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Case Report

Metallic foreign body in the ovary of a broodmare

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Summary

A 12-year-old Thoroughbred broodmare was presented for laparoscopic removal of an abnormal ovary. Rectal examination and ultrasound revealed firm attachment of the enlarged right ovary to the ventral pelvis and right abdominal wall, and gas accumulation within the right ovary. Laparoscopic examination revealed extensive adhesion formation between the abnormal ovary, ispilateral uterine horn, ventral pelvis and the right abdominal wall. A flank laparotomy was then performed to improve visualisation of the area. Due to contamination of the abdomen during attempts to detach adhesions, the complexity of the structures involved and the poor prognosis for further reproduction, the decision was made to subject the mare to euthanasia. Post-mortem evaluation revealed a large encapsulated abscess of the right ovary, with a small, linear wire foreign body within the centre of the abscess.

Introduction

While horses are more selective feeders than other grazers such as cattle, metallic foreign bodies are still occasionally consumed, and can pass through the alimentary tract and either become encapsulated within the gut lumen or perforate the intestinal wall, leading to peritonitis, adhesions or abscess formation (Monteiro *et al.* 2011). Metallic foreign bodies are most commonly reported lodged in the upper alimentary tract or tongue (Bayly and Robertson 1982; Kiper *et al.* 1992; Pusterla *et al.* 2006). In addition, the metallic objects can be swallowed, and pass through the gastrointestinal tract (Elce *et al.* 2003) to extraintestinal sites, where abscesses are formed (Dehlinger *et al.* 2006; Saulez *et al.* 2009).

This paper describes a case of a metallic foreign body that potentially migrated through the intestinal tract, penetrating into the right ovary where it formed a large encapsulated abscess, with multiple adhesions forming between the ovary and the body wall, as well as the right uterine horn.

Case history

A 12-year-old Thoroughbred broodmare was referred to the Drakenstein Veterinary Clinic for removal of an enlarged right ovary. The referring veterinarian was suspicious of a granulosa cell tumour due to the mare being unable to conceive during this and the previous breeding season and an enlarged ovary had been palpated on rectal examination. There was no recorded history of colic symptoms, fever or behavioural changes.

Case description

On presentation, the mare was bright and alert, and all vital parameters were within normal limits, with a heart rate of 40 beats/min (reference range [rr] 36–44 beats/min), a respiratory rate of 14 breaths/min (rr 12–16 breaths/min) and rectal temperature of 37.3°C (rr 36.5–38°C). Haematology and serum chemistry showed no abnormalities, with white cell count, neutrophil count, packed cell volume and fibrinogen all within normal limits.

Rectal palpation revealed a grossly enlarged right ovary that was immobile, with only the dorsal border of the ovary palpable. The ovary appeared to be anchored within the pelvis, and unusually firmly attached to the cranial ipsilateral uterine horn. Transrectal ultrasonography showed the large right ovary with a gas pocket within the stroma; infection was suspected. A decision to perform laparoscopic evaluation and removal was made.

Surgical findings

The mare was starved for 2 days prior to laparoscopy being performed. She was premedicated with 1.1 mg/kg bwt i.v. flunixin meglumine[1], 6.6 mg/kg bwt intravenous gentamicin[2] and 22,000 iu/kg bwt i.m. procaine penicillin[2]. She received a loading dose of 4 mg detomidine hydrochloride[3] (0.006 mg/kg bwt) and 4 mg butorphanol tartrate[4] (0.006 mg/kg bwt), and was then placed under constant rate infusion sedation with detomidine hydrochloride[3] and butorphanol tartrate[4] at 5 μg/kg bwt/h (Van Dijk *et al.* 2003; Solano *et al.* 2009).

The right flank of the horse was clipped and aseptically prepared for surgery and the skin and muscles at the sites for laparoscopic instrument insertion were infiltrated with 2% lignocaine hydrochloride[5] (10 ml per site).

Laparoscopy was performed using a 57 cm long rigid laparoscope with a 30° viewing angle, connected to a video monitor. The laparoscope was introduced into the abdominal cavity using a 10 mm trocar inserted just dorsal to the crus of the internal abdominal oblique muscle, approximately 2 cm caudal to the last rib. The abdomen was insufflated with carbon dioxide via an insufflator with a flow rate of 6 l/min (Latimer *et al.* 2003), and an intra-abdominal pressure cut-off at 10 mmHg. A 5 mm trocar was introduced approximately 10 cm caudal to the laparoscope port and directed caudally and ventrally, to act as an instrument port.

The 30° viewing angle enabled a craniomedial visualisation of the affected right ovary (Gottschalk and Berg 1997). The ovary was located dorsally in the abdomen, extending caudally into the pelvic canal. Extensive adhesions were visible, tightly adhering the ovary to the right abdominal

wall, the ventral pelvis and the ipsilateral uterine horn. The rest of the visible peritoneum appeared healthy, with no evidence of fibrin accumulation, or purulent material. Breakdown of the adhesions between the right ovary and the body wall was attempted using blunt dissection with laparoscopic artery forceps and laparoscopic Metzenbaum scissors (Bleyaert *et al.* 1997); however, gross contamination of the abdomen with purulent material occurred due to rupture of the ovarian capsule, and it was opted to perform a flank laparotomy for better visualisation. The laparoscopic instruments were removed. Additional local anaesthesia was provided by paravertebral thoracolumbar anaesthesia with 2% lignocaine hydrochloride (50 ml) (Moon and Suter 1993). Laparotomy was performed by vertical skin incision made midway between the last rib and the ventral aspect of the *tuber coxa*, incorporating the caudal instrument portal. Muscle layers were then bluntly dissected, and the peritoneum entered bluntly. Laparotomy revealed a large amount of purulent material contaminating the abdomen from the right ovary due to rupture of the abscessed ovarian capsule, as well as extensive adhesion formation between the ovary and the abdominal wall, pelvis and right uterine horn.

Discussions with the owner included the fact that the mare would have to undergo removal of most of the right uterine horn and, additionally a peritonitis had been created during the surgery which would require potentially expensive and prolonged post-operative treatment. The owner's goal for this mare was that of a breeding animal and therefore they made the decision to proceed with humane euthanasia.

Post-mortem findings/gross pathology

Post-mortem examination revealed the right ovary to be 18 × 10 cm with fibrous adhesions to the right uterine horn (**Fig 1**). Bisection of the ovary revealed a thick, fibrous capsule with necrotic debris and purulent material in the centre. Within the abscess, a metallic foreign body was discovered, a thin, linear piece of wire measuring 4 × 3 mm (**Fig 2**). No fistulous tracts were evident on serosal surfaces of the abdominal organs and, while there was purulent contamination of the peritoneal cavity from the surgery and manipulation of the ovary, there was no evidence of chronic peritonitis or inflammation. Multiple fibrous adhesions were present between the ovary, uterine horn and body wall.

Fig 1: Post-mortem image of the grossly enlarged right ovary with extensive adhesions (arrow) between the ovary and the right uterine horn.

Fig 2: Image of the thick capsuled abscess bisected, revealing linear metallic foreign body within necrotic debris (arrow).

Sections of the ovarian mass were fixed in 4% formaldehyde and submitted for histopathological examination. A sample of the purulent material around the foreign body was submitted for aerobic and anaerobic bacterial culture and antibiogram.

Histopathology and culture

Histopathology of the submitted tissue showed that there was almost complete obliteration of normal ovarian tissue. There was extensive neutrophil infiltration with necropurulent and haemorrhagic exudate with interstitial lympho-plasma cellular accumulates present in the deeper smooth muscle and connective tissue bands (**Fig 3**).

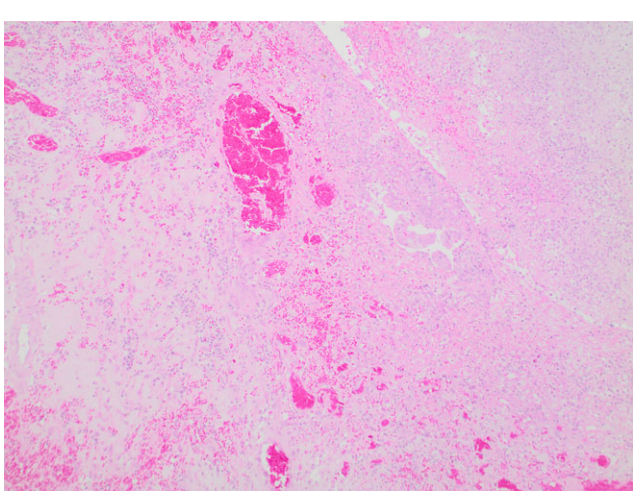

Fig 3: Histopathology images of the right ovary with ovarian tissue obliterated. Extensive interstitial lympho-plasma cellular accumulates with necro-purulent and haemorrhagic exudate (Image courtesy of Dr Sophette Gers, Western Cape Provincial Veterinary Laboratory).

Aerobic and anaerobic bacterial culture done at the Wemmershoek Diagnostic Laboratory revealed a pure culture of *Streptococcus viridans*, an isolate that is commonly associated with the normal gastrointestinal flora of horses (McVey *et al.* 2013).

Discussion

While ingestion of foreign bodies by horses is infrequent (in comparison to ruminants), when it does occur, it can often have disastrous implications. Most frequently ingested foreign materials include such things as pieces of fencing, hay nets, parts of feed bags, plastic bags or ropes, and also small wires from the inside of tractor tyres that are used as feed bins (Pusterla *et al.* 2006; Farr *et al.* 2010). These ingested particles can pass through the alimentary tract and become coated in a mineral precipitate and eventually cause a small colon impaction (Rosso *et al.* 2012) or obstruction (Dobson and Lopez 1981). Alternatively, the foreign body may migrate through the gastrointestinal wall at any point, and thereafter lodge in an extraintestinal site, where an abscess will form (Pusterla *et al.* 2007). This can lead to local inflammation, peritonitis, abscess formation or adhesions. These frequently cause acute abdominal pain, either due to small colon obstruction, or from perforation of the intestinal wall (Schumacher 2000) and subsequent peritonitis or abscessation with associated signs of chronic colic or weight loss (Spier *et al.* 1986).

There are many descriptions in the literature of metallic foreign bodies that either lodge in the upper alimentary tract (Baum *et al.* 1998; Pusterla *et al.* 2006), or perforate intestinal walls leading to acute colic, or chronic weight loss and depression (Saulez *et al.* 2009; Magri *et al.* 2010). Reports of abscesses formed around wires located within the liver and spleen (Rosso *et al.* 2012), in the jejunal mesentery (Davies 1983), and adjacent to the diaphragm or in the thorax (Tremaine *et al.* 1995; Monteiro *et al.* 2011) have all been published. In all published cases, the horses presented for acute colic signs, or for pyrexia, depression and weight loss (Rumbaugh *et al.* 1978; Dobson and Lopez 1981; Saulez *et al.* 2009; Lohmann *et al.* 2010).

In this case, it is assumed that the metallic foreign body migrated through the intestinal wall; however, no evidence of the migratory tract was obvious at post-mortem examination, though a small migratory tract could easily have been missed due to the presence of fibrous adhesions around the affected ovary. Intestinal source of the wire could be from the caecum, pelvic flexure, small colon or even jejunal loops. There was also no evidence of an external wound that would indicate a transcutaneous migration, but this could not be ruled out. Migration through the uterus could also have been a possibility, potentially migrating up the uterine horn during a previous breeding incident. The foreign body lodged itself within the stroma of the right ovary, and was subsequently encapsulated by the body, forming a large abscess. No colic signs were noticed by the owner at any stage, and the horse showed no overt signs of systemic illness at the time of presentation. The mare had failed to get into foal during the previous breeding season, but the enlarged ovary was only noticed by the referring clinician on routine palpation towards the end of the breeding season. The metallic foreign body had been fully encapsulated, and while adhesions had formed around the large abscess, there was no other macroscopic evidence of peritonitis or local inflammation. As no evidence of a migratory or fistulous tract was located on post-mortem examination, the source of the metallic foreign body is unknown.

Transrectal ultrasound findings were consistent with abscessation, as gas was detected within the ovarian mass. This is not consistent with a granulosa cell tumour which usually has a honeycomb appearance with or without cystic structures. In addition to this, the mare did not show clinical signs consistent with granulosa cell tumour, namely behavioural changes such as aggressiveness and stallion-like behaviour (Hinrichs and Hunt 1990). Hormone level testing would have been useful in ruling out an ovarian tumour as increases in testosterone and inhibin levels is diagnostic in approximately 95% of granulosa cell tumours (McCue *et al.* 2006), and anti-Müllerian hormone in approximately 98% of cases (Ball *et al.* 2013). It was deemed unnecessary in this case due to the suspicion of an ovarian abscess.

Transcutaneous abdominal ultrasound and abdominocentesis cytology as well as ovarian centesis could potentially have provided a more comprehensive clinical picture preoperatively, and would have given an indication if a subclinical peritonitis was present, although it would probably not have changed the clinical outcome of the case, as laparoscopic evaluation of the extent and nature of the adhesions would still have been required. It has also been reported that the sensitivity of cytological analysis of the abdominal fluid in predicting the presence of an abdominal abscess is only about 40% (Zicker *et al*. 1998; Arnold and Chaffin 2012).

During the laparoscopic procedure, an attempt was made to break down the fibrous adhesions between the ovary and the body wall; however, tearing of the ovarian capsule with rupture of the abscess and contamination of the abdominal cavity with purulent material occurred. One of the risks of adhesiolysis during laparoscopic procedures is rupture of the viscus rather than the adhesion, and unfortunately that is what occurred in this case (Bleyaert *et al.* 1997). Early or fibrinous adhesions are easier to break down, with fewer complications reported; however, mature, fibrous adhesions are tough, and breakdown of these adhesions often leads to tearing of the viscus (Bouré *et al.* 2002). An alternative method of adhesiolysis such as use of a laser may have prevented this from occurring, but was unfortunately not available (Maier *et al.* 1992).

The decision to subject the mare to euthanasia was made with several considerations in mind; the purulent contamination of the abdomen and resulting septic peritonitis that would have resulted from this could have been treated with broad-spectrum antimicrobials and large volume peritoneal lavage, but financial implications would have been high. In addition to this, the nature and extent of the adhesions present would have necessitated the removal of most of the right horn of the uterus. While there are descriptions of successful partial ovariohysterectomy in horses (Berezowski 2002) and (Santschi *et al.* 1995) it is unknown to what extent the uterine horn can be removed and still result in pregnancy. There are reports of successful pregnancies after removal of 50% of one horn (Berezowski 2002), but in this case, more than 80% of the right horn would have had to be removed, and adhesions broken down from the uterine body. It was considered unlikely that such a procedure would result in a fertile reproductive tract. Had the mare been a riding

horse rather than a broodmare, a partial or complete ovariohysterectomy via flank laparotomy could potentially have been performed.

To the authors' knowledge, this is the first described case of a metallic foreign body lodging in the reproductive tract of a horse, leading to abscessation of the ovary.

Author's declaration of interest

No conflicts of interests have been declared.

Ethical animal research

Not applicable.

Authorship

Both authors contributed to the case and P. Randleff-Rasmussen prepared the manuscript. Both authors gave their final approval of the manuscript.

Manufacturers' addresses

[1]Norbrook Laboratories, Centurion, South Africa.
[2]Phenix Laboratories, Johannesburg, South Africa.
[3]Pfizer Laboratories (Pty) Ltd, Sandton, South Africa.
[4]Intervet SA (Pty) Ltd, Johannesburg, South Africa.
[5]Bayer (Pty) Ltd, Isando, South Africa.

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