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Novel and minimally invasive technique to retrieve oesophageal foreign bodies in cattle

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Abstract

Choke is one of the emergency conditions of bovine alimentary tract requiring surgical intervention. Till date various methods of foreign body retrieval were on record. We invented a novel and minimally invasive technique of retrieving foreign body from oesophagus. 6 cattle presented to our clinic with signs of acute oesophageal obstruction at various levels after ingesting various types of vegetables/fruits. They showed signs of acute bloat, dyspnoea, restlessness and severe ptyalism. In all, futile attempts were made to manually retrieve foreign bodies. Hence, foreign bodies were removed by using a specially designed needle (of length 8 - 10 cm and diameter 1.3 - 1.4 mm) and a wire that was fixed into the foreign body and retrieved orally.

Keywords: cattle, choke, needle and wire technique, minimally invasive method

Introduction

Complete oesophageal obstruction or choke is one of the important and an emergency condition of alimentary tract requiring surgical intervention (Smith, 2008) [10]. Complete obstruction blocks the eructation process thus causing life threatening bloat (Viswanatha *et al.*, 2011). Stray cattle were more prone to choke due to their indiscriminate feeding behaviour. Earlier reports envisage retrieval of various foreign bodies like mango (Saibaba *et al.*, 2017) [9], tarpaulin cloth (Sreenu and Sureshkumar, 2001) [11], beet root (Prakash *et al.*, 2014) [7], tricho-phytobezoar (Gangwar *et al.*, 2013) [1]. Diagnosis could be done easily based on history, clinical signs and radiography. The cranial or mid cervical obstructions were relieved manually after pushing towards gullet (Manjunatha *et al.*, 2018) [4], but complete immovable obstructions or caudal cervical obstructions necessitated surgical intervention (Sreenu and Sureshkumar, 2001; Viswanatha *et al.*, 2011) [11]. Oesophagus is a motile organ and if it is coupled with improper post-operative care can lead to some complications like fistula formation, suture dehiscence, oesophageal stricture, etc. (Ruben, 1997) [8]. These may prolong healing, reduce value of animal leading to culling and sometimes end fatally. This would be uneconomical to a farmer. Hence we invented a novel minimally invasive technique of retrieving caudal cervical oesophageal foreign bodies in cattle that avoids surgery, very safe for the animal and economical to the farmer too.

Materials and Methods

Six cattle of different breeds and ages were presented to the Dept. of Veterinary Surgery and Radiology, Veterinary College, Hebbal, Bengaluru with history of choking after ingesting vegetables/fruits followed by severe acute bloat (Fig. 1) and laboured breathing for a period of 4 to 18 hours (Table 1).

Clinically they were dyspnoeic, with severe bloat, palpable swelling at mid to caudal cervical region, restlessness, severe ptyalism, regurgitation through nostrils and cough. Physiologically they were tachycardiac (104 - 120 beats/min), hyperpnoeic (42 - 52 breaths/min) and normal to hyperthermic (100.2 °F -103.0 °F). Plain radiographs revealed gas in oesophagus and displaced trachea but foreign body was not visible (Fig. 2) which could be figured out on contrast radiograph after barium swallow (Fig. 3). Haematological and biochemical parameters were in normal range.

Materials used

1. 8 - 10 cm long and 1.3 - 1.4 mm luminal diameter, specially designed needle without hub

- and curved in shape with eye facing the curve.
- 2. 1.0 - 1.2 mm thick 2 m long nylon wire
- 3. Vernel's mouth gag
- 4. 2% lignocaine hydrochloride

Results

Three animals presented with open mouth breathing were immediately trocarized under local anaesthesia (Fig. 4) to relieve severe bloat as they were presented in odd hours. In other two animals, which were not much dyspnoeic, the bloat was relieved by needle puncture using 16 G hypodermic needle. Futile attempts were made to retrieve the foreign body orally after opening the mouth using Vernel's mouth gag. Hence we decided to retrieve them using needle and wire technique. For this the animals were restrained in standing position in a trevis. The swollen/obstructed area over left side of neck was prepared aseptically and infiltrated with 5 ml of 2% lignocaine hydrochloride over the swelling. Mouth is slightly opened using Vernel's mouth gag. The foreign body is pushed towards left lateral side and fixed on both ends by hands without pressurizing either trachea or jugular vein. The needle is passed through the mass by puncturing skin and oesophagus (Fig. 5), so that the tip just passes the foreign

body and stays in the oesophageal lumen. Entry of needle tip in to oesophageal lumen was confirmed by flow of saliva mixed with or without barium through needle lumen to the exterior (Fig. 6). Then a long nylon wire is passed through the needle lumen till it comes out of mouth. The end of needle staying on the skin was tightly pinched at 2 or 3 places including the wire so that it gets trapped inside the needle lumen (just like the catgut inserted into swaged suture needles). Now the wire at oral end was pulled out carefully while simultaneously pushing the foreign body in oesophagus towards gullet (Fig. 7). The needle puncture site at cervical region was dressed with povidone iodine solution and applied povidone iodine ointment. The puncture due to trocarization of rumen of 3 animals made for relieving bloat was closed routinely. Later, they were administered with streptopenicillin 2.5 - 5 g and inj. Meloxicam @ 0.3 mg/kg b. wt. i. m. All animals consumed water immediately after the procedure without any difficulty (Fig. 8). Post-operative barium swallow revealed complete passage of barium and no leakage from the site of needle insertion (Fig. 9). The size of the retrieved foreign bodies (Fig. 10) was measured using vernier callipers (Fig. 11) and tabulated as shown below.

Table 1: Details of cattle presented and their respective seats of obstruction

S. No.	Breed of cattle	Age	Site of obstruction	Duration of illness
1.	HF	7 yrs.	Caudal cervical	2 hrs.
2.	HF	5 yrs.	Mid cervical	12 hrs.
3.	Jersey	6 yrs.	Mid cervical	18 hrs.
4.	Non - descript	5 yrs.	Caudal cervical	8 hrs.
5.	HF	3 yrs.	Caudal cervical	9 hrs.
6.	HF	5 yrs.	Caudal cervical	15 hrs.

Table 2: Table showing types of foreign body retrieved and their measurements

S. No.	Breed of cattle	Type of foreign body retrieved	Measurements
1.	HF	Beet root	4.8 cm
2.	HF	Knol-khol bulb	5.1 cm
3.	Jersey	Beet root	4.7 cm
4.	Non - descript	Mango	5.3 cm
5.	HF	Guava	4.5 cm
6.	HF	Hair ball	4.3 cm

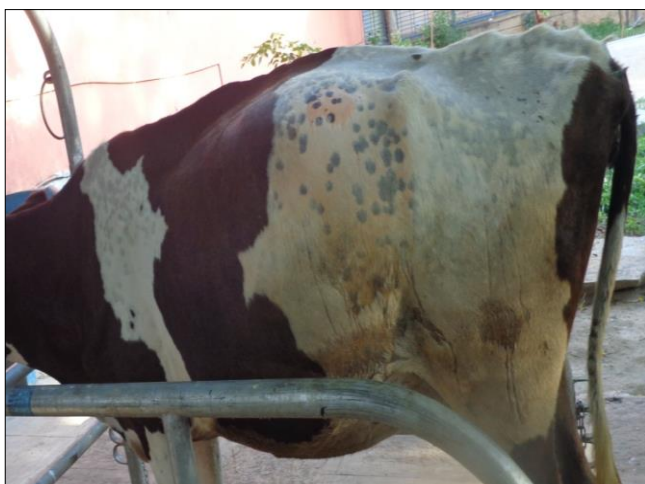


Fig 1: Photograph showing animal with distended left flank due to bloat

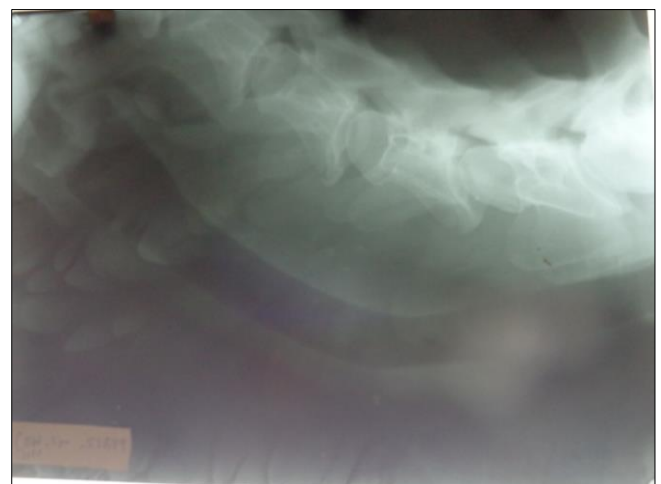


Fig 2: Skiagram showing plain survey radiograph indicating displacement of trachea



Fig 3: Skiagram with barium swallow showing complete blockage of barium before spherical mass



Fig 6: Photograph showing leakage of saliva mixed with barium through the needle indicating needle placement in oesophageal lumen



Fig 4: Photograph showing cannulated rumen to relieve bloat



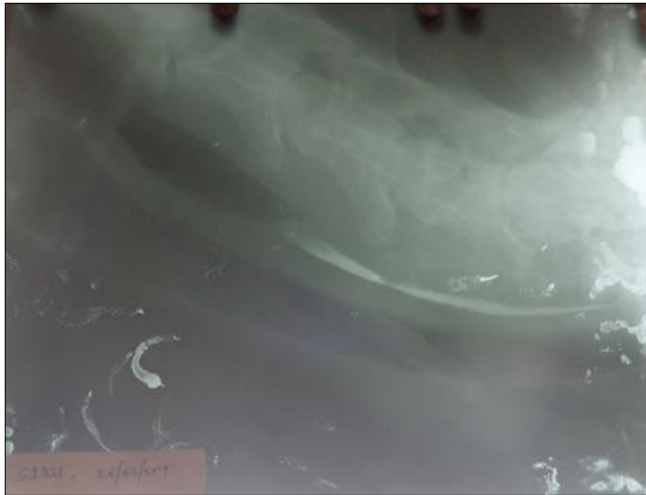
Fig 7: Photograph showing retrieved mango



Fig 5: Photograph showing insertion of specially designed needle in to the obstructing mass

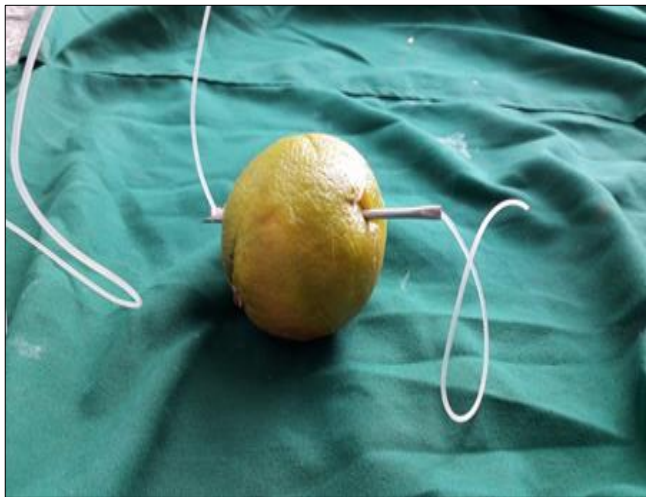


Fig 8: Photograph showing water intake by animal immediately after the manoeuvre



Note: trachea in straight and normal position

Fig 9: Skiagram showing barium swallow passing through cleared oesophagus without any leakage into the needle insertion site



Note: Pinched end of the needle

Fig 10: Photograph showing retrieved orange attached to wire



Fig 11: Photograph showing measuring retrieved guava fruit by Vernier calliper

Discussion

Incidence of choke is more in stray cattle owing to their indiscriminate feeding habits. In cattle, mostly choke occurs at the level of caudal cervical oesophagus due to their anatomical trumpet shape and narrowed lumen (Haven, 1990)

[2]. The signs encountered in these cases *viz.*, acute bloat, restlessness, swelling in cervical region, regurgitation through nostrils were also reported by Sreenu and Sureshkumar (2001) [11] and Viswanatha *et al.*, (2018). The signs of dyspnoea and respiratory sounds were produced due to pressure over the trachea by oesophageal foreign body and reduced respiratory space resultant of bloat due to blockage of eructation (Marzok *et al.*, 2015) [5]. Hence the animals were trocarized to relieve severe bloat and facilitate breathing. Diagnosis of choke in these animals was done based on history, clinical signs, palpation and contrast radiography. Radiography is one of the best diagnostic aids in confirming the site and type of obstruction (Marzok *et al.*, 2015) [5], however, use of ultrasonography was also on record (Manjunatha *et al.*, 2018) [4].

Cranial cervical choke could be relieved manually in conservative manner after applying mouth gag (Manjunatha *et al.*, 2018) [4] and is a best method to follow. But, the disadvantages include that, (i) one should be cautious while placing hand in the bovine oral cavity; else the animal may crush the hand if not restrained properly. (ii) On the other way the person keeping the hand in pharynx may damage the mucous membrane. (iii) And extensive pulling out of the tongue may damage the hyoid apparatus leading to tongue dysfunction.

Retrieval of foreign bodies through oesophagotomy is another age old technique followed by many surgeons (Hofmeyer, 1974; Veena *et al.*, 2000 [4]; Sreenu and Sureshkumar, 2001) [11]. It also had some complications like suture dehiscence, oesophageal fistula formation, oesophageal stricture formation, necrosis, etc. (Ruben, 1997) [8]. In bovines, chances of fistula formation are more due to absence of serosal layer in oesophagus and segmented blood supply. To avoid these complications we invented a new minimally invasive technique in which the foreign body can be retrieved orally. Advantages of this technique over non-invasive method include (i) avoided damage to the person keeping hand in mouth, (ii) avoided damage to mucous membrane and (iii) tongue also need not be pulled out with tension. Advantages over invasive method i.e. oesophagotomy include (i) prevent suture dehiscence; (ii) prevent fistula formation, stricture formation as the needle puncture in oesophagus was of a size of needle hole itself. This puncture also will get closed once the foreign body is removed and oesophagus comes to its normal luminal diameter; (iv) animal can take water and solid food immediately post manoeuvre. This was confirmed by immediate water and solid food intake by the animal and post-operative barium swallow radiograph.

Conclusion

To conclude, the cases of choke must be attended on emergency basis. Minimally invasive techniques like these are proved to be safe and can be followed at field level also.

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