Flexible Gastrointestinal Endoscopy in Ferrets (*Mustela putorius furo*)

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KEYWORDS

• Ferret • Endoscope • Esophagoscopy • Gastroscopy • Colonoscopy
• Percutaneous endoscopic gastrostomy • *Mustela putorius furo*

KEY POINTS

- Gastrointestinal diseases are common complaints in ferrets. However, apart from a few references in biomedical research articles, there is little information on the use of flexible endoscopy.
- The anatomy of the ferret gastrointestinal tract is relatively simple and short. The small intestine distal to the duodenum forms coiled tubes suspended by a mesentery; the large intestine is a straight dilated tube that is differentiated into ascending, transverse, and descending colon.
- Because of the small lumen size of the ferret gastrointestinal tract, small-diameter bronchoscopes have been traditionally used.
- Gastroscopes can be used in ferrets weighing more than 1 kg, while the new generation of smaller videoscopes is likely to make this practical in smaller ferrets.
- Percutaneous endoscopic gastrostomy is a promising and useful technique for anorectic or dysphagic ferrets.

INTRODUCTION

Gastrointestinal diseases are common complaints in ferrets (*Mustela putorius furo*). Causes include infection (*Helicobacter* gastritis, campylobacteriosis, salmonellosis,

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epizootic catarrhal enteritis, rotavirus infection, mycobacteriosis, proliferative enteropathy), neoplasia (gastrointestinal lymphoma and adenocarcinoma, stromal tumor adenomatous polyp), but also other conditions (foreign body, eosinophilic gastroenteritis, lymphoplasmacytic enteritis, inflammatory bowel disease).[1,2] The relatively simple and short gastrointestinal tract of ferrets makes them ideal candidates for flexible endoscopy.[3] Although routinely used in cats and dogs,[4] little information is available about flexible endoscopy in ferrets, apart from a few references in biomedical research articles.[5,6] Recent technical advances, especially in smaller videoendoscopy, have both decreased the diameter and purchase price of flexible endoscopes. General practitioners now have affordable access to suitably sized endoscopes for ferrets that provide high-quality images.

CLINICAL ANATOMY OF THE FERRET GASTROINTESTINAL TRACT

The anatomy of the ferret gastrointestinal tract is comparable to cats and dogs. However, differences include dental formula, small length of the intestine, lack of differentiation between jejunum and ileum, absence of a cecum, and small lumen size of the colon. The relatively simple anatomy results in a short gastrointestinal transit time of 4 to 8 hours, whereas in cats the rate of food passage is 24–37 hours.[7]

Esophagus

The esophagus starts at the pharynx, just above the laryngeal cricoid cartilage, extends to the cardia, and measures 17 to 19 cm.[3] It is divided into cervical, thoracic, and abdominal segments. The cervical segment is dorsal to the trachea, but at the thoracic inlet veers to left. The esophageal lumen decreases in size when it crosses the left bronchi and passes through the diaphragm. As a strong gastroesophageal sphincter does not exist, ferrets can vomit easily. The musculature is composed only of striated fibers like the dog, making the esophagus thin and fragile.[8] Characteristic of animals that are able to ingest food rapidly, the mucosa is covered with a layer of squamous, keratinized epithelium.[8]

Stomach

The stomach is simple, J-shaped, and similar to the dog. It consists of a cardia, fundus, body, antrum, and pylorus.[8] The stomach is located in the cranial abdomen, under the hypochondrium, and positioned transversally, left of the median plane. It is in contact cranially with the left liver lobe and diaphragm, dorsally with the ascending colon, and caudally with the spleen and left pancreatic lobe. The greater curvature of the stomach is in communication with the visceral side of the spleen, the 2 organs being linked by the gastrosplenic ligament that contains nerves and blood vessels.

The lesser curvature of the stomach is oriented craniodorsally and is separated from the papillary process of the caudate liver lobe by the lesser omentum. The pylorus is well developed and in contact with the abdominal wall. The capacity of the stomach is large in ferrets relative to their size and can easily hold 50 mL/kg or more.[9] The fullness of the stomach determines its shape, size, and position. When it is full, the stomach occupies all of the subcostal area and pushes the intestines to the right. The cranial border of the stomach is located under the 11th thoracic vertebra and the caudal border is located under the first or second lumbar vertebra. The fundus can also move caudoventrally. The musculature is composed of 2 layers: a smooth longitudinal external muscular layer and a smooth circular muscular layer.[8]