Successful treatment of suspected gastro-intestinal ulceration and parasitism in a rescued Chinese pangolin (*Manis pentadactyla*)

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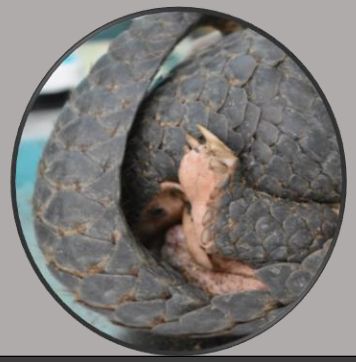

Fig.1 – Sub-adult Chinese Pangolin on arrival to LCTW

INTRODUCTION

Chinese pangolins (*Manis pentadactyla*) are a critically endangered species[1]. In captivity, pangolins are known to have low survival rates and to be prone to develop gastro-intestinal ulceration[2,3]. Because it is projected that the species will experience further population declines due to indiscriminate hunting and poaching[1], a better understanding on how to improve their health care and welfare in captivity may be key to the species' conservation.

In August 2018, a sub-adult female Chinese pangolin (Fig. 1) was admitted into the Lao Conservation Trust for Wildlife – LCTW after confiscation from the illegal wildlife trade. We will present the treatment instated upon development of clinical signs compatible with gastro-intestinal ulceration.

CASE PRESENTATION

Approximately one month after arrival, mild diarrhoea was noted. Faecal flotation evidenced a moderate burden of nematode eggs (Fig. 2) that persisted after initial treatment with ivermectin. Eighteen days later, the patient presented acutely lethargic, anorexic and with emetic episodes containing live nematodes. Its clinical status deteriorated, with severe lethargy and anorexia, melena and necrotising gastro-enteritis.

Abdominal ultrasound evidenced hypermotility but no free fluid; blood analysis showed hypoproteinaemia, hypoalbuminaemia, anaemia and leucocytosis. Findings were found to be consistent with gastro-intestinal ulceration and therapy was instated as described in Table 1. The patient relapsed after antibiotherapy was discontinued, metronidazole was reinitiated for an extended course. Appetite, demeanour and faeces improved again and returned to normal within six days. Once food intake was consistent, cimetidine and sucralfate were changed to oral administration. Following 28 days of treatment, clinical signs had resolved. Six subsequent coprological analysis over the following four weeks showed no evidence of parasitism.

Fig.2 – Nematode eggs evidenced by faecal flotation. (Magnification x 100)

Table 1

Date	Clinical presentation	Treatment
Arrival day	NAD	Ivermectin - 0.2 mg/Kg, SC, SD
Day 1 (approx. one month after arrival)	Mild diarrhoea; faecal flotation – moderate burden nematode eggs	Ivermectin - 0.2 mg/Kg, SC, SD Scheduled faecal and repeat dose in 2 weeks
Day 5	No diarrhoea; mild burden of nematode eggs	---
Day 19	Lethargy, anorexia, vomit with live nematodes, abdominal discomfort, normal temperature (33.5 °C); faecal floatation – mild burden of nematode eggs, numerous linear motile protozoa	Ivermectin - 0.2 mg/Kg, SC, SD Cimetidine - 5 mg/Kg, SC, BID Tramadol - 2 mg/kg SC, BID Metoclopramide - 0.5 mg/kg SC, BID Amoxicillin-clavulanate - 10 mg/kg SC, SID, 8 days Ringer-lactate with 5% glucose - 60mL SC, BID Metronidazole - 25 mg/Kg, PO - **refused**
Day 20	Anorexia, further lethargy, live nematodes in diarrhoea	Light sedation- Diazepam - 1 mg/Kg, IM Oro-gastric intubation: Water - 10 mL, SD Praziquantel - 20mg/kg PO, SD Albendazole - 20mg/kg PO, SD Metronidazole - 10 mg/kg SC, BID (in 1.66 mg/mL solution) Cimetidine - **increased to** 10 mg/Kg, SC, BID Tramadol - **discontinued** – concerns over sedative effect Fluid bolus - 10-25 mL IV BID to TID, following 48h
Day 21	Stupor, mucoid faeces, with melena and gastro-intestinal mucosa	Oro-gastric intubation: Sucralfate 50mg/kg PO, SID
Day 22	Abdominal ultrasound: no free fluid; gastro-intestinal hypermotility Blood analyses: Hypoproteinaemia; hypoalbuminemia (2.6 g/dL); anaemia (HTC 37%); leucocytosis (11.3 x 10^9/L) by neutrophilia (78%)	no changes - maintained metronidazole, amoxicillin-clavulanate, metoclopramide, cimetidine and sucralfate
Day 23	Acceptance of small amounts of food without vomit	Metoclopramide **withdrawn** Sucralfate **increased** to BID, PO w/out oro-gastric intubation
Day 27	Improved appetite, demeanour; normal faeces, negative faecal flotation	Amoxicillin-clavulanate **discontinued** Metronidazole **discontinued** Oro-gastric intubation: Sucralfate - 50mg/kg PO, SID - rejection of prior 3 doses
Day 28	Anorexia, diarrhoea	---
Day 29	Lethargy; anorexia; vomiting with live nematodes; hypoglycaemia (3.3 mmol/L)	Fluids with 5% glucose - 20 mL SC, BID, 3 doses Metoclopramide - 0.5mg/kg SC, TID, following 48 hours Metronidazole - **re-instated** - Previous dose, for 14 consecutive additional days
Day 30	Lethargy, anorexia	Sedation: diazepam + ketamine - 1mg/kg + 5mg/kg IM Orogastric intubation: Albendazole - 20mg/kg PO Hills a/d - 10 mL Water - 4 mL Cimetidine and sucralfate maintained
Day 33	Negative faecal flotation	Ivermectine - 0.2 mg/Kg SC
Day 36	Normal appetite, demeanour and faeces	Cimetidine - **changed route** to PO, continued until total 28 d Sucralfate - **maintained** PO BID, without oro-gastric intubaton until 28d total After 28 d, these were gradually decreased and then discontinued

DISCUSSION

As is common with many wildlife species, the lack of data and literature complicates clinical management more so than with domestic species. This is further complicated by limited resources and lack of expertise in range countries such as Lao PDR.

Interpretation of blood results is hindered by the limited baseline data. Haematology and blood biochemistry reference ranges have been published for the species[4]. However, because the study sampled all rescued animals with no apparent disease, it is possible both unhealthy and dehydrated animals were included, resulting in wide reference ranges, as is the case of the reported haematocrit range (18-53%). Because the patient was dehydrated, she was considered likely mildly anaemic.

Diagnosis of this case was made based on clinical signs and species history of being prone to developing gastric ulceration in captivity[2,3]. While the clinical presentation was highly suggestive, the lack of further diagnostic tests such as endoscopy or histopathology of the defecated gastro-intestinal mucosa, makes it impossible to confirm the presence of ulcers and their location in the gastro-intestinal tract. The etiology of this condition is thought to be stress-related[3], so care was taken to balance appropriate treatment with avoidance of excessive stress through handling and medical administrations.

The ventral tail vein was used to administer fluid-therapy and collect a blood sample. However, repeated IV administration was impossible. In veterinary practice, metronidazole has been anecdotally reported to cause local inflammation and necrosis when peri-vascular infiltration occurs. The difficult oral administration and IV access, prompted the sub-cutaneous administration in a diluted form, under expert advisement. Although manual restraint was necessary and the volume had to be distributed in two sites on the ventral aspect of the animal due to limited dorsal sub-cutaneous space, no adverse reactions were ever observed.

The patient recovered and has been healthy ever since. While some drugs have been suggested to treat early-stage ulcers in pangolins[3], to the authors' knowledge, this is the first report of a full clinical case where gastro-intestinal ulceration was successfully managed in this species.

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