

OESOPHAGOSCOPY AND ENDOSCOPIC AIDED REMOVAL OF OESOPHAGEAL FOREIGN BODIES IN CAMEL CALVES (*Camelus dromedarius*)

T. Shawaf¹, O.R. Ramadan¹, A. Elnahas^{1,2}, I. Eljalii¹ and M.F. Al Salman¹

¹Department of clinical studies, College of Veterinary Studies, King Faisal University, Al Hasa Box 400, Kingdom Saudi Arabia

²Large Animal Clinic for Surgery, Leipzig University, Germany

ABSTRACT

In this study, endoscopy was used to confirm a presumptive diagnosis of oesophageal foreign body in 8 camel calves and it helped retrieval of the foreign bodies by an alligator forceps. The main clinical signs observed were regurgitation of food and liquids immediately after feeding, hypersalivation and inappetance. All procedures were performed under sedation. Endoscopic removal of the oesophageal foreign bodies using alligator forceps was found safe and effective.

Key words: Alligator forceps, camel, endoscopy, foreign bodies, oesophagus obstruction

Oesophageal disorders are relatively uncommon in large animals (Marzok *et al*, 2015). Oesophageal obstruction in ruminants is relatively frequent (Singh and Maghrabi, 1993; Marzok *et al*, 2015). Dry feed, rags, wool balls, polythene bags and rubber balls were the most common causative agents that have been reported in camels (Ramadan and Abdin-Bey, 1990). Ingestion of foreign bodies causing oesophageal obstruction could be attributed to pica and craving appetite (Singh and Maghrabi, 1993). Diagnosis of oesophageal obstruction is achieved in systematic manner. External palpation of the cervical region may be used to confirm the presence of an object lodged in the cervical oesophagus (Haven, 1990). Additional diagnostic tools besides the clinical signs and external palpation, may help to determine the location of an obstruction; these include oral examination, probangs or stomach tubes, oesophageal ultrasonography, oesophageal endoscopy and radiography of the cervical and thoracic oesophagus (Marzok *et al*, 2015). In comparing to ultrasonography, the endoscopic examination has the advantages of examining the oesophageal mucosa (Stierschneider *et al*, 2007). Most cases of oesophageal obstruction should be treated as an emergency as increased pressure on the oesophageal mucosa by the foreign object is likely to cause a tissue damage with consequent formation of scar tissue, stenosis, stricture and even oesophageal perforation (Feige *et al*, 2000). The high

rate of complications associated with conventional oesophageal surgery was attributed to many factors. The latter include the lack of a serosal layer, physical trauma caused by food deglutition, reverse peristalsis and the nature of the segmental blood supply of the oesophagus (Meagher and Mayhew, 1978). Incisional dehiscence, stricture formation, cellulitis, oesophageal diverticulum formation, the development of fistulae and the resultant anorexia and failure to gain weight are the main post-operative complications associated with an oesophagotomy (Church *et al*, 1972; Ruben, 1977; Haven, 1990; Smith *et al*, 2008b).

In man, endoscopic removal of oesophageal foreign bodies is the gold standard and most interventions are done without major complications (Shafique *et al*, 2013). A flexible endoscope is the mainstay as it permits direct visual evaluation of foreign objects and allows assessment of oesophageal mucosa and its integrity (Arantes *et al*, 2009). However, only about 10%–20% of cases of oesophageal foreign bodies require endoscopic removal, while less than 1% of the cases require surgery for foreign body extraction and or to treat complications (Telford, 2005; Ambe *et al*, 2012). An endoscope and a forceps are generally used to visualise and remove the oesophageal foreign bodies (Seo, 1999). Flexible endoscopy is the best diagnostic and therapeutic approach for the management of foreign bodies and food bolus impaction in the upper gastrointestinal tract, with a success rate greater than 95% (Chen

SEND REPRINT REQUEST TO T. SHAWAF [email: tshawaf@kfu.edu.sa](mailto:tshawaf@kfu.edu.sa)

et al, 2013; Dray and Cattan, 2013; Sugawa *et al*, 2014). Endoscopic assisted removal of foreign bodies causing oesophageal obstruction in camel has not been reported previously. This study was designed to remove oesophageal foreign bodies with an alligator forceps under endoscopic guidance in camel calves.

Materials and Methods

Animals

Eight (3 females, 5 males) camel calves (*Camelus dromedarius*) aging between 14 to 120 days and body weights from 32 to 80 kg were presented to the Veterinary Teaching Hospital, College of Veterinary Medicine, King Faisal University with common clinical signs of salivation, dysphagia, regurgitation and swelling in the neck area. All animals were subjected to clinical and endoscopic examinations.

Instruments

A flexible endoscope (VetVu, a unit of Swiss Precision Products) with 8mm diameter, 110 cm long supported with an insufflation system, light source and irrigation system was used in all camel calves. To protect the endoscope from damage, a Gunther's mouth Gag (Eickeymeyer, Germany) was used to keep the oral cavity open during endoscopy procedures. A surgical suction unit (New Askir, Italy) was used to aspirate the oesophageal fluid. A grasping alligator forceps (Eickeymeyer, Germany) with 80 cm long arms (Fig 1).

Oesophagoscopy procedure

Oesophagoscopy was performed with the animal secured over a table in sternal recumbency position after sedation with xylazine (Rompun; Bayer Health Care) at the dose of 0.1mg/kg body weight. A mouth gag was placed to keep the oral cavity open in order to facilitate the entrance of the endoscope. After good restraint of the head and the neck, the endoscope was inserted via oral cavity, pharynx into the oesophagus. An insufflation and irrigation system of the endoscope were used to optimal visibility during the examination. In some animals, suction system was used to aspirate the fluid located in the oesophagus. The mucosal lumen of the oesophagus was evaluated for the abnormal findings and contents.

Removal procedure

The upper airway and the oesophagus were endoscopically examined through mouth using the video-endoscope. The endoscope was inserted through the gag into the mouth and oesophagus to identify the foreign bodies and distance from the

mouth opening to foreign body was measured. The obstructive area in oesophagus was washed in some cases through the channel of the endoscope using 50 ml NaCl 0.9% solution to visualise the foreign body. The fluid was injected through the noses of endoscope and regained using fluid suction device. Thereafter, the alligator forceps was inserted to grasp the end of the foreign body and it was removed smoothly (Figs 2, 3). The procedure was repeated as many times as needed depending on the type, size and location of foreign body. Final confirmation of complete removal of the foreign body mass was made by flushing 300 ml of normal saline through the mouth.

All patients received a five day course of penicillin and streptomycin (Norbrook Laboratories, UK) at a dose rate of 1 ml/25kg body weight, Flunixin meglumine (MSD, Germany) was given intravenously at a dose rate of 2ml/50 kg body weight for three days. The camel calves were given access to suckle milk or food after 12 hours. Follow-up information was obtained for period of successive two months via telephone communication with owners.

Results

Seven out of the 8 examined animals were younger than 3 months and showed complete obstruction in the cervical oesophagus. Most of the removed foreign bodies were plastic bags (50%), clothes pieces (25%) and plastic bags mixed with sand (25%) as shown in Table 1 and Figs 4, 5, 6.

Moreover, we noticed that the location of the foreign body in the younger animals (<1 month) was in the upper third part of the neck and its distance from the mouth opening was about 60 cm, while in the elder animals (>1month) it was in the middle third of the neck and its distance was about 80 cm. The length of the removed foreign bodies ranged 16-25 cm. In most cases (87.5%) there was a complete oesophageal obstruction hence big amount of fluid accumulation proximal to the foreign body was seen. Oesophageal mucosal ulceration was observed endoscopically after removal of plastic foreign bodies.

Discussion

Despite its wide use in small animals and equine practice, oesophageal endoscopy reports in camels are very scarce (Ramadan, 2016). Oesophagoscopy is a valuable, non-invasive imaging procedure in ruminants (Franz and Baumgartner, 2002). Furthermore, conventional oesophageal surgery harbours a high rate of complications and many factors have been implicated (Haven, 1990; Ramadan, 2016). Endoscopic examination was useful to confirm the location of the

Table 1. Summary data for 8 calf camels (5 males, 3 females) with oesophageal obstructions.

Variable	Sex		Age		
	Male	Female	<1 month	1-3 Month	4 month
Type of obstruction					
Complete	5 (62.5%)	2 (25%)	4 (50%)	3 (37.5%)	0 (0%)
Incomplete	0 (0%)	1 (12.5%)	0 (0%)	0 (0%)	1 (12.5%)
Type of the foreign body					
Cloth pieces	2 (25%)	0 (0%)	1 (0%)	1(12.5%)	0 (0%%)
Plastic bags	2 (25%)	2 (25%)	2 (37.5%)	2 (25%)	1 (12.5)
Plastic bags with food materials or sand	1 (12.5%)	1 (12.5%)	1 (12.5%)	1 (0%)	0 (0%)
Total	5 (62.5%)	3 (37.5%)	4 (50%)	3 (37.5%)	1 (12.5%)

Per cent in all values is calculated from the total examined animals.

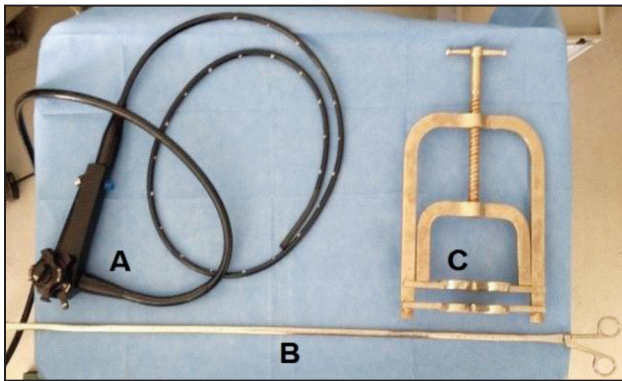


Fig 1. A: Endoscope, B: Alligator forceps, C: Gunther's mouth Gag.



Fig 2. Endoscopic view showing a foreign body being grasped with an alligator forceps.



Fig 3. Performing removal of foreign body using alligator forceps under endoscopic guidance.



Fig 4. Foreign body (plastic bags) with sand in the cervical region of oesophagus of a 28 days old camel.

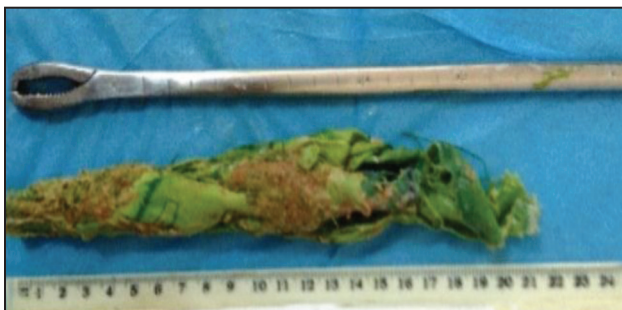


Fig 5. A cloth piece being retrieved from the oesophagus.



Fig 6. A plastic material mixed with food material retrieved from the oesophagus.

foreign bodies as well as the determination of abnormal anatomical changes which helps in the diagnosis and prognosis (Stierschneider *et al*, 2007). Dry feed, rags, wool balls, polythene bags and rubber balls were the most causes of oesophageal obstruction that have been reported in camels (Ramadan and Abdin-Bey, 1990). It is highly interesting that technique employs an alligator forceps under endoscopic guidance to remove oesophageal foreign body from camel calves. In the present study, it is surprising that most of the camel calves (87.5%) that had oesophageal obstruction were younger than 3 months, although these animals were suckling. The pre-dominant cause of oesophageal obstruction in this study was ingestion of plastic bags which could be present in the animal environment (Marzok *et al*, 2015). Most of obstructive objects in examined camel were either in the pharyngeal entrance (Smith, 2008a), cervical region or just at the thoracic entrance (Ramadan and Abdin-Bey, 1990). These anatomical locations ease their removal without surgical manipulation using alligator under endoscopic guidance (Ramadan and Abdin-Bey, 1990; Smith, 2008a).

Removal of most oesophageal foreign bodies were accomplished under sedation thus avoided risks associated with general anaesthesia in young animals (Gomez *et al*, 2014). Furthermore, the complications of oesophagotomy were also avoided (Haven, 1990; Ramadan, 2016).

In humans, fiberoptic-endoscopic management of oesophageal obstruction of the upper gastrointestinal tract was successful in 92% of food impactions and 76% of true foreign bodies (Vizcarrondo *et al*, 1983; Arantes *et al*, 2009). The success rates for endoscopic removal or dislodgement of oesophageal foreign bodies in dogs ranged from 26% to 85% (Gianella *et al*, 2009). Ruminant tympany was not observed in most oesophageal obstruction camel calves as these were yet to start rumination hence had a favourable effect on the prognosis of the recovery (Ramadan *et al*, 1986).

In conclusion, ingestion of foreign bodies is not uncommon in camels. However, in young camels, endoscopic removal of oesophageal foreign bodies using alligator forceps under endoscopic guidance was an effective and safe procedure.

Acknowledgements

The authors would like to thank the authorities of Veterinary Teaching Hospital, College of Veterinary Medicine, King Faisal University (Al-

Hasa, Saudi Arabia) for their kind cooperation in conducting this valuable study.

References

- Ambe P, Weber SA, Schauer M and Knoefel WT (2012). Swallowed foreign bodies in adults. *Deutsches Arzteblatt International* 109:869-75.
- Arantes V, Campolina C, Valerio SH, de Sa RN, Toledo C, Ferrari TA and Coelho LG (2009). Flexible oesophagoscopy as a diagnostic tool for traumatic esophageal injuries. *The Journal of Trauma* 66:1677-82.
- Chen T, Wu HF, Shi Q, Zhou PH, Chen SY, Xu MD, Zhong YS and Yao LQ (2013). Endoscopic management of impacted oesophageal foreign bodies. *Diseases of the Oesophagus. Official Journal of the International Society for Diseases of the Oesophagus* 26:799-806.
- Church TL, Niwa JE and Clark GR (1972). The use of Thygesen's probang in the treatment of bovine esophageal obstruction due to sugar beets. *The Canadian Veterinary Journal (La Revue Veterinaire Canadienne)* 13:226-227.
- Dray X and Cattani P (2013). Foreign bodies and caustic lesions. *Best practice and research. Clinical Gastroenterology* 27:679-89.
- Feige K, Schwarzwald C, Furst A and Kaser-Hotz B (2000). Oesophageal obstruction in horses: a retrospective study of 34 cases. *The Canadian Veterinary Journal (La Revue Veterinaire Canadienne)* 41:207-210.
- Franz S and Baumgartner W (2002). A retrospective study of oesophageal endoscopy in cattle - oesophagoscopy for diagnosis of mucosal disease. *Veterinary Journal* 163:205-210.
- Gianella P, Pfammatter NS and Burgener IA (2009). Oesophageal and gastric endoscopic foreign body removal: complications and follow-up of 102 dogs. *The Journal of Small Animal Practice* 50:649-654.
- Gomez DE, Cribb NC, Arroyo LG, Desrochers A, Fecteau G and Nichols S (2014). Endoscopic removal of oesophageal and ruminal foreign bodies in 5 Holstein calves. *The Canadian Veterinary Journal (La Revue Veterinaire Canadienne)* 55:965-969.
- Haven ML (1990). Bovine oesophageal surgery. *The Veterinary Clinics of North America. Food Animal Practice* 6:359-369.
- Marzok M, Moustafa A, El-Khodery S and Müller S (2015). Esophageal obstruction in water buffalo (*Bubalus bubalis*): a retrospective study of 44 cases (2006-2013). *Turkish Journal of Veterinary and Animal Sciences* 39:233-240.
- Meagher DM and Mayhew IG (1978). The surgical treatment of upper esophageal obstruction in the bovine. *The Canadian Veterinary Journal (La Revue Veterinaire Canadienne)* 19:128-32.
- Ramadan R (2016). *Advances in Surgery and Diagnostic Imaging of the Dromedary Camel*. King Faisal University, Saudi Arabia.
- Ramadan R, Kock RA and Higgins AJ (1986). Observations on the diagnosis and treatment of surgical conditions in the camel. *British Veterinary Journal* 142:75-89.

- Ramadan RO and Abdi-Bey MR (1990). Obstruction of the oesophagus in camels. *Indian Veterinary Journal* 67: 363-364.
- Ruben JM (1977). Surgical removal of a foreign body from the bovine oesophagus. *The Veterinary Record* 100:220.
- Seo JK (1999). Endoscopic management of gastrointestinal foreign bodies in children. *Indian Journal of Paediatrics* 66:S75-80.
- Shafique M, Yaqub S, Lie ES, Dahl V, Olsbo F and Rokke O (2013). New and safe treatment of food impacted in the oesophagus: a single center experience of 100 consecutive cases. *Gastroenterology Research and Practice* 2013:142703.
- Singh S and Maghrabi M (1993). Small bowel obstruction caused by recurrent cystic lymphangioma. *The British Journal of Surgery* 80:1012.
- Smith B (2008a). *Large Animal Internal Medicine*. 4th edn, St. Louis, MO, USA: Mosby. Smith B, Von Pfeil D, Schulz K, Klocke E, Borgarelli M and Anderson D (2008b). Unusual cause of esophageal choke: Vascular ring anomaly in an alpaca cria. *Alpaca Magazine* 18:168-172.
- Stierschneider M, Franz S and Baumgartner (2007). Endoscopic examination of the upper respiratory tract and oesophagus in small ruminants: Technique and normal appearance. *Veterinary Journal* 173:101-108.
- Sugawa C, Ono H, Taleb M and Lucas CE (2014). Endoscopic management of foreign bodies in the upper gastrointestinal tract: A review. *World Journal of Gastrointestinal Endoscopy* 6:475-481.
- Telford JJ (2005). Management of ingested foreign bodies. *Canadian journal of gastroenterology. Journal Canadien de Gastroenterologie* 19:599-601.
- Vizcarrondo FJ, Brady PG and Nord HJ (1983). Foreign bodies of the upper gastrointestinal tract. *Gastrointestinal Endoscopy* 29:208-10.