Successful management of gastroesophageal intussusception in an adult puma (*Puma concolor)*

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ABSTRACT

A 7-year-old entire female puma (*Puma concolor)* presented with a history of regurgitation and diarrhoea of 2 weeks duration. Conventional medical management was initially attempted to alleviate the clinical signs, which were unsuccessful. Oesophagoscopy allowed for the diagnosis of gastroesophageal intussusception (GEI) through the observation of gastric mucosa in the lumen of the distal portion of the oesophagus. The intussusception was reduced using the endoscope, which did not result in resolution because the intussusception recurred within 24 hours. A ventral midline celiotomy was performed, followed by a left-sided belt loop gastropexy. No postoperative complications related to the surgery were observed. The puma resumed eating within 48 hours following the surgery, and no regurgitation recurred for a period of 24 months following surgery. To the knowledge of the authors, this is the first report of GEI in a puma that was successfully resolved.

BACKGROUND

Gastrointestinal intussusception (GEI) is rare in companion animals. Literature regarding GEI in wild felids is even more limited. Therefore, the condition is evidently underrepresented in the literature for this taxon. To our knowledge, the case reported here is the first report of GEI in a puma that has been successfully resolved. Intussusception in wild felids seems to occur at a much older age similar to domestic cats where approximately half of the cats presented at greater than 6 years of age.[1, 2]

The treatment performed in this case resulted in the resolution of the puma's clinical signs, similar to what has been described in the case of a leopard.[3] This case report will contribute to further data on GEI and its successful treatment in wild felids.

CASE PRESENTATION

A 7-year-old entire female puma presented with a 2-week history of regurgitation and watery diarrhoea with melaena. The puma's clinical parameters, such as temperature, pulse and respiration rate, were within normal limits. It weighed 58 kg and had a body condition score of 4/5. The mucous membranes were pale, and it had a distended abdomen with fluid and gas-filled intestinal loops. The puma lived in captivity under the care of Lory Park Zoo—located in Johannesburg, South Africa.

INVESTIGATIONS

The puma was darted for initial clinical examination with 2-mg medetomidine (0.03 mg/kg; Kyron Laboratories, 20 mg/ml) and 60 mg zolazepam and tiletamine (1 mg/kg; Zoletil 100, Virbac, 100 mg/ml) intramuscularly (IM). The patient was treated with 585 mg of metronidazole (10 mg/kg; trichazole; Fresenius Kabi; 5 mg/ml, intravenously [IV]), 600 mg amoxycillin clavulanic acid (10 mg/kg; amoxyclav; Sandoz SA; 30 mg/ml, IV),[4] 8 ml of kyroligo (0.14 ml/kg; Kyron Laboratories, IM), 900 ml of Ringer-lactate solution (Fresenius Kabi, IV), started on small amounts of raw chicken (200 g three times daily) and continued with 615 mg amoxycillin clavulanic acid tables (10 mg/kg; q12h PO, amoclan; Cipla, 375-mg tablets) for 5 days. A parvovirus snap test (Afrivet) was negative. Faecal aerobic and anaerobic cultures showed normal flora. Biochemistry results showed mild hypoproteinaemia (46 g/L, normal range 59–85 g/L[5]) and hypoalbuminaemia (albumin = 22 g/L, normal range 28–48 g/L[5]). The rest of the biochemistry, haematology and electrolytes, including ionised calcium, were within normal limits.

Ultrasonography of the abdomen was performed without identifying the cause of the clinical signs. Oral medication could not be given because the puma refused to eat, and it was thus darted with 3 ml of amoxycillin/clavulanic acid (synulox, 10 mg/kg; Zoetis, 175 mg/ml, IM) and 10 mg of metoclopramide (0.1 mg/kg; clopamon; Aspen Pharmacare, IM) daily for 5 days. The regurgitation resolved, but there was ongoing diarrhoea with melaena.

One week later, the puma was anorexic and regurgitating. The puma was darted with medetomidine (Kyron Laboratories), zolazepam and tiletamine (Virbac) at the same dosage as previously described and brought to the Onderstepoort Veterinary Academic Hospital and underwent thoracic and abdominal radiographic examinations. No abnormalities were noted in either of these studies. Subsequently, anaesthesia was maintained with 2% isoflurane in oxygen (isofor, Safeline Pharmaceuticals). Oesophagoscopy was performed with an 8-mm flexible endoscope that revealed mild erythema, suggestive of oesophagitis on gross observation of the distal oesophagus. Invagination of gastric mucosa into the distal oesophagus was visible, confirming a GEI (Figure 1). The distal oesophageal sphincter demonstrated mild patency and lack of tone. The intussusception was reduced by probing with the endoscope. Subsequent gastroscopy revealed a grossly normal gastric mucosa, while visualisation of the pylorus demonstrated bile reflux, which confirmed patency of the pylorus. Upon retrieval of the endoscope, the gastric mucosa had retracted back into the stomach, supporting the transient nature of the invagination. Pending definitive surgical correction, another 3 days of more intense medical management were attempted. This consisted of fluid

therapy with Ringer-lactate, ranitidine (0.1 mg/kg; q24h, Zydus Healthcare, IV) and metoclopramide (0.1 mg/kg; q8h, Aspen Pharmacare, IV). The diarrhoea and melaena resolved; however, the regurgitation persisted.

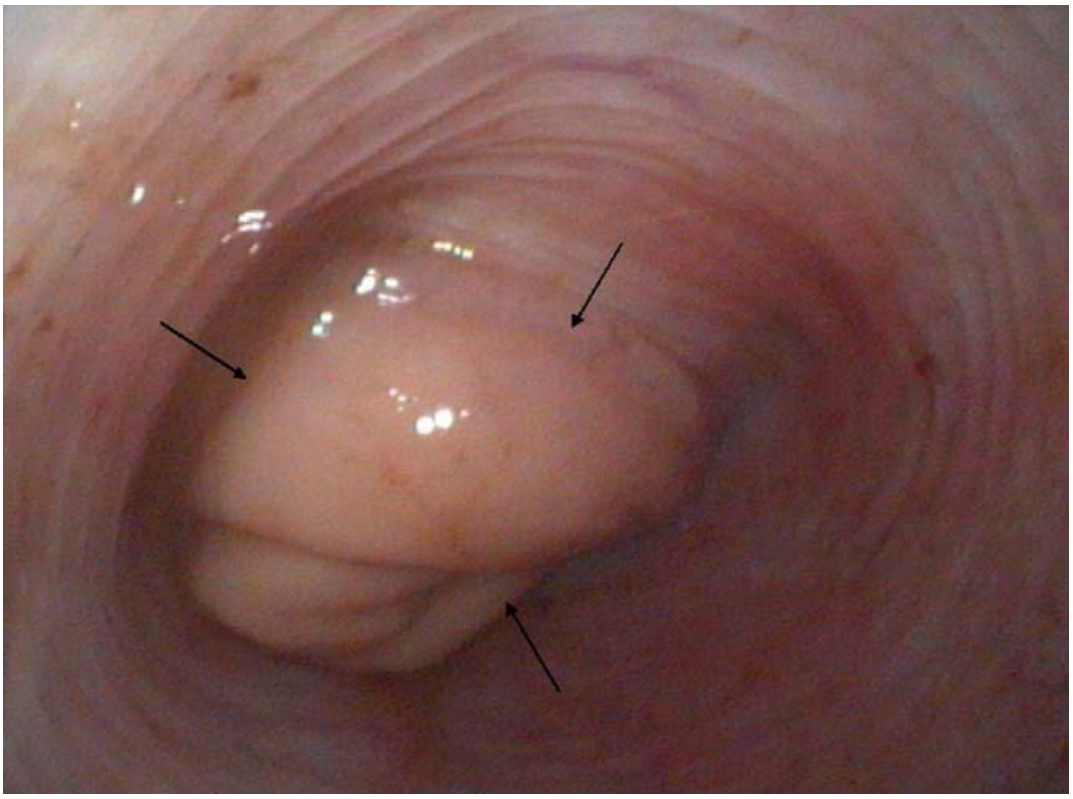

FIGURE 1. Oesophagoscopy image of a 7-year-old female entire puma (*Puma concolor*). Gastric mucosa is visible within the lumen of the oesophagus (arrows)

DIFFERENTIAL DIAGNOSIS

A tentative diagnosis of enteritis was made; however, the puma did not respond to treatment, and subsequent oesophagoscopy confirmed GEI.

LEARNING POINTS/TAKE-HOME MESSAGES

- Gastroesophageal intussusception (GEI) in wild felids seems to be acquired at a much older age as compared to companion animals.
- In this case of a puma with GEI, surgical treatment resulted in the resolution of the felid's clinical signs after failed medical management.
- Oesophagoscopy can be used in the diagnosis of GEI, especially if intermittent in nature.

TREATMENT

The puma was anaesthetised with the above-mentioned protocol, intubated and anaesthesia was maintained with isoflurane 1%–2% (Isoform; Safeline Pharmaceuticals) in oxygen. A ventral midline coeliotomy was performed. No intussusception of the stomach was noted at

the time of surgery. A left-sided belt loop gastropexy was performed with 2/0 poly-p-dioxanone (MonoPlus; B. Braun Surgical), and mild tension was placed on the gastric cardia. The abdominal incision and skin were closed routinely. The puma received cefazolin 1160 mg (20 mg/kg; zefkol, Sandoz SA, IV) and morphine sulphate 5.8 mg (0.1 mg/kg; Fresenius Kabi, IV) and ranitidine 2 ml (0.9 mg/kg, Zydus Healthcare, IV) intraoperatively. It received buprenorphine 0.6 mg (0.01 mg/kg, temgesic, Indivior, IV) twice 6 hours postoperatively. It was maintained on cefazolin (20 mg/kg; q8h; IV) and ranitidine (0.1 mg/kg; q12h, IV) for 2 days. The puma started eating the following day. Then, it was sent home on oral metoclopramide (0.2 mg/kg; q12h, clopamon, Aspen Pharmacare) and omeprazole (0.3 mg/kg; q24h, Sandoz) for 5 days.

OUTCOME AND FOLLOW-UP

No postoperative complications were noted during the initial 6 weeks, and clinical signs did not recur during the 24-month follow-up period.

DISCUSSION

GEI is a rare disease but has been reported in cats and dogs, especially male German shepherd dogs younger than 6 months old.[6-10] In the literature, two types of GEI have been described: an acute, persistent type that presents as acute oesophageal obstruction and respiratory discomfort and a chronic, recurrent form more commonly reported in cats that causes intermittent gastrointestinal signs.[9, 11, 12] To the best of the authors' knowledge, this is the first report of GEI in a puma. The condition was diagnosed early and successfully treated with surgical gastropexy. It is, however, the third report in wild cats.[2, 3] Two of these cases involved adult animals and were of an intermittent nature.[2] This is unlike the situation in dogs, where the majority occurs in young animals and they present with an acute complete intussusception with rapid progression of the disease and mortality if not promptly treated.[13, 14] A conventional loop gastropexy was chosen to ensure the correct anatomical position of the stomach to facilitate optimal motility and adequate adhesions.[15] A minimal invasive laparoscopic gastropexy would have been an alternative for this case and could be considered for future cases as it reduces pain.[15, 16]

The diagnosis of GEI can be made through various procedures, with the most common being radiography and oesophageal contrast studies.[8, 17] Another method involves ultrasonography of the abdomen, which has been used in the successful diagnosis of GEI in a young German shepherd dog.[6] In veterinary medicine, oesophagoscopy has been used with great success for the diagnosis and treatment of GEI, especially in chronic cases.[6] Although radiology is often one of the diagnostic modalities, no specific abnormalities could be seen in this case. The mild and intermittent nature of this case, therefore, necessitated an oesophagoscopy to make the diagnosis.

There are various means of treatment that have been described in the available literature for the resolution of GEI in veterinary medicine, of which surgical intervention appears to be the preferred method. Concurrent diseases, such as pneumonia, should ideally be diagnosed and treated before attempting to reduce the intussusception.[11] There are some limitations when treating GEI through surgical intervention. These include the invasive nature of the operation, compared to laparoscopy, increased time under general anaesthesia in a possibly malnourished and haemodynamically compromised patient, and the difficulty to assess the integrity of the gastric and oesophageal mucosa, which ultimately influences the prognosis.[18]

Additionally, the lengthy phase of recovery and the possible occurrence of postsurgical complications, such as prolonged tissue healing or infection, are aspects that need to be considered.[18] Despite the surgery being the favoured treatment of choice, a case of GEI was successfully treated without the need for surgery in a 7-week-old husky puppy.[13, 14] After reducing the intussusception by using endoscopy, a tube gastropexy was used to fix the stomach to the abdominal wall.[11] It is a simple technique, and there are many advantages of this method, including reduced invasiveness due to a smaller number and size of incisions, decreased time under general anaesthesia and a minimised degree of postoperative pain and analgesic needs.[10] Furthermore, enteral nutrition is a possibility, and incision complications, hospitalisation days and costs are minimised.[10] However, this is difficult in wild felids because patients are often not handleable without anaesthesia, and the tube gastropexy would be difficult to manage.[2] There are contraindications to consider for laparoscopic/open surgery reduction of GEI such as gastric wall compromise, which increases the risk of gastric penetration.[10, 18] Subsequently, the mild and intermittent nature of the condition made us attempt conservative treatment, which was not successful. In contrast, the puma recovered quickly and completely after gastropexy was performed.

It is difficult to speculate about the cause of the disease due to the paucity of information. Previously, GEI has been associated with abnormalities of the lower oesophageal sphincter or even motility disorders of the oesophagus.[9, 12] GEI has been linked to medical conditions such as diarrhoea or neoplasia in the preceding 30 days in domestic cats.[1] In this case, the patient presented with gastrointestinal disease, which first presented as diarrhoea and then subsequently developed regurgitation. It is therefore possible that the GEI developed as a response to abnormal oesophageal sphincter and stomach activity. Biopsies of the stomach were not carried out, so a histopathological diagnosis was not reached. The puma presented with an acute disease that worsened despite speedy medical treatment. Surgical intervention using a belt loop gastropexy resolved the clinical signs of the puma described in this case report.

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CONFLICTS OF INTEREST

The authors declare they have no conflicts of interest.

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ETHICS STATEMENT

This case involved the use of a non-experimental animal (owner consent to use the data for a case report was obtained). The clinical case was approved by the University of Pretoria Research and Animal Ethics Committee (REC 164-20).

AUTHOR CONTRIBUTIONS

KK, JOD, JS and HVDZ acquired the data. CS, KK, JOD and JS analysed the data and prepared the manuscript

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