Clinical Commentary

Foreign body-associated splenic abscess in a horse

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The preceding article (Rosso *et al*. 2012) describes an unusual and interesting case of splenic abscessation in a mature horse caused by a metallic foreign body penetrating the small intestine. The case report adds to the literature on foreign body-associated diseases in horses which, although considered rare, appear to present a significant problem in equine medicine.

The principal presenting complaints in the horse of this report were progressive weight loss, inappetence and fever. The authors do not expand on the suspected diagnosis leading to treatment of the affected horse one week prior to admission, and one can only assume that the use of enrofloxacin at that time was based on suspicion of an infectious condition and regional experiences with bacterial culture and sensitivity patterns. Interestingly, an acute colic episode 3 months prior to admission to the Veterinary Teaching Hospital was reported, and may have been associated with initial intestinal penetration of the foreign body. As the authors mention, transient colic episodes have previously been reported in horses with foreign body associated disease (Dehlinger *et al*. 2006; Monteiro *et al*. 2011), and while it may be difficult to utilise this information in individual cases of colic, the authors here present a situation where suspicion was raised as multiple horses on a property were affected. Although generally considered rare causes of abdominal disease, veterinarians should be aware of the association between recurrent colic episodes and foreign bodies in horses.

As part of their diagnostic work-up the authors performed abdominocentesis, which, based on a high packed cell volume of the obtained fluid and, presumably, absence of haemoabdomen upon exploratory laparotomy, was suspected to have resulted in splenocentesis. Cytological or culture findings of the fluid are not described and, with hindsight, one wonders whether further assessment of the fluid might have helped to establish a definitive diagnosis prior to surgery. It is not entirely clear whether abdominal ultrasonography demonstrating a massively enlarged spleen was performed prior to abdominocentesis and the case illustrates the difficulty in obtaining peritoneal fluid from horses with enlarged or displaced abdominal organs. The benefits and risks of abdominocentesis must always be weighed carefully in cases with abnormal rectal or ultrasonographic findings.

The authors attribute anaemia in the reported case to a chronic inflammatory process but unfortunately do not provide additional details about red cell characteristics to support their conclusion. Anaemia of chronic disease in horses is typically characterised by mild to moderate normocytic, normochromic, nonregenerative anaemia (Sellon and Wise 2010) and diagnosis is supported by low serum iron concentration (hypoferraemia), low or normal total iron binding capacity, normal or increased serum ferritin concentration and the absence of other obvious causes of anaemia. Differentiation of a nonregenerative as opposed to regenerative process based on CBC alone can be difficult in horses and bone marrow evaluation should be pursued in cases where a definitive diagnosis is elusive based on standard laboratory assays. A central cause of anaemia of chronic disease is a disturbance of iron homeostasis leading to reduced haem biosynthesis and erythropoiesis (Weiss and Goodnough 2005); proposed mechanisms include sequestration of iron into reticuloendothelial storage sites and decreased iron absorption mediated through the acute-phase protein hepcidin. Additional effects of chronic disease include defective bone marrow response to anaemia, which may be mediated through inflammatory mediators such as interferon-γ, TNF-α and interleukin-1, inadequate erythropoietin production, and a decreased erythrocyte lifespan (Weiss and Goodnough 2005). The human literature further discusses anaemia specifically in the context of critical illness and studies demonstrate an early rapid onset of anaemia in the first 24–48 h of hospitalisation (Walsh and Saleh 2006). Proposed causes of anaemia in critically ill human patients, in addition to the effect of inflammation, include haemodilution, diagnostic blood sampling and blood loss; changes in circulating red cell composition and shape may also be of importance for tissue oxygenation (Walsh and Saleh 2006).

While the evidence for a chronic inflammatory process in the presented case is obviously compelling, the degree of anaemia appears subjectively more severe than is

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typical for chronic disease and it is tempting to speculate on additional contributing factors. Blood loss associated with intestinal perforation or chronic gastrointestinal ulceration appears possible but is not mentioned in the report (Rosso *et al*. 2012) such that obvious disease was probably not present. Immune-mediated haemolytic anaemia in horses has occasionally been attributed to clostridial and other infections (Reef 1983; Weiser *et al*. 1983; Cottle and Hughes 2010; Sellon and Wise 2010); unfortunately, the authors do not report on culture results from the abscessed spleen in this case. Anaemia associated with metal exposure or poisoning is reported in several species and includes zinc-induced haemolytic anaemia in dogs (Latimer *et al*. 1989; Bexfield *et al*. 2007; Gurnee and Drobatz 2007), copper-induced haemolytic anaemia in ruminants (Plumlee 2009) and lead poisoning in horses and ruminants (Burrows and Borchard 1982; Liu 2003). Given the small size of the foreign bodies in this case compared to the size of a mature horse, and the absence of additional clinical signs of toxicosis, metal exposure seems an unlikely if potential contributing factor. The combination of anaemia and splenomegaly is typical for haemolytic anaemia as erythrocyte destruction results in an increased 'workload' for the spleen. It has to be assumed that splenomegaly in the presented case was largely due to infection and abscessation, and the potential contributing effect of functional enlargement as well as the significance of thrombosis affecting the splenic vasculature remains speculative. Interestingly, in the context of anaemia and splenic disease, functions of the spleen in adults include iron storage, and the human literature contains a case report of splenic haemangiosarcoma resulting in excessive iron deposition within the tumour and subsequent iron deficiency anaemia (Thomas *et al*. 2001).

The definitive diagnosis of the cause of splenic abscessation was made on *post mortem* examination, which is consistent with a number of previous reports and further supports the difficulty in making definitive *ante mortem* diagnoses of foreign body associated disease in horses. In support of a diagnosis of foreign body ingestion, a fistulous tract within an adhesion between the jejunum and spleen was noted; the authors do not comment on the fact that only one perforation site was identified while 3 wires were found in the liver and spleen, respectively. Alerted to the potential for a foreign body problem based on previous cases, the authors used single organ radiography to demonstrate the presence of metallic wires in the spleen and liver, which might have otherwise been missed. Abdominal radiography to look for foreign bodies in mature horses is often not considered feasible; however, personal experience suggests that this modality may be useful in individual cases (**Fig 1**). This particular horse suffered from septic peritonitis that was suspected to be secondary to intestinal perforation or 'leakage'; however, positive response to medical therapy alone pre-empted exploration of the abdomen and the relevance of the observed foreign body remained elusive. Follow-up

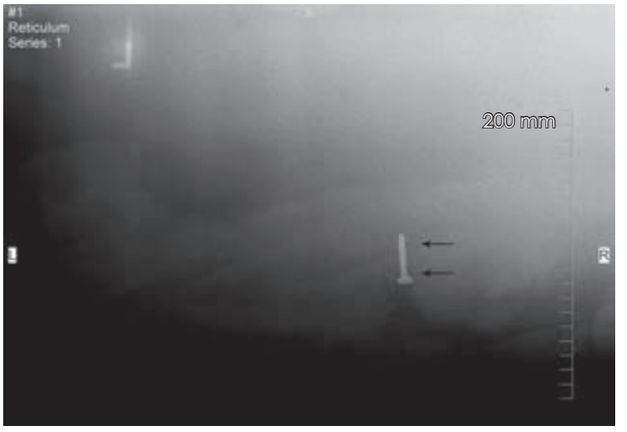

Fig 1: Lateral abdominal radiograph from a horse with septic peritonitis suspected to be caused by intestinal perforation or leakage. The arrows point towards a foreign body suspected of being a screw or nail. The horse recovered with medical therapy and the relevance of the detected foreign body is unknown.

radiographs suggested movement of the foreign body within the intestinal tract and the horse remains healthy 22 months later.

The authors briefly comment on their consideration of splenectomy, which was ultimately not pursued due to the presence of multiple adhesions and the perception of a poor prognosis despite treatment. Considerations surrounding splenectomy in horses were recently reviewed in this journal (Sherlock 2011) and risks and benefits of the procedure must be carefully evaluated in individual cases. Several surgical techniques have been proposed based on elective procedures, and splenectomy for medical reasons has been approached via thoracotomy (Madron *et al*. 2011) or laparotomy and resection of the 17th rib with (Ortved *et al*. 2008) or without laparoscopic assistance (Roy *et al*. 2000). Interestingly, 2 reported cases of splenectomy in mature horses describe splenomegaly of similar severity to the horse in this report (Rosso *et al*. 2012), with spleens weighing 21 kg in a mule with splenic lymphosarcoma (Madron *et al*. 2011) and 36 kg in a horse with idiopathic splenomegaly (Ortved *et al*. 2008).

The most striking aspect of the presented case report is arguably the history of previously affected horses on the same property and the suspected association with the shavings manufacturing process. The authors do not expand on the specifics of the manufacturing process in their article but it appears that the use of metal brushes in wood treatment and less strict quality control of wood shavings not sold specifically for use as animal bedding may be responsible (M. Gandini, personal communication). The authors do not report whether affected horses were fed off the ground but it appears reasonable to assume that ingestion of metallic wires was accidental. The very small size of the wires (**Fig 2**) may also make it impossible for horses to differentiate them from pieces of hay (M. Gandini, personal communication). The frequently cited fastidious eating habits of horses, at least in

Fig 2: Metallic foreign bodies (wires) removed surgically from a horse. The horse was subsequently subjected to euthansia due to multiple small bowel perforations, intestinal wall abscessation and adhesions. The wires are similar in size to those found in the present case report by Rosso* et al. *2011. Image courtesy of Dr M. Gandini, University of Turin, Italy.

comparison to cattle (Monteiro *et al*. 2011) are therefore not sufficient to protect them from accidental ingestion of foreign materials in all instances. The authors state that all cases previous to theirs affected the alimentary tract but do not specify which portions in particular were affected. Based on previous reports, each section of the alimentary tract including the oropharynx (Kiper *et al*. 1992; Farr *et al*. 2010), tongue (Pusterla *et al*. 2006), oesophagus (Abutarbush 2011), stomach (Lohmann *et al*. 2010) and intestinal tract (Saulez *et al*. 2009) can be affected.

Author's declaration of interests

No conflicts of interest have been declared.

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The spleen of horses stores roughly 30 percent of the red blood cells and can release them when needed.[16] In humans, up to a cup (240 ml) of red blood cells is held within the spleen and released in cases of hypovolemia[17] and hypoxia.[18] It can store platelets in case of an emergency and also clears old platelets from the.Â In mice the spleen stores half the body's monocytes so that upon injury, they can migrate to the injured tissue and transform into dendritic cells and macrophages to assist wound healing.[4]. Additional images[edit]. Transverse section of the spleen, showing the trabecular tissue and the splenic vein and its tributaries. It is recorded that Splenic abscesses may be miliary or large and focal, but both types being uncommon [2]. In one of the studies in horses having perforation of gastro-intestinal tract by metallic wires, the wires were found contained within an abscess with multiple adhesions with liver, spleen and mesentery, and a few were encapsulated with adhesions in the small intestines [3]. It can be deduced that foreign body penetration is most likely to cause abscessation. The impression smear from the edge of the abscess cavity, stained with Gram's stain showed numerous G+ve bacilli, a few G+ve cocci...Â Splenectomy for treatment of suppurative splenitis caused by a reticular foreign body in a heifer. Veterinary Surgery. 38(4):477-80. Early diagnosis of splenic abscess in small animals requires a high level of suspicion based on clinical and ultrasonographic findings. Immediate surgical intervention is preferable and confirms the diagnosis. Total splenectomy remains the most effective therapy.Â The most common organisms associated with splenic abscess in humans are aerobic microbes, particularly streptococci and Escherichia coli[23]. In animals, other organisms such as Clostridium species and Fusobacterium necrophorum have also been reported [7]. In our case, severe infection with Staphylococcus epidermidis and S. pseudintermedius was diagnosed.Â Culp WT, Aronson LR: Splenic foreign body in a cat. J Feline Med Surg. 2008, 10 (4): 380-383. â€¢ Foreign body granuloma. â€¢ Pythiosis. â€¢ Bacterial pseudomycetoma or botryomycosis (limb, lips, head, mammary area, scrotum).Â However, in dogs, barbiturate euthanasia solutions typically cause marked splenic congestion and enlargement [6]. The degree of splenic enlargement due to barbiturate administration can vary from animal to animal; therefore histopathology is necessary to accurately interpret splenic enlargement in the dog.Â Enteritis is associated with abnormal intestinal motility patterns that generally result in decreased SITT through a combination of decreased phasic contractions and increased aboral giant contractions. These abnormalities resolve with successful treatment of enteritis. A splenic abscess containing Bacteroides ruminicola and Clostridium sporogenes was found at necropsy.Â The horse's condition improved after drainage. Fifteen months later, the horse became depressed and febrile. A splenic abscess containing Bacteroides ruminicola and Clostridium sporogenes was found at necropsy. View on PubMed. Save to Library.Â Metallic foreign body in the ovary of a broodmare. P. Randleff-Rasmussen, A. S. Gray. Medicine.