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Foreign Body Gastrotomy in an Adult Captive Cheetah, *Acinonyx jubatus*

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Abstract

A five year-old, 45kg female captive cheetah presented with inappetence, dehydration and a guarded abdominal stance after suspected ingestion of a rubber sandal 24 hours previously. On examination, the animal had normal temperature, pulse and pressure. Abdominal palpation revealed a flatulent stomach with a compacted mass movable within. Upon admission, plain radiographs confirmed the presence of gaseous distention of the stomach around a radio-dense central mass. Exploratory laparotomy was performed to reveal normal intestines but a distended stomach. Gastrotomy was performed parallel to the greater curvature to expose pieces of a rubber sandal that were in a compacted mass within the stomach. Another rubber piece was removed from the pylorus where it was firmly lodged and impeding flow of gastric contents. Gastric and abdominal closure was successfully performed and two weeks later the animal had recovered and was in good health. Individuals owning/handling captive wild felids or other wild animals need to make sure their habitat is free of foreign objects that can possibly be ingested out of boredom or sheer curiosity. Adequate nutrition for these is also advocated to prevent pica which may also result in animals ingesting otherwise inedible or non-digestible materials.

1. INTRODUCTION

Ingestion of indigestible material (foreign bodies) by animals is a pathological condition which is prevalent in ruminants and has implications in production as well as health of the concerned animals (Mushonga et al., 2015). In cattle, the condition occurs more commonly during the dry season and is associated with food scarcity as well as with nutritional deficiencies (Mushonga et al., 2015). It has been observed that animals tend to ingest items in their immediate environment.

The reasons for animals ingesting indigestible materials are not well understood but is likely multifactorial. It has been suggested that animal tend to ingest indigestible materials out of boredom, inexperience (or unfamiliarity with the foreign material) (Omar, 2014; Squarre et al., 2015) and even due to pica (Mushonga et al., 2015). (Squarre et al., 2015) recovered blanket pieces occluding the pylorus in a post mortem of two lion cubs that died of foreign body impaction and found out that the blankets had been used as litter when the cubs were four months old. Similarly, Omar (2014) reported that use of litter for bedding in enclosures of tigers in captivity caused ingestion of straw which was subsequently recovered at post mortem examination.

According to several authors (Boag et al., 2005; Hayes, 2009; Hoefer and Levitan, 2013) foreign body ingestion occurs commonly in pets and the problem is on the increase (Cornell and Koenig, 2015). The problem is also now increasingly being reported in wild animals (Eckermann-Ross, 2014; Omar, 2014; Squarre et al., 2015), parrots (Hoefer and Levitan, 2013), aquatic (Mousa et al., 2014) as well as marine animals (De Majo et al., 2016; Williams et al., 2013). It is normal for ingested foreign bodies to perforate the wall of the gastrointestinal tract and end up causing granulomatous lesions in the abdomen (Hoefer and Levitan, 2013; Papazoglou et al., 2010). Hartman et al. (2015) have recently reported a thorn

induced pyogranulomatous lesion in the abdomen of a cheetah. It has been shown by previous workers that pollution of the environment with items such as litter, plastics and old toys has been associated with increased ingestion of these indigestible materials by livestock (Mushonga et al., 2015), pets (Boag et al., 2005; Hayes, 2009; Hobday et al., 2014; Papazoglou et al., 2010; Tyrrell and Beck, 2006) birds (Hoefer and Levitan, 2013) and even marine animals (De Majo et al., 2016).

Other materials that have been recovered from animals during surgery, at the abattoir or during post mortem examination include clothing, strings, toys, leashes, bones, sticks, metal pieces (Fazio, 2006) and fishing hooks (De Majo et al., 2016).

Clinical signs of ingestion of foreign bodies vary according to duration, location, degree of obstruction and the type or nature of foreign body. Clinical signs are variedly nonspecific and may include vomiting, pain, anorexia, diarrhoea, dehydration (Tyrrell and Beck, 2006) and weight loss (Papazoglou et al., 2010). Hobday et al. (2014), carried out a study of foreign bodies in dogs in which they separated foreign bodies into linear foreign bodies (LFB) and discrete or nonlinear foreign bodies (NLFB) and observed that dogs with linear foreign bodies showed more severe clinical signs and gastrointestinal pathology and higher cost of cure and hospitalization than dogs with discrete foreign bodies. These studies contradict those by Hayes (2009), who had earlier reported that animals with linear foreign bodies showed more severe clinical signs and gastrointestinal pathology than animals with discreet foreign bodies.

Diagnosis of foreign bodies can be done by careful history taking (Hoefer and Levitan, 2013), physical examination (palpation), plain radiography, contrast radiography, ultrasonography (Boag et al., 2005), computed tomography (Williams et al., 2013), clinical pathology (Blundell and Adam, 2013), and exploratory coeliotomy (Papazoglou et al., 2010). The pathology associated with the foreign bodies varies according to time lapse since lodgement, the location, the nature, shape and size (Tyrrell and Beck, 2006) and solubility of the material and the degree of obstruction caused by the foreign body (Fazio, 2006). Accumulation of fluid and gas usually leads to gastrointestinal distention which can be detected on radiographs or ultrasound (Tyrrell and Beck, 2006). It has been shown that partial or complete blockage of the gastrointestinal tract can lead to vomiting that usually results in profound acid/base imbalances as well as electrolyte derangements (Blundell and Adam, 2013). Such disturbances can easily be picked out with clinical biochemistry profiles (Blundell and Adam, 2013; Papazoglou et al., 2010). Furthermore, bleeding from perforations can result in anaemia and contamination of the peritoneal cavity by ingesta leading to neutrophilia both of which can be detected by routine haematology (Hoefer and Levitan, 2013; Papazoglou et al., 2010).

The sequela to foreign body ingestion includes passage of the foreign body in faeces without any consequence, accumulation of foreign bodies in the stomach and dissolution of the ingested foreign material over time. Some foreign bodies may dissolve and disappear without consequence. However, some foreign bodies will dissolve followed by absorption of toxic products which may lead to systemic toxicities (Blundell and Adam, 2013). Sharp objects tend to perforate the wall of the gastrointestinal tract leading to peritonitis and sepsis (Hoefer and Levitan, 2013; Papazoglou et al., 2010). Discrete foreign bodies can either partially or completely block passage of ingesta resulting in distention due to gas or ingesta. Over filling of the gastrointestinal tract may lead to rupture resulting in peritonitis and sepsis. Partial blockage usually results in mild to severe abdominal discomfort. Blockade of passage of ingesta can also lead to exponential growth of gastrointestinal microbes culminating in enterotoxaemia (Squarre et al., 2015).

Many foreign bodies can be retrieved by endoscopy (Hoefer and Levitan, 2013) while the majority of cases require exploratory laparotomy (Boag et al., 2005; Papazoglou et al., 2010) and if lodged in the thoracic oesophagus, thoracotomy may be indicated.

2. Case presentation

A five-year-old, 45kg captive female cheetah was presented to our ambulatory clinic with a history of lethargy, dehydration, inappetence, guarded abdomen of a day's duration following the suspected ingestion of a rubber sandal.

The patient was fairly responsive to her surroundings, and had, in fact, eaten small amounts of meat. As the cheetah was not sufficiently tame to allow a thorough clinical examination, it was anaesthetized with an intramuscular 2mg/kg Ketamine (Ketamine®, Kyron South Africa) and 30µg/kg Medetomidine (Meditomidine®, Kyron, South Africa) injection. TPR was considered normal (for an anaesthetised cheetah). Gastric distention was not obvious on visual inspection but upon stomach palpation, compacted material of a rather soft consistency was movable in a somewhat flatulent stomach. With the owner's consent, the animal was immediately transported the Veterinary Surgical facilities in Windhoek. A Ringer's Lactate drip was connected and administered to the patient in transit.

Upon arrival at the clinic, abdominal radiographs revealed numerous peripheral gaseous opacities surrounding a radio-dense central area in the stomach which was remarkably distended (Plate 1). A peripheral blood smear indicated mature neutrophilia. A tentative diagnosis of gastro-intestinal foreign body was made resulting in a decision to perform exploratory laparotomy. The animal was weighed and then intubated in preparation for abdominal surgery (Plate 2). Isoflurane (2-4%) inhalation anaesthesia was used for maintenance of anaesthesia during surgery. Pre-operative intravenous antibiotic (20mg/kg Amoxycillin-Clavulanic acid – Augmentin® IV 1.2g Vial) and analgesic (Meloxicam – Metacam®, Boehringer Ingelheim Vetmedica, Inc.) were administered.

Exploratory laparotomy revealed an abnormally full stomach. No foreign bodies could be palpated in the small or large intestine. Upon inspection, the other abdominal were found to be normal. A decision to perform a gastrotomy was made. Upon gastrotomy, about four centimetres to the right of the greater curvature (Plate 3), a large amount of rubber sandal pieces was removed from the stomach (Plate 4). A piece of rubber sandal 5 cm x 3 cm which was blocking the pylorus was removed with the use of large artery forceps. The stomach was subsequently flushed with warm sterile saline prior to closure. A simple continuous suture pattern was used to close the inner gastric layer followed by a simple interrupted pattern for the muscularis externa and serosal layers of the stomach. Absorbable (3/0) monofilament sutures were also used to close the abdominal wall.

The patient was taken off gaseous anaesthesia but maintained on intramuscular Ketamine-medetomidine anaesthesia to facilitate transportation back to its enclosure outside Windhoek. Upon arrival at the enclosure 150 µg/kg Atipamezole (Antisedan®, Novartis, South Africa) (5 times the Ketamine-Medetomidine dose) was used to reverse Ketamine-Medetomine anaesthesia. The veterinarian stayed with the animal for three hours after recovery from anaesthesia during which recovery was recorded as excellent. Oral antibiotics 20mg/kg Amoxycillin-Clavulanic Acid (Augmentin® 625 Tablets, GlaxoSmithKline, South Africa) to be administered twice daily with food (venison), were dispensed. Two weeks later, at reassessment, the patient was clinically healthy with a good appetite, and the abdominal wound had healed well.

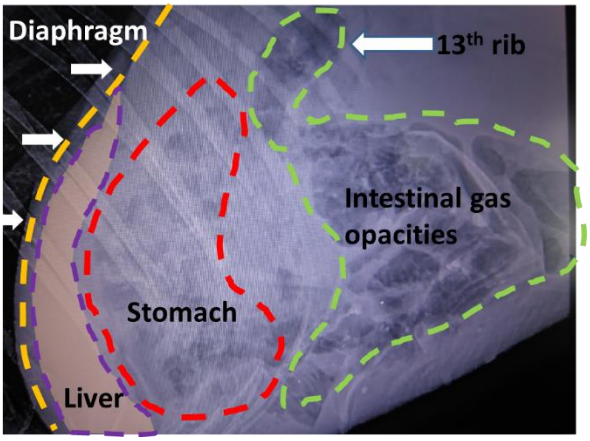

Figure 1: Lateral radiograph of cranial abdomen. Below stomach and liver shifted cranially

Figure 2: Patient prepared for surgery

Figure 3: Gastrotomy procedure: exteriorised and incised stomach

Figure 4: Pieces of sandal removed from patient's stomach

3. DISCUSSION

Removal of foreign bodies from a cheetah has not been reported previously in Namibia. It is clear that more and more foreign bodies are being retrieved from livestock, pets, wild birds, marine animals as well as wildlife by veterinarians (Boag et al., 2005; De Majo et al., 2016; Hayes, 2009; Hobday et al., 2014; Hoefer and Levitan, 2013; Kassem et al., 2014; Mushonga et al., 2015; Papazoglou et al., 2010; Tyrrell and Beck, 2006). This might be a result of environmental pollution by plastics as has been reported by Mushonga et al. (2015). Another possible reason for this trend could be the fact that there is increased encroachment of animal and human habitats. Humans, however, increasingly pollute the environment with the result that animals are continuously getting into contact with strange items that that they intentionally or inadvertently ingest as a result of unfamiliarity, pica, boredom or a combination of the aforementioned factors. It has been suggested that captivity always comes with attendant boredom and an animal can easily devour items in its environs out of boredom. Captivity also comes with limitation to range and variety of food available to the animal. The result is that subtle nutritional deficiencies can result in pica (Mushonga et al., 2015) causing an animal to consume strange objects in its immediate environment in a bid to find these deficient nutrients. It is possible that the cheetah ingested the sandal either due to pica, inexperience, boredom or even out of curiosity, a characteristic that cats are known for in legend.

The clinical signs of pain, anorexia and dehydration shown by this cheetah were consistent with signs described by previous workers (Hobday et al., 2014; Papazoglou et al., 2010; Tyrrell and Beck, 2006). However, vomiting and diarrhoea was not reported in this cheetah, probably because the ingestion of foreign body had only occurred the previous day.

The diagnosis in this case was arrived at using history and plain radiography following findings suspicions from palpation. Exploratory laparotomy was used for definitive diagnosis and subsequent removal of foreign bodies was previously used by others (Hartman et al., 2015; Papazoglou et al., 2010). Endoscopy has been used for removal of foreign bodies by previous workers (Hoefer and Levitan, 2013). Endoscopic removal of the foreign bodies in this case was, however, not a favourable option since the sizes and numbers of the sandal pieces relative to oesophageal diameter were not known and probably indicated the possibility of prolonged surgical time. Since there was no gastrointestinal perforation due to foreign bodies, the animal did not bleed and was not anaemic. However, it is possible that the blockage caused by the sandal piece lodged in the pylorus resulted in increased microbial growth downstream in the small and large intestines as described by Squarre et al. (2015). Such an unusual microbial proliferation would possibly explain the mature neutrophilia discovered on a peripheral smear from this case would have found their way into the blood though the compromised stomach wall. Clinical biochemistry described by others (Boag et al., 2005; Hoefer and Levitan, 2013; Kassem et al., 2014) was not performed as it was felt that any additional information on clinical biochemistry would be obtained at the risk of progressive debilitation of the patient. Since the animal was not yet at anaesthetic risk, an immediate surgical approach outweighed any further non-invasive investigations.

4. CONCLUSIONS

It is clear that captive cheetahs are very curious about their surroundings and may ingest indigestible materials out of curiosity, playfulness, boredom inexperience or even nutritional deficiencies. We therefore recommend that for health and welfare reasons enclosures of these captive felids be checked to make sure that the animals are not ingesting their bedding litter and blankets (especially if they are soiled with food). We also recommend routine radiography of the abdomen (wherever possible) whenever wild cats are captured to rule out foreign bodies as the problem is on the increase.

5. Authors' contributions

S.S. Contributed to the case management, surgery and discussion. R.W. contributed to case management and surgery of the case and initial case write up. M.B. contributed to the initial case write up, manuscript write up and editing. H.G. contributed to the write-up, editing of the manuscript and coordinated the publication process. K.E. contributed to manuscript writing and editing.

6. Conflict of interest

The authors declare that they have no financial or personal relationships with other people, affiliations, memberships or organisations that might have inappropriately influenced them in writing this paper. They declare that they have no competing interests.

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