A practical guide to the diagnosis of intestinal disease in horses

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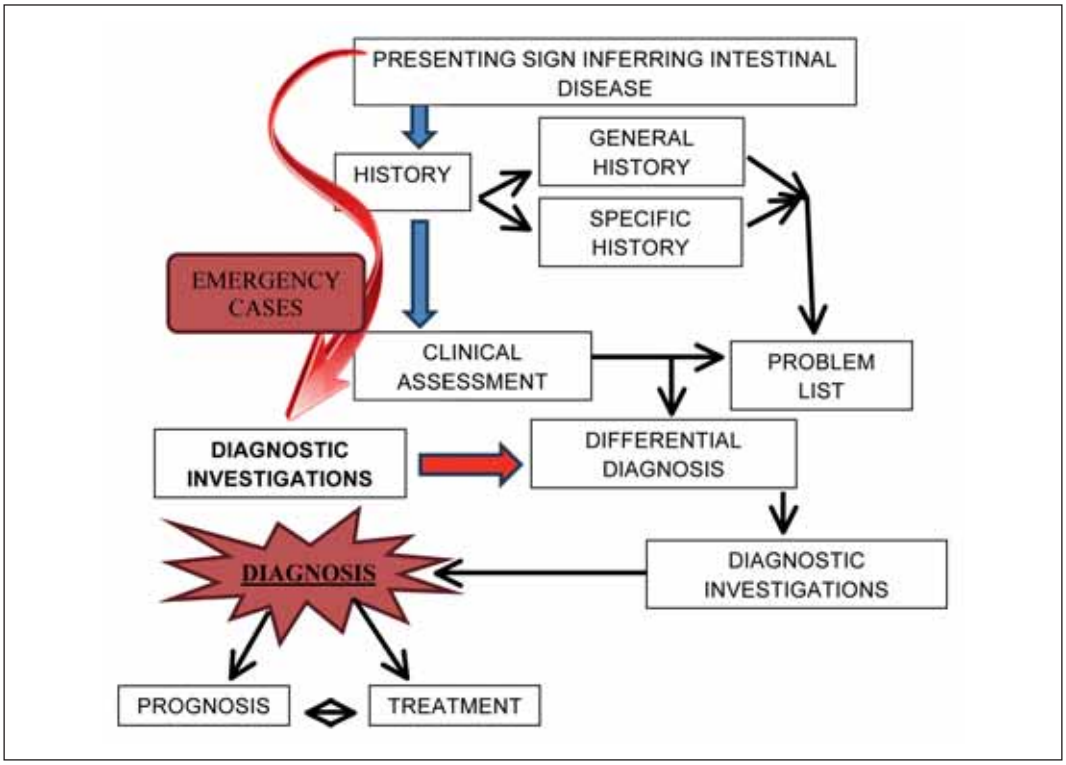
Gastro-intestinal disease in horses has become a major challenge as more and more different conditions have been recognised, improved diagnostic methods have developed in parallel. This paper sets out to explore a suitable investigational procedure that leaves little chance of errors. However, it has to be said that the full diagnostic investigation can require some sophisticated diagnostic equipment such as higher power ultrasonography and long endoscopes!

The limitations of the clinical examination are still obvious - there are areas where diagnostic aids cannot really help no matter how sophisticated they are. Mistakes can result in catastrophic decisions that leave the



horse, the owner and the veterinarian in difficult positions!

For example, in the past rectal examination was deemed to be the most significant diagnostic aid and whilst it is still true to say that abnormal rectal findings are still definitive and cannot be overruled, at the best of circumstances, only 40% of the abdominal content can be examined. Inevitably there are aspects of experience, patience and skill that are involved and lack of any or all of these three aspects frequently results in a wrong diagnosis or even a catastrophe.

The practical clinician needs to establish a definite logical process that must be followed in all cases of suspected intestinal disease logical process; the concept of pattern recognition in which a sign is immediately and categorically designated as a diagnostic certainly is no longer acceptable. The depth of history that can be obtained depends on a number of factors but significant time can be taken to do this. Sometimes, as in the case of a chronic long standing problem, the time is extremely well spent and often this process provides really strong clinical guidance. By contrast, of course, the amount of history that can be achieved in the few available minutes with a severely colicking patient can be limited. In the latter case a much more focussed history is taken but it is still TAKEN! It is not ignored. A chronic long standing diarrhoeic horse with weight loss is unlikely to suffer any material harm from a short delay in the process of diagnosis and treatment. The acute severely painful colic case with abdominal distension is a bigger problem but in such cases the history is usually relatively easy. It is always important to deal with the emergency situation first and even if it has to be taken after extensive surgical interferences; the history of all cases with gastrointestinal disease should be collected in depth.

Inevitably the first major component is the HISTORY of the case. Here there are many possible variations and it is usually easy to get full history in respect of the intestinal function but the clinician has to ask the right questions to get the right answers. This aspect of clinical medicine is frequently or, regrettably is often ignored almost completely. "Time spent in collecting a history is never wasted".

Having taken the history both of the general background of the horse and the specific history relating to the presenting complaint, a detailed clinical examination is undertaken. Again here it is easy to take shortcuts but given the complexity of the equine gastrointestinal tract it is important that all body systems should be examined at least in a cursory manner. Only around 40% of the abdomen can be assessed at all in horses using normal clinical aids such as rectal examination and auscultation/palpation. When considering the diagnosis of intestinal disease it is impossible to exclude aspects relating to the other abdominal organs that are associated with intestinal function, including the liver, the pancreas and the spleen. Concurrent signs such as anaemia, ventral oedema, heart murmurs and arrhythmias can be important aspects of intestinal disease as well of course so no aspect of the clinical examination should be overlooked!

The more detailed examination of the alimentary tract is limited in its scope. It is possible of course to palpate the mouth and the pharynx and to some extent the oesophagus. Thereafter we are reliant very heavily on secondary events such as abdominal auscultation and further diagnostic tests such as rectal examination.

Fortunately there is an extensive panel of diagnostic tests that can be applied in the investigation of intestine or disease. Since most individual signs are non-specific, combinations of tests and procedures have to be employed in most cases. These include:

1. **Palpation and auscultation**. These are routine procedures that should be within the compass of every veterinarian dealing with horses. There are however some additional points that could be improved. The first of these is the careful assessment of the sounds associated with progressive motility of the gut in each of its major regions. Simultaneous auscultation and percussion is a rather overlooked but simple diagnostic test for the detection of tightly distended viscera.
2. **Rectal examination** is useful in horses with suspected gastrointestinal disease and in particular those suffering from ab-

dominal pain or abdominal related weight loss syndromes. Any horse with a history of persistent or recurrent colic, diarrhoea or short or long duration, should be examined in this way during rectal examination the concept of rectal tourism should be avoided at all costs. A logical and careful procedure needs to be followed so that the risks of the procedure are minimised and the returns in terms of diagnosis and diagnostic information are maximised. It is important during this procedure to ensure operator safety and modern sedation and the use of *Buscopan*™ (hyoscine-n-butyl bromide) should be considered and in many cases there is an obligatory need for both of these. The improved diagnostic capacity following the use of intestine relaxants such as *Buscopan*™, is surely enough to encourage its regular and routine use during this procedure. Rectal findings are definitive and should not be passed over. During this procedure faecal consistency and composition must be interpreted carefully. The faecal matter could be dry and hard all may contain blood mucous, sand or even parasites. There is a plethora of information that is available from this. The status of the rectal mucosa should be assessed and in particular in respect of its smooth and thin normal state abnormalities can impart a roughened and thickened palpable character. During rectal examination the inguinal rings, this small colon, the small intestine and the large colon including the pelvic flexure and the caudal margin of the spleen and caecum can usually be identified. Animals with peritonitis have a very characteristic palpation character.

3. **Passage of a nasogastric tube** is usually undertaken when investigating colic patients - it must be passed in every case that has continuing abdominal pain signs for 15 minutes or more - but it can provide much more information in the cases with any suspected gastro-intestinal disease. The pH of the fluid can be an important measurement and its specific content may help with the diagnosis of gastric bleeding (from ulceration or from carcinoma). The tube should be examined upon withdrawal also in case there is abnormal odour or even evidence of blood and other pathology including parasites. The fluid can be sampled and cytology performed also where that is deemed appropriate.
4. **Abdominocentesis i**s another routine procedure used in colic cases for the most art but again it can provide very helpful information in other conditions. For example, cases with peritonitis, ruptured or permeable lacteals/lymphatics and the cytological examination can be used to differentiate between inflammatory disease and neoplastic disease. However, many of the changes that are detected cytologically are secondary - on a few occasions specific neoplastic or diagnostically significant cytological responses can provide a very much more accurate diagnosis. For example, it is sometimes possible to detect neoplastic squamous cells in peritoneal fluid in cases of serious gastric carcinoma. Very few of the intestinal lymphoma cases exfoliate into the peritoneal cavity and so quite commonly under the circumstances the changes are subtle or non-existent or reflect secondary changes such as peritonitis. Of course the quantity of peritoneal fluid may be significantly elevated and its biochemical profile may also be significantly changed. Assessment of the peritoneal fluid lactate concentration has become a significant clinical parameter.
5. **Endoscopic examination** of the upper part of the alimentary tract is regularly performed and the advent of long video endoscopes has enabled examination of the stomach, pylorus, duodenum and in some cases the proximal part of the jejunum (see Figure 1). The endoscope can also of course be used to examine the hind part of the gut and examination of the rectum and distal small colon are also possible. Polyps and inflammatory lesions are easily identified. Meaningful information can often be gained in this way. For example oesophageal strictures and instruc-

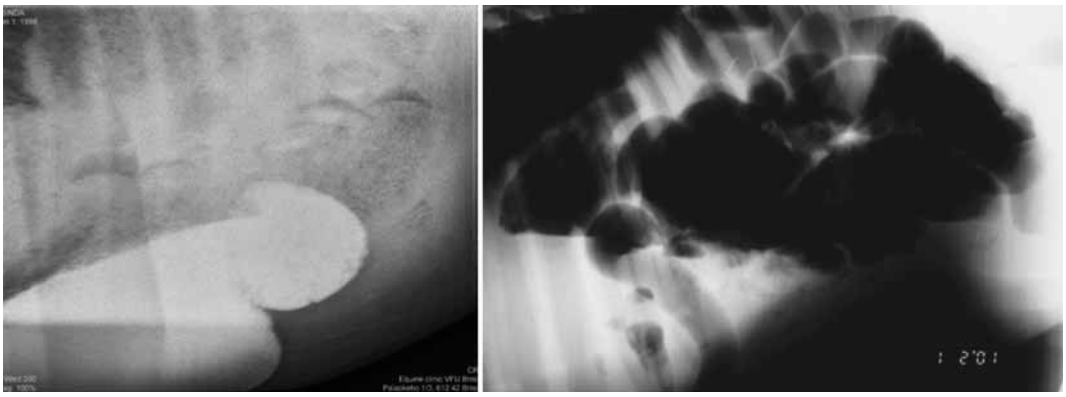


Figure 1 *- LEFT: Radiographic examination of the abdomen in a pony with recurrent colic confirmed the presence of a dense, fine radiopaque accumulation in the large colon. This was confirmed by fecal examination and laparotomy. RIGHT: A foal presented with an acute gas distended abdomen as a result of meconium impaction - the radiograph shows massive gaseous distention of the colon and caecum.*

tions, gastric ulcers and colonic inflammation and masses are easily detected. Probably the biggest value of the endoscopic examination of the upper alimentary tract is currently shown by the prevalence of gastric ulceration syndrome is in horses. Here it has become common practice to examine horses in detail endoscopically when there are signs associated with recurrent episodes of mild colic, post-prandial pain or variations in appetite. The gastric ulcer syndrome in horses is a management issue and guidance can usually be given to trainers and owners concerning the ongoing management of affected horses. Although it is standard practice to treat gastric ulcers with omeprazole, it is far better of course to prevent their occurrence in the first place through careful management and the correction of feeding methods. There is considerable advantage in trying to maintain gastric and intestinal health through the use of proven supplements that will support the normal function of the tract.

Laparoscopic methods are gaining far wider access now and significant diagnostic information concerning overt pathology and even adhesions etc. can be usefully diagnosed (and in some cases treated)[1]. Tears in the mesocolon are not easily detected by use of traditional tests. Laparoscopy proved to be a more thorough means of evaluating the caudal portion of the abdomen including the digestive and urogenital tracts in these horses. As a less invasive diagnostic tool, laparoscopy can be performed earlier in the course of disease than alternative approaches for direct viewing. Furthermore, laparoscopy can be used to access the viability of tissues as well as the location and severity of lesions for prognostic purposes. The distal portion of the descending colon can also be evaluated to determine whether celiotomy with anastomosis or colostomy may be the surgical procedure of choice.

6. The value of **radiography** in the investigation of abdominal/intestinal disease is very limited but the advent of high power machines and digital technology has meant that meaningful information may even be obtained from large horses. Contrast studies can also be performed and may identify masses within the stomach and foreign bodies such as sand accumulation within both the stomach and the large colon.
7. **Ultrasonography** forms a major pillar in the investigation of intestine of disease in horses. Even conventional linear probes of 5 MHz can be used to get really useful information - it is of course inevitably compromised in some way when the technology is not at the highest possible level but

Figure 2 *- LEFT TOP/BOTTOM: Acutely distended small intestine in an acute colic case; notice the very thin intestinal wall and the fluid nature of the distension. RIGHT: An ultrasonogram of a grossly thickened large colon wall as result of a diffuse lymphoma (arrow) (see also Figure 3 below).*

this can often be overlooked as a diagnostic aid. Information concerning the thickness of bowel and the presence of masses within loops of intestine can easily be detected. This has led to a very considerable improvement in the diagnosis of intestine of disease. Perhaps the classic use of ultrasound is in the detection of nephrosplenic entrapment where bowel can easily be detected within the nephrosplenic space. In general sector scanners provide the best information and power ratings of 3.5-5.0Mhz are ideal. The approach to the ultrasonographic examination of the abdomen of horses needs to be completely logical and very thorough. It is impossible to avoid consideration of the liver and spleen during this process and for the most part the outcome of the ultrasonographic examination will provide non-specific evidence of intestine of thickening/oedema or focal disease. Ultrasound is extremely useful in the investigation of colic course and is now used widely in that area.

8. **Faecal examination** is often overlooked during the investigation of intestinal and this is most regrettable because a large amount of useful information can be gained from both direct observation (it may be possible to see evidence of fresh or change blood or even parasites) or from further examination. Further tests include bacteriological cultures, protozoological examination, worm egg counts, and the detection of faecal occult blood. The latter is starting to gain considerable value as more and more information is gained about the meaning of the test. Currently a commercially available faecal blood test kit (*Succeed*™) is being used widely and provided that the interpretation is made correctly on the findings in conjunction with other tests it may even be possible to identify relatively minor early pathology in parts of the intestinal tract that are impossible to examine fully in the normal clinical situation and are largely overlooked in the clinical considerations. It is undoubtedly true that intestine neoplasia and minor early intestinal pathology can develop into really significant and often life-threatening issues and so there is much to commend the use of this test both as a routine within a stable and as a specific diagnostic test by clinicians.

Bacteriological culture and sensitivity are commonly important, particularly in respect of the serious diseases such as salmonellosis and clostridiosis. Repeated cultures or PCR methods of bacterial iden-

tification provide valuable information in cases of intestinal inflammation or diarrhoea (colitis). In the case of *Salmonella* spp. infections there are of course zoonotic and epidemiological implications so the convention is that 5 fecal cultures should be performed at 24 hour intervals. PCR provides a much higher sensitivity but it may also be misleading given that a relatively high proportion of cases will be positive without any clinical implication.

9. As might be expected there are many **haematological and biochemical tests** that can be applied to the investigation of intestinal disease. There is a distinct difference between the investigations that are performed in acute or per acute abdominal disorders such as strangulating intestinal obstructions and those conditions which are much more subtle. Alterations in the red and white cell parameters will provide very useful information when taken in conjunction with the clinical events. It is absolutely imperative that blood samples are not interpreted without regard to the clinical state of the horse because inevitably there are very few haematological or biochemical parameters that are pathognomonic for any particular disease entity. For example, plasma fibrinogen and SAA are widely accepted as indices of acute phase responses but they are very non-specific and can only be interpreted alongside other haematological or clinical events.
   Malassimilation/malabsorption should be suspected in horses with weight loss in spite of a good appetite. Small intestinal malassimilation/malabsorption is usually confirmed through oral glucose (or more rarely) D-xylose absorption tests, whereas the oral lactose tolerance test can be used to evaluate lactase deficiency in foals. The glucose/xylose absorption tests have become a standard means of detecting a lack of absorption in the proximal small intestine and this test is indicated in all cases of weight loss in horses. The interpretation of the test is now accepted and the results can provide very useful information on the likely location of pathology[2]. It is important to point out that this test is a means of non-specific identification of small intestinal malabsorption[3]. Once malassimilation is confirmed, other diagnostic tests such as abdominocentesis, rectal mucosal biopsy, or exploratory laparotomy with intestinal biopsies may provide the aetiology of malassimilation.
10. **Histology** provides the best possible diagnosis of pathology and is the gold standard for many of the medical disorders of the intestinal tract. It also provides a definitive diagnosis in cases of suspected grass sickness (equine dysautonomia)[4]. Of course collection of a biopsy in most circumstances remains very challenging but biopsies can be relatively easily collected endoscopically - the biopsy specimen obtained from this method are usually very small and the double bite technique is usually Figure 3: A definitive diagnosis of enteric disease can occasionally be made from clinical evidence alone but ultimately confirmation of diagnosis relies heavily upon histological examination. Usually this is carried out at laparotomy or at necropsy and there is an urgent need for much more effective ante-mortem diagnostic capability - including the collection of appropriate histological samples.
    Rectal biopsy can sometimes be useful and several papers have discussed its merits; a70% sensitivity has been found in the correlation between rectal biopsy findings and ileal and mesenteric ganglion histology[5,6]. Where rectal biopsy is positive for defined pathology, it is very useful but when it is negative it is of little help. There have been several more extensive studies that have outlined its advantages and its pitfalls in the diagnostic process[7].

SUMMARY

Probably the most important aspect of the investigation is LOGIC! The investigation can be time consuming and challenging but in cases of infiltrative bowel disease the time is well

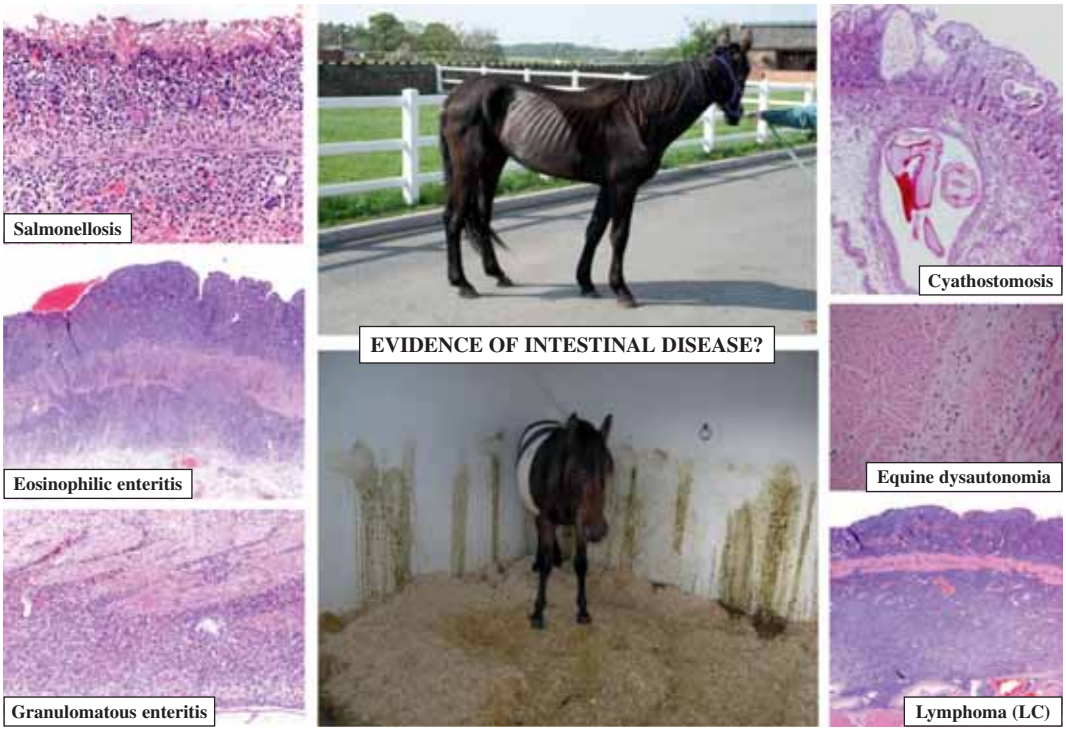


Figure 3

spent 8. In the paper by Trachsel et al. (2010), the diagnostic workup 7 horses with chronic inflammatory bowel disease were subjected to a complete clinical work-up; weight loss and chronic diarrhoea were the most commonly reported signs. Ancillary examinations including fecal analysis (with occult blood tests), gastroscopy, abdominal ultrasonography, rectal mucosal biopsy and the D-xylose absorption test provided the most useful information. The diagnosis was definitively confirmed histologically from biopsies taken during laparoscopy or laparotomy or during post mortem examination. They concluded that although clinical signs and laboratory findings were helpful diagnostic tools, a definitive diagnosis was only possible by histological analysis of the intestinal segment involved. Klak (2009) considered that the minimum tools required in investigation of any case presented with signs of intestinal disease include a detailed clinical and haematological and biochemical database should be accompanied by rectal palpation, abdominal ultrasound, abdominocentesis, biopsy procedures, and absorption tests[9].

A review of reported cases of equine inflammatory bowel diseases (IBDs) for which no specific aetiology was identified showed that histological findings were required to differentiate cases of granulomatous enteritis (GE), multi-systemic eosinophilic epitheliotropic disease (MEED), lymphocytic-plasmacytic enterocolitis (LPE), and idiopathic eosinophilic enterocolitis (EC)[10]. Horses with GE, MEED, or LPE are usually examined because of weight loss and depression, but horses with EC are usually examined because of signs of abdominal pain. Ante-mortem diagnosis of IBD can only be made by histologic examination of affected intestine. In some cases, ante-mortem diagnosis was made from histologic examination of rectal mucosa obtained by biopsy (see above). Typically, horses with IBD have low concentrations of serum proteins, especially albumin, and fail to adequately absorb glucose or xylose. Suspected causes of IBD in the horse include abnormal immune response to bacterial, viral, parasitic, or dietary antigens. Most horses with IBD do not survive long-term, but horses with EC are more likely than those with

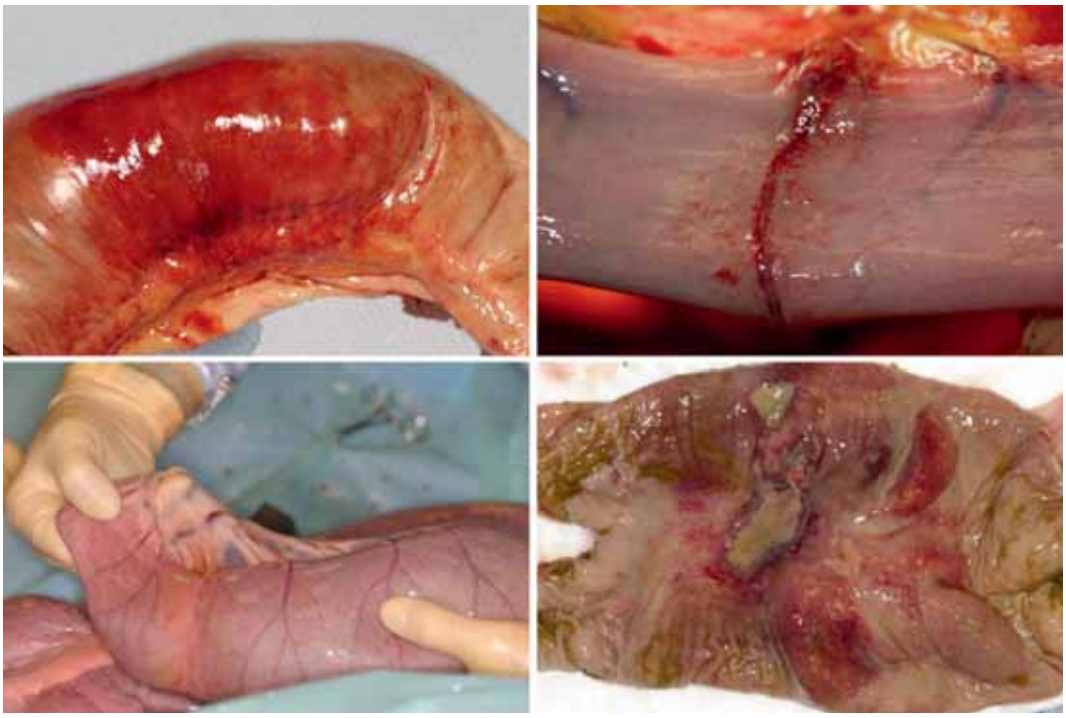


Figure 4 *- Idiopathic focal / regional / circumferential eosinophilic enteritis. In spite of the severity of the disorder, the clinical evidence is usually non-specific. Peritoneal fluid does not consistently or even usually contain significant eosinophils! Usually the diagnosis is made during exploratory laparotomy, which is possibly the gold standard for diagnosis of intestinal pathology in spite of the hazards and the fact that even then quite a lot of the abdominal content cannot be visualised.*

LPE, MEED, or GE to respond to treatment-usually including resection of grossly affected intestine and administration of corticosteroids. In spite of the dramatic pathology that is recognised on laparotomy, the condition known as Idiopathic Focal Eosinophilic Enteritis (IFEE) very little evidence of this condition is present in any of the investigatory procedures - vague and non-specific changes are present but ultimately it all comes back to the surgical approach or at least a laparoscopic diagnosis.

REFERENCES

1. Ragle CA, Southwood LL, Galuppo LD, Howlett MR. Laparoscopic diagnosis of ischemic necrosis of the descending colon after rectal prolapse and rupture of the mesocolon in two postpartum mares. *J Am Vet Med Assoc.* 1997; 210(11):1646-1648.
2. Mair TS, Hillyer MH, Taylor FG, Pearson GR. Small intestinal malabsorption in the horse: an assessment of the specificity of the oral glucose tolerance test. *Equine Vet J.* 1991; 23(5):344-346.
3. Sweeney RW. Laboratory evaluation of malassimilation in horses. *Vet Clin North Am Equine Pract.* 1987; 3(3):507-514.
4. Mair TS, Kelley AM, Pearson GR. Comparison of ileal and rectal biopsy in the diagnosis of equine grass sickness. *Vet Rec.* 2011; 168(10):266.
5. Ricketts SW. Rectal biopsy - a piece of the diagnostic jigsaw puzzle. *Equine Vet J.* 1996; 28(4):254-255.
6. Wales AD, Whitwell KE. Potential role of multiple rectal biopsies in the diagnosis of equine grass sickness. *Vet Rec.* 2006; 158(11):372-377.
7. Lindberg R, Nygren A, Persson SG. Rectal biopsy diagnosis in horses with clinical signs of intestinal disorders: a retrospective study of 116 cases. *Equine Vet J.* 1996; 28(4):275-284.
8. Trachsel DS, Grest P, Nitzi D, Wunderlin-Stähli P, Wehrli Eser M. Diagnostic workup of chronic inflammatory bowel disease in the horse [German]. *Schweiz Arch Tierheilkd.* 2010; 152(9):418-424.
9. Kalck KA. Inflammatory bowel disease in horses. *Vet Clin North Am Equine Pract.* 2009; 25(2):303-315.
10. Schumacher J, Edwards JF, Cohen ND. Chronic idiopathic inflammatory bowel diseases of the horse. *J Vet Intern Med.* 2000; 14(3):258-265.