

CLINICAL EVALUATION OF ENDOSCOPY FOR DIFFERENTIAL DIAGNOSIS OF UPPER GI DISORDERS IN DOGS

A.A. RANSINGH*, B.K. BHADANE, S.B. AKHARE, S.V. UPADHYE and G.S. KHANTE
Department of Veterinary Surgery and Radiology, Nagpur Veterinary College, Nagpur-440006, India

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ABSTRACT

Upper GI endoscopy was performed in fourteen dogs suffering from upper gastrointestinal disorders brought to the Veterinary Clinical Complex (VCC) of Nagpur Veterinary College, Nagpur during the period of October 2020 to September 2021. A detailed history was obtained followed by physical examination. Plain survey radiography was performed in all fourteen dogs while, positive barium contrast radiography was performed in two dogs. Esophagogastroduodenoscopy (EGD) was performed in all fourteen dogs which helped in the diagnosis of oesophageal nodules, ulcers, erosions, FBs, gastric oesophagus reflex disease (GERD), Barrett's oesophagus and gastric ulcers, erosions and gastritis. EGD proved to be non-helpful in diagnosis of megaesophagus which was later effectively diagnosed by positive contrast radiography. Endoscopic retrieval of oesophageal and gastric foreign bodies was successful in all cases which reduced post-operative care and time. Hence, EGD proved to be an effective tool in differential diagnosis of upper GI disorders.

Keywords: Dogs, Endoscopy, Esophagogastroduodenoscopy, Upper gastrointestinal disorders.

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Various disorders involving single or multiple organ systems in the body give rise to gastrointestinal disturbances manifested by inappetence, anorexia, dysphagia, vomiting, haematemesis, melena or haematochezia, and weight loss. Hence, early and accurate diagnosis is essential to determine the underlying cause to adopt a treatment protocol (Singh *et al.*, 2018). According to Happe (1985), inconclusive or vague results on clinical and radiographic examinations of animals suffering from gastrointestinal disorders require the use of endoscopy for further differentiation of lesions. Upper GI flexible endoscopy has the advantage of being a minimally invasive procedure that is highly beneficial in examining the mucosal surfaces of the upper GI lumen. According to Simpson (2008), photographic recordings of the mucosa allow accurate instantaneous comparisons in time without recourse to surgery. Endoscopy is thus useful for differential diagnosis in animals exhibiting vague clinical signs. Hence, the present study clinically evaluates the value of endoscopy for differential diagnosis of upper GI disturbances.

MATERIALS AND METHODS

Esophagogastroduodenoscopy (EGD) was performed in fourteen dogs irrespective of breed, sex, age and body weight which were brought to the Veterinary Clinical Complex of Nagpur Veterinary College, Nagpur from October 2020 to September 2021. These fourteen dogs suffered from various GI disturbances and included those which were unresponsive to conventional medical treatment (with antibiotics, antacids and antiemetics) or with foreign body obstruction. On clinical presentation, a detailed history was taken followed by physical and

radiographic examination. For further diagnosis, two dogs were subjected to right lateral positive contrast radiography of the cervical and abdominal region using barium sulphate (60% W/V) @ 8-12 ml/kg b.wt. for small dogs and 5-7 ml/kg b.wt. for large dogs. Dehydration status of the patients was assessed and corrected before subjecting them to EGD. All the animals were kept off-feed and water for twelve hours. The dogs were premedicated with Inj. Atropine Sulphate @ 0.04 mg/kg b.wt. S/C. Inj. Xylazine hydrochloride @ 1 mg/kg b.wt. I/M and Inj. Triflupromazine hydrochloride @ 2 mg/kg b.wt. I/M in four dogs with foreign bodies. The dogs were then induced using either Inj. Ketamine Hydrochloride-Diazepam combination @ 5 mg/kg b.wt. and 0.2 mg/kg b.wt. I/V, respectively or Inj. Tiletamine-Zolazepam @ 3 mg/kg b.wt. I/V; and maintained using Isoflurane @ 1-3% vaporiser setting utilizing a semi-close inhalation anaesthetic circuit. The dog was restrained in left lateral recumbency with its neck extended and mouth propped open using a mouth speculum and a roll of micropore tape to prevent accidental champing of the scope. A flexible endoscope manufactured by Karl Storz (model no. 60714 PKS) was used to perform EGD in dogs. Endoscopy was performed using minor movements and air insufflation in order to properly dilate the lumen thus aiding in proper mucosal visualisation. Irrigation and suction were performed wherever required. In the stomach, the scope was retroflexed performing the 'J-manoeuvre' bringing the gastric cardia and the fundus in view followed by 360° rotation of the scope to properly view the cardia and the fundus (the most common site for FB obstruction). The scope was then manoeuvred to visualise the incisura angularis with the cardia above it and the pyloric antrum

*Corresponding author: ashishransingh2212@gmail.com

below it. In four dogs with FBs, flat FBs (n=3) were retrieved using grasping forceps having a jaw span of 1.7 mm while, spherical or ovoid FBs (n=1) were retrieved using a foreign body basket.

RESULTS AND DISCUSSION

The fourteen dogs that underwent EGD exhibited clinical signs such as ptyalism in 4 dogs, haemoptysis in one dog, odynophagia in two dogs, dysphagia in two dogs, inappetence in five dogs, anorexia in two dogs, retching in one dog, vomiting in two dogs, frothy vomiting in two dogs, and regurgitation in three dogs while, two dogs exhibited no clinical manifestations. The duration of clinical signs ranged from one day to two months. Plain survey radiography revealed no abnormalities in twelve out of fourteen dogs, while the presence of a shaving blade and three large pebbles were observed in two dogs, respectively. Contrast radiography was performed in two dogs of which one dog revealed no functional abnormality which was diagnosed as gastric ulcers on EGD while, pooling of barium in the thoracic oesophagus was observed in another dog.

Endoscopy of oesophagus revealed the presence of oesophageal nodules in one dog, oesophagitis in two dogs, Barrett's oesophagus in one dog, oesophageal erosions and ulcerations in one dog, Gastric oesophageal reflux disease in one dog, oesophageal trauma in one dog and oesophageal foreign body in two dogs. The presence of two circumscribed oesophageal nodules a few inches behind the lower esophageal sphincter (LES) was observed in one dog (Fig. 1). Both the nodules appeared smooth, pink with congested blood capillaries noticeable on them. A characteristic lemon-sized oesophageal nodule with a broad base and a nipple-like orifice at the heart base was noted by Suryawanshi *et al.* (2018) which was identified to be a *Spirocerca* nodule. Histology could not be performed in the present study due to lack of owner compliance.

Oesophagitis was noticed in two dogs observed as mild erythema along with pooling of bile in the dependent oesophagus (Fig. 2). Barrett's oesophagus was diagnosed in one dog. EGD revealed the presence of metaplastic oesophageal gastric-type mucosa which appeared as 'tongues' and 'islands' (Fig. 3). Gibson (2010) remarked that Barrett's oesophagus (BE) can be diagnosed on the basis of visual detection of columnar or glandular epithelium above the LES and histopathologic finding of columnar cells with or without goblet cells. They linked the occurrence of BE to consistent irritation of oesophageal mucosa by gastric acid and bile as a result of gastric reflux owing to the reduced tone of LES which is said to be the most common cause of BE. Mucosal erosions and ulcerations of the

oesophageal mucosa was observed in one dog exhibiting inappetence and odynophagia for a month (Fig. 4).

Gastric Esophageal Reflux Disease (GERD) was diagnosed in a dog exhibiting inappetence, dysphagia, ptyalism and regurgitation for 3 weeks. EGD revealed numerous punched out ulcers on the thoracic oesophageal mucosa (Fig. 5). A relatively lax LES was noted on J-manoeuvre. This suggested the possibility of loss of LES tone resulting in gastric acid reflux. Suryawanshi *et al.* (2018) observed reflux oesophagitis seen as mucosal erosions with thickened folds, mucosal irregularity, erythema and haemorrhages in dogs. Sherding and Johnson (2011) stated that reflux oesophagitis may be caused due to functional abnormality of GES as evidenced by the protrusion of gastric mucosal folds through the LES in the present study.

Oesophageal trauma was diagnosed by EGD in a dog with a history of pica, haemoptysis and anorexia. Haemorrhagic streaks and local mucosal trauma in the cervical oesophagus along with dry sticks was noted in the cervical oesophagus (Fig. 6). Doran *et al.* (2008) remarked that acute penetrating injury in dogs was recognised by oral algesia and haemoptysis, but the injury was non-penetrating in the present study. Megaoesophagus was diagnosed in one dog exhibiting regurgitation post feeding for two months. EGD revealed no significant abnormality of the oesophagus (Fig. 8). Also, no obstruction or stricture was noted in the oesophagus. Contrast radiography revealed a dilated oesophagus extending from the 1st thoracic vertebra to the diaphragmatic hiatus, constricting at the thoracic inlet (Fig. 7). Thus, EGD proved of no significant value in diagnosis of megaoesophagus also observed by Sherding and Johnson (2011) as normal oesophagus becomes dilated on insufflation of air during EGD and flaccid due to the influence of general anaesthesia. However, oesophagoscopy made it easier to identify obstructive causes of oesophageal dilatation.

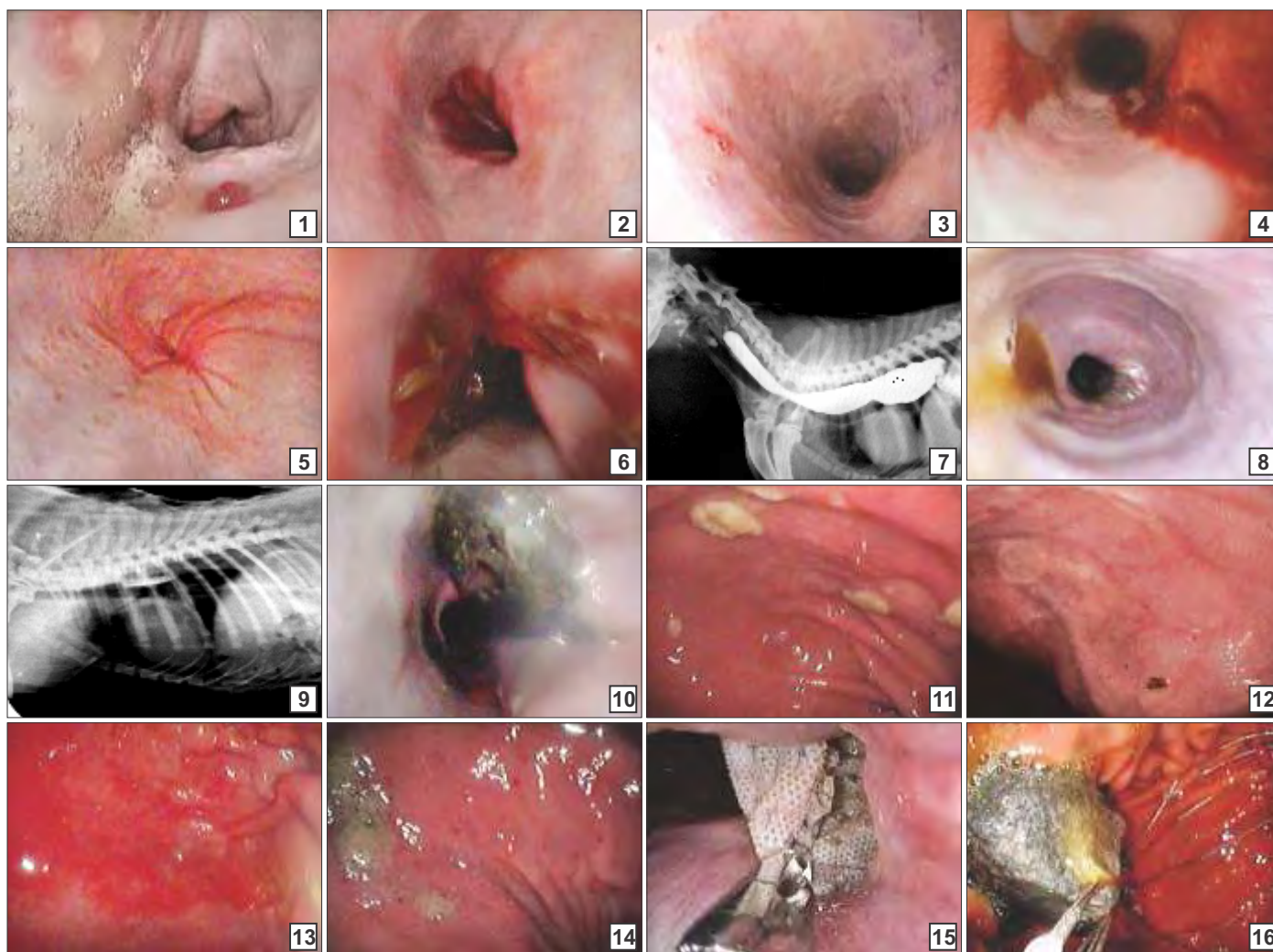
A survey radiograph revealed the presence of a shaving blade in the oesophagus of one dog (Fig. 9). On EGD, the shaving blade was visible in the thoracic oesophagus adjacent to the tracheal impressions (Fig. 10). The blade was then removed with a grasping forceps. Tams and Spector (2011) stated that most of the sharp objects tend to lodge at the thoracic inlet, the heart base or the distal oesophagus just cranial to the EGD as observed in the present study. Endoscopy is considered to be the treatment of choice for oesophageal FBs and is recommended to be performed within 4-12 hours of clinical presentation.

Gastroscopy in dogs revealed the presence of gastric ulcers (n=1), gastric erosion (n=1), gastritis (n=4), and

Table 1
Anamnesis, history/clinical findings, endoscopic findings and diagnosis of dog patients presented to the VCC that underwent EGD

Dog No.	Breed	Age	Sex	History/Clinical findings	Endoscopic findings	Diagnosis
1.	Mongrel	2.5 years	Female	Dysphagia and inappetence for a week	Two smooth, pink circumscribed oesophageal nodules a few inches behind the LES.	Oesophageal nodules
2.	Mongrel	5 years	Female	Ptyalism, vomiting and anorexia for a week	Closed LES with bilious froth. Thickening of the gastric rugae.	Gastritis (Mild)
3.	Rottweiler	1 year	Female	Vomiting 4-6 hrs. after food ingestion since a month	Multiple ulcers with fibrinous plugs. Pooling of bile in the stomach.	Gastric ulcers
4.	German Shepherd Dog	4 years	Male	Frothy vomitus 2-3 times/day, inappetence for 2 weeks	Mild erythema with erythematous streaks on oesophageal mucosa at level of LES. Pooling of bile in the dependent oesophagus and stomach. Diffuse moderate to severe erythema of gastric mucosa.	Mild esophagitis and gastritis (Moderate)
5.	Labrador Retriever	4 years	Female	Ptyalism, persistent regurgitation, inappetence and odynophagia since a month	Apparent red to dark red, slightly elevated gastric-type oesophageal mucosa extending upwards from the LES.	Reflux esophagitis (Barrett's oesophagus)
6.	Pomeranian	1.2 years	Male	Ptyalism and vomiting for 1 week	Diffuse to patchy moderate-severe mucosal erythema of the gastric body and antral mucosa. Pooling of bile in the stomach.	Gastritis (Moderate)
7.	Mongrel	2 years	Male	Intermittent frothy vomiting for 2 weeks	A smooth, denuded irregular patch on the gastric wall.	Gastric erosion
8.	Labrador Retriever	3 years	Male	Inappetence and odynophagia for 3 weeks	Presence of diffusely spread mucosal erosions, ulcerations and hyperaemia of the oesophagus.	Oesophageal erosions and ulcers
9.	Rottweiler	9 years	Female	H/o ingestion of sanitary pads 1 day ago	One sanitary pad and shreds of plastic wrap were observed in the fundus along with food material just distal to the cardia.	Gastric FB: Sanitary pads
10.	Labrador Retriever	6 years	Female	Regurgitation immediately post feeding for 2 months	Insignificant, dilated distal thoracic oesophagus with pooling of bile in the dependent part.	Megaoesophagus
11.	Mongrel	2 years	Female	Inappetence, dysphagia, lip-smacking and regurgitation since a month	Numerous punched out ulcers on the thoracic oesophageal mucosa along with a relatively lax LES resulting in protrusion of the gastric mucosal folds, noted on J-manoeuvre. Pooling of bile noted in the dependent oesophagus.	Gastroesophageal Reflux Disease (GERD)
12.	Mongrel	5 months	Male	Haemoptysis and anorexia since a day	Haemorrhagic streaks and presence of dry vegetative matter in the cervical oesophagus. Erythema of the oesophageal mucosa.	Oesophageal trauma and oesophagitis

13.	Mongrel	7 months	Male	Ingestion of shaving blade a day ago	Shaving blade visible adjacent to the tracheal impressions on the thoracic oesophagus. Haemorrhagic abrasive streaks and petechiae on the cardiac and antral mucosa, respectively. Haemorrhages noted at pyloric sphincter.	Oesophageal FB with mild antral gastritis
14.	Rottweiler	1.2 years	Female	Anorexia and retching after ingestion of pebbles for 2 days	Three large pebbles observed at the gastric cardia.	Gastric FB: Pebbles



Figs. 1-16. (1) Two circumscribed oesophageal nodules; (2) Erythema of the oesophageal mucosa; (3) Barrett's oesophagus; (4) Erosions and ulcers of oesophagus; (5) GERD—Pin-point oesophageal ulcers; (6) Oesophageal trauma; (7) Pooling of barium in cervical and thoracic dilated oesophagus; (8) Megaoesophagus-Insignificant, dilated distal thoracic oesophagus; (9) Left lateral radiograph-Shaving blade seen at the base of heart; (10) Shaving blade in the thoracic oesophagus adjacent to the trachea; (11) Gastric ulcers with necrotic base; (12) Gastric erosion; (13) Gastritis-Erythema of the gastric mucosa; (14) Gastritis - Petechiae on the pyloric antral mucosa; (15) Retrieval of sanitary pad using grasping forceps; (16) Retrieval of large pebble using a foreign body basket.

gastric foreign bodies (n=2). Multiple gastric ulcers with a fibrinous or necrotic base were observed on the gastric mucosa (body) on EGD in a dog (Fig. 11). A smooth, denuded irregular patch diagnosed as gastric erosion was noticed on the gastric wall of a dog presented with a complaint of intermittent frothy vomiting since two weeks (Fig. 12). Moderate gastritis was diagnosed in two dogs while mild gastritis was diagnosed in one dog. EGD

revealed diffuse to patchy, moderate to severe mucosal erythema of the gastric body and antral mucosa along with petechiation (Fig. 14). Bilious froth, thickened gastric rugae and pooling of bile were also observed. Suryawanshi *et al.* (2018) observed gastric mucosal petechiation and erosion with congested mucosa similar to the present study.

Gastric foreign bodies were diagnosed endoscopically in two dogs which were retrieved per orally using grasping

forceps (sanitary pads) and foreign body basket (pebbles). On EGD, two sanitary pads were noticed adhered to the gastric wall adjacent to the cardia in one dog (Fig. 15) while three large pebbles were observed at the gastric cardia (Fig. 16). Tams and Spector, (2011) remarked that non-pliable foreign bodies such as leather and plastic might get impacted in the antrum, pylorus and cardia. Also, after passage from the stomach, FBs may get obstructed in the duodenal angle, ileocecal valve and the anus. Hence, FBs suspected to get obstructed in these areas of anatomical narrowing can be removed endoscopically as performed in the present study. Endoscopy proved to be very useful in the non-invasive removal of FBs without recourse to surgery as also reported by Lotlikar *et al.* (2020) and Saharan *et al.* (2018).

Endoscopy proved to be a very important aid for the differential diagnosis of upper GI disorders which have very similar presenting clinical signs. Proper diagnosis thus helps in selecting a proper therapeutic regimen making the treatment productive and cost-effective.

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