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Authors

Schneider, Jaycie

Ames, Marisa

DiCicco, Michael

et al.

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Recovery of normal esophageal function in a kitten with diffuse megaesophagus and an occult lower esophageal stricture

Jaycie Schneider, Marisa Ames, Michael DiCicco, Mason Savage, Clarke Atkins, Michael Wood and Jody L Gookin

Abstract

An 8-week-old male domestic shorthair was presented to the Internal Medicine Service at North Carolina State University for regurgitation. Radiographic diagnosis of generalized esophageal dilation and failure of esophageal peristalsis were compatible with diagnosis of congenital megaesophagus. Endoscopic examination of the esophagus revealed a fibrous stricture just orad to the lower esophageal sphincter. Conservative management to increase the body condition and size of the kitten consisted of feeding through a gastrostomy tube, during which time the esophagus regained normal peristaltic function, the stricture orifice widened in size and successful balloon dilatation of the stricture was performed. Esophageal endoscopy should be considered to rule out a stricture near the lower esophageal sphincter in kittens with radiographic findings suggestive of congenital megaesophagus. Management of such kittens by means of gastrostomy tube feeding may be associated with a return of normal esophageal motility and widening of the esophageal stricture, and facilitate subsequent success of interventional dilation of the esophageal stricture.

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An 8-week-old intact male domestic shorthair kitten was presented to the Internal Medicine Service at North Carolina State University (NCSU) for further evaluation of regurgitation. The kitten had been adopted at 6 weeks of age from an animal shelter and was immediately noted by the owners to have a ravenous appetite and to regurgitate food once or twice approximately 30 mins after ingestion of each meal. Water was consumed in normal quantities and was not associated with regurgitation. A lateral thoracic radiograph performed by the referring veterinarian prior to and after feeding the kitten barium mixed with canned food demonstrated generalized esophageal distension and food retention, and prompted referral of the kitten to NCSU.

On presentation to NCSU, the kitten was bright, alert and responsive, with a body weight of 570 g and a body condition score of 3/9. Physical examination of the kitten was unremarkable, although he was suspected of being deaf based on lack of response to auditory stimuli. Thoracic radiographs revealed a diffusely dilated esophagus containing fluid and air, and causing ventral displacement of the intrathoracic trachea and cardiac silhouette. There was no evidence of aspiration pneumonia. Fluoroscopic examination of swallowing was performed while the kitten was fed liquid barium and barium mixed with kibble. The study results demonstrated a total absence of esophageal peristalsis and no evidence of esophageal obstruction (Figure 1a). Liquid barium passed through the lower esophageal sphincter; however, propulsion of kibble through the sphincter was not observed and this was attributed to failure of esophageal peristalsis. Results of a complete blood cell count, serum biochemistry profile, and serum total T4 and basal cortisol concentrations did not identify any underlying systemic or endocrine cause of esophageal dysfunction. Results of fecal centrifugation–

College of Veterinary Medicine, North Carolina State University, Raleigh, NC, USA

Corresponding author:
Jody L Gookin DVM, PhD, DipACVIM (Internal Medicine), College of Veterinary Medicine, North Carolina State University, 1060 William Moore Drive, Raleigh, NC 27607, USA
Email: jody_gookin@ncsu.edu

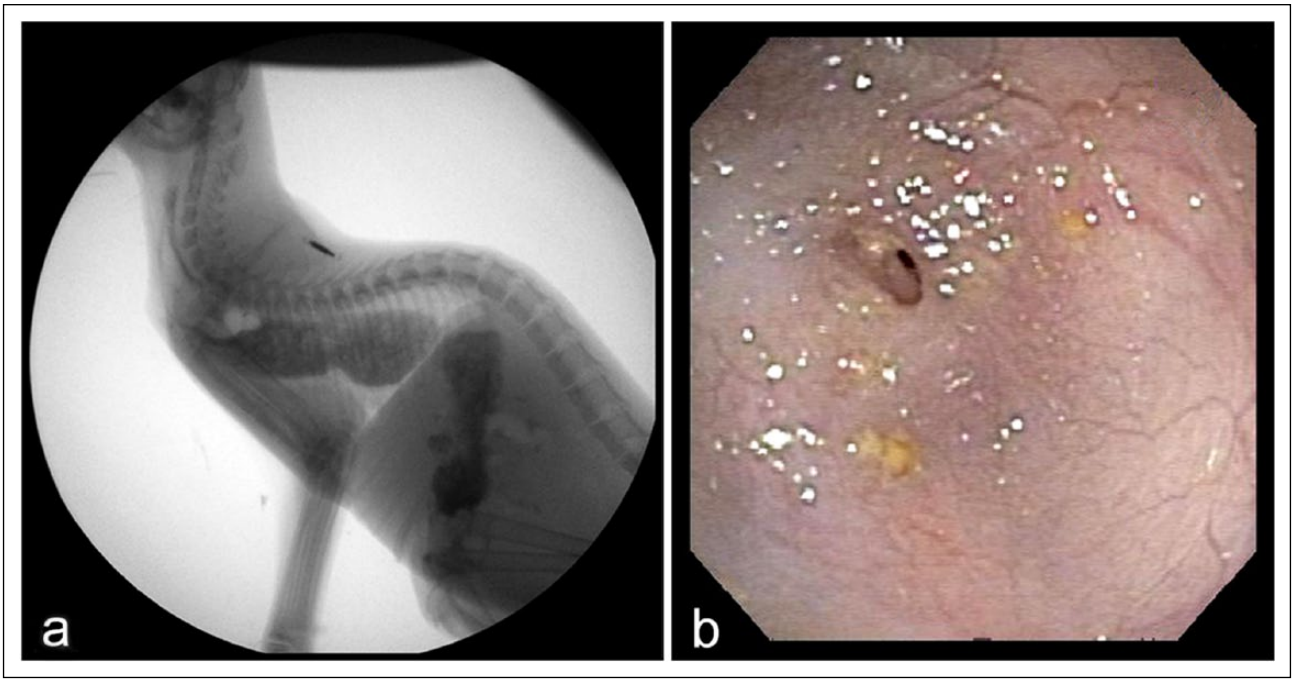

Figure 1 (a) Horizontal beam left lateral thoracic radiograph taken during fluoroscopy to examine swallowing. The contrast radiograph demonstrates liquid barium in the stomach and kibble mixed with barium retained in the non-motile esophagus. (b) Endoscopic view of the lower esophageal sphincter region demonstrating severe narrowing of the esophageal lumen diameter

flotation and sedimentation were negative for the presence of parasite ova.

Although imaging studies were considered diagnostic for congenital megaesophagus, esophageal endoscopy was additionally performed to rule out a partial esophageal obstruction. Anesthesia was induced by mask inhalation followed by endotracheal intubation for delivery of sevofluorane. Esophagoscopy was performed using an Olympus 5.5 mm GIF XP180N gastrovideoscope and revealed a diffusely dilated esophagus. However, at the location of the lower esophageal sphincter, narrowing of the lumen prohibited passage of the endoscope into the stomach (Figure 1b). An attempt to traverse this region using a 3.8 mm Olympus BF3C160 videobronchoscope was also unsuccessful; however, under endoscopic visualization, a 5 French red rubber catheter (diameter = 1.67 mm) could be passed through the opening.

Owing to unfamiliarity with the expected appearance of the lower esophageal sphincter in a patient of this size and age, the added risk of prolonging anesthesia and danger of perforating the esophagus, the decision was made to reassess the lower esophageal sphincter after providing the kitten with nutritional support and time for further growth. Attempts were made to orally syringe-feed a gruel to the kitten while holding it in an upright position for 15 mins; however, he continued to intermittently regurgitate. Therefore, surgical placement of a 16 French latex gastrostomy tube (Pezzer model; CR Bard) was performed 3 days after the endoscopic examination. Postoperative analgesia (buprenorphine, 0.005 mg/kg IV) was administered as needed. An incisional biopsy of the stomach, obtained at the time of gastrostomy tube placement, was assessed to be histologically normal.

To provide its daily metabolic energy requirement, the kitten was prescribed a nutritional plan divided into six feedings a day, based on an estimated gastric volume of approximately 30 ml.[1] Our goal was to restore normal body condition and promote normal growth until such time as the kitten was considered to be healthy and of sufficient size for further investigation and possible dilatation of a lower esophageal sphincter stricture. The kitten was fed exclusively through the gastrostomy tube, with free access to water, for a total of 62 days. On day 30 of gastrostomy tube feeding, the kitten pulled out the original tube, which necessitated percutaneous replacement using a temporary 10 French Foley catheter. Likewise, the temporary Foley catheter was replaced a day later with a 14 French low-profile gastrostomy tube (MIC-KEY; Kimberly Clark). The kitten steadily gained weight, both at home and during medical boarding.

Fluoroscopic examination of swallowing was repeated 45 days after initial presentation to NCSU, at which time the kitten weighed 2.0 kg. Survey radiographs revealed less distension of the intrathoracic esophagus than initially

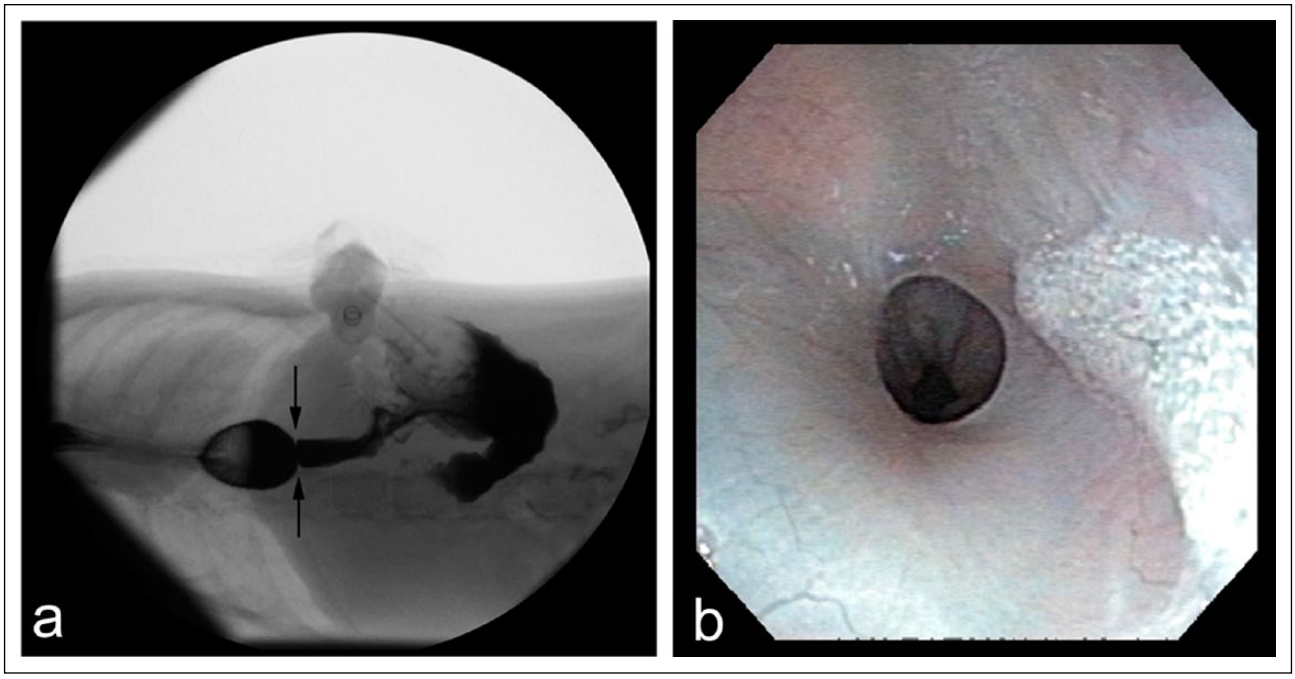

Figure 2 Ventrodorsal horizontal beam radiograph taken during the swallowing of liquid barium on day 45 after presentation. (a) Note the presence of focal narrowing (constriction) of the esophageal lumen and the level of the lower esophageal sphincter (arrows) and presence of a gastrostomy tube. (b) Endoscopic appearance of the esophageal stricture after 60 days of esophageal rest and gain of 1.73 kg body weight

documented. With swallowing of liquid barium, normal esophageal peristalsis was observed. However, a well-defined focal circumferential attenuation of the esophageal lumen, consistent with an esophageal stricture, was observed just orad to the lower esophageal sphincter (Figure 2a). Following administration of soft food during fluoroscopy, passage of the bolus was interrupted at the site of the stricture and resulted in regurgitation.

General anesthesia with the intent of conducting an endoscopic and fluoroscopic-guided balloon dilatation of a presumed esophageal stricture was performed on day 60 after original presentation. At this time, the kitten weighed 2.3 kg. Using a GIF XP180N gastrovideoscope, an esophageal stricture with a lumen diameter of approximately 10 mm was observed just orad to the lower esophageal sphincter (Figure 2b). Using fluoroscopic guidance and endoscopic visualization, a cardiac balloon valvuloplasty (BVP) catheter (12 mm × 2 cm; Agiltrac, Abbott Vascular), selected on the basis of balloon diameter and length relative to the stricture, was placed across the stricture without a guide wire. A single dilatation was performed by instilling the balloon with radiopaque contrast medium. Two subsequent dilatations were performed with a larger (14 mm × 3 cm; Z-med, B-Bruan Interventional Systems) BVP catheter. Ultimately, all dilatations reached the maximal burst pressure of each balloon (14 and 10 atmosphere, respectively) and were held inflated for a duration of 10–15 s. The result was a moderate tearing of the stricture. Esophagoscopy was repeated 4 days later, at which time dilatation of the stricture was repeated once using the 14 mm × 3 cm BVP catheter, which resulted in mild-to-moderate mucosal tearing. Adverse effects of balloon dilatation were not observed.

To discourage restricturing of the esophagus or esophageal injury from gastric reflux, treatment with prednisolone (0.5 mg/kg/day) and famotidine (1 mg/kg/day) was instituted the day prior to the first balloon dilatation and continued until the day following the second balloon dilatation. Immediately following full anesthetic recovery from the second balloon dilatation, the kitten was fed small meatballs of canned kitten food from a non-elevated bowl. No episodes of regurgitation were observed over a period of 3 days, at which time the decision was made to remove the gastrostomy tube. Immediately following removal of the tube the kitten appeared to be uncomfortable. Cellulitis and leakage of gastric contents over a period of 4 days necessitated surgical debridement and primary closure of the gastrostomy site. Recovery from surgery was uneventful and the kitten was discharged from the hospital 79 days after initial presentation. Over a follow-up period of 1.5 years the kitten has been fed a dry kibble diet from a non-elevated position and has not been observed to regurgitate.

Feline esophageal disorders are considered to be uncommon. Descriptions of esophageal dysfunction in very young kittens are particularly rare and are attributed

to either congenital idiopathic megaesophagus,[2,3] or congenital fibrous narrowing of the esophagus orad to the gastroesophageal junction,[4,5] or associated with congenital pyloric dysfunction.[6] In the present case, radiographic evidence of diffuse esophageal dilation with the absence of esophageal peristalsis in an 8-week-old kitten was compatible with a diagnosis of congenital idiopathic megaesophagus. Congenital megaesophagus in cats generally carries a guarded prognosis.[2,3] Arguably, endoscopy of the esophagus may have been deemed unnecessary in this case. However, even with fluoroscopic examination of the esophagus, strictures can go undetected owing to small patient size and/or close proximity of the stricture to the lower esophageal sphincter. Had we not chosen to perform endoscopy in this case, diagnosis of the stricture would have been missed and the kitten would likely have been euthanized.

Esophageal strictures in cats are most often reported as secondary to an identified predisposing cause, such as gastroesophageal reflux (recent anesthesia or history of vomiting), esophageal foreign body (eg, trichobezoar), or oral administration of caustic drugs such as doxycycline or clindamycin.[2,7–15] No predisposing cause for esophageal injury was identified in the kitten described herein. It remains unclear whether the identified esophageal stricture in this kitten was congenital or acquired.

Our decision to postpone further endoscopic examination of the gastroesophageal region until the 570 g kitten was of sufficient body size and condition to withstand an interventional procedure was considered to be essential to the successful outcome of this case. Over the 60 day period between the first and second esophageal endoscopy, the kitten gained 1.73 kg of body weight, and the esophageal stricture orifice increased significantly in size from approximately 2 mm to >10 mm in diameter. Moreover, providing nutritional support exclusively by means of a gastrostomy tube over this time period was associated with full restoration of esophageal motility, as assessed by fluoroscopy. Whether this recovery can be attributed to resting of the esophagus or simply reflects additional time needed for maturation of normal esophageal function in this kitten is unclear. Instances of improvement in esophageal function over time in kittens diagnosed with congenital megaesophagus have been previously reported.[2] Despite recovery of esophageal motility and widening of the esophageal stricture over time in this kitten, oral kibble was not tolerated until after dilatation of the stricture. This argues for an important role of the stricture in contributing to the kitten's regurgitation. In any circumstance, feeding by means of a gastrostomy tube likely contributed to the recovery of esophageal function and certainly contributed to the overall recovery and wellbeing of the patient.

Conclusions

Based on the present case and precedent descriptions of esophageal achalasia in kittens,[4,5] an endoscopic examination of the distal esophagus to rule out a partial obstruction is worth considering in kittens diagnosed with congenital megaesophagus. Placement of a gastrostomy tube should also be considered with the intent of allowing time for esophageal functional recovery or maturation. Moreover, if an esophageal stricture is identified, temporary gastrostomy may allow additional time for widening of the stricture, thereby making it easier to dilate, and nutritional recovery that results in a better anesthetic candidate. In this case, the BVP catheters with 2 and 3 cm balloon lengths provided a superior alternative to use of bougienage because of the kitten's small size and the proximity of the stricture to the lower esophageal sphincter. Balloon dilatation of esophageal strictures in cats is well described and was a successful treatment approach in this kitten.

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Conflict of interest The authors do not have any potential conflicts of interest to declare.

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