GI Disorders in Exotic Companion Mammals: Focus on Stasis, Obstruction, and Pain

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Vladimír Jekl, DVM, PhD, DECZM (Small Mammal); Karel Hauptman, DVM, PhD

Faculty of Veterinary Medicine, Avian and Exotic Animal Clinic, University of Veterinary and Pharmaceutical Sciences, Brno, Czech Republic

The most common disorders of gastrointestinal tract in herbivorous exotic companion mammals is ileus. Ileus is defined as disruption of the normal propulsive gastrointestinal (GI) motor activity from non-mechanical mechanisms (synonyms: paralytic ileus, functional ileus, gastrointestinal stasis) or because of bowel obstruction (synonyms: mechanical ileus, mechanical obstructions). The cause of the obstruction may be external to the bowel (extrinsic), within the wall of the bowel (intrinsic), or due to a luminal defect/foreign body that prevents the passage of gastrointestinal contents. Obstruction of the intestine can be partial or complete. The most common cause of the bowel obstruction in exotic companion mammals is a presence of intraluminal foreign body.

In rabbits, the term gastrointestinal syndrome or rabbit gastrointestinal syndrome was recently used to define a complex of clinical signs, symptoms, and concurrent pathologic conditions affecting the digestive apparatus of the rabbit. The following pathologic conditions can be included, and often occur in combination: gastric impaction, gastric gas accumulation, intestinal impaction, intestinal gas accumulation, intestinal obstruction, primary gastroenteritis, adhesions, neoplasia, pancreatitis and liver disease. It is true that the pathophysiology of the primary GI stasis etiology and secondary diseases is in exotic companion mammals very wide and they are even more complex than already described.

NON-MECHANICAL OBSTRUCTION (STASIS)

Gastrointestinal stasis in herbivorous exotic companion mammals (rabbits, guinea pigs, chinchillas) is commonly associated with inappropriate diet (low fiber, high in digestible carbohydrates). However, gastrointestinal stasis could be associated with any stressful situation or condition that stimulates the sympathetic nervous system including pain, systemic disease or surgery.

The GI motility decrease, the digesta retention is prolonged and the normal balanced ecosystem in bowel (especially cecum) is disrupted. Cecal pH is altered and allow potentially pathogenic bacteria to overgrowth (*Clostridium* sp., *E. coli*). This bacterial overload could lead to clinical enteritis/typhlitis or to enterotoxaemia.

In case of prolonged digesta retention in stomach, there is a risk of gastric ulcers development, which leads to another source of pain.

Gastrointestinal hypomotility results in gas formation in intestines (mostly caecum) or stomach. Gas distension is painful and stimulates the sympathetic nervous system and deteriorate the situation.

Secondary impaction can be produced by over accumulation of normal gastrointestinal contents due to alterations in motility, or desiccation of normal contents due to dehydration.

Metabolic acidosis is common sequela of negative energetic balance due to anorexia esp. in rabbits and herbivorous rodents.

MECHANICAL OBSTRUCTION

Primary mechanical obstruction of the stomach is commonly seen by the author in ferrets. Various foreign bodies of different origin (mostly rubber, foam, earplugs) are located within the stomach of the ferret. Foreign bodies are causing permanent or temporary pyloric obstruction or can be passed distally into the duodenum or jejunoileum, where can cause permanent obstruction.

In rabbits, the most common site of the GI obstruction seen at the authors practice is in the proximal duodenum. In case of distal GI is the obstruction located in the distal part of the cecum or proximal colon. However, this obstruction is commonly secondary due to caecal content dehydration and cecolite formation (seen in rabbits and chinchillas. In guinea pigs, signs associated with GI obstruction are present in case of gastric dilatation/torsion. It was stated that the pellets of impacted hair that acutely obstruct the small intestine of rabbits are a completely different condition from the hairballs (gastric trichobezoars) or impacted stomach contents that develop during periods of gastric hypomotility. It seems, that the pellets are formed by compression of ingested hair during passage through the large intestine, and the excreted pellets containing the compressed hair are accidentally re-ingested during cecotrophy. This would explain why the pellets are

similar in size to hard feces and are so compressed. Small hair pellets can pass through the digestive tract whereas larger pellets may obstruct the intestine causing pain, which slows gut motility and further reduces the chance of the pellet moving along the intestinal tract. In some cases, the obstruction does move through the small intestine, resulting in a spontaneous recovery as it passes into the hindgut.

Obstruction leads to progressive dilation of the GI tract proximal to the blockage. Swallowed air, and gas from bacterial fermentation, can accumulate, adding to stomach or intestine distention. As the process continues, the stomach/intestine wall becomes edematous, normal absorptive function is lost, and fluid is sequestered into the bowel lumen. In severe cases, the perfusion to the GI wall is reduced and obstructions leads to ischemia, which will eventually lead to necrosis and perforation. In ferrets, with pyloric or duodenal obstruction, ongoing emesis leads to additional loss of fluid containing sodium, potassium, chlorides, hydrogen ions and to metabolic alkalosis. In rabbits and rodents which cannot vomit, the gas and fluid accumulation leads quickly to stomach dilatation and cardiovascular collapse. In rabbits and guinea pigs, stomach dilation readily leads to metabolic acidosis. These fluid losses (vomiting or into the GI tract) can result in hypovolemia. Bacterial overgrowth can also occur in the proximal duodenum, which is normally nearly sterile. Gastric mucosa erosions and/or ulcerations can develop due to reduced vascular supply of the stomach.

Pain Management and Goals of the Therapy

- Recognizing the pain (inactivity, anorexia, staring, reduced comfort behavior, pressing of the belly against the ground, changes of the facial mimic, other behaviour changes).
- Try to find out the primary (or secondary) etiology.
- Anxiolytics, first line analgesia/sedation:
    - Midazolam (0.2–0.5 mg/kg IM) + ketamine (rabbits, rodents 5 mg/kg IM)
    - Opioids:
        - Butorfanol: 0.2–0.5 mg/kg IM
        - Buprenorphine: 0.01–0.05 mg/kg SC
    - Fentanyl/fluanisone: 0.2–0.3 mg/kg SC

- Oxygen
- Thermal support
- IV access and IV fluids:
  - No saphenous or femoral veins
  - e.g., lactated Ringer's
- Diagnostics:
  - Abdominal radiography
  - Abdominal ultrasound (more helpful in ferrets)
  - Hematology
  - Blood chemistry:
    - Pain is in rabbits associated with marked hyperglycemia (above 350 mg/dl).
  - Urinalysis (esp. pH)
  - Blood acid-base balance
- Treat the primary disease/diseases
- Pain medication:
  - NSAIDs (can be controversial):
    - Meloxicam: 0.1–0.3 mg/kg SC q12h (use with care in ferrets)
  - Opioids:

        - Buprenorphine: 0.01–0.05 mg/kg SC q8–12h
        - Or CRI: Fentanyl 5–10 mg/kg/min, ketamine 1–2 mcg/kg/h
        - Hydromorphone: 0.1 mg/kg SC, IV
        - (Tramadol: 10 mg/kg PO q8–12h)
- Prevention of gastric ulceration:
    - Ranitidine: 5 mg/kg IM q12h
    - Famotidine: 1–3 mg/kg PO q12–24h
- Prokinetics (only in case of nonobstructive ileus or postoperatively):
    - Metoclopramide: 0.5–1 mg/kg IM q8h
    - Ranitidine: 5 mg/kg IM q12h
    - Itopride: 10 mg/kg PO q12h
    - Trimebutine: 1–2 mg/kg PO q12h
    - (CRI lidokain: 0.01 mg/kg/min IV)
- Simethicone: 65–130 mg PO q3–12h
- Feeding (only in case of non-obstructive ileus or postoperatively):
    - Recovery diet (force-feeding - syringe, nasogastric tube)
    - Herbivores: Fresh grass, vegetables and fruits
- Surgery:

    - Gastroscopy in ferrets
    - Gastrotomy/enterotomy
    - Authors are, in general meaning, not afraid of so called "problematic rabbit gastrointestinal surgeries." The main issue is how much and how long is mechanical obstruction present, if intestine wall is necrotic, if cardiovascular changes developed, if there is a presence of gastric ulcers, hepatic lipidosis and/or metabolic acidosis and if the animal suffering from any other concurrent disease.
    - Foreign body "milking" distally
- Stress release/anxiolysis:
    - Quite hospitalization
    - Benzodiazepines (see above)
    - (Pheromones)
- Antibiotics:
    - When indicated (not used by the author routinely)

Notice: Optimal management of GI stasis need to be determined based on particular clinical case. Dosages and therapeutic protocols used in this paper are recommended and used in the author's practice, however need to be adjusted when indicated or not used at all.

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Vladimir Jekl, DVM, PhD, DECZM (Small Mammal)
Avian and Exotic Animal Clinic
Faculty of Veterinary Medicine
University of Veterinary and Pharmaceutical Sciences
Brno, Czech Republic