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Case Reports

MEGAOESOPHAGUS SECONDARY TO OESOPHAGITIS AND OESOPHAGEAL STRICTURE ASSOCIATED WITH DOXYCYCLINE THERAPY IN A DOMESTIC SHORTHAIR KITTEN

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SUMMARY

Oesophageal strictures associated with doxycycline therapy in cats are a rare occurrence but several cases have been reported. A 3-month-old kitten was presented to University Veterinary Hospital, Universiti Putra Malaysia (UVH-UPM) with the primary complaint of persistent vomiting. The kitten was prescribed with doxycycline two weeks prior to presentation. Regurgitation was observed during hospitalisation. Radiographs and endoscopy performed revealed findings consistent with a megaesophagus cranial to an oesophageal stricture located at the region of the second thoracic vertebrae.

Keywords: Megaoesophagus, oesophagitis, oesophageal stricture, doxycycline, kitten

INTRODUCTION

Oesophagitis is the inflammation of the oesophagus. In cats, it is often caused by several factors and one of them is the retention of medication (commonly associated with doxycycline therapy) in the oesophagus (German *et al.,* 2005). The occurrence of oesophagitis may lead to the formation of an oesophageal stricture and megaoesophagus (Schneider *et al.,* 2014). An oesophageal stricture is an abnormal narrowing of the oesophageal lumen (Alicia, 2009) and megaoesophagus is a condition of oesophageal dilatation due to dysmotility (Graves *et al.,* 2010).

Doxycycline is a bacteriostatic broad spectrum antibiotic (Kogawa *et al.,* 2012) which can produce a pH of less than three when dissolved in saliva or water (Shelat *et al.*, 2011). The acidic nature of doxycycline may cause tissue irritation and inflammation of the esophageal mucosal wall due to the caustic effect of doxycycline (Leib, 2005).

CASE REPORT

A 3-month-old male Domestic Shorthair (DSH) kitten weighing 0.8 kg was presented to University Veterinary Hospital, Universiti Putra Malaysia (UVH-UPM) with a primary complaint of persistent vomiting. It was an adopted stray kitten managed on dry food and boiled fish. Approximately two week prior to presentation at UVH-UPM, the kitten was treated by a private veterinarian for the complaint of fever, vomiting and diarrhoea for three days and the medicines prescribed incluced doxycycline, Liv 52 and Vetri DMG. The condition of the kitten improved for two days but vomiting recurred. Owner noticed the kitten vomited shortly about one minute after food and was further prescribed with clavulanate potassium and amoxicillin trihydrate and metoclopramide. The kitten was dewormed, deflea-ed and referred to UVH-UPM.

Upon physical examination, the kitten was quiet but responsive. Rectal temperature was 37.6°C. The kitten was 7% dehydrated with pale mucous membranes and emaciated with a body condition score of 1.5/5. There was presence of bilateral mucoid nasal discharge and sneezing was noted. Auscultation at the thoracic region revealed harsh lung sounds. Soft food was offered and the kitten ate but, dysphagia was observed and the kitten regurgitated immediately after food. Oral examination revealed no abnormal findings.

The problem list included dysphagia, regurgitation and emaciation with the differential diagnoses of; esophageal foreign body, oesophagitis, oesophageal stricture; and bilateral nasal discharge due to feline upper respiratory disease (FURD).Intravenous fluid therapy (Lactated Ringer's) was administered upon hospitalisation to rehydrate the kitten and Dulphalyte (Cymedica, Czech Republic) was added as supportive therapy. Thoracic and abdominal radiographs revealed normal appearance of the gastrointestinal structure with no no obvious or visible obstruction due to foreign body, thus esophageal foreign body was unlikely in this case. The kitten was maintained on a nasogastric feeding tube to ensure adequate caloric intake and to reduce the episodes of regurgitation during hospitalisation (Figure 1).

Figure 1. Kitten managed on nasogastric tube feeding throughout hospitalisation.

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Blood samples were sent to the clinical pathology laboratory for complete haemogram and serum biochemistry analysis. The haemogram results revealed mild to moderate leucocytosis with left shift, neutrophilia, monocytopaenia and increased plasma protein; suggestive of inflammation or infection. The biochemistry analysis revealed hyponatremia, hyperkalaemia and hypochloraemia which indicated an electrolyte imbalance due to the regurgitation. There was elevated BUN with normal creatinine value that might be due to the haemoconcentration. There was also an increase in total protein level and hyperglobulinaemia indicative of inflammation or infection due to oesophagitis and FURD.

The kitten was treated with Papain (1 tablet BID orally; Beazyme, CCM Pharmaceuticals, Malaysia) to reduce swelling and inflammation. Metoclopromide (0.5 mg/kg; Primperan, Sanofi-Aventis, France) was administered intravenously as an anti-emetic and to increase lower esophageal sphincter tone for the first four days. Ranitidine (2 mg/kg; Rantac Injection, Sifam Healthcare Ltd., India), administered intravenously to reduce gastric acid secretion. As for the bilateral mucopurulent nasal discharge, potassium clavulanate and amoxicillin trihydrate (8.75mg/kg, Noroclav, Norbrook, Australia) was administered subcutaneously as a broad spectrum antibiotic. The mucopurulent nasal discharge reduced by day-4 of hospitalisation.

Regurgitation was closely monitored during the hospitalisation. During the first three days, regurgitation was consistently observed as the kitten passively expelled out the milk that was administered slowly via the nasogastric tube. Regurgitation continued to persist even though the kitten's head and neck were elevated for about 15 minutes during nasogastric tube feeding. Hence, oesophageal stricture and megaoesphagus were highly suspected. The second chest radiograph (Figure 2) obtained revealed an increased radiopacity of the oesophagus at the level of the T2 vertebrae with dilatation of oesophagus cranial to the narrowing. The radiological diagnosis of esophageal stricture and megaesophagus were made.

Endoscopy (Figure 3) was performed successfully under anaesthesia using the combination of Ketamine (5 mg/kg; Ilium Ketamil, Labtroy, Australia) and Midazolam (0.25 mg/kg; Midazolam hydrochloride, Roche, US). Endoscopic examination revealed presence of oesophageal stricture at with a stricture size of approximately 2mm (the diameter of the nasogastric tube). There was also an area of hyperaemia of the esophageal mucosa at the level of the stricture. Therefore the final diagnosis for this case was megaoesophagus secondary to oesophagitis and oesophageal stricture concurrent with FURD.

Prognosis for the kitten was guarded. Unfortunately, owner decided to stop further treatment and the kitten was then discharged and prescribed with antibiotics and anti-inflammatories. The owner was advised to feed the kitten with 20 ml of blended slurry food (i.e. chicken) every 4 hours with the kitten's head and neck elevated during and 15 minutes after feeding to reduce the episodes of retching and prevent aspiration pneumonia. The medications prescribed were to be crushed and mixed together with the slurry food for administered. The cat died a week later.

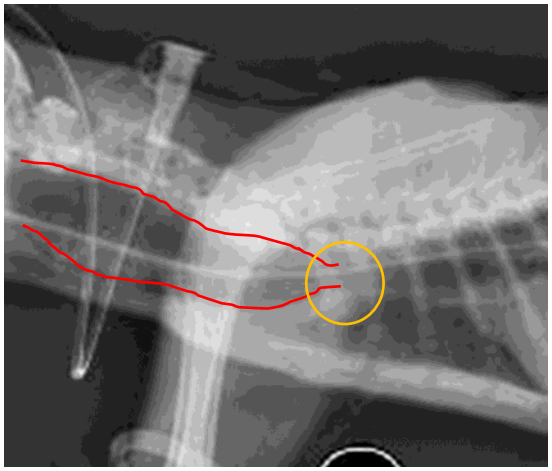

Figure 2. Second radiograph revealing a dilatation (megaoesophagus) cranial to a narrowed oesophagus (red line) at the level of T2 vertebrae, suspected to be a stricture (yellow circle).

Figure 3. Endoscopic examination revealed presence of oesophageal stricture approximately 2 mm in diameter.

DISCUSSION

The causes of oesophagitis are often due to oesophageal retention of medication, oesophageal trauma or foreign body obstruction, and gastro-oesophageal reflux secondary to anaesthesia (Alicia, 2009; Westfall *et al.,* 2001). Sick cats are often presented weak, dehydrated and emaciated due to chronic regurgitation (Westfall *et al.,* 2001). In this case, it is more likely that oesophagitis occurred due to improper administration of doxycycline that may have resulted due to inadequate oesophageal propagation of the tablet into the stomach leading to oesophageal retention. The cat did not have any other history of trauma, pica, neither undergone any anaesthesia nor was diagnosed with chronic gastritis during the first presentation with clinical sign of vomiting. Clinical sign of vomiting occurred at the initial stage could have been acute probably due to unspecific reason. However, the observation of recurrent and persistent vomiting after doxycycline therapy even though other clinical signs such

as fever and diarrhoea has resolved was suggestive that doxycycline could have been the likely cause for oesophagitis leading to esophageal stricture and megaesophagus in this case.

Doxycyline is relatively acidic with a pH of 3.0 and has a caustic effect on the oesophageal mucosal cells causing tissue irritation and inflammation (Leib, 2005). The inflammation can extend into the submucosa and submuscularis of the oesophagus leading to formation of focal fibrous tissues that eventually may reduce the diameter of the oesophageal lumen leading to oesophageal stricture (Alicia, 2009; Westfall *et al.,* 2001). Chronically, the inflammation that extends into the submuscularis will disrupt the normal function of the nerves that innervates the oesophageal wall causing dysmotility and dilation of the oesophageal muscles with a condition known as megaoesophagus (Graves *et al.,* 2010). Cats diagnosed with megaoesophagus will show clinical signs of regurgitation due to the dysmotility of the oesophageal wall to propagate the food into the stomach, thus food is passively expelled out. Cats diagnosed with megaesophagus are at risk of aspiration pneumonia and therefore elevated feeding is recommended as prevention (Graves and Ridgeway, 2010).

There are two treatment optionsfor oesophageal strictures (Alicia, 2009;Fossum, 2007; Slatter, 2003); (1) balloon catheter dilatation or (2) bougienage technique. With balloon catheter dilatation, the balloon at the end of the catheter can be inflated with air or water which then applies a maximal force of stretch at the narrowest point of the oesophageal stricture. The advantage of balloon catheter dilatation is that it generates a stationary radial stretch force at the site of the oesophageal stricture (Alicia, 2009). Bougienage are conical dilatators that exert a considerable longitudinal force with increasing diameter as it is being inserted through the oesophageal stricture. However, the longitudinal shear force generated may increase the risk of oesophageal rupture (Alicia, 2009). Eventhough the bougienage technique has a 50 – 75% success rate, balloon catheter dilatation have been reported to be safer compared to the traditional bouginage technique (Alicia, 2009). In this case, both treatment options were were not practical due to the the small size of the kitten (body weight = 0.80 kg),and a suitable dilator to correct the oesophageal stricture was not available. Recovery of normal oesophageal function in a kitten with diffuse megaoesophagus and anoccult lower oesophageal stricture was reported and the kitten was successfully treated via endoscopic guided balloon catheter dilatation and the kitten weighing 0.57 kg upon initial presentation is now 2.30 kg (Scheider *et al.,* 2014). At times, the interventions or procedures as mentioned above would not be feasible in a small kitten and cost constrained owners often would opt not to proceed with treatment such as in this case. Therefore, maintaining the cat on stomach tube feeding with calculated calories requirement is recommended to prevent starvation and to ensure a good quality of life being maintain for these patients but it would be detrimental if owners were not compliant in caring for these patients. Oesophagitis can be prevented by giving an oral bolus of 6 ml water following tablet administration in cats (Alicia, 2009). Westfall *et al.* (2001) showed that this healthy practice can significantly hasten the passage of the tablet into the stomach. It was seen that in about 90% of cats the tablet would reach the stomach in 30 seconds when treated with 6 ml of water bolus after tablet administration. However, in 36.7% of cats administered with tablets without the bolus of waters, the tablets took much longer to reach the stomach (~ 300 seconds). Healthy practices with bolus water during tablet administration and client education especially when doxycycline is prescribed may significantly hasten the tablet passage through the oesophagus into thus stomach, thus limiting irritation to the oesophagus and reducing the occurrence of oesophagitis and other complications.

CONCLUSION

Doxycycline should be administered properly to cats to avoid any risk of oesophagitis. Tablets can be administered with food or followed by water bolus to reduce the risk of oesophageal retention. Successful balloon catheter dilatation is reported in both cats and dogs with oesophageal stricture. The prognosis of a cat with oesophageal stricture is guarded if treatment is not carried out promptly.

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CONFLICT OF INTEREST

No conflict of interest.

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