beyond emphasizing that the pain is usually coincident with an actual *enteralgia*, reasonably inferring that complications exist, often of serious nature and indicative of disturbances having their origin in intestinal or circulatory obstruction, intestinal catarrh or inflammation through extension or intoxication, or again in nervous irritability and exhaustion.

Prognostications upon these complications or manifestations of pain must be largely determined by the severity of the attack, the degree of impairment of the

nervous system and the physical state of the organism as a whole.

Laryngeal, pharyngeal or esophageal stenosis or obstruction, pregnancy, retained placenta and hernia are unlikely to be confused with colic and may be quickly disposed of. The careful practitioner after securing a complete history of any of these cases will observe in the multiplicity of idiopathic or pathognomonic symptoms adequate means for their differentiation from true colic and from one another.

Colicky Pains from Poisoning

Grouping next the various poisonings by irritants—pathologic conditions produced directly by irritant inorganic and organic preparations, of the latter more particularly the aliphatic and cyclic compounds which include certain of the ammonia derivatives, as amids, alkaloids, ptomains, and toxins, we observe that as far as their action upon the digestive tract is concerned, they produce lesions and symptoms allied or identical to gastro-enteritis; hence, we will include them and for the moment consider them jointly with gastro-enteritis, enteritis and peritonitis as it becomes necessary to present material sufficiently competent to separate them collectively or individually from the condition we purpose to interpret as true colic.

Of course, we acknowledge that it is only through broad generalization that we can include the multiplicity of morbid conditions arising from these causes into a summary of one or even two types of disease. Such liberties are taken through assuming that the reader is aware that poisoning exhibits certain characteristics aside from

those of disturbance of the intestinal or gastric apparatus; these symptoms, naturally, do not concern us at this time beyond the knowledge that they furnish means of differentiating these forms of enteric disturbance from true colic.

Colicky Symptoms Due to Enteritis

In enteritis the pains are symptomatic, continuous, the pulse is not squirty as with many colics, but quickened, small and so faintly perceptible, because of the systemic shock and coincident vasomotor disturbance, as to be distinguished with difficulty. The temperature is elevated considerably above that usually produced as a result of the violent exertions of genuine colic; there is injection of the conjunctivæ which have the hue of raw beefsteak; a prostration altogether too profound and of too rapid onset for ordinary colic but such as might be mistaken only for that colic accompanying rupture or strangulation of a vital organ. In prostration from enteritis, however, there is lacking that peculiar period of anxiety and quietness which accompanies rupture of a vital organ. The pains are intermittently constant; the movements of an animal are more considerate, and do not manifest careless tumbling about, but constantly express soreness.

Colicky Pains Due to Peritonitis

Peritonitis is even more difficult than enteritis to separate from true enteralgia. The somewhat wiry though small and increased pulse is an aid to its differentiation as is also the restlessness, and the manifestations of sensitiveness of the abdomen which are more intensive than in enteritis, rather approaching true colic. Absolute

differentiation of peritonitis from true colic is not always possible during life and especially is this the case during the earlier periods of the attack.

Differentiation from Disturbances of the Urinary System

For distinguishing those false colics attributed rightly to troubles within the urinary system, viz.: acute nephritis, calculi of ureters, urethra or bladder disturbances, recourse must be had to the evidence collected through manual exploration through the rectum, which in severe or uncertain colics is never omitted by the painstaking diagnostician; furthermore, catheterization will often uncover a hidden diagnosis.

During the manipulative work one must not fail to take cognizance of the value of certain features as accumulative evidence; I refer especially to a degree of sensitiveness of the kidneys or bladder, evidenced by flinching on pressure; the amount of urine within the bladder considered jointly with history of manner of voiding, whether free or limited micturition or constant straining but suppression; information gained through locating foreign substances that may impede one or both of the ureters, or the urethra or lie in the bladder, likewise a history of periodicity, the passing of blood-colored urine, fecal movements and chemical or microscopical examination of the fluid passed.

Differentiation from Hepatic Disease

Disturbances of the liver in the horse have been given little heed in veterinary medicine possibly on account of the indefinite character of the symptoms and

because even the trained observer finds it difficult to make a clear and entirely satisfactory differentiation between the various functional and organic hepatic troubles. There are, however, certain signs, in protracted illness, that point to probable hepatic derangement, viz.: extreme depression, pronounced immobility, slight periodic uneasiness, elevation of temperature, possibly icterus and, in cases of hepatic abscess, increased phagocytosis as determined by a blood count.

Dangers in "Home Made" Diagnoses

Nothing is more common than for the practitioner to be called upon to attend a horse described as having "kidney trouble" or "trouble with his water." This conclusion, indeed confusion, of the untrained observer is quite natural because of the frequency with which the suffering animal assumes an attitude indicative of a desire to micturate; rarely voiding any urine, the action being due usually to an irritation of the bladder from bowel pressure, or because the stretching gives temporary ease.

The wily practitioner will not be misguided by the "home-made" diagnosis, but will through his trained manipulations, observations and a historical resumé exercise painstaking efforts and thoroughness to refute or affirm the opinions expressed, remembering throughout the examination of the patient the possibility of the absence of certain important symptoms that are masked consequent upon previous administration of medicines given by the owner or caretaker in a usually misguided effort to effect a cure.

Differentiation from Hemoglobinemia

Let us now turn to azoturia as the one remaining disease having symptoms allied to true colic to which I wish at this time to call your attention. Hemoglobinemia is typically distinctive as the disease progresses to greater severity or duration, and after the paresis of the crural muscles appears, and the gluteal group becomes rigid and enlarged or if other groups are affected after they become similarly involved.

A differentiation may also be made through the discovery of the typical high-colored urine; absence of pain and return of appetite, together with the history of high feeding, a short rest, exercise, sudden onset and lameness which is so consistently diagnostic.

The primary expressions, however, in azoturia and enteralgia are conflicting in many instances, particularly in those cases seen during the initiatory pain or muscular spasm, when the anxious and excited animal sweats profusely, breathes excitedly, becomes restless, lies down, rolls, rises, or if unable to get up, flounders heavily from place to place or side to side with accompanying convulsive movements, quickened pulse and peristalsis apparently suppressed through involvement of the sympathetic nervous system.

It is, therefore, evident that a careless examination may easily lead to error that would not be made by the painstaking diagnostician.

Differentiation from Pectoral Ailments

Pleurisy is another condition that is altogether too frequently overlooked by writers who attempt to differentiate true and false colic. The practitioner who casts

his lot where the business of importing and selling "green horses" assumes any magnitude, soon has occasion to realize the great superficial similarity between equine restlessness caused by actual colic and that consequent upon the early beginnings of pleurisy or pectoral influenza; indeed, one observes as allied symptoms; the restlessness, tucked up abdomen, pawing, looking at flank, and anxiety and a mistaken diagnosis is frequently made.

Many times in my career as a practitioner have horses been sent to my hospital preceded by the telephone message or relinquished to my care by the statement, "The animal has a slight colic; as soon as it is over let us know and we will send for him." A look at the animal and compilation of the history obtainable prompts a general examination rather than one confined solely to the abdomen, and as a result certain symptoms are discovered that when considered in conjunction with the anamnesis furnish a diagnosis of this type of false colic.

The differentiating symptoms of pleurisy are: a characteristic wiry pulse; possibly a precursory chill; elevated temperature, in these early stages usually considerably above normal; a tucked-up abdomen with the characteristic pleuritic ridge extending from the ends of the false ribs to the flank; abnormal thoracic auscultation sounds and painful expressions upon forced movement, or upon costal percussion, all clearly demonstrating, after systematic study of the case, that there is actually no intimate similarity to enteralgia but emphasizing the value of never allowing an opinion to become fixed until a thorough investigation of all details has been completed; a positive diagnosis earlier will many times lead to embarrassment.

Other Disturbances Simulating Enteralgia

In leaving the subject of false colics at this point, of course it is admitted that greater completeness would be accomplished did space permit me to consider several other maladies with manifestations conflicting in part. Fearing, however, to weary the reader with unnecessary, though not wholly irrelevant, detail, we may pass them over by simply suggesting the possibility of error from iliac or femoral thrombosis, cerebral derangement, foot trouble or from open synovial sacs, as well as from rupture of the stomach and diaphragm.

CONSIDERATION OF TRUE COLICS

We have now to consider true colics. As altered function of the stomach either independently or jointly with the bowels may occasion pains akin or identical to colic, I am prompted to give a broader interpretation to the word than is inferred by enteralgia and include in this discussion certain gastric disturbances quite intimately associated with colics of the soliped.

It would appear to be impossible to intelligently diagnose colic if one expected in all instances to discover each and every symptom cited by various authors; indeed, there is much irregularity among the varieties of colic in the manner of their expression. Some symptoms prominent in one instance are entirely absent in another. Right here is emphasized the value of adopting a methodical system of examination, and the importance of differentiation; for naturally lucid understanding of the nature of the painful condition will very materially aid in lessening mortality where the accepted death rate is seemingly excessive.

To handle more intelligently the work at hand, we will group, as is customary with writers upon veterinary medicine, the several varieties of true colic which it is our purpose to consider. The classification that appeals most to the writer is a modification of those adopted in Hayes' translation of Friedberger and Fröhner's "Veterinary Pathology" and by Reeks in his excellent work upon "Colics of the Horse." Without attempting to adhere absolutely to the details in either instance but acknowledging the basis mentioned for the classification, we present the following groups, viz.:

1. Colic due to engorgement.
2. Colic due to intestinal and mesenteric obstruction.
3. Gaseous colic.
4. Spasmodic colic.
5. Verminous colic.

Engorgement Colics

1.—**Gastric Impaction.**—We will first consider engorged stomach, called also stomach staggers, gastric impaction or vertigo. There is usually a history of gluttony; possibly the horse has slipped his halter or gained freedom through an open stable or stall door or from a pasture enclosure or otherwise and thus had access to some especially palatable growing food or the grain bin.

Having eaten to over-indulgence the animal appears especially dull, full-bodied and exhibits every evidence of reflex brain pressure, leans heavily against the wall of the stall or rests the head upon the edge of the manger. The pains are slow to set in, mild at first but gradually increase in intensity until they become a steady grind, but

like all colics of this group they are never excruciating unless gaseous complications develop.

2.—Impaction of the Small Intestine.—Overloading of the small intestine presents a line of symptoms not unlike those observed in certain forms of impaction or obstruction of the floating colon, and it is often quite impossible to determine with certainty which condition actually exists until after a careful and intelligent rectal examination has given a basis for differentiation.

In the beginning of cases of engorgement of the small intestines the discomfort is protracted, persistent and, although the pains are of rather sudden onset after eating, especially if impaction is near the stomach, they are of the mild type with intermittent spells of greater uneasiness. The patient seeks recumbency for extended intervals, often shows icterus, and diarrhea is frequently observed, though rectal examination demonstrates these parts to contain fecal matter in more or less solid state. The fecal passages are foul-smelling and usually preceded by pain. A better appetite is observed, during the early beginning of this than with most other colics, and there is an almost diagnostic inclination to move backward as if endeavoring to get free from the gradually increasing pressure. Prompt diagnosis has much to do with lessening the possibility of a grave termination through the development of enteritis or bowel rupture.

3.—Impaction of Cecum and Colon.—There yet remains two very distinct portions of the intestinal viscera to be considered before leaving the subject of colics due to overloading—the cecum and large or folded

colon. Experience has led me to believe that disturbances of the former are exceedingly difficult, if indeed they are not impossible to clearly differentiate from trouble involving the folded colon, unless at times distinguishable through the exceedingly protracted periodical character of the pains and by rectal exploration. In spite of this admission I believe it is quite within our rights to suggest that the cecum is susceptible to disturbances allied to those occurring in the colon and though painstaking postmortem examinations have failed to reveal cecal impactions to an extent of overloading. I have, on the other hand, found rupture of that viscera presumably as a result of fecal stasis or of gaseous accumulation, and believe the constant stretching of the walls of the cecum, together with pressure, so impairs the local nutrition as to prompt necrotic areas which readily account for the rupture.

Considering jointly possible impaction of the cecum and engorgement of the folded colon from an abnormal accumulation of ingesta, we observe, together with the general symptoms of colic, manifest by mild periodic, colicky pains, a fullness of the abdomen, bracing of the hind parts heavily against a convenient wall, couching walk and hesitancy in lying down, diminished peristaltic sounds and on rectal exploration a firm consistency of the accumulated mass as well as a displacement of the pelvic flexure of the colon, which in these cases lies somewhat to the left of the rectum, having presumably, as a result of its gravid state, become moved from the normal position which is somewhat more anterior and superior. The history of enforced idleness and free feed-

ing may quite frequently be competently applied to the general summary of etiology and symptomatology of engorgement of the large intestines.

Obstruction Colics

Intestinal colics that it is desired to classify under this heading are grouped by Reeks under "acute intestinal obstruction" in contradistinction to engorgement colic already considered, which he styles "sub-acute obstruction." Experience amply demonstrates that the etiologic factors contributory to the development of these kinds of colicky pains are multiple and, moreover, that they may in many instances, at least, be primarily attributed to overeating. Among the disturbances belonging to this group we include colics due to foreign substances, neoplasms, abscesses, displacement, volvulus, intussusception or invagination, stricture, paralysis and obstruction from accumulated ingesta in the floating colon.

Owing to the tendency of the coarser particles of the food to accumulate anterior to the seat of obstruction, these colics are in a manner, at least, allied to those of the engorgement group, but are, however, distinguished by their acuteness contrasted with the slow grinding pains of engorgement.

Some of these conditions are rare, not readily discernable unless through rectal exploration, but apparently capable in each instance, of altering the symptoms to some extent, depending upon the character of ingesta and consistency of the visceral contents. Little, if any, attempt has thus far been made to clearly distinguish one form of obstruction colic from another.

1.—New Growths, Foreign Substances, Etc.— Foreign substances, including calculi, hairballs, sand, gravel, or other extraneous and indigestible materials, growths in the form of tumors or abscesses seldom give rise to signs having any definite diagnostic value, and oftentimes it is only through postmortem examination, perhaps following death from some other cause, that we discover the actual nature of a condition that has been conducive to periodic attacks of enteralgia.

At such time a review of the case furnishes sufficient information to substantiate the belief that intestinal trouble has existed for a considerable period; the historical résumé of such cases show that the horse has not been, in most instances at least, an easy keeper, has inclined toward loss of flesh under the least provocation; has been subject to periodic attacks of colic that have been as spontaneous in their disappearance as unaccountable in origin; straining intervals, with periods of constipation are not infrequently followed by diarrhea.

Should an abscess develop well toward the rectum, switching and restlessness of the tail and general uneasiness are frequent, especially when the lower bowel is impacted anterior to the obstruction. I well recollect one case of abscess formation in particular that came to my observation and that had its origin as a result of mal address, in which the injury to the rectal mucous membrane was associated with symptoms just detailed and which invariably ceased after removal of the crowding fecal collections.

2.—Obstruction with Paralysis.—Intestinal paralysis, particularly when involving the lower bowel, has

similar symptoms, associated with a straddling attitude, elevated tail and dropping, at frequent and irregular intervals, of scattered particles of alvine material, together with entire absence of pain upon artificially emptying the crowded rectum.

3.—Obstruction Due to Displacement.—Colics of displacement have their origin more especially through escape of a portion of the bowel following diaphragmatic or mesenteric rupture, in inguinal or scrotal hernia, and also volvulus may for simplicity be included under this group, the latter constituting either a simple or multiple torsion, twisting or knotting of one portion of the bowel upon its mesenteric axis or around the loop of another portion; either condition prompted through irregular peristalsis and varying weight of the contents of adjacent regions of the tract. Volvulus can occur in any part of the tract, but more constantly in the ileum of the small intestines, the double or floating colon.

These displacements may, under certain influences, be differentiated one from another by intelligent rectal or scrotal examination. Collectively they are characterized primarily by intermittent, sharp spasmodic pains that increase in duration and intensity, causing ultimately the most violent demonstrations, with entire disregard to self-inflicted injury. The animal moves about with a head-shaking, swaggering, straddling gait. When standing it inclines to move backward; has an anxious look; a weak pulse and progresses rapidly toward collapse, with relapse of pain just prior to death, which finally results from shock, intestinal or mesenteric strangulation, internal hemorrhage, peritonitis or enteritis.

4.—Intussusception.—Intussusception is another form of obstruction colic characterized by violent and excruciating pain; it is also called invagination or indigitation, and probably occurs with greater frequency than is popularly supposed. Four forms of this classification are listed among writers upon intussusception, viz.: First, a telescoping of one portion of the small intestine into another, ileal; second, passage of the ileum, together with the ileocecal valve, into the cecum, ileocecal; third, passage of a portion of the large intestine into itself, colic; and fourth, passage of the ileum into the opening of the colon, ileocolic.

Here the symptoms of pain incident to the convulsive contractions are closely allied to those detailed for intestinal displacement, but with a somewhat longer duration; violent straining, often associated with the passage of blood-stained particles of fecal matter. The ultimate strangulation is less sudden, and the period of ease is more protracted, prior to the excitement premonitory to final collapse. In those cases of favorable termination there may eventually be discovered in the alvine discharges the cylindrical portion of the tract that has become necrotic and sloughed off simultaneously with the new union between the opposing peritoneal surfaces at the anterior circumference of the prolapsed portion.

5.—Obstruction of Small Colon.—During my references to overloading of the small intestines the remark was made that it “presents a line of symptoms not unlike those observed with obstruction of the floating colon” and “careful rectal examination gives basis for differentiation.” This must be borne in mind now that

we are to consider obstruction of the small colon which is one of the most common and most dangerous of the prolonged colics, often extending uninterruptedly for twenty-four to thirty hours.

The pains are continuous, of considerable intensity and accompanied by peculiar stretching forward of the front limbs and backward on the toes of the hind feet; also by violent straining either during recumbency or when standing. There is a tendency for gas to collect anterior to the stoppage; a frequent passing of small particles of fecal matter, and the gas is expelled in a rather characteristic snapping-like manner in contradistinction to the prolonged blowing of ordinary unobstructed flatulency.

Like in other forms of colic of this class, should the obstruction interrupt the visceral circulation sufficiently to produce strangulation, there occurs a period of anxiety free from pain, that just prior to death, is interrupted by tremors, cold sweating and renewed pain. Rectal examination may aid in detecting this obstruction. This manipulation causes excessive pain, straining, a tendency to rise on the toes of the hind feet and the rectum gives to the hand a feeling of tightness.

6.—Embollic or Aneurysmal Colics.—As a result of aneurysm or thrombosis of one or another branch of the mesenteric arteries, especially consequent upon helminthiasis, we encounter a number of cases of enteralgia, particularly in older horses, but not entirely confined to animals of mature age. These manifestations though on the whole lacking distinction, and resembled by symptoms observed in other varieties of true obstruction

colic, are possibly best characterized as being quite generally protracted with unaccountable intermittent evidences of severe pain, unthriftiness and susceptible to fatal strangulatory complications.

Gaseous Colic

Referring now to that group which we have advisedly styled "gaseous colics," a knowledge of anatomy will readily afford opportunity to realize the possibility of no less than five varieties and each subject to sequelæ of the gravest consequence, particularly rupture and suffocation. Three forms I wish especially to call to your attention are :

1. True gastric tympany.
2. False gastric tympany.
3. True flatulent colic.

1.—True Gastric Tympany.—Gaseous distension of the stomach, if not the most serious, may rightly be classified among the disturbances of grave character, owing to its frequency and liability to terminate fatally in a short time. Here the practitioner is called upon to demonstrate his capabilities and in a vast majority of communities his reputation will be in direct ratio to his success in dealing with acute indigestion. Primarily this colic comes on suddenly, is associated with a history of a rapidly-eaten meal upon either an empty stomach or by a tired animal. Within the stomach there is a mixture of undigested food and more or less rapidly accumulating gas.

Unless dulled by the indiscreet administration of anodynes, the patient exhibits a rather uniform line of symptoms, viz.: sudden onset, tremors of flank and

humeral muscles; profuse general perspiration, becoming patchy; with manifestations of extreme pain; crouching walk; dog-sitting attitude and general fullness of abdomen. Brown-red nasal discharge and salivation, together with belchings of foul-smelling gas, later retching, which at times constitutes an actual vomit; tossing of head and elevation of the upper lip, exposing the incisors; anxious look; dilated nostrils and a peculiar catchy, sobbing respiration induced through diaphragmatic pressure; peristalsis is diminished but continues, and the use of the trocar and canula fails to relieve, though some gas may escape. The gait becomes uncertain and following a period of the most excruciating pain, the animal dies of suffocation, rupture of the stomach or nervous collapse, without that period of dullness characteristic of strangulation. When attempting to give liquids by the mouth note a tendency of the patient to crowd forward when the head is elevated; likewise, a disinclination or an apparent inability to swallow owing to the distension of the stomach.

2.—False Gastric Tympany.—False gastric tympany is an accumulation of gas involving more especially the diaphragmatic flexion of the great colon. As a result of pressure exerted upon the stomach and diaphragm, an animal suffering with this complaint presents symptoms that are quite similar to the foregoing, hence my designation "false gastric tympany." A differentiation is, however, quite possible; the gulping is odorless, the breathing labored, but free from sobbing, and there is an escape of an abundance of gas *per rectum* and a tendency to greater comfort following enterocentesis.

3.—True Flatulency.—Flatulent colic or the evolution of gas within the intestinal canal, not necessarily confined to any one particular locality, is usually characterized by rotundity of the abdomen, more especially at the flanks. Tinkling sounds replace the absent peristaltic murmurs; the pain is distressing but varying with the tenseness of walls; breathing is labored and cyanosis ensues if not relieved. Flatus escapes from the anus in blasts in contradistinction to the previously described interrupted sounds accompanying obstruction.

Rectal exploration and flank or intra-rectal tapping establishes the diagnosis if it is not otherwise determined through history and symptoms.

Spasmodic Colic

Long before any attempt was made to classify true colics; either through etiologic or pathologic means, practitioners of equine medicine recognized symptomatically two forms of intestinal pain, viz.: flatulent and spasmodic. After having come to a more lucid understanding of the varieties of colic and though inclined to place less stress upon the distinction "spasmodic," we must yet admit the occurrence of large numbers of cases unassociated with either impaction, obstruction or gas accumulation, and, moreover, that cannot be correctly attributed to intestinal parasites or mesenteric aneurism. These conditions are probably the result of temporary derangement of the sensory nerves producing irregular peristalsis through stimulation of certain areas of the unstriated muscular coats of the intestinal viscera, particularly within the small intestines.

The pains are sharp and diagnostically intermittent, alternating with periods of what seem to be perfect health; the abdomen has a tucked-up pleuritic look; peristalsis is augmented, causing abnormal intestinal sounds of a metallic character; diarrhea often becomes an associated symptom and though spasmodic colic will not, as a rule, cause great concern, it may lead to ruptures, volvulus or intussusception, consequently it should be seriously regarded in those instances where pain-free intervals become shortened, alternated with lengthening periods of uneasiness of increasing severity.

Verminous Colic

This paper, did time permit, could even yet be amplified to greater completeness were I to include rupture of the stomach, bowel and diaphragm and other especially applicable conditions, but having already carried my remarks beyond all conservatism, I must close with but the briefest reference to verminous colic resulting from an intestinal invasion of lumbricoids, particularly certain of the ascaridæ, oxyuridæ and strongylidæ.

The pains in colics from these causes are usually recurrent and mild unless associated with severe disturbance of the mucosa. As differentiating symptoms we may mention chronicity, emaciation and the discharge of ova and of mature parasites per rectum.

Stomach Lavage in Acute Indigestion of the Horse*

D. O. KNISELY, D. V. S., TOPEKA, KANSAS.

With this, as with many other ailments of the horse, we have several different phases, which differences we are unable, in many cases, to adequately explain. Without attempting to explain them I shall try to describe some of these different forms of indigestion and to outline, briefly, the treatment I employ for each.

Colic from Overeating

First consider engorgement of the stomach. Not that I really consider it acute indigestion, for it is not; yet in so many of these cases the symptoms approximate those of acute indigestion and the treatments are so nearly the same that I think it may well be described with this class.

To illustrate this similarity, take a typical case of recent occurrence in my own practice. A small, black horse, aged eighteen years; a very fat, well-preserved animal, and a good individual, even at this age, and apparently well cared for, was brought to me for treatment.

The evening preceding this attack he had been taken out for a drive, and afterwards put away as usual, about 10 p. m. The next morning he was found down in the stall, rolling from side to side, and very badly bloated.

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The owner immediately started for the hospital with him, and a call was sent in for me to meet him there, as he was bringing me a very sick horse.

Symptoms.—On my arrival at the hospital I noted the following symptoms: a very anxious look from the eyes, breathing very labored, each inspiration accompanied by a jerk, and the abdomen bloated to about twice its normal size. As soon as he was permitted to stop he would lie down and roll; an act difficult to accomplish on account of the badly distended abdomen. He could not remain down long, but would get to his feet again and then lower his head close to the ground with his legs drawn under him, and in this position would turn in a small ring, a time or two, and then drop to the ground. This performance was kept up until I had my stomach tube prepared for use and was ready to take care of the case.

Course and Treatment.—First the horse was put into a chute, securely tied, and the stomach tube passed, not without some trouble because of the great uneasiness of the animal. By the use of plenty of water I succeeded in washing out of the stomach about two gallons of solid feed. This required about fifteen minutes. The tube was removed and the horse put into a box stall.

Distention of the colon being very bad, I gave a hypodermic injection of eserine, one-half grain, pilocarpine, one and one-half grains. Following there was great uneasiness, violent rolling, but rarely turning over; the head was frequently turned to the right side. Very little peristalsis could be detected. Following the injection of

eserine and pilocarpine, there was profuse salivation, but no gas or fecal matter was expelled.

At 7 a. m. the stomach tube was passed a second time. About one-half gallon of solid food was removed this time, and the fluid that came with it was very sour and of an offensive odor. Cold water rectal injections were given. The water came away barely colored, no defecation followed.

Arecoline, one grain, and strychnine, one-half grain, was then given. This occasioned great distress, a very fast, weak pulse, very labored breathing and profuse salivation. After an hour he became somewhat easier and lay quiet, rolling only at intervals, with a very distressing look from the eyes and the nostrils wide open. The injection of arecoline and strychnine induced no flatus or fecal passage. Cold water enema was given and the clear water expelled.

At 10 a. m. the tube was passed again. No solids whatever were removed this time, but quite an abundance of sour fluid came away. After washing the stomach until the water returned clear, one and one-half pints of raw linseed oil and one and one-half ounces of turpentine were given through the stomach tube, and this was followed by a rectal injection of cold water, after which the horse became easier.

At 1 p. m. one-half grain of strychnine was given; the bloating had noticeably diminished, but was still in evidence. At 3 p. m. the bloating was gone and the patient was standing easier and looked bright out of eyes. Very little peristalsis could be detected in any part of the intestinal tract; no defecation as yet.

At 5:30 p. m. he wanted to eat when the other horses were fed, a small handful of hay was given him and he ate it greedily. At 6 p. m. ninety grains of sulphocarbolates compound and one grain of strychnine was given in a capsule.

Nothing further was given this patient and there was no passage from the bowels for forty-eight hours; when a small quantity of feces was voided, very heavily coated with coagulated albumen, in fact, entirely covered with it. A nice recovery followed without complications.

Résumé.—I cite this case because of its train of symptoms, first badly bloated, second, amount of solids removed by the use of the tube, and, next, no action of the bowels from beginning to end. Not a single passage from them in forty-eight hours, nor any gas to speak of, yet the bloating was relieved by persistently and repeatedly using the stomach tube, and a nice recovery followed.

While I had a very satisfactory recovery in this case and in many others similar to it; for the medicinal treatment in such cases I have since quit using eserine and arecoline. Instead I use pilocarpine in two-grain doses, as the case seems to demand. There is no doubt that the use of either physostigmine, or arecoline, or barium chloride are contraindicated here, as these agents produce more trouble by their action on the muscles of bowels than they do good. Oils or oil and turpentine is much better; notwithstanding their slower action, they are far surer. The addition of four to eight ounces of ether to the oil is very advantageous.

Colic from Acute Gastritis

There is another form of indigestion, one which is met with very often, and one we all agree should be termed acute indigestion. It occurs when the horse is fed early before the usual hour and started as soon as he has eaten on a long drive, of say from twenty to forty miles.

Symptoms.—These cases begin with purging out, after being driven from seven to fifteen miles. As the animal is forced onward he shows little or no inconvenience while moving, or he may slack up in his gait, but not enough to be called really sick, but every half to one mile he will have a movement of the bowels, and at each time the discharge grows more watery or fluid. This will continue for several miles, when gradually it will cease and apparently he is over his trouble.

The difficulty, however, is not over, for when unhitched and led to water he will walk with his head down and with a slow, shambling gait. He refuses to drink or eat; stands resting on one or the other of the hind feet; head hanging down; at intervals the head will be raised and the nose pointed outwards. As soon as these movements are gone through with the head will be drooped again and a change of position of the hind legs will take place, shifting from one to the other.

Soon he will paw a little with one front foot and then with the other; instead of raising and lowering the head, he will now look around towards his sides and you will note that the nostrils are more widely open than normal and the breathing is just a trifle faster than it should be.

As time goes on he will get more uneasy and threaten

to lie down by getting down on his knees, then getting up again. These symptoms usually last about an hour in such cases.

When, as the trouble advances, the symptoms increase in severity, the horse will not only lie down but let himself fall with a thud. And thus the case becomes very critical. At this time, by carefully listening along the course of the esophagus, one may hear distinctly the fluid-like rumble of regurgitation from the stomach.

Usually considerable gas is expelled *per anum* and to this alone is due the fact that the animal does not become badly bloated. Should the flatus fail to escape, then, of course, there is distention of the colon, which adds to the other trouble.

Treatment.—In these cases the treatment indicated is similar to the treatment for the indigestion from overloading. Confine the horse securely and pass the stomach tube.

The results are so striking in this class of cases that one must stop and wonder how it is accomplished. The bloody looking fluid, that comes away from one of them and the relief that is given almost at once, surprises one who has not previously seen it. The amount washed from the stomach varies greatly, from an ordinary pailful in some of them, to three or four times as much in others.

It is very seldom that any solids to speak of can be washed from the stomach in these cases, but the fluid that comes out of it is very offensive and dark colored, often almost like blood.

If, when washing out this stomach, one will keep at it until the water comes away almost clear, he will have

very little else to do. No medicinal treatment is needed unless it be a small dose of strychnine, one-quarter grain, as a heart stimulant.

Convalescence.—Should the horse become uneasy, an hour or two later pass the tube again. Such relapses are due to a retrograde peristalsis, that again fills the stomach; pass the stomach tube and a return of fluid through it will result. The fluids at this time will be colored, but not nearly so much as at the time of first using the tube.

It is rarely the case that the animal will need another thing after using the stomach tube in this class. After using the tube until the stomach no longer fills by antiperistalsis, these patients will stand around drowsy from one to two hours, as though partially asleep, then will want to eat. I usually let them have some good prairie hay, no alfalfa, and so far have had no bad results from it. Keep the grain away for about thirty-six hours, after which it is not likely to be harmful.

Résumé.—To go back again—if when called to this class of cases the symptoms have gone far enough, there will be belching of gas, and very frequently fluids will be returned through the nose. While this is not what one would wish to see in any of these cases, I had always rather see this than to be told my patient has just lately become easier, and they think he is doing all right, for in almost all of such cases that have gone through this train of symptoms and have become easy, you will find that a nervous shock has set in. The animal is trembling in certain groups of muscles, usually the shoulders and flanks, a sweat has broken out that has a

cold feel to it, even on a warm day. These are the cases in which you *should not pass a stomach tube*, for, I assure you, you will be blamed for tearing that horse's stomach with the tube if you do pass it here.

This tearing of the stomach is, of course, a thing quite impossible with a double tube, yet you will be blamed for the rupture, which is already present when the tube is passed.

The foregoing symptoms obtain, with a very few exceptions, only in ruptures, not always of the stomach, but of any part of the intestines and of the diaphragm as well. But the cold sweat is almost a conclusive evidence of rupture of the stomach, and a stomach tube should never be passed on one of them. So long as you are in time to see these cases belching gas and fluids from the nose (vomiting), you can be sure that you have a stomach that is full and not ruptured. For once rupture of the stomach occurs no more fluid returns.

I had been told time after time that when a horse was seen to vomit that the stomach had ruptured. This is unbelievable; how could vomition be accomplished after rupture has taken place? The contents of the stomach would empty through the rent in it. There could be no muscular contractions to produce vomiting and so *no horse ever vomited after a rupture of the stomach had occurred*. As long as you can be sure of this, you should not wait, or hesitate to pass the tube. Don't consult the owner as to the work. He does not know, and for this reason would likely object, for it would be new to him. Get ready and do it. And while at it keep on until you do get the results. Don't quit and have to say

you were wrong, for if you have taken time to examine the case you can't go amiss, and then the owner will be the next one to comment on the use of the stomach tube and you will get the benefit.

At this point I would like to emphasize that so far as the fluids returning of their own accord, or rather from the distension of the stomach, I always think is a good symptom, for had this not occurred I am sure that I should have been too late in many cases, for the accumulation of fluids in them occurs very rapidly, and many cases after two or three hours are filled and rupture, and invariably in them the owner will tell you his horse is lots better and has got so he will stand on his feet, something he would not do until just lately. Do not let such talk deceive you, but look carefully and note if you have any trembling of the muscles, etc.

I do not wish to impart the idea that all of this class of cases of acute indigestion terminate fatally, unless a stomach tube is used, for such is not the case. I have seen a great many live, but on the other hand I formerly had many a one taken away dead, and others have had the same experience. But since using the tube, I do not have this loss, nor will any one else who will follow this line of treatment.

Colic from Exhaustion

This form of acute indigestion is often met with in the heavier horses at hard work, not necessarily fast work, but hard pulling, such as draying, excavating work, coal, lumber and brick hauling, etc.

Cause.—Take it on a warm, sultry day: the teams are usually fed early in the morning and started

to work at 7 or 8 a. m.; from that time on till noon they are kept going. At noon the team is either fed in nose bags or one box suffices for both horses. At this time the driver will notice that one horse is not eating; the chances are he has not drunk any water, but this was not noted. No hay, or but a very small amount, is given.

Symptoms.—At 1 p. m. they are again hooked up and put to work, the horse goes fairly well until about 2:30, when he becomes slow, does not want to keep up his end of the load; on being struck with the whip he will spurt up for a short distance, but soon is lagging back again. As soon as allowed to stop he will look around at his side, likely paw a little with one foot; if pressed onward he will shortly get to wanting to lie down in the harness, and will do so as soon as allowed to stop.

About this time it is noticed that the horse is commencing to breathe hard, and that he is also starting to bloat. Now is the time when everyone around will suggest that horse be given a dose of nitre for his kidneys. The driver will just have remembered he has not urinated during the entire day. This, from their viewpoint, is positive proof that the horse is bothered with a "stoppage of the kidneys." A dose (sweet spirits of nitre) is prepared in size varying from fifteen drops to three ounces.

After a time they notice he is growing worse on the nitre. You are called. This is seldom done until the horse is very far along. You will find him wet with perspiration and usually a mass of mud, rolling from side to side, pulse weak and fast, breathing very labored, and with a very anxious look from the eyes.

On raising he won't want to straighten up in a normal position, but will crouch down, with his legs well under him. Many will let themselves drop; if so they always emit a heavy grunt following. Most of them are more careful and will make several efforts to lie down before doing so.

They roll violently for a short time, but soon get up. Breathing becomes harder and shorter right along, and if relief is not soon given, the animal is speedily beyond help. The bloating and also the severity of the pain, of course, can be temporarily relieved by the trocar, an instrument I very seldom use.

Treatment.—In these cases confine the animals securely as directed before, for they are very uneasy from the distended stomach and intestines. It's an exception when I tap an animal, but it is sometimes necessary. I rely almost altogether on the use of the stomach tube. In eight out of every ten cases as soon as I get the return of the fluids and solids from the stomach started the patient will become easy and many will not move until the tube is ready to be withdrawn.

In these cases you may look for from two quarts to three gallons of mixed feed, according to what is fed. In our town it is usually cracked corn and bran, sometimes shorts instead, rarely oats. It is not an uncommon thing to get four gallons of solid corn and bran from the operating room floor after I have finished, this in addition to a certain amount which drains into the sewer with the fluids.

I am sure that to get results in these cases one must have a double stomach tube, because the feed is sour and

heavy and would choke up any single tube used. It will in some cases choke up a double tube, but there is this advantage, water is forced into this mass continually, thinning it up all the while, and not only that, enough air is being forced into the stomach to let it have an air space, without which siphoning is not successful. I will admit that in pumping water into the stomach increased pressure, to a greater or less extent is produced, just how much I do not know, but from actual experience I do know that not enough can be caused to do a good job of lavage with the single tube.

In this class of colic should your horse not ease off in forty-five minutes, use the tube again. At this time the gas will practically all come away and you do not run any risk of causing any trouble from the puncture, from dirt, etc., as when using the trocar.

It is not often that cases such as this will need any medicine, yet I think that an antiseptic, such as eucamphine eucalyptolin or sulphocarbolates compound is beneficial, and sometimes strychnine as a stimulant aids materially; yet there are few that really need them.

The case described in the foregoing is one of many of its kind that occur here in Topeka, and I am sure that my success with them is entirely due to the persistent use of the stomach tube; for ten years ago and longer, I can remember of many good horses being hauled out to the desiccating plant from attacks of this type.

I would like to impress upon the minds of all, that in all cases like the foregoing, if it is possible to get them to the hospital where you can use city water pressure for the gastric lavage, to do so. Better results will

thus be had than it is possible to have in any other way. No pump can take the place of city pressure. It is always the same and always at hand. Should they be too bad to come to the hospital, use the tube first, and get away all that you can with the pump. This will relieve them enough so that they may be taken to the hospital if you keep them moving. As soon as you arrive at the hospital pass the tube again, this time using plenty of time and water and remove all sour material, in other words, keep the stream of water going in until the water comes out clear and cool.

The class of cases just described are typical cases, in which a tube should be used, and that at once. Do not try any form of medicinal treatment first, for any form of drench only fills up the already distended stomach and arecoline or eserine and pilocarpine, hypodermically, surely aggravates all the symptoms and causes the animal to thrash around a great deal more than he would without them; and not only that, but in his agony he is likely to let himself fall hard enough to rupture the stomach, in its distended state.

Colic Due to Enfeebled Digestion

There is another common type of colic; while it may not be considered acute, it is none the less indigestion, and is very amenable to treatment with the stomach tube.

Symptoms.—The animal will first show a sluggish disposition, head hanging downward, resting on three feet, restless at intervals. Such as stated will take a few mouthfuls of hay and eat it, not with a relish, but chewing it slowly, if in a tie stall, it will paw at inter-

vals, then for a time will be quiet and apparently half asleep.

This may continue for as much as half a day before anything is thought of it. The owner, when calling, will give you to understand that while he would like to have you come and see his horse, he does not consider that there is much the matter with him, but thinks probably a dose of nitre or something of this nature would fix him all right. He has already diagnosed the case and stipulated what to give.

On the veterinarian's arrival these patients are usually quiet and it is quite a difficult thing to convince the man that he might be mistaken, both in diagnosis and treatment. He will be sure to have noticed that the horse has been trying hard to pass urine. This in a measure cannot be held against the man, for in nine out of every ten of these cases, the animal will at times stretch out, placing the front feet as far forward as he can. This, to a degree, relieves the pain of the animal, but the owner cannot be made to believe this (at least many of them will not), and while you can repeatedly tell him differently he will continue to think he is right, and should he induce the animal to urinate, no matter how long afterwards it is, before the animal is over his trouble, the owner will think his position proven to be the correct one.

By the time you are called the patient will have been sick from five to ten or twelve hours. At this time the condition has changed; the slow gripping pains have given place to pains more acute, and the patient is more restless. If in a box stall he will be in one corner usually, pawing; at intervals he will toss his head up and down,

then apparently be easy for a spell. He will stand quietly for a short time, but very soon he will raise the head, nose pointed out, will turn up the upper lip; this will be quite noticeable. Respiration is somewhat hurried, but not labored in any way. Temperature about normal to one degree of elevation. No flatulence to speak of may be noticeable as yet. He does not show any great distress at any time, and while lying down is quiet; he does not tumble from side to side, but will point the nose out and turn the upper lip up, showing the incisor teeth.

Treatment.—With this, as with other cases, I always pass the stomach tube and invariably get some gas and quite a lot of sour feed from the stomach. If the stomach is washed clean of this sour mass and fluids, it will be but a short time until the animal will quit turning up the lip and soon all uneasiness will have passed.

Why use medicine in these cases when a stomach tube, rightly used, will relieve your patient so promptly? I do not mean to be understood that in such cases a tube must necessarily be used in order to have a recovery, for I know it is not really essential. I am aware that medicinal treatment in this class of cases is almost always successful in time, but it does take time for the medicine to act and still more time for the intestinal tract to rid itself of the sour mass.

In all our work we strive to remove the cause, then why not in these cases I have mentioned. If we can do this why are we not getting at the seat of the trouble. I am positive that in eight out of every ten cases of this type the trouble starts right in the stomach, and that as time goes on, and fermentation takes place, this same stomach acts as a generator of gas, and since the stomach

of the horse is so well guarded as to *almost* exclude vomiting, we can readily see that unless it does pass along the intestinal tract we soon will have a largely distended stomach to contend with.

On the other hand, should it follow the intestinal tract and accumulate in the cecum and large colon, we have a badly bloated animal. I will admit that this gas can be removed readily by using the trocar and canula, but will this be all? I have tapped horses as many as eight or nine times in one night to keep them from smothering, but too many of them died to suit me, and why? Because I did not remove the generator of the gas—the cause of the colic. Then why not use a stomach tube (one that will do the work) in this case, and remove all this trouble from where it starts. This done, you have no more accumulation of gas. You have spent only from five to twenty minutes of your time, you have no use for the trocar, your patient rests easily and you are sure you can go home to rest or answer calls, knowing that things will be all right.

I have made no mention of the different colics of the horse, nor to the differential diagnosis of them, in this article, for I am sure if you will read Dr. R. P. Lyman's article (in the May, 1912, issue of *VETERINARY MEDICINE*), you will have to say it is the best article on the diagnosis of colics of the horse ever published.

Surgical Treatment of Colics in Horses*

L. A. MERILLAT, V. S., Chicago, Ill.

PROFESSOR OF SURGERY, M'KILLIP VETERINARY COLLEGE

I am using this title, for want of a better one, to present a brief review of the available forms of instrumentation useful in the management of gastric and intestinal obstructions of animals, and I trust you will not be deceived by the startling title—"The surgical treatment of colics," which might easily be mistaken for more than I shall be able to disclose as rational treatment of a surgical character for intestinal and gastric ailments. Let me therefore first announce that this epitome is not a startling proclamation about the invasion of the intestinal tract through the abdominal wall. On the contrary, as Prof. Hobday has stated, and as Doctor Blattenburg has reaffirmed, I shall repeat, that we are not today and probably never shall be able to invade the abdominal viscera to any great extent.

One of my objects is to draw attention to the necessity of diagnosing abdominal disease at an early stage with more certainty in order that we may attack them with a therapy directed precisely at the affected part. Colic, I dare say, in veterinary practice is too frequently treated as such. I have often thought if the word colic had never entered our nosology we would then have approached abdominal pain with more searching inquiry as

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to the nature of causative condition and then all of these years we should have been treating causes instead of eternally seeking medicament to cure the effect.

Colic in animals has usually been considered as a mild, or overwhelming abdominal pain, as the case may be, and too little attention has been paid to the underlying cause. Our weakest point in the management of colics is our inability to diagnose the cause of, and the seat of the ailment, at a stage early enough to put direct, effectual treatment into operation before it is too late.

The conventional treatment of almost all colics is the administration of a pain-relieving potion, and then, if this is not followed by a cessation of the pain, an evacuant is thought necessary. When these two fail the patient dies. The painkillers are usually morphine, cannabis indica or chloral and the evacuant anything from a hypodermic injection of violent eserine, arecoline or pilocarpine to a large drench of linseed or castor oil.

In addition to the foregoing, when there is bloating, carminatives and antiferments are given and if the bloat is threatening a trocar and canula are thrust into the right flank. This, with a few variations in the selection of drugs, constitutes, with most of us, the standard treatment of colics today, and these treatments are so strictly conventional that almost anyone of ordinary intelligence can master the entire system after a few days of instruction. In fact, we all know of "handy" fellows in veterinary hospitals and large stables who manage colics quite up to the prevailing standards.

This is not as it should be in this day of sane therapeutics. We should accept now the burden of studying

observations on our patients, sick from abdominal diseases, with a view of determining the exact nature of the condition responsible for the pain.

Autopsy after autopsy held on animals dead from colics shows, too often, how wide of the mark our treatment had been and how useless were our efforts to turn the tide toward a recovery if we did succeed at a late stage to discover the cause. Very often these post-mortem investigations show that a vigorous attack at the affected spot right from the beginning might have been effective.

By exclusion, we do sometimes, after a patient has suffered for some time, make a correct diagnosis but then it is usually too late to effect a cure. In short, such cases are already beyond hope and out of reach of any treatment when the diagnosis is made.

The better management of abdominal diseases must come through an intensive study of symptoms and groups of symptoms coupled with probable causes which will enable us to determine early in the march of the disease the exact seat and the exact nature of the trouble.

Abdominal Pains Misleading

Abdominal pains, to say the least, are very misleading. Even in human beings, where the symptoms are subjective, grave errors are often made by the treachery of pain. For example a patient with an attack of appendicitis may complain of pain in the left loin or over the solar plexus. The location of pain, in fact, gives no assurance that the lesion is at the same point. So misleading are these expressed manifestations that only the specialist seems able to properly interpret them.

In animal patients we may actually be thankful to be rid of this group of subjective symptoms. In truth we are at no loss whatever in diagnosing the seat of abdominal pain for want of them. I am certain after many observations covering a good many years amongst animals sick with colics that the objective symptoms presented by animals if properly studied and if properly grouped and then coupled with the probable cause can be depended upon as fairly diagnostic of special conditions even in the early stages of painful abdominal diseases. And it is largely in this direction we must turn our attention if we would arrive at that "refinement of diagnosis" upon which all sound treatment must be based.

In short we are now face to face with the problem of differentiating as to exact location and cause of pain in the alimentary canal within the abdomen. Pain in the stomach should be differentiated from pain in the colon, and either should be distinguished from pain in the small bowels, and so on, at a very early stage of the colic. With these difficulties out of the way the treatment of colics would at once be simplified into a more effectual attack upon the actual trouble. And while I admit that perfection in making these differentiations need not be expected it is only by developing a more inquisitive disposition toward these phenomena that we may ever hope to become sufficiently proficient to bring our treatment of intestinal obstruction up to a worthy standard of excellence.

Inspection and Palpation

In addition to the manifestations of pain there are other valuable resources upon which one may rely. In-

spection of the abdomen often aids materially in arriving at positive conclusions as to the seat of the trouble and while deep abdominal pressure, depended upon so much by doctors of human medicine, is of service only in small animals, we have in large animals the advantage of exploration per rectum which will yield a great wealth of diagnostic information to anyone who will but practice diligently this method of searching for abnormalities. To the unskilled hand all rectal explorations are alike, but the experienced diagnostitian is capable of making wonderfully accurate deductions from what his hand palpates.

In the earlier days of my career as a practitioner I doubted the possibility of recognizing a twisted colon, but after having read positive statements, to this effect, from others, especially European writers, I became more inquisitive and finally discovered that torsion of the colon is not only easy to diagnose but the exact direction of the twist even can be determined with precision. And so it is with other conditions if we would but search for them more often than we are in the habit of doing.

The rectal and vaginal routes offer a wide field for explorations which are fruitful or useless in accordance to the training that the hand that makes them has received. The condition of the large colon, the small colon, the cecum, the inguinal rings, the kidneys, the uterus and of the ovaries can be determined by these manipulations. Impactions, new growths, cysts, calculi, torsions, and abscesses can be diagnosed in this manner. Why then wait for the autopsy for a diagnosis with this wide open route available during life?

Then again we may take advantage of exploratory

punctures and stomach cathetrization in many instances to determine more accurately the nature of alimentary disorders of an acute character.

This paper is not designed to be a discourse on diagnosis, but I can not very well introduce my subject logically without first showing the possibility of locating the seat and cause of abdominal pain with a degree of accuracy that would warrant the recommendation of treatment by instrumentation. A surgical operation is justified only when directed at a definite object and when this object cannot be located accurately then the surgeon must leave the condition in the therapist's category. On this account the following remarks deal at some length with the diagnosis of the condition the operation is intended to cure.

ACUTE PAINFUL DISEASES OF THE STOMACH

The stomach of animals is subject to the following disorders which cause acute pain:

1. Overloading of the stomach of work horses. In this country almost universally called "acute indigestion."
2. Impaction of the stomach.
3. Acute gastritis.
4. Acute dilatation of the stomach.

It will be noticed here that without going beyond the stomach we already find four definite disorders, each of which I shall endeavor to show belongs to the list of surgical diseases. Some of them may yield to medical treatment and when of a mild type may still properly remain in the list of medical diseases, but when they are grave, the aid of the surgeon must be enlisted or the patient will not survive. Let us analyze them separately.

Overloading of the Stomach of Work Horses

Acute indigestion, so-called, is so well known to all practitioners that its symptoms need no special description here. It is so characteristic and its characteristics are so well known that there is little chance of mistaking it for any other disorder. Esophageal obstruction (choke) in the very first stage and poisoning with aconite are the only two conditions for which it might by any chance be mistaken and these are very easily excluded by a little study.

Symptoms.—The eructations of gas, the activity of the esophagus in the cervical region, the distended abdomen which may be slight or threatening, the colicky pains of a fairly acute character, occurring in a horse after a day's work, sometimes before and sometimes after having eaten the evening meal is a clinical picture that is at once recognized as an overloaded stomach.

Here the volume of water and feed is too great for the exhausted stomach to handle. Gases pass readily from the stomach into the bowels and these, too, become bloated. In the more formidable cases large quantities of chyme are washed into the intestinal tract, until all of the bowels as far back as the floating colon is teeming with a fermenting process.

Treatment.—Mild cases may take a favorable turn without any treatment and will usually respond to the administration of antiferments, of which salicylic acid, recommended by Quitman is probably the best, but when the attack is of a severe type only radical measures undertaken promptly will prevent a fatal termination. The radical measures to which I refer are catheterization of

the stomach and puncture of the colon if the bloating is threatening.

Cathetrization of the stomach is practiced extensively in this country, but in spite of its merits as a radical cure it has by no means been universally adopted as the standard intervention against an overloaded stomach, as it should have been long ago.

Here is an operation that goes to the "fountain-head" of the trouble and without ceremony removes it from the body. To fight a stubborn fermentation in such a mass of chyme and then start the whole volume through its long course to the rectum by means of drugs seems criminal with such a splendid operation available.

Those who have practiced this operation have little patience with the uncertain and slow medical treatment. Stomach cathetrization not only evacuates the harmful contents, but it also lowers the abdominal tension, and besides the dilution of the chyme with water controls the fermentation more effectually than any other form of antiferment treatment, and leaves what remains of the mass in a better physical condition for the intestines to handle. And often animals almost dead from acute indigestion, destined by medical treatment to go through a prolonged agony, followed by death or sometimes to end in laminitis, are cured immediately and ready for work in a few hours.

The Single Stomach Tube Favored

The first question usually asked in connection with stomach cathetrization is: "Which is the better tube, the single or the double one?" And the second query is invariably an inquiry as to the better route through which

to pass it. Both of the questions are indeed pertinent, and therefore need detailed replies.

The fact that we have finally adopted the single tube in our practice in preference to the double one, after years of experimentation with both of them, leaves us no choice but that of recommending the former; and yet this decision need not be interpreted as a final condemnation of the double tube which has many adherents. We discarded it because we found it possesses no advantages of sufficient importance to offset its greater cost, and because we have yet to find a double tube of sufficient internal caliber, and at the same time durable enough to meet the approval of the veterinarian, who keeps it in constant use.

A stomach tube is a somewhat cumbersome affair to carry with one, without exposing it to harsh treatment, therefore the more complex it is the more likely it is to become damaged in one way or other.

Gastric lavage with a tube having both an influx and a reflux channel has been practiced by human physicians for years, and it is evidently from this practice that veterinarians have conceived the idea of applying the same method to the treatment of animals. In principle, the idea seems good, but when put into practice side by side with lavage with a single hose it is soon found that in horses the actual force of the pump has very little influence in forcing out material from the stomach. The intra-abdominal pressure after all must be depended upon to bring out the accumulated material, and this pressure is nearly always present when stomach cathetrization is required.

A single tube, smooth, pliable, soft and with a lumen large enough to allow solids to flow out freely is the ideal one to select. A harsh or hard tube is a dangerous weapon. Our old tubes which have become stretched and soft from long use we regard as precious instruments. In fact, we always deplore the necessity of "breaking in" a new one, when finally an old one is worn out. A rattan stylet is an essential adjunct to a soft tube as it of itself is too pliable to pass through the tortuous route to the stomach without something to stiffen it. A large soft tube with a lumen much larger than the diameter of the stylet is such a pliable, yielding object that it is perfectly compatible with the route over which it must travel and with the delicate tissues upon which it must sojourn during the more or less protracted operation. These facts have been so conspicuously revealed to us that we no longer regard them as controvertible or even subjects for further discussion.

Selection of the Passage

As to the route through which to pass a hose to the stomach of a horse, we have found the nasal route the more satisfactory. When the oral route is chosen the mouth must either be held open with a mouth speculum or else tied shut with a strap or rope. Both of these maneuvers require precious time, and are always opposed vigorously by the patient; furthermore, the opposition is usually continued during the whole procedure, in marked contrast to the remarkable complacency with which the patient always allows a tube to rest in the nose throughout the procedure, however protracted. The nasal route has the disadvantage of an occasional epis-

taxis, but as this is never a serious hemorrhage, and can be prevented by practicing more gentle manipulations as the hose is passing through the turbines, but little objection can be raised for this reason. The chief advantage of the nasal route is the facility with which the tube can be passed without ceremony into the stomach and without any preparatory step like adjusting a speculum or nose strap. In short, it is a wide open, ever-ready channel through which a hose can always be passed without formidable opposition from the patient.

Modus Operandi of Stomach Lavage

The *modus operandi* as practiced in our establishment is as follows: Ten to twenty gallons of hot water are usually needed and as hot water in such quantities is not always available the first step is to plan to have this matter provided for while the other appurtenances and the patient are being prepared. There should be a vessel to catch the reflux and one to hold the hot water. It is not good practice to allow the reflux to flow upon the floor since it is rather important to keep some account of the relations between the amount of water pumped into the stomach and the material that flows out of it.

The stylet is well lubricated with vaseline and pushed into the hose until its end reaches to a point one inch from the end of the tube. If the end of the stylet is too near the end of the tube it may be pushed out in passing downward and thus inflict damage, and if more than one inch from the end of the tube the latter may fold upon itself and block the channel.

The intensive lubrication of the stylet to facilitate its

removal when the tube has reached the stomach and placing it so that its end is one inch from the end of the tube are both essential preparatory measures.

The patient, everything being ready, is backed into a single stall and tied loosely to the pillar rein, preferably with a good strong dental halter. Cases in the throes of violent pains should be tied carefully to provide against injury in case of sudden decumbency. The left nostril is usually chosen. The tube is lubricated with a soft vaseline, but the entire length should not be lubricated at once, as it may become soiled by litter adhering to it during the first maneuvers of the operation. It is best to lubricate only about eighteen inches and then apply vaseline to the remainder as fast as it enters the nostril. In this manner the tube is kept free from any grit, litter, earth or any other loose objects over which it is certain to be trailed.

The end of the tube is held in the right hand, which now directs it along the floor of the nasal fossa by a firm pressure, as the left hand slowly pushes it backward. When buried ten inches the head should be extended to bring the channel through which the tube must pass nearer to a straight line. The tube may now be taken in both hands and pushed right down without further hesitation, except to lubricate it with vaseline as fast as it enters.

The timid, unskilled operator may stop momentarily after three feet of the tube has entered to palpate the neck to assure himself it has not passed into the trachea, an accident that very seldom, if ever, occurs, when a stylet is used. With the limber rubber tube passed with-

out a stylet entrance into the trachea was a very frequent occurrence, and sometimes the operation would have to be abandoned, because despite everything, the tube could not be made to enter the esophageal infundibulum, but instead, it persisted in dropping into the larynx. Sometimes it would pass as far down as the lungs without warning.

It would seem that the entrance of a tube into the glottis would immediately and certainly cause a fit of coughing, but this is not the case. Coughing does not occur to warn the operator. The only real warning that a tube has entered the trachea is the ease with which it enters the trachea as compared with the force required to push it down the esophagus.

The danger of forcing a tube into the lower air passages is negligible when the stylet is used. In fact, we have not had this accident occur since using a stylet. Furthermore, a styletted tube can always be felt in the neck. Holding the free end of the tube to the ear to listen for respiratory sound must not be depended upon as blowing sounds synchronous with the respirations may be heard from the esophagus, as well as from the trachea. The only auscultation of any service here is that which reveals the gurgling sounds of escaping gases, and these can always be heard as the tube approaches the cardiac orifice.

When the tube has entered the stomach, determined either by measurement or by the gushing of gas or chyme the stylet is removed. This feat requires the full strength of a man, who pulls forward on the stylet as the operator pulls backward upon the tube. It is here that

the necessity for lubricating the stylet well is appreciated.

The operation of washing out the contents of the stomach now begins. Water at 110° F. is used. Often large quantities of material will flow out as soon as the stylet is removed, but when the flow ceases the water is pumped in, first in small quantities, detaching the tube from the pump frequently to allow the syphoning to continue. When there is no more reflux from this alternate pumping and syphoning two or even three gallons of the hot water may then be pumped in slowly, watching cautiously all the while for a well marked distress the overfilling of the stomach always produces. When this is observed the pump is again detached and the contents allowed to flow out again. This may be repeated *ad libitum* so long as a more or less accurate account is kept of the difference between the amount pumped in and the amount evacuated. The desideratum being to leave at least as much in volume in the viscera as was evacuated. Six to eight ounces of ether, stirred into the water, may be pumped into the stomach as a parting treatment.

This describes fairly well our procedure against acute indigestion and acute gastritis, the two chief diseases for which stomach cathetrization is indicated.

Sequels of Stomach Cathetrization

The sudden evacuation of the overwhelmed viscera particularly if the attack has been of several hours' duration may be followed by shock on resumption of the splanchnic circulation that had been dammed up by the pressure. It may be mild, serious, or even fatal, accord-

ing as the causes and conditions of the patient chance to operate.

An old subject or one systemically weak from continued hard work that has suffered two or three hours from an overloaded stomach if suddenly relieved will often begin to show symptoms of collapse from one-half hour to six hours after the operation. The weakened viscera, overcome by the prolonged stretching, take more than their share of the blood volume and this at the expense of the periphery. The result is shock; but this may very frequently be prevented by injecting large volumes of hot water into the stomach after the harmful contents have been removed. The sudden relief of a badly overwhelmed abdomen is a hazard at all times when this precautionary treatment is omitted.

Laminitis is of course always liable to follow such a disorder and while cathetrization of the stomach does not always prevent it we have found that the instillation of alum, five ounces in solution, as a parting step of the operation is markedly preventive. In our practice stomach cathetrization has even been charged with causing laminitis, but the reason we had so many cases at first is due to the fact that before we practiced stomach cathetrization these bad cases died before laminitis could develop. When we began to prolong the life of these otherwise fatal cases we found that some of them fell victims to this complication. Now alum has come to our rescue.

Alum for laminitis was first given, to my knowledge, by Doctor Douglas, of New Orleans. Since he announced this remedy several years ago it has come into

pretty general use in the West. I heard of it in California last winter where at least one veterinarian administers it in quantities up to one pound.

A third sequel of stomach lavage is *acute dilatation* of the stomach, of which I shall speak later.

Impaction of the Stomach

Impaction of the stomach is a condition I fear veterinarians have too frequently failed to recognize. It is invariably referred to as a senile trouble in our literature and is usually attributed to chronic dilatation of the stomach and in animals fed exclusively upon a dry fibrous forage.

While such is often the case under which the disease is encountered it is by no means limited to old animals. We have found numerous grave impactions in young, vigorous horses with great frequency. Straw, hay, shredded fodder, coarse ensilage, alfalfa or even clover hay partaken of ravenously, is the usual cause. The cases in our urban practice are found chiefly among horses in small establishments where the food is carelessly or irradically allowed, that is, a spare ration today and a liberal one tomorrow. In short, the hungry horse, after a day or two of hard work and privation, suddenly given access to a full manger, is found sick with impaction of the stomach the following morning, or falls sick in the harness during the next day.

Symptoms.—The symptoms of this affection are characteristic. The pains are fairly acute and as the patient finds no comfort in the recumbent position—is continually up and down. There is always a marked perspiration about the neck and shoulders. The respirations are

short and the nostrils widely dilated. Sometimes there is a grunt heard during the exhalations, particularly noticeable while the patient is recumbent. The absence of abdominal distention to account for this distressing respiration is in fact pathognomonic when coupled with the above symptoms. There may be some bloating of the right flank that becomes more pronounced as the disease progresses, but the bloating is never sufficient to account for the grave condition of the patient and only momentary relief is afforded when it is evacuated with the trocar and canula.

Treatment.—Allowed to run its course or under the ordinary medical treatment usually administered for colics, impaction of the stomach runs rapidly toward a fatal ending. Eserine, by further exhausting the stomach in the futile contractions to expel its contents, is always disastrous in impaction of the stomach and the same applies to the other powerful drugs resorted to for serious colics. Oil and purgatives afford no relief whatever.

The only remedy I have found to turn these fatal cases toward recovery is to patiently liquify the impacted mass and endeavor to aspirate it out through the tube. The operation requires patience, as this feat cannot be accomplished immediately. The injections of two or three gallons of water into the already full stomach may actually increase the patient's agony, but after a time when the water has had time to distribute itself through the mass, the injection of additional quantities of water will begin to bring out food particles in the reflux and finally, as the softening process continues, more will flow out. After a patient attempt without success a second or third

attempt may be made at intervals of an hour. As much as forty or fifty pounds of solids may be removed from the stomach in this way, thus placing an otherwise fatal case well toward recovery.

Such patients are, however, invalids for some time and are subject to subsequent attacks of colic, probably due to chronic dilatation.

Acute Gastritis

Acute gastritis is the most severe as well as the most fatal of colics if not promptly recognized and relieved. It is seen under two distinct circumstances. First after a hard day's work or long, tiresome journey, and, secondly, after eating tainted food. Sometimes these causes operate together. Ground foods containing poor qualities of corn, oats, barley and mill feed are responsible in many cases, particularly when there is a sudden change to these feeds.

Symptoms.—The animal is stricken on the road or soon after having reached the stable and always before having eaten the evening meal. The patient suffers horrible agony and cannot be controlled, thrashing about in a terrifying manner. There is usually a threatening abdominal bloat that calls for immediate relief from the trocar and canula. This operation gives only a momentary comfort. Belching is not a constant symptom, although there is generally a perceptible activity of fluids in the esophagus. The respirations are accelerated, the nostrils dilated, the body bathed in perspiration, the temperature is elevated to 104° to 105° F. and the mucous membranes are highly injected. In hot weather the body

temperature is sometimes very high as this disorder may be associated with overheating of the body.

Treatment.—The pathognomonic symptoms are found in the course of the treatment, which consists of the prompt washing out of the stomach with the stomach tube and pump. The contents which usually flow out as soon as the tube reaches the cardiac orifice are blood stained with the exudates from the inflamed mucous membrane. It is sour and flows out in sufficient quantity to afford an immediate relief. As the tube enters the stomach the patient, till then in great agony, immediately stands quiet.

The volume of solids evacuated from such a stomach is always small and can in no way account for the patient's agony. The extreme pain is the pain of inflammation and not entirely of engorgement as in acute indigestion. The stomach should be well washed out by alternate instillation and aspiration of hot water until the reflux is clear and then several gallons of hot water are injected to fill the stomach and guard against a too sudden reaction of the gastric circulation.

In these cases we also use the alum solution to prevent laminitis. One-half of a grain of strychnine is helpful, and in twenty hours a small dose of linseed oil is given to prevent the constipation that otherwise may follow two days later.

Acute Dilatation of the Stomach

Acute dilatation of the stomach is a sequel of the above disorders and is due to an exhaustion of the muscles from the severe and especially from the prolonged stretching to which the stomach was subjected. In some

instances the walls give way to the stretching and rupture occurs. Dilatations follow stomach colics in which there is little or no bloating in the bowels or when the bloat in the bowels is suddenly relieved by evacuation of the gases with the trocar and canula. As long as the stomach is pressed upon by bloated bowels its walls are supported against stretching or rupture, but when bloat is absent or is relieved it distends in a backward direction and either stretches into a serious dilatation or else gives way entirely. It is therefore important in treating overwhelmed stomachs to relieve the distention by catheterization and then if necessary attend to the gases in the large bowels. To reverse these operations is hazardous.

Every bad case of acute indigestion, impaction and gastritis is followed by more or less dilatation with which the surgeon in charge should reckon. In the vigorous subject, given prompt treatment of the proper kind, the stretched organ almost immediately resumes its normal state and is ready to functionate in the normal manner; in others the reaction requires several days and in some it runs rapidly to a fatal end or leaves the stomach a prey to frequent similar attacks and the patient a victim of chronic indigestion.

In order that I may not be misunderstood I should mention here that we use the phrase "dilatation of the stomach" to designate exclusively the stretched stomach that does not immediately contract after the material engorging it has been removed. The term is used by some, notably by Hutyra and Marek, as synonymous with engorgement of the stomach, whether the organ is

damaged by the stretching or not, while here I am restricting its meaning to the more or less permanent damage done by the stretching. That is, dilatation of the stomach is that state in which the muscularis does not contract back to a normal state when the bloat is relieved.

Symptoms.—The effects of dilatation vary from a delayed return of the patient's health after an attack of colic lasting several days, in mild cases, to the gravest symptoms of fatal shock in severe cases. A bad case of dilatation of the stomach following a severe stomach colic presents all of the symptoms of a rupture of the stomach. There may be free vomiting and the peripheral coldness, cold perspiration, running down pulse rate, empty arteries, labored breathing, and tremors about the shoulders and flanks combine to bring about a clinical picture that all practitioners recognize as signs of approaching death.

Treatment.—The prevention of dilatations is found in the prompt relief of gastric colics by catheterization. It is also important to avoid a too sudden evacuation of colonic bloat when the stomach is overwhelmed. This is a fine point in the treatment of colics I would like to impress upon the reader. And lastly the stomach after having been relieved of its harmful contents should be refilled with hot water. These recommendations are particularly essential in stomach colics of old horses and in those of some hours' duration.

Weak solutions of aromatic spirits of ammonia instilled into the stomach as a parting treatment is beneficial to the weakened circulation, strychnine subdermally is helpful and warm clothing, body frictions and sinapisms cannot be overdone.

THE SMALL INTESTINES

The small intestines are subject to very grave conditions which cause colics, and pain located in them is the most violent of all abdominal pains, and the more anteriorly the trouble is located the more intense is the pain. A diagnosis of colic in the small intestines is made by the intense agony the patient suffers and continues to suffer throughout. Whenever a horse throws itself about recklessly and violently and is beyond control, often falling to the floor with the full weight of the body, time after time, without a moment of relief, except, possibly, when it rolls into a dorsal position against the wall, it is pretty safe to diagnose colic in the small intestines, and the antero-posterior location may be judged by the intensity of the pains. The duodenum and jejunum cause a more intense pain than the ileum, other things being equal.

The small intestines, especially of large animals, are not affected with conditions that can be successfully managed by surgery and they are only mentioned here to carry out our plan of differentiating colicky pains. Our loss, however, in this connection is not great and should not be discouraging, because bowel surgery for intrinsic conditions are pretty hopeless anywhere. Even the human surgeon despairs at the necessity of cutting into the intestinal tract, and if we are denied the benefit of such intervention we are not denied much that is successful.

I know that surgical literature records enterotomies, enterectomies, and approximations with a recklessness that would lead a reader to believe that these are but

commonplace every-day trivialities, but when one scans statistics of mortalities and onward sequelæ, we veterinarians may be thankful that our animal patients are not suitable subjects for such operations.

The diseases of the small intestines found in the horse with sufficient frequency to be called common diseases are:

Enteritis

Enteritis may be local, from a local obstruction, but more often it affects a more extensive area. The whole tract including the stomach and large intestines may be affected. It probably always has its origin in faulty alimentation, but early in the course of the pain bacteria play the important role and thus produce a condition that no surgical operation could benefit.

Obstruction

Obstipations from fibrous forage or unnatural food may cause obstruction at one point or over a considerable portion of the small bowels. Circumscribed obstructions may cause pouching of the gut at the point affected and thus leave a place for future accumulations. Clay, sand, or foreign bodies may lodge in the small intestine of dogs and in ruminants, foreign bodies may pass the fourth stomach and lodge at or behind the pylorus. Here again we cannot successfully operate for them even if we should eventually succeed in diagnosing these cases.

Volvulus and Invaginations

Volvulus and invaginations are common enough to warrant a very close study of the early symptoms. And it is a pity we do not diagnose them early, because here we have conditions which could be relieved by extrinsic

manipulations and would therefore be less hazardous than operations requiring invasion of the lumen. I regret to say that I have never been able to find these conditions except at the postmortem examinations.

THE LARGE INTESTINES

Pain in the large bowels is easy to differentiate from pain in the stomach or small intestines. It is always of a milder type and often intermittent. It may last for days. In practically all of the autopsies I have had the opportunity to hold on animals, dead after long sieges of colic, the incriminating lesion was found in the large bowels. The pain may be acute in the early stage, but this soon gives way to one that is milder and lasting.

Sitting upon the haunches, dog-like, points to trouble in the large bowels. The common sign of turning the nose toward the flank is also one that is seen more often in disorders of the large bowels than of the small ones, although too much dependence must not be placed upon this symptom because the same manifestation may be seen in almost any form of colic. The act of holding the nose at the flank for some moments at the time is, however, a certain indication of a grave condition, like strangulated hernia, volvulus, invagination or fatal local obstruction of some other character.

In stomach colics there is always the telltale dilatation of the nostrils and local sweating about the fore parts of the body, while in colon disorders these symptoms are wanting after the bloating has been relieved. These rules, of course, apply only to the early stages of the affection. An impaction at the sternal flexure may give rise to these stomach symptoms, but the differentiation is

soon made when stomach cathetrization fails to afford relief, and then there is always the rectal exploration upon which we can depend to make an accurate diagnosis of the exact seat of the obstruction in almost all instances.

The disorders of the large bowels in which surgery plays an important role are:

Acute Intestinal Indigestion

This is sometimes, although by no means always, associated with acute indigestion in the stomach. This condition is the flatulent colic of the old school veterinarians.

Symptoms.—The bowels are overwhelmed with food or with tainted food. The formation of gases from fermentation is sometimes so rapid as to cause death in short order if relief is not promptly given and often the damage done to the intestinal walls by the stretching produces a condition in the colon analogous to the dilation of the stomach previously described.

The exhausted muscularis, being unable to contract, fails to move the accumulated mass. Very often, I regret to say, this state of exhaustion is aggravated, if not actually caused, by the administration of eserine or arecoline. These drugs tax the muscularis severely, by causing futile contraction against the solid contents, and thus leave the bowel helpless, vapid, paralyzed at a crucial period of the disease when even a little peristalsis would be mighty valuable.

Treatment.—The simple operation of intestinal puncture, enterocentesis, as we have been prone to call it, is the cherished bit of colic surgery that must be depended upon as the curative expedient. It is strictly a

veterinarian's operation, very old and very simple, but no less valuable because of this. The total value of horses saved by this simple operation would be well worth recording. When this operation has been done, appropriate medical treatment *per os* must follow. Analgesics? No. Cannabis indica, chloral, opiates are just so many harmful agents that should have no place in the treatment of this condition, or, in fact, in the treatment of any form of colic for that matter.

During the past few years I have followed, with wonderful success, the treatment of the late Dr. N. P. Whitmore, of Illinois, which consists of the administration of ether in large doses. Whitmore would administer to his patients, sick with acute indigestion, gastric or intestinal, a full half-pint of ether as a drench. I have been told on good authority that he sometimes drenched a horse with one-half pint and even a full pint of ether from the original package without dilution. This we have modified to six ounces given with linseed oil. The effect of ether vapor upon intestinal fermentation is phenomenal, when given in large doses.

A purgative of aloin or aloes given as soon as the acute symptoms have passed, will act as a stimulant to the colon some hours later, at a time such stimulation is needed to prevent obstipation.

Impaction of the Colon

The second disorder of the large bowels is impaction of the colon—a condition consisting of the accumulation of more or less solid masses of aliment throughout or at different points of this large folded compartment. It

may follow acute intestinal indigestion or may arrive as an initial condition. Where horses are fed largely upon dry fodder for months, it is very common and horses worked hard and fed well to keep up their condition are also very susceptible. In hard-worked city horses it often follows periods of idleness where the ration has not been reduced, and horses idle from some locomotory disability may fall victims while unable to take sufficient exercise to keep up the intestinal activity.

Pathologically, impaction of the colon, as seen in horses, is a partial or complete paralysis of the walls of the colon. The word "paralysis" applies best to this condition because the muscularis after being overwhelmed into a state of enfeeblement, fails to contract.

Symptoms.—The symptoms are quite characteristic. Indeed, there is little excuse for not making an early diagnosis in every case. The pain is mild and at first intermittent. The right flank, compared carefully with the left, is slightly bulged and sometimes bloated. During the first hour or two the feces are voided frequently in small quantities, but this ceases as soon as the floating colon is empty. On auscultation of the right flank the borborygmus is found feeble or absent, and on exploration *per rectum* there is little trouble found in locating the solid contents of the colon.

When the pain is more acute the patient may sit dog-fashion or at times stretch out as a male does in the act of urination. The absorption of toxic products may cause some elevation of temperature, in rare cases, early in the course of the disease, but more often there is but little rise in the body temperature until the patient is in a

hopeless condition. I always interpret fever with colonic impactions as an exceedingly grave symptom.

Treatment.—When impaction of the colon is found to exist, no time must be lost in waiting for the action of slow-acting purgatives. On the other hand powerful drugs that act as transient stimulants to the muscularis are exceedingly harmful. A horse affected with a formidable impaction of the colon that survives a dose of eserine, survives in spite of the treatment and not through it. Linseed oil and also aloes are probably the best drugs for this condition, but are useless in serious cases because there are no contractions of the muscularis to distribute them to, and through, the accumulated mass, and as for eserine I am certain it is only helpful in cases which would have recovered without medication. The walls are too weak to cope with the heavy, dry, voluminous mass impacted within them and a transient stimulation, such as is produced by eserine or arecoline, only adds to the enfeeblement, by impelling futile contractions.

We are now using for this condition three forms of direct treatment, as follows:

1. *Colonic Flushing Per Rectum.*—High enemas. While we have not entirely overcome the difficulties attending attempts to wash out the large colon of horses, we are becoming more and more successful in injecting large volumes of water into it.

We admit there is no easy method of washing out the colon. The long floating colon of the herbivorous animals stands as a real obstacle against the instillation of water into the larger compartment anterior to it, and since the

veterinarian is thus deprived of a highly effectual curative expedient, any manipulation that will surmount this obstacle would be an invaluable addition to the treatment of many grave disorders.

We need colonic flushing in animal therapy and we need it badly. Fatalities amongst animals, sick with digestive disorders, would be greatly reduced if we could inject water into the colon of herbivora, as easily as into that of the carnivora and of humans. Overcoming impactions of the colon would then be a triviality.

Our method of forcing water into the colon is not perfect. We are still in need of a better instrument to prevent reflux from straining, but we have shown to our entire satisfaction that by patiently forcing water at a temperature of 112° F. into the floating colon by means of a hose and pump with the rectum packed with some substance to prevent free reflux of the water, large quantities can be passed into the colon. While the floating colon is still full of feces not much headway can be made, but when this is expelled a stream may be made to flow forward through this gut and into the large colon. Straining to expel the water injected cannot be entirely controlled, but we have found that since all the water injected is not successfully expelled by the patient in these seizures, some will find its way into the colon if the operation is persistently continued.

We have found also that an animal narcotized with drugs administered hypodermically or anesthetized with chloroform will take large volumes of water by a little patient forcing, and also that water at the proper temperature, not too hot nor too cold, is less apt to cause

straining. We once ruptured a horse's floating colon by applying too much force to the pump, an occurrence that shows the operation is not without its hazards.

Our method in use today, but which we hope to improve when we have finally invented the proper instrument, is as follows:

A hose is passed into the floating colon as far as possible and then the rectum is packed with cotton wads until it is full. Expulsion of the cotton is prevented by holding the hand firmly against it within the anus. Then hot water, previously prepared, in abundance, is pumped into the horse until straining is produced. As soon as the straining paroxysm ceases the pumping is resumed. At first only a small quantity may be retained, but if the operation is persistently repeated large quantities will eventually find its way forward. The operation is a mussy affair, I admit, but is the no less valuable on this account.

The Kellogg rectal lock syringe, which contains an inflated rubber bulb to prevent reflux, is probably an improvement over this more crude mechanism of ours, but it, too, must be held in with the hands and the reflex is by no means controlled by it. There is need of a hose having an inflatable bulb as large as a football that is so arranged that it can be retained in the rectum by means of a harness. We are having such an affair constructed, but since it has not been completed we cannot, of course, venture any opinion as to its merits at this time.

2. *Instillation of Water Into the Stomach.*—The second operation we use against impactions of the colon is the instillation of copious drafts of water into the in-

testines through the stomach with the stomach tube. If the stomach is full, but this is seldom the case, it should first be washed out and then six to eight gallons of water injected into it. The water promptly finds its way into the intestinal tract, sometimes as far as the cecum. By supplying the intestines with these liberal draughts of water from two directions, there are, indeed, few cases of impactions that will not yield, when the diagnosis is made before the muscularis has been too seriously weakened and a peritonitis has already developed.

3. *Flushing the Colon Through the Abdominal Wall.*—The third is the direct instillation of water or oil into the colon through the abdominal wall by means of a trocar and canula. The right flank is punctured in the usual manner and after the trocar is removed a small rubber hose is attached to the canula and the instillation done by pouring the liquid into the funnel attached to the other end. The intestines will slowly take liberal amounts of fluids in this manner. The procedure is harmless, and, if done at an early stage, is very effectual.

When the contents are known to have been softened by these methods, eserine may be given with safety and with splendid results.

I am aware that these systems of attacking impactions are not new. They have, however, never become standard operations, and, in view of the fact that they are proving phenomenal in the hands of those who have become expert in the essential manipulations, this attention to them has been deemed worth while.

Torsion of the Colon

Torsion of the colon is a common enough accident of horses, and, of course, always fatal. Attempts to cor-

rect the displacement by manipulations have never been successful. Some have told us that this may be done by rolling the patient while the arm is held in the rectum. At my hands this has always failed. Direct handling of the organ through a flank laparotomy has likewise been an unsuccessful procedure with me. I have always found the colon too weak to stand the traction required to lift it with its heavy contents. Latterly the procedure of Doctor Hartwig of Wisconsin for torsion of the uterus of cows has occurred to me to be applicable to the colon as well. Unfortunately, I have not met a case since Hartwig announced his method publicly, but believe we now have a method of untwisting a colon without much trouble. The success, of course, will depend upon a diagnosis being made before the organ is damaged by disease.

Hartwig has performed some operations for torsion of the uterus in cows with splendid success, by making an abdominal section in the right flank large enough to admit both arms. In this I see the secret of success in handling the twisted colon, for with both hands the organ can be lifted without danger of tearing its walls.

In conclusion, I venture to say that the possibilities of successful instrumentation of the intestinal tract and stomach of animals are by no means meager. Although the operations are of a different order than those splendid invasions of the human surgeons, we have a broad field, that we have thus far failed to cultivate as fruitfully as is possible, and from which may be selected a wealth of operations that will cure colics heretofore regarded as fatal.

Impaction of the Cecum in the Horse*

By A. T. GILYARD, D. V. M., WATERBURY, CONN.

The subject of Cecal Impaction is one upon which there seems to have been little written. To the best of my knowledge the first description of this condition was written by Prof. Grofton, of the Royal (Dick) Veterinary College, Edinburgh, and published in the May 11, 1912, edition of *The Veterinary Record*.† In this article Prof. Grofton gives a very fine and complete description of four cases of subacute obstruction of the cecum, which fully establishes that as a distinct form of colic of the equine.

The next literature on the subject is from the pen of the well-known colic specialist, H. Caulton Reeks, F. R. C. V. S., and was published in January, 1913. In this paper the subject is dealt with in that most thorough and comprehensive manner, characteristic of all of the valuable writings of Mr. Reeks, on the common colics of the horse. Mr. Reeks describes one additional case of this trouble and advances some very plausible theories.

I have met with two cases of impaction of the cecum in the horse. Strange to say, these two cases of this ap-

*Read at semi-annual meeting of the Connecticut Veterinary Medical Association, Waterbury, August, 1913.

†Impaction of the cecum in the horse was first described and reported by D. M. Campbell in October, 1908, in the *American Journal of Veterinary Medicine*. The next report of this condition was made by Prof. Grofton, as mentioned above. Cases of cecal impaction have since been reported by Messrs. McLaren, Hanay, Spreull, Brown and Reeks, all of England.—
EDITOR.

parently rare disease, occurred within a month, and consequently impressed me quite strongly.

I must confess that during the lives of the patients I did not locate the exact portion of large intestine affected; and thought both cases to be impaction of the great colon, but realized that they were atypical. Fortunately, owing to certain extraordinary manifestations, I conducted thorough postmortem examinations in both cases, the results of which amply repaid me for the time and labor involved.

My observations during life and after death in these two cases will, I feel positive, enable me to make an early diagnosis, should I again meet with one of these cases. As an excuse for my failure to differentiate cecal from colonic impaction, I will say, that, while handling the first I was unaware of the possibility of impaction of the cecum, and in the second case I formed a strong impression that the unusually long duration of the impaction was due to adhesions or deformities of the colon, and failed to give weight to symptoms which I now recall.

The symptoms in my cases differ in some minor details from those in the cases chronicled by the above writers. I will describe the course of the disease as I have seen it, and attempt to draw conclusions.

A Case of Cecal Impaction Fatal in Six Days

Unfortunately I did not see the first case until eight hours before death which took place on the sixth day after the onset of the attack. Consequently part of this description is history which by much questioning I have tried to make complete in the important points.

The subject was a sturdy gelding, one of a farm team, weight about 1,300 pounds, age eight years. This team was subjected to hard work and irregular, heavy feeding on grain; they were rarely watered between the evening and morning meals. The owner wished water given during the evening, but as is too often the case this was neglected. Relative to the system of watering, I will insert an excerpt from Prof. Gofton's writings on this subject.

He says:

"I attributed my cases of cecal impaction to one of two causes, but I am not able to assess the relative importance of each nor to say how far they acted conjointly.

"Colic cases were of great frequency in this particular stable, and they all ceased suddenly, their cessation coinciding with the simultaneous removal of what I considered the causal factors in operation. The first was the system of watering. All of the horses were watered when they returned from work at night, and before feeding. From then until they turned out to work on the following morning they had no drink of any kind. This was altered by giving the horses the offer of a drink after feeding at night and before feeding in the morning, in addition to the existing arrangements.

"Secondly, molassine meal was mixed with the food when prepared.

"Food sufficient to serve three to seven days was prepared at one time.

"I think the damp molassine lying in the dry feed for

three to seven days injuriously affected it. This was altered by feeding the molassine with each meal instead of mixing it and allowing it to lie for days with the dry food."

It is interesting to note that one of these contributing causes, namely, the absence of water between the evening and morning meals, was present in the case under consideration. Also, the exciting cause in this case may be likened to the second contributing cause cited by Prof. Gofton, in that it was such as to bring about fermentation in the alimentary tract, as will be seen by the following.

History and Symptoms.—On the afternoon of Saturday, June 8th, a large quantity of green rye was mowed and given to this pair of horses. In a few hours both were showing distressing symptoms of acute indigestion, with both gastric and intestinal flatulence and quite violent pain.

A veterinarian who was immediately called to treat the animals administered arecoline and resorted to puncture of the intestine in both cases. The mate growing rapidly worse, regurgitating gas and fluid from the stomach, and suffering again from intestinal flatulence which could not be relieved by the trocar; died late that evening.

Our subject improved, it was said, and after the passage of considerable feces and flatus the pain seemed to stop. The attending veterinarian administered a quart of linseed oil, and believing the animal to be out of danger, dismissed the case.

On Sunday, June 9th, purgation from the oil occurred, there was evidence of intermittent dull pain, but the

horse ate some bran and hay and drank a bucket of water during the intervals of rest.

The presence of abdominal pain was shown by the animal's lying at full length on the left side and occasionally lifting the head to the right flank. The signs of suffering were so slight and the horse appeared so well during the intervals that the owner did not consider the condition at all serious, and attributing the pain to the action of the oil, did not call a veterinarian.

On Monday, June 10th, the periods of dull pain and the intervals of apparent ease, were about the same as on the preceding day. The appetite was more vigorous and there were two practically normal bowel movements. More water was taken and urination was said to be frequent and again professional advice was not sought.

On Tuesday, June 11th, the only change noted was in the appearance of the urine, which was described as thick and cloudy, being voided frequently, in small quantities.

On the morning of Wednesday, June 12th, the horse showed evidence of having suffered more acutely during the night. The head, heels and hips were badly bruised. The periods of pain were of longer duration and the intervals of rest were shorter. There was considerable straining to micturate, but the appetite was not entirely absent.

Another veterinarian was called, who, after having administered a hypodermic purgative, from the action of which there resulted quite a free passage from the bowels, left a stimulant and arranged to call again on the following day.

On Thursday, June 13th, there was less pain and

more appetite than on Wednesday. The attending veterinarian found sensitiveness in the region of the bladder on rectal exploration and as the urine was very cloudy, prescribed a refrigerant and alkaline diuretic.

Palpation of the bladder seems to have produced so much straining that further exploration was impossible.

On Friday, June 14th, I saw the case for the first time. On being hurriedly summoned, at 8:30 a. m., I found the horse in a serious condition. The owner said that there had been a decided change for the worse during the last two hours previous to my arrival. The symptoms were very puzzling, the pain was then of the type which causes the horse to step quickly back and forth, looking anxiously to one flank and then the other, crouch as if to lie down, then straighten up and paw. The respiration was of the "puffy" type. There was patchy perspiration, but still the pulse was fairly soft and smooth at sixty per minute and the general circulation seemed good with no chilling of the extremities.

As neither the history nor the external manifestations enabled me to make a diagnosis, I then proceeded with a thorough rectal exploration which soon revealed, to a certain extent, the nature of the trouble. The rectum was empty and dry, the intestines in the pelvic region were flacid, on advancing to the right flank region the hand encountered a very severely impacted large intestine, which was sensitive to palpation. The posterior and lateral faces of this bowel, as far as could be reached, were irregularly rounded.

Superiorly the viscous seemed to be attached to the roof of the abdomen in the sub-lumbar region.

Diagnosis.—Judging from the form, location and attachments of this obstructed portion of intestine, I immediately mistook it for the voluminous extremity of the great colon which so suddenly draws in to join the anterior extremity of the small colon. Often having found this part of the great colon impacted I thought it nothing out of the ordinary.

In view of the sensitiveness on palpation and the long duration of the attack and the seriousness of the general condition, I considered the outcome quite doubtful and so informed the owner.

However, as the owner believed very strongly in the old adage, "Where there is life there is hope," he insisted that I give treatment.

Treatment.—The stomach tube was passed and after having emptied the stomach of two or three gallons of fluid in which floated a small quantity of food, we pumped in three gallons of warm water in which had been dissolved 24 ounces of magnesium sulphate and eight ounces of sodium chloride.

After having withdrawn the tube I administered a regulation aloetic cathartic bolus and left nux vomica to be given every four hours.

The foregoing has been, for the past two years, by never failing treatment for subacute impaction of the colon, when the cases have been seen at a reasonably early date.

At 4 p. m. the owner again phoned that he wished me to come immediately; on my arrival I found that a decided change had taken place since the morning. The horse was covered with perspiration, the pulse at the

jaw could not be counted and the artery felt like a small hard cord. The extremities were cold and the shoulder muscles were in a constant tremor. *Per rectum* I detected the presence of ingesta floating free in the peritoneal cavity, this I attributed to intestinal rupture and told the owner that the horse must surely die in a very few hours.

I then made arrangements to hold an autopsy the next day at six a. m. Soon after my departure the owner had the animal led to a field, where he died after about an hour's suffering.

Post Mortem Findings.—At the autopsy I was surprised to find the cecum, instead of the colon, impacted and ruptured, its walls were darkened and easily torn.

The remainder of the intestinal tract was practically empty save for a small quantity of ingesta the consistency of pea soup.

Attack of Cecal Impaction of Seventeen Days' Duration

My second case occurred in a twenty-year-old mare weighing about 900 pounds. This mare was one of a stable of nine horses, used for delivery purposes, by a grocery firm.

These horses were fed oats, bran and hay, and were allowed water when brought in from work just before the evening meal, but received no more until after breakfast when harnessed for the day's work.

On the morning of July 1st this mare and an old gelding from the same stable were driven to the hos-

pital within an hour of each other, both showing symptoms of colic.

By auscultation and percussion of the flanks I determined the presence of an excess of gas in the intestines. This acute fermentative indigestion I attributed to faulty food.

Each horse received, subcutaneously, one grain of physostigmine salicylate and orally a capsule of betanaphthol and powdered nux vomica and both were sent home to be placed in box stalls and await results.

After about two hours I made a visit and found that in both cases the eserine had caused the evacuation of large quantities of feces and flatus, but the pain still persisted although it was not as severe as while purgation was taking place.

When I again saw the cases in the afternoon both were still uneasy and I had them taken to the hospital.

The gelding soon eased up after the walk from the stable but the mare continued in dull pain, with pulse full and soft at forty per minute; respiration slow, but slightly labored, and temperature normal. In the evening, *per rectum*, I discovered, in the right sublumbar region an impacted intestine, large, round and very hard, and seemingly attached superiorly.

This I took to be the last portion of the colon and confidently administered the magnesium sulphate and sodium chloride treatment through the stomach tube and followed this with an aloetic pill.

During the following day, July 2nd, there were several watery evacuations accompanied by some pain, which I attributed to the purgatives. As there was some

appetite for hay and water I gave the case little attention.

On July 3d the dull pain continued although the mare ate some bran and hay and drank a pail of water.

I made a rectal exploration to determine the cause of the pain and found the impacted intestine apparently unchanged since July 1st and was sorely puzzled. I repeated the treatment given on the first evening. On the next day, July 4th, the mare again purged and the stools contained a few whole oats, but the impaction was not perceptibly changed.

From the first until the seventeenth of July I tried, except laparotomy, every means within my knowledge to remove that impaction, all to no avail.

I used eserine, arecoline, barium chloride, aloes, aloin, magnesium sulphate, sodium chloride, linseed oil, etc., augmented by large quantities of water by the stomach tube and by rectal injection, both hot and cold. In the application of the rectal injections I sometimes attached the tube to the city water and continued it for hours; this, I think, gave better results than anything else used, sometimes bringing away quite a quantity of whole oats, none of which had been ingested since the beginning of the attack.

During these seventeen days I continued stimulation in the form of strychnine and powdered nux vomica, twice I pushed the latter to the limit, once until the mare was unable to gain her feet for a period of four hours.

On the evening of July 17th the mare seemed to be in about the same condition as she had been since July 1st,

but on the following morning she was much worse, in great distress, labored breathing, rapid wiry pulse and patchy perspiration.

Per rectum I discovered the presence of ingesta in the peritoneal cavity, denoting a rupture; whereupon I shot the poor creature. The postmortem examination showed the cecum to be full of almost dry closely packed ingesta with an eight-inch rent near its base.

The remainder of the intestinal tract was practically empty.

Theory As to the Cause of Cecal Impaction

From my observations in these two cases I firmly believe that impaction of the cecum is caused, primarily and fundamentally by the lack of water in sufficient quantities and at the proper time to keep this reservoir of the system filled with fluids.

We know that horses coming from work at night and expecting food, will not, as a rule, drink water in very great amount until this appetite for food has been satisfied. We know that horses will drink eagerly and at length if water is offered them two or three hours after the evening meal. Many times we have seen a horse stop eating hay during the evening and refuse to eat more until after having had water.

Physiologists agree that the contents of the cecum are always fluid or of the consistency of pea soup. I know that I have at postmortem examinations, except in these two cases, always found this to be true.

I think that Fred Smith, in his work on Physiology, hits upon a most plausible theory, when he suggests that the ingesta may pass directly from the ileum to the

colon without entering the cecum. To accomplish this, the firm muscular nozzle like extremity of the ileum would have to be carried upwards and into the entrance of the colon, there to discharge its solid contents.

I will go one step farther and suggest that if the above be true, and I have reason to believe that it is, may not this muscular extremity of the ileum, or so-called ileo-cecal valve, possess a selective power on solids, semisolids and fluids similar to that of the esophageal pillars of ruminants?

This would enable the ileum to discharge its coarse, practically indigestible solids directly into the colon and its fluids containing the great majority of the soluble and diffusible matter into the cecum where it could be quickly taken up by the blood.

Presuming this to be possible we may assume that in the absence of water in sufficient quantities to keep the cecum at its normal status of distention, collapse of its walls would occur and disturbance of this presumed selective power of the ileco-cecal valve might result and solids be discharged into the cecum until this reservoir became distended.

Following this, whatever diffusible fluids were mixed with these solids would be quickly taken into the blood in the natural way and a firm dry impaction of the cecum would be the result.

The very form of the cecum, with its outlet close to and higher than its inlet, makes it impossible for this organ to get rid of a large solid mass, in any manner that I can at present conceive of.

When we have an impaction of an intestine through

which the ingesta pass as through a tube and are carried along by the peristaltic movements of the bowel walls, the proposition is entirely different. In a case of this kind it is easy to see that fluids taken by mouth or secreted by the intestines would be carried along to the solid mass, which upon being softened by the mechanical action of these liquids, could be moved on by the action of a peristaltic stimulant.

On the other hand, in the case of the cecum, we have what may be practically termed a blind pouch, and we may not depend upon this, what I choose to term, washing action of the fluids.

In the tube-like intestine, the liquid with peristalsis forcing it along, must work its way into the impaction and disintegrate it.

But in the case of the cecum, when we have this large reservoir entirely filled with an impacted mass, it seems to me that the most natural course for any fluids entering through the illeo-cecal valve is directly out by way of the nearby entrance of the colon. This theoretic sudden discharge of an abnormally large quantity of liquid into the colon, I think, accounts for the prodromic diarrhea described by Gofton and later by Reeks.

So far as I could determine, this looseness of the bowels did not precede my cases but I think that I saw its counterpart in the acute colicky symptoms shown at the onset of the attack, which I attribute to the colon's receiving this unusual quantity of ingesta whose ingredients were not of a type upon which the colon is capable of acting. Consequently fermentation, rather than digestion, ensued and flatulence was the consequence.

Suggested Plan for Treating Cecal Impaction

In the event of my again meeting with a case of impaction of the cecum I have decided that I shall depend principally upon water to remove it. After having made a positive diagnosis, I shall first thoroughly empty the remainder of the alimentary tract by saline purgatives administered through the stomach catheter and withhold all food. Following this I shall use the tube not once but many times a day and each time I shall pump in just as much water as I may judge, by back pressure on the pump, that the horse will stand.

If this fails, after having thoroughly washed out the rectum, I shall carry in through this clean gut a trocar which I shall plunge through the rectal wall into the impacted cecum; to this I shall attache a tube and pump in a lot of water, in an endeavor to mechanically loosen the obstruction.

These two methods may seem rather far fetched and the latter, of course, is risky to say the least; but I am satisfied that no common means will relieve this condition.

Successful Non-Surgical Treatment for Impaction of the Rumen

In defense of my plan to introduce a large quantity of water through the stomach tube I will cite a similar condition, that of true impaction of the rumen in bovines, in which I have heard very pleasing results from the use of this method.

I never had a true case of complete impaction of the rumen recover without rumenotomy until I conceived of the idea of passing a stomach tube far into this great

reservoir, which I consider is in a great many points similar to the cecum of the horse, and of introducing as high as twenty gallons of warm water containing saline purgatives.

This treatment has so far never failed to effect an evacuation of this organ except in one case in which I afterwards found to have been caused by tuberculosis.

Likewise in this disease I consider that water in such quantities as the subject can be induced to drink or that can be given by drench passes by the full rumen and enters the other stomach and consequently fails to reach the mark as would also any medicaments dissolved or suspended in the water.

When conventional treatments continually failed in this almost parallel condition this treatment was successful and I think it not improbable that it will also do the work in impaction of the cecum; although in this case, of course, the stomach tube can not be introduced directly into the affected organ, but the trocar can, and I have hopes of being successful with it.

Colics in the Horse*

BY DAVID S. WHITE, D. V. M., COLUMBUS, OHIO
DEAN OF THE COLLEGE OF VETERINARY MEDICINE, OHIO
STATE UNIVERSITY

In this paper I will deal with colic in a narrow sense only, using the term to signify that a given patient is suffering from severe pain due to some disorder of the stomach or bowels or both. As is frequently observed, colics, while usually acute, are sometimes chronic, lasting for several weeks with either continuous or intermittent pain. These colics are usually due to some bowel lesion of long standing (tumor, stenosis near termination of ilium, chronic dilatation of the cecum, hernias) or occasionally helminths. On account of their greater frequency, only those colics will be discussed which are acute in course and due mainly to simple fecal impactions, impactions complicated with displacement, and gaseous distention of the stomach. Gastro-enteritis, a common cause of abdominal pain in the horse, can not be touched upon for lack of space.

The morbidity of colic is about 10% of all of the ailments of horses and 50% of their internal diseases.

The mortality averages 10%. The most common causes of death, according to Fröhner, are the following:

*Excerpted from an article in the January, 1914, issue of the *Veterinary Alumni Quarterly* (O. S. U., Columbus).

Displacement of the colon.....	1½%
Torsion of the small bowels.....	1½%
Rupture of the stomach.....	1½%
Simple impaction	1½%
Rupture of the cecum.....	1%
Rupture of the colon.....	1%
Gastro-enteritis	1%
Embolism, tumors, enteroliths, hernias, parasites....	1%

From the standpoint of practice colic may be classified as follows:

1. Acute dilatation of the stomach.
2. Simple impaction of the intestines (small or large).
3. Impaction complicated with displacement of the bowel.
4. Embolic colic.
5. Spasmodic colic.
6. Verminous colic.

In the space allotted to me it would be impossible to consider adequately all of these various forms in anything like proper detail. The following notes which apply to the first three of the above group may offer some suggestions:

Acute Dilatation of the Stomach—Gastrectasis

By this condition we understand a sudden distention of the stomach due to gas formed either in the organ (primary) or in the bowel (secondary) due to an unusual fermentation of the ingesta. This condition is very common in horses, forming about ten per cent of the cases of colic.

Primary dilatation is due to over-feeding, or more commonly to irrational feeding, especially, where large

quantities of corn, barley, bran or chop are fed. Horses which are fed irregularly, such as cab horses, express wagon horses owned by individuals, etc., which eat out of a nosebag and are placed at hard work too soon thereafter are the most frequent sufferers. On the other hand, horses which are regularly fed or on pasture are only occasionally attacked. There can be no doubt that extremes in atmospheric temperatures, especially if the air is damp, may predispose to an attack. It is commonly observed, therefore, during very hot weather or very cold weather, particularly when it is humid. Dilatation of the stomach is, as noted, quite commonly secondary, resulting from impaction of the bowel either simple or complicated.

Symptoms.—As a general proposition gastric dilatation may be diagnosed, provided a clear history of the kind of work, food and method of feeding are obtainable and a careful examination of the patient made. In most cases the attack of gastric pain comes on just after feeding, or more rarely during feeding. However, there are exceptions to this, and not infrequently attacks occur as long as seven to eight hours after feeding.

The patient is usually dyspneic, which, depending upon the degree of dilatation, will vary. It is usually well marked, however, and due to the distended stomach's interference with the action of the diaphragm. The dyspnea is more marked when the animal is recumbent. The expression of the face is usually staring and anxious, the conjunctiva in the early stages is slightly congested, in severe cases cyanotic and muddy. Depending upon the severity and duration of the attack the pulse varies

from normal frequency and strength to weak, often imperceptible, going as high as 80 to 100 per minute. The temperature varies between 100° to 102° F., although where the condition is protracted it may reach 105° F.

The symptoms of pain are usually marked in the beginning of the attack. The peristalsis in nearly every case is partially or entirely suppressed, due to the associated involvement of the bowel. In mild attacks there is usually little or no sweating, but in severe cases pronounced general hyperidrosis is observed. A symptom of great diagnostic value, but unfortunately not always present, is esophageal eructation. Behrens in his study of 142 cases of gastric dilatation noted belching in only 48. Vomiting is an occasional symptom which by no means speaks for rupture of the stomach. In not over twenty per cent of the cases of vomiting does rupture attend the act. The most valuable aid to diagnosis is the stomach tube. Unless the gastric dilatation is complicated with intestinal disorder, a rapid disappearance of the colic follows the use of the stomach tube.

According to some authorities, displacement of the spleen is a tangible symptom of gastric dilatation. This organ may be felt through the rectum where it has become displaced posteriorly lying in the region of the left flank. Inasmuch, however, as similar displacements of the spleen have been noted in perfectly healthy and even fasting horses, this symptom is at least not pathognomonic.

Treatment.—The treatment of acute gastric dilatation is mechanical. The stomach tube should be promptly passed to permit the imprisoned gas to escape, usually

bringing up with it large quantities of the gastric contents. The stomach may then be washed out (lavaged) by repeated injections of luke warm water to which sodium bicarbonate has been added, siphoning out as much as possible after each injection, although in old horses, to avoid collapse of the patient, the water should be allowed to remain in the stomach. If applied early, this method will bring about recovery in nearly 100 percent of the cases of primary dilatation, and fully 50 to 75 percent of secondary dilatation.

Simple Impaction of the Bowel

This colic is due to an accumulation of feces, which remains more or less stagnant in some part of the bowel. It is the most common form of colic we have. In the Berlin clinics nearly 75 percent of cases of colic were due to fecal stasis. Behrens reports 772 cases of colic, of which 547 were simple impaction. 316 of these were in the small bowels and 231 in the large. The proportions are 4 to 3.

Two forms of simple impaction may be recognized: 1. Impaction of the small bowels. 2. Impaction of the large bowels.

Impaction of the Small Bowel.—The usual symptoms of colic are present, i. e., suppressed peristalsis, constipation or obstipation and on examination *per rectum* the large bowels are found intact. In the early stages, at least, or unless the case has been allowed to go on neglected, the pulse, temperature and conjunctiva remain practically normal. Hypodermic injections of arecoline usually afford relief in from one-half to one hour, complete recovery in three to six hours. Unless relieved, the

condition may last several days, one attack of pain following another, and death resulting from toxemia, enteritis or torsion. The temperature, pulse, peristalsis and conjunctiva are important warning signals to consider in this regard. Under proper treatment, fully 95 percent of the cases of impaction of the small bowels recover.

Impaction of the Large Bowel.—In this condition the feces accumulate in either the cecum or colon (pelvic flexure, stomach-like dilatation) or in the rectum. These may each be briefly considered.

Cecal Impaction—Chronic impaction of the cecum is commonly the result of an organic change in the wall of the bowel. This change consists in the gradual dilatation which induces impaction and as a result hypertrophy. In time paralysis follows. The dilation becomes permanent and impactions frequent. This form of colic is usually chronic, occurring intermittently, and unless relieved takes a lethal termination. Usually toxemia, enteritis or rupture of the cecum with peritonitis causes death.

Cecal impaction can only be diagnosed by rectal palpation. In the region of the upper right flank may be felt an enlargement of about the size of a man's head. The enlargement is round, surface smooth and is not sensitive. Sometimes the bands of the cecum may be felt on the surface. The consistency of the swelling varies. It is sometimes quite soft, doughy, retaining finger imprints; at other times it is firm and hard. The fixed position of the enlargement, its size and location in the *upper right* region of the flank usually makes the diagnosis not difficult. Error would be possible only in case there was impaction with displacement of the lower left colon, the

bowel extending over from the left to the right side of the abdominal cavity. The impaction of the left lower colon, however, usually occupies the right *lower* region of the flank and usually hugs rather closely to the median line. The shape of the impacted mass is usually not round but more elongated, and finally the base of the impacted cecum may be felt *in situ*.

Impaction of the Left Colons—Usually the lower colon and the pelvic flexure are simultaneously involved. When the left lower colon is impacted, on rectal examination one feels in the left upper or lower flank region an impacted mass usually just in front of the pelvic inlet and more rarely protruding into the pelvic cavity. By carefully feeling the swelling from right to left one notes upon the surface the tænia or bands which designate the left lower colon. The condition could hardly be confused with other parts of the bowel, as its size is greater. It is extremely difficult to determine whether both the pelvic flexure and the left lower colon are simultaneously involved, as the crooked course of the bowel is difficult to follow. An impaction of the left upper colon is recognized by its limited diameter, the absence of the bands, the direction of its course being practically in a straight line forward, while its larger calibre permits us to differentiate it from the more tortuous and smaller loops of the small bowel.

Impaction of the Right Upper Colon—The impacted mass is imprisoned in the stomach-like dilatation of this bowel, beginning at its funnel, and extending anteriorly and including its widest diameter. As this portion of the bowel lies so far anteriorly as not be reached by the

arm except in very small horses, the results of rectal examination are almost always negative. The clinical symptoms are very similar to those of impaction of the small bowel, so that from a clinical standpoint a differentiation is not always possible. There is, in other words, nothing characteristic in the symptoms of this form of colic. As far as the pulse, conjunctiva and temperature are concerned, they are usually in the beginning not much affected. However, as in impactions of the small bowel, after the condition has prevailed for many hours, a general bloating of the small intestines results, so do we find in cases of impaction of the right upper colon usually considerable gas accumulation in the other colons, even the left colons may be found distended. This permits us to make a probable diagnosis. In brief, the differentiation between impaction of the right upper colon and impaction of the small bowels would depend upon whether the large or small intestines became bloated later in the attack. In the early stages a differentiation is not possible.

III. Impaction Complicated with Abnormal Displacement

The following abnormal displacements of the bowel have been noted:

1. Torsion of the colon.
2. Torsion of the cecum.
3. Torsion of the small intestine.
4. Intussusception of the small intestine.
5. Incarceration of the bowel in the inguinal canal, epiploic foramen, rents in the diaphragm, omentum, mesentery, etc.
6. Strangulation of the bowel from tumors.

All of these pathological displacements lead to a sudden occlusion of the bowel and fatal colic. They constitute about five percent of all colic cases. Displacement of the large bowel and displacement of the small bowel are of great practical importance and may be discussed as follows:

Displacement of the Large Bowel.—Most commonly this consists in a rotation (torsion) of the left colons around their long axis. On account of their free position in the abdominal cavity, contrary to the colons on the right side, a certain predisposition to abnormal displacement is present.

The exciting causes are usually primary impactions *behind* the point of torsion. Therefore, an impaction of the upper right colon ("stomach-like dilatation") may lead to torsion of the lower colons, or an impaction of the lower colons, torsion of the upper colon. In 36 cases of torsion studied by Behrens, 29 showed impaction (81%). In that part of the bowel, which is in front of it, impaction seems to produce a violent anti-peristaltic movement, which induces secondarily a torsion. In rare instances paralysis of the bowels, due to embolism is the cause, and still more rarely it is due to the rolling of the patient during an attack of colic.

A correct diagnosis of torsion can be arrived at only through rectal examination. Very important to consider is the course of the bands of the left lower colon. In place of their normal straight course, the bands will be found bent spirally to the right or the left. The torsion is always in the direction opposite to the turn of the

bands. For example, the common torsion of the left colons is to the right; the bands are twisted spirally toward the left in this condition. Besides the findings of the rectal examination in cases of torsion, it will be noted that the general condition of the patient is rapidly becoming serious. This is usually indicated in one to two hours by the change in pulse, peristalsis, temperature and the conjunctiva. There is further profuse sweating, great prostration, collapse, etc.

If the torsion is not soon removed death will result in six to twelve hours.

Displacement of the Small Bowels—Volvulus.—Usually a primary impaction of a part of the bowel *behind* the volvulus is the cause of change in position. The primary impaction may be either in the small or in the large bowel. Volvulus of the jejunum is commonly produced by impaction of the ilium at or near its cecal termination. As in the case of the large bowels, a violent anti-peristaltic movement of the bowel lying in front of the impaction favors torsion.

Contrary to the torsion of the large bowel, volvulus can not be determined positively *per rectum*. A diagnosis, therefore, is only possible by way of exclusion, and it is always a probable one. If on rectal exploration no change can be found in the layers of the large intestine and the condition of the patient is rapidly growing bad, the probability of the volvulus is great. In some cases a secondary bloating of the small intestine, which may be determined *per rectum*, points to volvulus.

Volvulus of the small intestines is nearly always fatal, leading to death in eight to twelve hours. Treatment as

a rule is without avail, as attempts to relieve the animal by laparotomy have not proven to be feasible.

The treatment for reducing torsion in the large bowels is purely mechanical. Behrens has successfully reduced torsion of the left colons (pelvic flexure) in about 60 percent of the cases by rolling the patient in the direction of the twist. He recommends the following procedure:

“Before making the rectal examination for diagnosis in torsion give the patient a clyster of five to ten quarts of cold water. By this means accumulations of feces in the rectum are removed, and to a large degree rupture of this bowel is rendered less liable. The hand and arm of the operator should be thoroughly smeared with soapsuds.

“The recognition of the many parts of the intestine that are reached through the rectum is made possible by noting the different calibre and anatomical structure of the parts. Mistaking small intestines for the left upper colon and the cecum for the left lower colon is possible. If the left upper colon is distended by gas or solid contents it will be found to be larger in calibre than the small bowel. If, however, the bowel is empty one can not distinguish between them. When the small intestines are impacted it will be noted that several folds or loops are pressed toward the pelvic cavity. To distinguish between the left upper and left lower colons it should be borne in mind that the left lower colon is of greater calibre and provided with four bands, while the left upper is smaller and possesses no bands. Mistaking the left lower colon for the cecum, which is very possible, as the calibre and bands are very similar, can as a rule be avoided by noting the direction of the bands, as even when the cecum is

displaced its bands may be felt coursing toward the right flank region."

The treatment in torsion of the left colon consists in rolling the animal in the direction of the twist. In three cases where a diagnosis was possible the patients were rolled in the direction of the torsion. If this did not relieve them, in the opposite one. The horse was not always cast for the operation; by waiting sometimes fifteen minutes it would lie down of its own accord. The patient is simply rolled over and over two to fifteen times or until relieved. Keeping the hand of the operator in the rectum during the rolling is seldom advisable and is dangerous in that perforation of the rectum may result.

This treatment is not always successful. Of seven cases of torsion of the left colons reposition was effected in only four. The remaining three did not yield to treatment. As the result of Behrens' study and attempts at this method of treatment of torsion of the left colons, he draws the following conclusions:

1. It is not possible under all circumstances to diagnose this displacement *per rectum*. In many cases the loops of small bowel, distended and pushed toward or into the pelvic cavity, prevent adequate palpation.
2. One is not always successful in recognizing in which direction and how extensive the displacement is.
3. Rolling the patient, as suggested, is not always successful. In general practice it is not always feasible.

Medicinal Treatment of "Colics"

BY E. L. QUITMAN, M.D.C., CHICAGO
PROFESSOR OF THERAPEUTICS, CHICAGO VETERINARY
COLLEGE

GENERAL CONSIDERATION

It is the writer's opinion, that in the larger cities, "colics" kill more horses than all other diseases combined. The high mortality from colics, and the enormous economic loss, that it entails, are due, in part, to dosing by the horse owners, those in charge, or on-lookers, or by the accommodating "near doctor." To this source, about sixty-five per cent of the deaths from colics should be charged. The thoughtless and unscientific methods employed by some veterinarians in the treatment of this class of ailments is responsible for another twenty-five per cent, leaving only ten per cent of the deaths to be charged to absolutely hopeless cases.

I would lay down two laws for the treatment of the various forms of gastric and intestinal disorders in horses, that are included under the generic term "colic." They are:

1. Do not use any treatment that *may* kill.
2. Do not use any treatment that will mask the symptoms.

Use No Treatment That May Kill

Among the medicinal agents prohibited by our first law, i. e., those that *may* kill, I will include:

1. **Aloes** and other severe purgatives.

2. **Aconite**; an agent that is sometimes used in stock colic mixtures, and one that oftentimes paralyzes the gastric functions and leads to flatulence.

3. **Drugs that evolve gases** under certain conditions, such as ammonium carbonate or sodium bicarbonate, and on that account should never be used in stock mixtures. When such agents are administered in gastric flatulence (and stock mixtures are of course liable to be given, in any and all types of colics), they are very liable to cause rupture of the stomach by the rapid evolution of carbon dioxide, when they come in contact with the acid, fermenting material in the stomach. This sudden increase of pressure in the already gas-filled stomach is almost sure to rupture that organ.

4. **Croton Oil**; this is a drug that the horse is especially susceptible to, and even when well diluted in bland oils, it frequently gives rise to a fatal gastritis or muco-enteritis.

5. **Irritant drugs improperly diluted.** These should also be considered as prohibited by the first law. The writer knows of many cases of gastritis that were caused by insufficient dilution of such drugs as ammonium carbonate, aqua ammonia, aromatic spirits of ammonia, tincture of capsicum, tincture of ginger, oil of peppermint and other volatile essential oils, etc., etc.

The administration of aromatic spirits of ammonia in capsules is, in the writer's opinion, nothing short of malpractice; first on account of the danger of such capsules being broken in the mouth, and the consequent dire results due to its caustic action, and sec-

only, because the liberation of this drug, in one place in the stomach, upon the solution of the capsule, causes sufficient irritation to set up gastritis, either acute, subacute or chronic.

Avoid Bad After-Effects

The fact that a horse does not die from the "colic" does not prove that he was properly treated. If he emerges from the attack of colic with first a loss of appetite, later on showing an indifferent desire for food, and a constantly increasing loss of flesh, it indicates, in ninety-nine out of one hundred instances, that he was improperly treated—that the treatment because of its irritant character caused gastritis.

Under the first law for the treatment of colic the writer would also warn the reader against the danger of stock colic mixtures, that contain aromatic spirits of ammonia and linseed oil, for the reason that, if allowed to get old, a caustic, soft soap seems to be formed, by the action of the alkaline ammonia on the oil, and although it had when prepared a sufficient excess of oil to prevent irritation, upon standing for months it frequently becomes sufficiently irritating to cause inflammation of the mucous membrane of the stomach.

As for aloes, the sooner this drug is discarded by all veterinarians as a part of the treatment of *all* forms of colic, either before or during the attack, or as an after treatment, the sooner will the mortality, and the disappointing sequelae, such as muco-enteritis, enteritis, super-purgation and laminitis, decrease appreciably.

The Folly of Using Aloes in Colic

That *elimination* of the contents of the stomach and bowels is *essential* in the treatment of the various forms of gastro-intestinal affections, from spasmodic colic to the graver conditions, there can be no doubt, as *irritating contents*, either bacterial, chemical or mechanical, is the *cause* of the various morbid conditions that give rise to colic in its manifold forms.

But such elimination can be secured more quickly and safely by other means than through the action of aloes. Such agents as physostigmine, arecoline and raw linseed or castor oil, coupled with, in some cases, liberal rectal injections, are far preferable.

Aloes never has, and never will, overcome impaction of the bowels; but it has been the cause of numberless cases of this ailment, "running into" inflammation of the bowels.

Aloes requires a period of from eighteen to twenty-four hours to produce the first evacuation in a horse, and furthermore causes an intense congestion of the posterior portion of the intestines, that is the large intestines.

The folly of administering it as an aid to "cure" colic, can be seen by the length of time it takes it to act. Most colic cases will be well or dead before it acts, so the question of its usefulness in the great majority of cases may be disposed of by saying it is *nil*, for obviously neither a well nor a dead horse has any need for the action of aloes. But in addition to its uselessness its administration is fraught with danger in colics. Suppose a horse has suffered a severe attack of one of the forms of

colic and has been ill for several hours; under such conditions there is almost sure to be some congestion of the bowels, especially in those cases that occur in the spring of the year, when the weather is mild and the water that horses drink icy cold; conditions that give rise to "congestive colics." Doesn't it look reasonable to assume, that aloes with its irritant, congestive action, will add fuel to the fire, or the spark to the powder, and thus increase a moderate type of congestion to an acute active congestion and the consequent enteritis?

More than twenty years ago, the writer dropped aloes from his treatment of colics; he has since been rewarded by having but exceedingly few cases of enteritis or other of the untoward sequelae of this class of ailments. I am convinced that more cases of enteritis are induced by faulty treatment than occur as a primary disease or as a sequel to colic in any and all of its forms.

Avoid Anodynes Except in Rare Instances

The second law for the treatment of colics, *do not use any treatment that will mask the symptoms*, while broad in its scope, can be disposed of briefly. Under this law I strongly advise against the use of drugs having a distinct and primary anodyne action, like opium or morphine, for the very good reason that they allay the pain but have no curative effect on the cause, thus commonly misleading the attending veterinarian and the owner (who is frequently requested to make reports of the patient's condition over the telephone) and the animal, though in no pain, is heading for an attack of impaction of the bowels, and possibly still graver conditions.

Another objection to the use of anodynes, including cannabis indica and hysocyamus, lies in the fact that they delay and lessen the effects of the quick acting cathartics, physostigmine and arecoline, although of themselves they do not actually cause constipation.

There are of course exceptions to this, as to all rules. Occasions do occur in one's practice when a patient is suffering such acute pain as to make him unruly to a degree that it is impossible to administer to him, immediately the properly indicated treatment. Such animals must be given an anodyne hypodermatically to render them tractible enough for further treatment. Even for such, I advise the trial of three- or four-grain doses of morphine sulphate instead of the usual five- or six-grain doses. Naturally the smaller the dose, the less the tendency to produce constipation or impaction, and the less it will retard the effect of the quick acting cathartics which have become a *sine qua non* in the treatment of colics.

Stock Colic Mixtures of Little Value

All, I think, will acknowledge that colic in its generic sense cannot be properly nor scientifically treated by stock mixtures which of necessity must be of the "shot-gun" variety. However, we are forced to supply some of our clients with a "colic remedy" for various and obvious reasons, one of which is to prevent them from using quack nostrums and another is to save ourselves from being called out at night.

This being so, study the question closely and omit drugs like opium, morphine, cannabis indica and hysocyamus, which are non-curative, and will mask the symptoms

should the case later demand your personal attention. In addition they will retard the effects of the quick-acting cathartics, should they be given.

Anodynes and antispasmodics which may be substituted for the above and which do not have their objectionable features are belladonna, stramonium, acetanilid and oil of turpentine.

It is best, on stock-mixture labels, to advise that not more than two doses be given and that upon the failure of the second dose the doctor be called. This limitation of the number of doses is imperative if they contain any of the poisonous drugs.

When medicine is furnished to clients living many miles from the office, where many doses may be administered, it is doubly advisable to omit poisonous drugs from the mixture. In fact it is advisable to omit these even in city practice where the ignorant horsemen will not read or obey even the most explicit directions.

A Safe "Colic Remedy"

The suggestions for the possible use of belladonna and stramonium are made more for administration by the veterinarian than for use in stock colic mixtures. For a stock colic mixture which is as nearly harmless as any that can be made, and still be of value, the following is suggested:

R

Acetanilidi pulv.	5 ij to iij
Ol. Menthae Piperitae.	5 ij
Ol. Terebinthinae.	
Ætheris	

Tr. Zingiberisaa ̄ j to ij
 Ac. Salicylici ̄ iij to iv
 Ol. Liniq. s. ad. ̄ xij
 M.

Sig. Give at one dose (repeat in an hour if necessary).

The acetanilid is used on account of its being a non-constipating anodyne. One that will not retard the action of eserine or arecoline, and has a beneficial influence in congestive conditions of the bowels.

Tincture of ginger is preferable to tincture of capsicum because the latter is constipating.

Spirits of nitrous ether may be used in place of the ether if desired.

The Quick-Acting Cathartics

Under the caption of general considerations it may not be amiss to discuss the comparative value of the three quick-acting cathartics, namely—barium chloride, arecoline hydrobromide and physostigmine (or eserine) sulphate.

Barium chloride, the least desirable and most dangerous of this class, belongs to the category of "kill or cure" drugs, and while once enjoying a wave of great popularity, it is now rapidly passing into a well-deserved oblivion, with perhaps a faint occasional flutter of life.

It is administered in $7\frac{1}{2}$ to 10-grain doses, intravenously (never subcutaneously as it does not act as a cathartic, and will cause sloughing). Dissolve this quantity in two to four grams of water and filter the solution. Barium chloride was formerly used in this

way in 15-grain doses, but this is excessive. If used, I would advise that the ten-grain dose for jugular vein injection be not exceeded.

Barium chloride is given in from one-half to one dram doses by the mouth. Occasionally the devil-may-care veterinarian gives two drams, but here again I wish to advise against the use of more than one dram. For oral use, it should be diluted with one pint to one quart of water, both as a diluent and to prevent its too rapid absorption. Catharsis is induced by it in 15 to 30 minutes.

When barium chloride acts, it acts beautifully, when it kills, it kills quickly, and it does the latter frequently. It is intensely painful in its effect and can bring in the end only shame and discredit on the user.

Arecoline hydrobromide has many users and friends in the veterinary profession. It is supplied the practitioner in tablet form and is administered hypodermatically in one, one and one-half, and two-grain doses; dissolved, of course, in sterile water. It acts in about 20 to 30 minutes, causing considerable griping and a greatly increased flow of saliva, sometimes amounting to a gallon or two, which is swallowed by some horses and is allowed to run out of the mouth by others. It usually causes from five to seven evacuations and empties the rectum only. *It also greatly increases the secretion of acid in the stomach, which effect, coupled with the severe pain it causes, makes it a dangerous drug to use in gastric flatulence.*

I use arecoline hydrobromide occasionally in the less serious types of cases, in which an active cathartic

is indicated; but under no conditions do I use it when gastric flatulence is present.

Physostigmine sulphate (also known as eserine sulphate), if properly selected and properly used is a safe and highly satisfactory, quick cathartic. I would advise its *purchase only in hermetically sealed glass tubes* as the drug is very delicate, very hygroscopic and deteriorates rapidly on exposure. The average dose for country horses is one grain, for city horses, one and one-half grains. It is very soluble, but for hypodermatic administration is usually dissolved in one-half to one dram of water. Tablets of this drug are unstable in their effect; due to both the delicate nature of the drug and to the fact that in tablet making, the salicylate of physostigmine is used. This salt is not very soluble, and as a consequence, is often administered in an incompletely, dissolved state when, hypodermatically, absorption does not take place. This results in failure to secure action from it and the unjust condemnation of a most valuable drug. It can be purchased in one-half, one, one and one-half, two, three, five and fifteen-grain tubes; however the one, and the one and one-half-grain tubes are best for general use.

Tablets of physostigmine benzoate have recently been placed on the market; unlike the salicylate, the benzoate is very soluble and gives good results, but I cannot say as to their keeping properties. We know that the drug in the sealed tubes cannot deteriorate, and consequently, pin our faith to it in that form.

Physostigmine is slower of action than arecoline, usually requiring one hour to produce catharsis, though occasionally acting in one-half hour. It usually causes some griping but not as severe as that produced by arecoline; quite often it not only fails to gripe but allays the pain in 15 to 20 minutes as though it were some powerful anodyne, yet acting as a cathartic.

While physostigmine is slower than arecoline, it is very much more thorough, usually causing copious defecation seven to a dozen times during the first hour of its action and five or six defecations during the second hour, by which time any griping it may have caused will have ceased, although catharsis continues for from two to four hours longer; resulting in as complete an unloading of the intestine as can be secured from a full purgative dose of aloes.

Unlike arecoline, which is emphatically contraindicated, physostigmine may be given in gastric flatulence, however, neither of these agents should ever be given to a horse suffering from "heaves" if it can be avoided, though if imperative it may be administered to such patients by breaking up the regular dose into three or four doses, given fifteen to twenty minutes apart. Should this so aggravate the heaves as to make death from dyspnoea imminent, its effects on the bronchi can be quickly checked by the administration hypodermatically of two drams of fluid extract of stramonium diluted with one ounce of water, or by one-fourth to one-half grain atropine sulphate, I prefer the stramo-

nium to overcome this spasm of the bronchioles so disastrous in animals suffering from heaves, because of its more lasting effect.

An hour after the first dose of the antidote, a second dose may have to be administered, oral administration will usually suffice for the second and third doses, should they be necessary. In using eserine or arecoline where the patient is afflicted with heaves, it naturally is advisable that the veterinarian watch his patient until danger has passed.

All quick-acting cathartics are also more or less liable to produce abortion in pregnant animals; this is especially true if they be near full term.

SPECIFIC CONSIDERATION OF COLICS

Without reference to the symptoms of the various forms of colic, which are discussed at length in other articles in this book, we may take up a discussion of their treatment as follows:

Gastric Flatulence

Synonyms: Gastric tympany, gastrectasis, acute indigestion.

The time was, and that during my time, when a case of gastric flatulence meant a six or eight-hour job for the veterinarian, provided the patient survived that long, but thanks to the perfection of the stomach tube, or to the discovery that a capsule of salicylic acid, preferably but not necessarily, augmented by a hypodermatic injection of physostigmine sulphate will relieve this condition,

thirty to sixty minutes is about the time it now requires to treat such cases.

Tapping the stomach by means of an extra long trocar and canula was tried by Dr. Joseph Hughes some 15 or 18 years ago, but was discarded as being dangerous and inefficient.

The writer had a stomach tube made to order in England twenty-one years ago but being made of the same material and similar to, the old light-colored, linen catheter it was stiff and awkward to pass into the stomach, and was discarded as being impractical. It remained for Dr. D. O. Knisely to perfect and popularize stomach lavage in the horse by means of the rubber stomach tube and the injection pump. As a full explanation of its value and uses may be found elsewhere in this little volume, it is not necessary to go into a discussion of it here.

The writer fully concurs with those who place a high value upon the stomach tube in gastric flatulence, but does not use it in his practice except on rare occasions on account of its being rather bulky to carry, its use rather a "mussy" operation, occasionally producing quite a hemorrhage from the turbinated bones which, though of no consequence, frequently alarms the owner and because its use is commonly followed by a severe cough.

Drenches are often impossible of administration in gastric flatulence, due to the eructation of gas forcing the medicine up and out again. They are dangerous because of the frequency with which they are forced up to the fauces, and on account of the partial stupor and distress

of the patient, they often find entrance to the trachea and cause a mechanical broncho-pneumonia that usually terminates fatally.

The treatment that I use and have used for 20 years, and recommend with the utmost confidence, is salicylic acid in capsules. I have fondly dubbed this "my vest pocket stomach tube." I administer it in doses of one-half ounce. Not more than two or three cases in a hundred will require a second dose.

℞—Ac. Salicylici $\bar{3}$ ss
 Zingiberis pulv. $\bar{3}$ ij
 M. ft. caps. No. 1.

Sig. Give at one dose (repeat in one-half to one hour if necessary).

Owing to the bulkiness of salicylic acid, it will require a capsule having a liquid capacity of $1\frac{1}{2}$ ounces to hold the ingredients prescribed above; however, the regulation one-ounce capsule can be made to do, by using salicylic acid alone, and packing it in firmly or the above prescription may be put into two, one-ounce capsules and by discarding the short ends of the capsules and moistening the capsule in a line and with a knife splitting the capsules on one side from top to bottom two of these can thus be pressed together enabling the veterinarian to give both capsules at one shot.

Two drams of fluid extract of nux vomica may be slowly poured onto the contents of the capsules at the time of use, if desired and with advantage.

In addition to the capsule of salicylic acid, I administer a dose of physostigmine sulphate, unless there is

some specific contra-indication as previously noted in this article.

I wish to repeat my injunction, *do not use arecoline* in gastric flatulence, for the reason, already mentioned, that it commonly causes the death of the patient.

I consider salicylic acid the most powerful antiferment we have, that is applicable for use in a horse's stomach. It not only checks the fermentation but in some inexplicable way seems to get rid of the gas already in the stomach.

Eserine, in one to one and one-half grain doses, is used to empty the stomach and bowels.

Spasmodic Colic

The condition usually diagnosed as spasmodic colic may be of a comparatively simple nature and yield to very simple treatment, such as a three, four or five-grain dose of morphine, or a dram or two of fluid extract of belladonna or to some warming up medicament of a carminative nature as alcohol, whisky, tincture of ginger, tincture of capsicum, oil of turpentine, spirits of camphor or spirits of nitrous ether, etc., etc.; but what seems to be a simple spasmodic colic, is frequently the earlier stage of some more serious condition, and even if it is only spasmodic colic, it denotes the presence in the intestinal tract of an irritant which should be expelled by the use of a prompt cathartic (eserine is preferred by the writer) and the administration of a carminative or a mixture similar to the one recommended as a type of stock, colic mixtures on pages 119 or 128.

Intestinal Flatulence

Enterocentesis should be resorted to in this ailment if danger is imminent. The indications call for the quick purgatives (eserine or arecoline) and the following:

℞—Ol. Menthæ piperitæ.....	ʒij
Ol. Terebinthinæ.	
Ætheris.	
Spts. Ammon. Arom.	
Tr. Zingiberis	aa ʒij
Ac. Salicylici	ʒvj

M.*

Sig. Give one-half at a dose in a pint of water, repeat in three-quarters of an hour if necessary.

Avoid anodynes.

This form of colic is frequently followed by impaction due to the exhaustion of the muscular coats of the bowels, resulting from the stretching they have been subjected to during the flatulence. Eserine sulphate is doubly valuable in this instance, to eliminate the fermenting material and to stimulate secretion and peristalsis and the exhausted muscular coats through their nerves thus warding off impaction.

Making it an almost invariable rule to use eserine, or possibly arecoline, in these cases will well repay the practitioner by saving him the worry and danger incidental to impaction of the bowels.

Naphthalin is a useful intestinal antiseptic and anti-ferment in two to three-dram doses. Autointoxication

*Note: Dissolve the salicylic acid in the tincture of ginger to prevent a too violent chemical reaction between it and the aromatic spirits of ammonia.

following impaction is an especial indication for naphthalin.

Gastro-Intestinal Flatulence

When one has to deal with this ailment enterocentesis should be resorted to immediately to give breathing room and prevent toxemia from absorption of the gases; then administer the treatment recommended for gastric flatulence. Should the intestines again bloat, then give the mixture mentioned under intestinal flatulence.

Do not fail to use eserine at the start.

In a number of cases of intestinal flatulence or gastrointestinal flatulence, a fever may prevail for several days. This denotes autointoxication and should be combated by a liberal dose of raw linseed oil (one and one-half to two pints), and the administration of naphthalin in two-dram doses, three or four times daily.

Betanaphthol is also very good as is phenyl salicylate or salol and hexamethylenamine (commonly known as urotropin); all may be used in about two-dram doses.

The first-named is preferred by the writer.

Impaction of the Bowels

This ailment is one that, if properly treated, rarely destroys life, yet many losses occur from it, due to treatment being forced. I refer especially to the use of aloes and other powerful purgatives.

When there is impaction, there is paralysis of the bowels; this paralysis differs in no material way from paralysis of a leg. Would you expect to cure paralysis of a leg with repeated doses of aloes? I dare say not.

Does the physician expect to overcome paralysis of an arm with irritating purgatives? He certainly does not.

In impaction, besides the paralysis of the bowels (whole or partial), we have the hard dry mass of feces with which to contend.

The danger from impaction of the bowels lies in:

1. Death from starvation and exhaustion.
2. Death from autointoxication.
3. Death from gangrene (rare).
4. Death from enteritis.

The first can be prevented only by overcoming the ailment before this condition is possible. Many veterinarians to try to force bowel movement with aloes, which not only commonly fails, but is a potent factor in bringing on the fourth danger (enteritis).

Let us analyze the error of the aloes' treatment in impaction of the bowels.

Picture in your mind a large portion of intestinal tract, rich in blood supply, filled with a large, hard, dry, *heavy* mass of feces weighing 40 to 50 or 60 pounds, harsh and irritating, practically a foreign body *lying in one place*, mechanically interfering with the flow of blood or in other words causing congestion over a greater or less area of the intestinal tract.

Now comes a dose of aloes, which itself must be acted upon by the bile before it really can have a purgative action and with impaction there is usually, in fact, I think always, a sluggish liver, which being so, renders void the cathartic action of the aloes. Unfortunately this is not true of the irritant action of this drug; whether acted

upon by the bile or not, *aloes causes an intense congestion of the large intestines*; thus *aloes adds congestion to congestion* and consequently makes enteritis a great deal more likely to supervene upon a case of impaction when it is used.

The second danger can be combated by the addition of intestinal antiseptics, the writer's favorite being two-dram doses of resublimed naphthalin administered three or four times daily. This drug may be given in capsules or suspended in linseed oil.

The third danger can be combated only indirectly—by removing the cause of the impeded circulation as quickly as possible, but in attempting to do this, we should not substitute the more common danger—enteritis by forced treatment, i. e., from the use of aloes and similar irritating purgatives.

The above remarks, regarding forced treatment, have, perhaps led the reader to think, that the writer's treatment is slow, requiring, probably five, six or more days to re-establish bowel movements. I wish to assure you, that such is not the case; that one, two or three days is about the time required for the treatment of impaction of the bowels in ninety-nine out of one hundred cases. These periods comparing with three, six and nine-day cases treated by the old-line methods.

Since the writer has made eserine an essential part of his treatment, for practically every form of colic, impaction, following colic, has almost ceased to occur in his practice; however, impaction does occur as a

primary disease and if the case comes into my hands still showing slight peristalsis, the following is administered :

℞—Physostigmine sulphategr. jss
 Pilocarpine hydrochloridegr. ij
 Strychnine sulphategr. j
 Distilled waterq. s. ℥iij
 M. et fiat sol.

Sig. Administer one dram (or one-third of the solution) every twenty minutes until all is used.

This commonly is all that is necessary, except perhaps a quart of raw linseed oil is sometimes beneficial. Should it fail, or if the impaction is fully established, the following is administered :

℞—Fluidextracti Nucis Vomicae.....℥j
 Fluidextracti Pilocarpi℥ij
 Fluidextracti Colchici sem.....℥ss-j
 Fluidextracti Physostigmatis℥j
 Aquae q. s. ad.....℥viiij

M.

Sig. Give one ounce every one and one-half to two hours, diluted with an ounce or two of water.

If there is considerable pain, one-half dram doses of fluidextract of belladonna may be added. This drug also stimulates intestinal secretion after a brief diminution; or instead of the repeated one-half-dram doses of belladonna, a single two-dram dose may be given and repeated in three or four hours if necessary.

Should there be considerable congestion of the

bowels or liver or great pain present, instead of the above prescription, I put the patient on the following:

℞—Nucis Vomicae pulv. ʒj
 Acetanilidi pulv. ʒjss-ij
 Sodii phosphatis ʒxvj
 M. et ft. chart. No. VIII.

Sig. One powder in four or five ounces warm water, every two hours.

This prescription will be found serviceable in painful cases of impaction in place of the preceding one, but the first one is generally to be preferred.

Now as to the actual purgative. I never use any other than oil. Usually raw linseed oil—*one quart night and morning*. Occasionally in the more serious cases a quart every eight hours. *Flood them with oil* is my slogan.

In some cases I use a pint each of linseed and castor oil at a dose or sometimes a quart of castor oil is given once daily and a quart linseed oil once daily.

Rectal injections of two or three ounces of glycerin every two or three hours are often of value as glycerin promotes secretion and peristalsis and by its slight irritant action makes the animal strain slightly, which by virtue of the contraction of the abdominal muscles brought into play, acts somewhat in the manner of an abdominal massage and aids in overcoming the condition.

Should the patient be already straining, then glycerin injections should not be used.

Rectal injections of water, soap suds and water or soap emulsion or water containing an ounce of turpen-

tine to each bucket of water are useful and of great value if thrown well up into the bowels. Injections by means of a syringe, no matter how large are of little value as it does not go in far enough.

The writer attaches a stomach tube to a continuous flow injection pump and prefers warm water to cold water for this purpose. The tube is well lubricated and pushed gently up into the bowel for about six feet, stopping for a moment if the patient strains. Should the tube apparently meet with an obstruction blocking further progress after going in only part way, pump in one or two gallons of water which either lubricates or balloons the bowels, thus facilitating insertion.

Now flood them with water, not a bucketful, but as much as you can get into them, 15 to 20 or even 30 gallons, the more the better, and the more there will be retained to soften up the hard fecal mass. One such intestinal lavage is worth *dozens* of the usual bucketful enemas. To do this once or twice daily is sufficient as the patient will at intervals pass the water mixed with some feces for three to six hours after the injection.

Some veterinarians contend that injections of cold water are more stimulating to peristalsis than hot water and when convenient run a hose attached to a hydrant or faucet up into the bowel, six or more feet and turn on the water, slowly at first and gradually increasing the flow. This rapidly reduces any fever that may be present and no doubt has its value.

I practice it occasionally, when it is difficult or im-

possible to get sufficient warm water for the purpose, but prefer warm water, inasmuch as I have seen several severe chills brought on by the cold injection, and I have not seen it produce any better results than warm water.

While I admit, and advocate the value of liberal rectal injections, I do not, by any means, use them in all cases as I find the internal treatment, with the liberal use of oil usually, saves me the trouble of the rectal injections.

Superpurgation

Give starch or flour gruel to drink instead of water. A hypodermatic injection of morphine sulphate may be of value for immediate and temporary action. Give the following also:

R̄—Ac. Hydrocyanici Dil.
 Chloroformi
 Ol. Menthæ Piperitæaa ʒss
 Ol. Terebinthinæ Rectif. ...ʒjss
 Tr. Capsici.
 Spts. Camphoræ.
 Tr. Opiiaa ʒiij

M.

Sig. Give two ounces in one-half to one pint starch or flour gruel, every two or three hours. (Less often as improvement is shown.)

Enteritis

There is no doubt that true enteritis involving a considerable portion of the intestines is invariably fatal, but I am of the opinion that where it exists only in a small localized area that recovery may occur.

Externally to wrap the entire barrel of the horse up in *hot*, wet woolen blankets, covered by an impervious dry covering, is of the greatest value; but unfortunately this highly valuable procedure is impossible, or at least impracticable in most cases in veterinary practice, as we usually cannot procure sufficient blankets, enough hot water, and enough help. Furthermore, the unwieldiness of our patient who is so frantic from pain that it is resistant to enormous doses of morphine make this part of the treatment rarely available.

Where the hot, wet blanket treatment cannot be carried out, apply the following liberally over the patient's abdomen.

℞—Ol. Sinapis ℥ij
 Ol. Terebinthinæ ℥ij
 Aq. Ammonii Fort. ℥j-ij
 Ol. Gossypii sem. q. s. ad. ℥viii

M.

Sig. Apply thoroughly once only.

Internally, the following is recommended:

℞—Fluidextracti Aconiti ℥j
 Fluidextracti Belladonnæ ℥iij
 Aquae q. s. ad. ℥vj

M.

Sig. Give one ounce every hour till effect, then less often.

Acute Muco-Enteritis

In this ailment the prescription recommended for enteritis is to be given every two hours in conjunction with

two to four-dram doses of bismuth subnitrate and one-half-pint doses of raw linseed oil, every four hours.

Intussusception

Great stimulation of peristalsis with eserine or arecoline, together with the use of liberal doses of linseed oil, is the only medicinal treatment that holds out any hope in this ailment.

If it is possible to get fluid well up into the bowel, a pound of bicarbonate of soda dissolved in a gallon or two of water may be injected (using a long tube like a stomach tube) followed by about a quart of dilute acetic acid (or vinegar) mixed with a gallon of water; this will evolve considerable gas and the consequent ballooning of the bowel may prove of value in some cases.

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