Oesophageal foreign bodies: treatment and complications

Author : ROB WHITE

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ROB WHITE BSc(Hons), BVetMed, CertVA, DSAS(ST), DipECVS, MRCVS following part one (*VT*44.40) of his article, moves on to discuss treatments available for the management of oesophageal foreign bodies in dogs and cats

ENDOSCOPIC removal of a foreign object is generally considered the most effective way to manage the majority of cases in the first instance.

The object should be grasped with forceps (and) and rotated slightly to free it before an attempt to remove it in an orad direction. Extreme care must be taken during this procedure to minimise the incidence of iatrogenic damage of the oesophageal wall.

Knowing how hard to safely pull on a “fixed” foreign body is very difficult to describe. There is little doubt there is a “knack” to the procedure that only comes from experience. The following list of tips might prove helpful.

• The use of a large bore rigid endoscope is often preferred to that of an expensive flexible endoscope. A large bore rigid endoscope will allow the use of robust retrieval forceps that can be passed down the lumen of the endoscope itself. The rigid wall of the endoscope can be used to distend the oesophagus aiding in the removal of the object.

It is very helpful if the endoscope has an integral light source. For small terrier breeds (and the majority of dogs less than 20kg in weight) the author uses a stainless steel human fibre optic sigmoidoscope (and). An advantage of the sigmoidoscope is that, in addition to its fibre-optic light source, it also has an integral hand pump-operated air insufflator. The gentle insufflation of air

will allow the oesophagus adjacent to the foreign body to be distended. Such distension will often greatly assist in the initial mobilisation of the foreign body.

For smaller dogs and cats, a similar human paediatric fibre optic sigmoidoscope may be used as an alternative. Alternatively, if it proves difficult to obtain such an instrument it is possible to construct a very effective rigid endoscope from materials that can be purchased from the plumbing section of a DIY store (' ' and).

• Insufflation should always be performed with care due to the risk of perforation associated with distension of a diseased or damaged oesophagus.

This can be sudden and life threatening (development of a tension pneumothorax in the case of continued insufflation following oesophageal rupture) and so it is essential preparations are made for prompt percutaneous thoracic drainage if this should occur.

• The largest rigid endoscope possible should be used as this can help dilate the proximal oesophagus and aid removal of the foreign body.

• Flexible fibre-optic or video-endoscopes can also be very useful since most will have the facility for insufflation of the oesophagus, improving visualisation and aiding removal of the object.

It can sometimes be very helpful to combine the benefits of a rigid endoscope (large, rigid lumen) with the benefits of a flexible endoscope (light source and insufflation). Insertion of a flexible endoscope through a rigid tube (into which the foreign body will fit) is most applicable to the removal of sharp, pointed foreign bodies such as fish hooks since the rigid outer tube will protect the mucosa of the oesophagus during extraction of the object (Michels et al, 1995; Gianella et al, 2009).

• The use of forceps that pass down the biopsy channel of a flexible endoscope will almost invariably be too small and not robust enough to remove the majority of oesophageal foreign bodies. The one exception might be removal of fish hooks (Michels et al, 1995) – but, see the next point.

• Great care should be exercised if using a flexible endoscope for the removal of very sharp foreign bodies such as fish hooks. It is very easy to inadvertently penetrate the outer covering of the endoscope during the retrieval. The endoscope will subsequently fail the “leak test” necessitating an expensive and inconvenient repair.

• Whichever type of endoscope is used, a good light source is essential. Similarly, some form of effective suction facility should be considered mandatory.

• In many instances (especially when trying to remove bony foreign objects from the oesophagus between the heart and the diaphragm), it can prove easier to push the object aborally into the stomach rather than struggle to remove it in an orad direction (Pearson, 1966; Rousseau et al, 2007; Leib and Sartor, 2008; Gianella et al, 2009; Thompson et al, 2012).

Many objects, including bone and hide chews, do not require subsequent gastrostomy for retrieval provided the animals are carefully monitored over subsequent days for signs of obstruction further distally (Pearson, 1966; Rousseau et al, 2007; Leib and Sartor, 2008; Gianella et al, 2009; Thompson et al, 2012). Gastrostomy is only indicated if digestion of the foreign body is unlikely to occur.

• To attempt removal of an oesophageal foreign body with an inappropriate endoscope or inappropriate grasping forceps will almost invariably result in failure to retrieve the foreign object.

• When clear visualisation of the foreign body cannot be achieved (poor lighting, poor choice of endoscope, inability to remove fluid/froth from the site of obstruction), it can be all too easy to inadvertently grasp the oesophageal wall with the forceps.

• Smooth/slippery objects can be retrieved using a balloon (Foley) catheter if grasping forceps are unavailable or too small. The catheter is slid past the object under endoscopic guidance and the balloon inflated before gentle traction is applied and the object moved orad (Figure 4).

• The use of fluoroscopy for identification and removal of objects using forceps has been reported to be equally as effective as endoscopy with minimal risk of associated complications (Luthi and Neiger, 1998; Hotston Moore, 2001).

In dogs, published studies indicate that with the appropriate endoscopic equipment, removal of bony or chew hide oesophageal foreign bodies (either orad or aborad) can be achieved in between 68 per cent and 100 per cent of treated cases (Ryan and Greene, 1975; Houlton et al, 1985; Spielman et al, 1992; Leib and Sartor, 2008; Gianella et al, 2009; Juvet et al, 2010; Thompson et al, 2012).

Following successful removal of the foreign body, the endoscope should be reinserted to ensure no foreign material has been left in the oesophagus and, if it was pushed aborally, to ensure the body resides in the stomach and not the cardia.

In addition, the oesophageal wall at the site of the foreign body should be inspected for evidence of mucosal damage (Figure 5; Rousseau et al, 2007; Gianella et al, 2009).

Fish hooks

The removal of a fish hook requires some additional discussion (and). Difficulties in the removal of

fish hooks relate to the presence or absence of an attached line, the type of hook (for example, barked or barbless or single, double or treble in design) and whether the hook remains “baited” (and ; Michels et al, 1995).

The presence of an attached line can be useful during the hook removal as it can often be used to help locate the hook and also to manipulate it during the process of removal (Figure 8). Do not be tempted to detach the fishing line, especially if you are planning to refer the case to a colleague for hook removal.

There are a large number of different types of fish hooks. Hooks are designed as either single hooks (a single eye, shank and point), double hooks (a single eye merged with two shanks and points), or, treble (a single eye merged with three shanks and three evenly spaced points). In addition, the point of the hook may be either barbed or barbless.

Regardless of whether the hook is single, double or treble it is most common for only one hook to have penetrated the oesophageal mucosa. As such, the actual removal of the embedded hook from the mucosa will be similar for all three types.

However, once freed from the mucosa, the retrieval of a double or treble hook is more likely to be associated with further mucosal snagging if measures are not taken to protect the exposed points during the extraction process. For example, if using a flexible endoscope it should be passed through a previously placed rigid tube into which the entire fish hook will fit. Once the hook is in the outer rigid tube, both this and the endoscope can be removed in unison, thus protecting the mucosa of the oesophagus and pharynx from further penetration. Similarly, when using a rigid endoscope it should ideally be of a size where the hook will fit into its lumen, thereby protecting the oesophageal/ pharyngeal mucosa during the retrieval procedure.

The presence of a fish hook that remains “baited” can make removal very awkward because it often proves difficult to locate and grasp the body of a hook that is covered in bait. In some instances the bait can be removed with grasping forceps without too much difficulty, whereas, in others the type of bait used can make its removal from the hook extremely difficult. In such instances, it can sometimes prove possible to slide the bait off the hook and up the attached fishing line – revealing the shaft of the hook and allowing it to be grasped.

The majority of barbless hooks can be removed relatively easily by manipulation and subsequent traction in the opposite direction to the direction in which the point of the hook is facing.

Manipulation can often be most easily accomplished by very gently pulling on an attached line in a cranial direction (prior traction on an attached line by the owner prior to examination). This will position the hook so that when grasped, traction in an aboral direction will result in the release of the point from the mucosa.

An embedded barbed fish hook can most easily be removed using either the back-out technique or torque/ twist technique (Michels et al, 1995). The torque/twist technique involves grasping the shaft of the hook and applying a twisting force to the hook (Michels et al, 1995). The back-out technique involves the direct traction of the barb of the hook along its original path of entrance. The shaft of the hook should be grasped firmly with robust grasping forceps. A sharp, but deliberate, push or pull (depending on the orientation of the hook) will dislodge the hook without causing significant damage to the oesophageal wall. Both techniques might appear to be relatively brutal, but, in the majority of instances, they will result in the rapid removal of the hook without causing significant damage to the oesophageal wall. In general, any damage will heal rapidly without complication (Michels et al, 1995).

Post-removal medical management

Animals with minimal damage may be treated conservatively postoperatively with a combination of a cytoprotective agent (sucralfate) and proton pump inhibitor (omeprazole) or an H_2 receptor antagonist (ranitidine, famotidine). Sucralfate is best used in its liquid form so it will coat the oesophageal mucosa creating a chemical diffusion barrier preventing further erosion from reflux of gastric acid. In most cases, water can be offered 12 to 24 hours after foreign body removal, depending on the degree of mucosal damage. Those with small perforations should not be allowed oral intake for 72 hours.

Cases with marked oesophageal wall damage or very small full thickness perforations should undergo further radiographic thoracic imaging to rule out the presence of a pneumomediastinum or pneumothorax.

Patients with more severe damage may benefit from similar medication, but should have a gastrostomy tube placed so they can be fed via this route for five to10 days following foreign body removal.

Authors differ on the amount of time oral food and water should be withdrawn following removal of the foreign body and, in reality, decisions should be made on a case-by-case basis depending on the degree of damage observed at the time of foreign body removal. Small amounts of water are offered before food in case of regurgitation or leakage into the thoracic cavity.

The time the gastrostomy tube remains in position depends on the method of placement regardless of whether it is still being used. Those placed via endoscopy (PEG tubes) should not be removed for at least 14 days following placement (Marks, 2000). Tubes placed with open surgery that included a gastropexy of the stoma site to the adjacent peritoneal/ abdominal wall can often be safely removed in seven days.

Table 1 provides a summary of the medical management options that might be considered following the removal of an oesophageal foreign body.

Surgical treatment

Surgical treatment should generally be reserved for those cases in which the foreign body cannot be removed with the aid of endoscopy/ fluoroscopy. Other indications for an open oesophagostomy that have been described include cases in which non-surgical extraction risks perforation of the oesophagus or great vessels, or if there is already oesophageal perforation and a mediastinitis/mediastinal abscess.

A discussion on the surgical intervention is beyond the scope of this article and the reader is referred to a relevant surgical textbook. As stated above, it is actually very unusual a foreign body cannot be removed with the aid of rigid endoscopy. In the author’s experience, most difficulties with endoscopic removal relate to a lack of adequate endoscopic equipment and to the experience of the operator.

There is much debate whether surgical intervention is indicated in cases with significant perforation; open surgical exploration commonly fails to achieve either repair or resection of the damaged section of oesophagus. On the contrary, open exploration may only result in the distribution of contamination throughout the thoracic cavity.

Remember, in cases where a bony foreign body has been pushed into the stomach there is rarely, if ever, any indication to perform a subsequent gastrostomy since the offending structure will be naturally digested by acid secretions.

Prognosis

The prognosis following foreign body removal is mostly very good. It is adversely affected by the degree of oesophageal damage; the presence of perforation warrants a guarded prognosis depending on the severity of thoracic contamination.

Potential complications include oesophagitis, rupture, infection, motility dysfunction, aspiration pneumonia, stricture, fistula and diverticulum formation and death.

Conclusion

Oesophageal foreign bodies should be considered emergencies. The longer a foreign body resides in the oesophagus, the greater the potential for complications such as ulceration, secondary stricture formation, oesophageal perforation and aspiration pneumonia.

Left unrecognised and/or untreated, the majority of oesophageal foreign bodies will result in the death of the affected animal, whereas prompt recognition and appropriate treatment will result in a complete resolution of the condition in the majority of cases. Successful removal hinges on the

early recognition of the condition and the availability of adequate facilities (such as endoscopes and forceps) for the management of the condition.

References and further reading

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Figure 1a. Examples of different size grasping forceps that can be used for the removal of oesophageal foreign bodies.

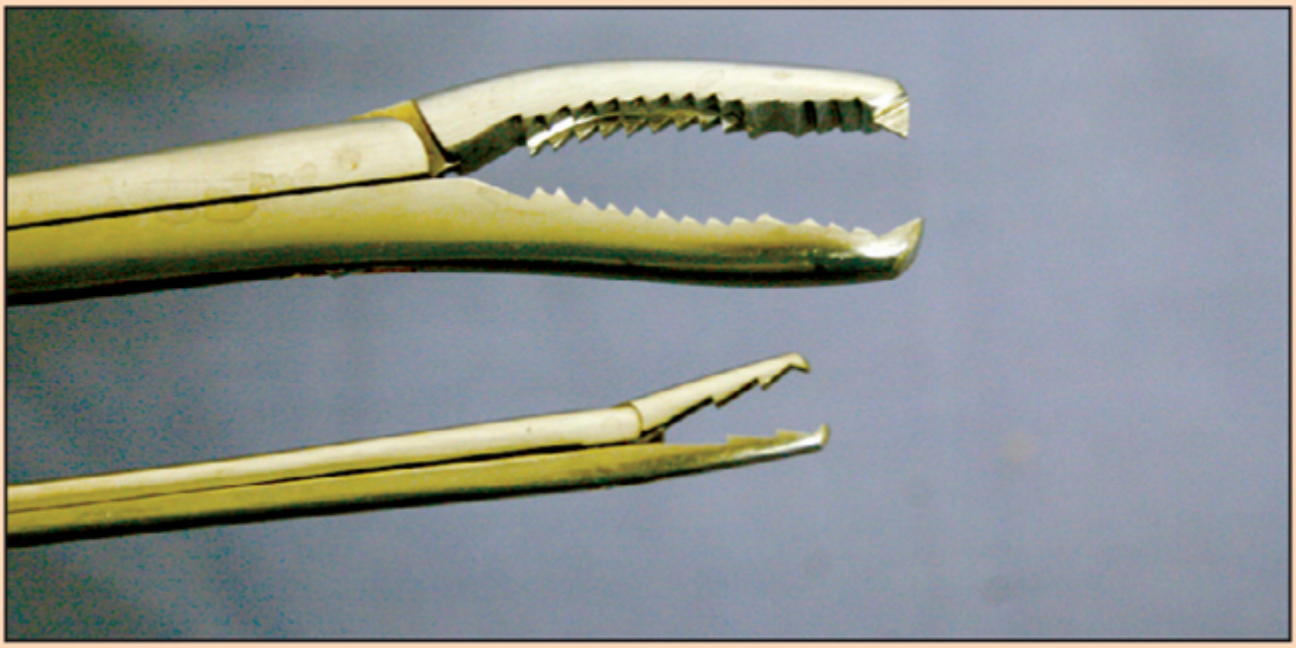

Figure 1b. Close-up view showing “teethed” jaws which are helpful in ensuring a secure grip on the foreign body.

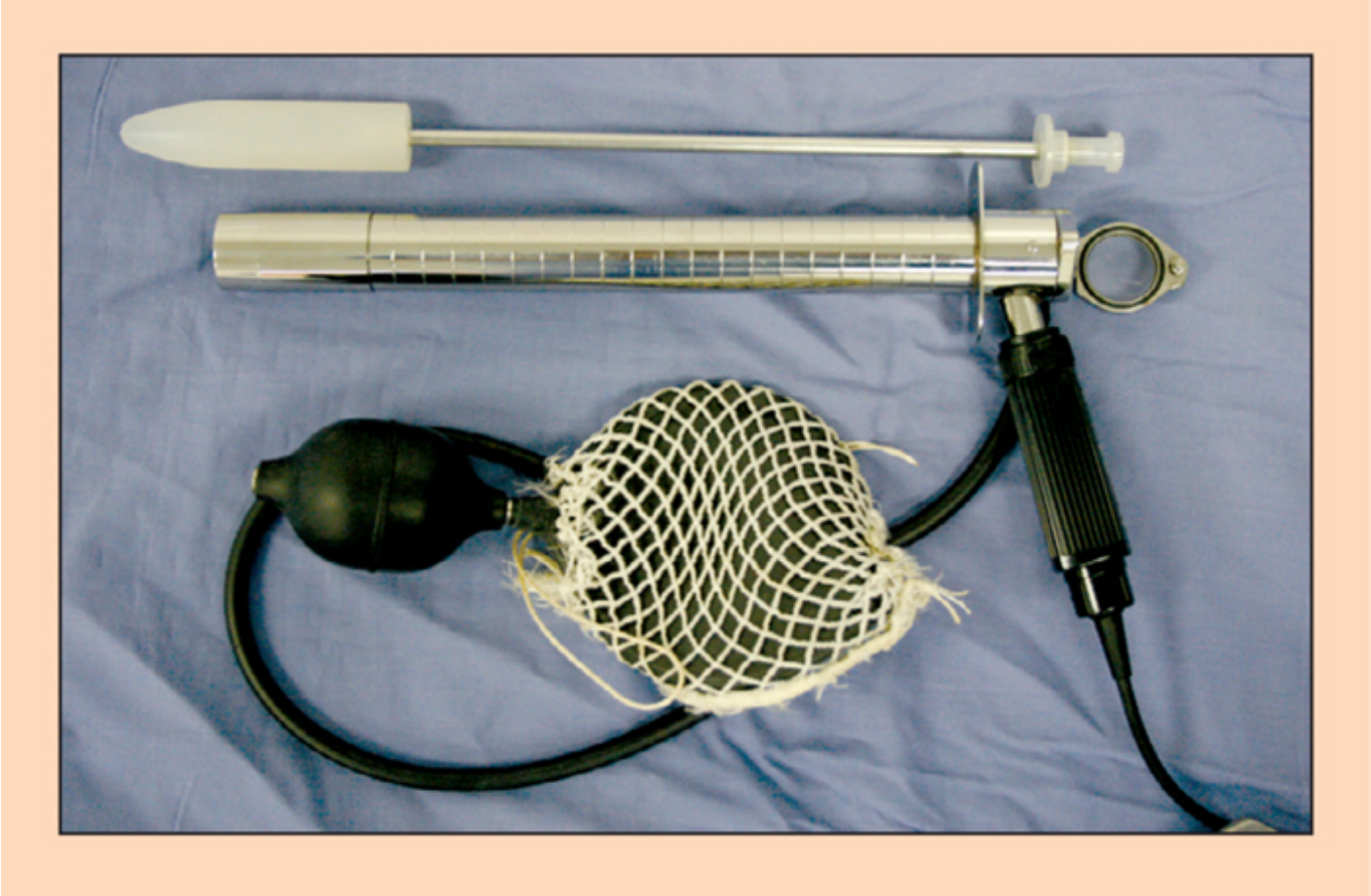

Figure 2a. A commercially available human fibre-optic sigmoidoscope the author commonly uses for the visualisation and removal of oesophageal foreign bodies in dogs (note, the integral light source and hand pump-operated air insufflator).

Figure 2b. The viewing window that can be closed with an airtight seal, allowing the effective use of air insufflation.

Figure 2c. The sigmoidoscope in use in a West Highland white terrier that had a bone oesophageal foreign body.

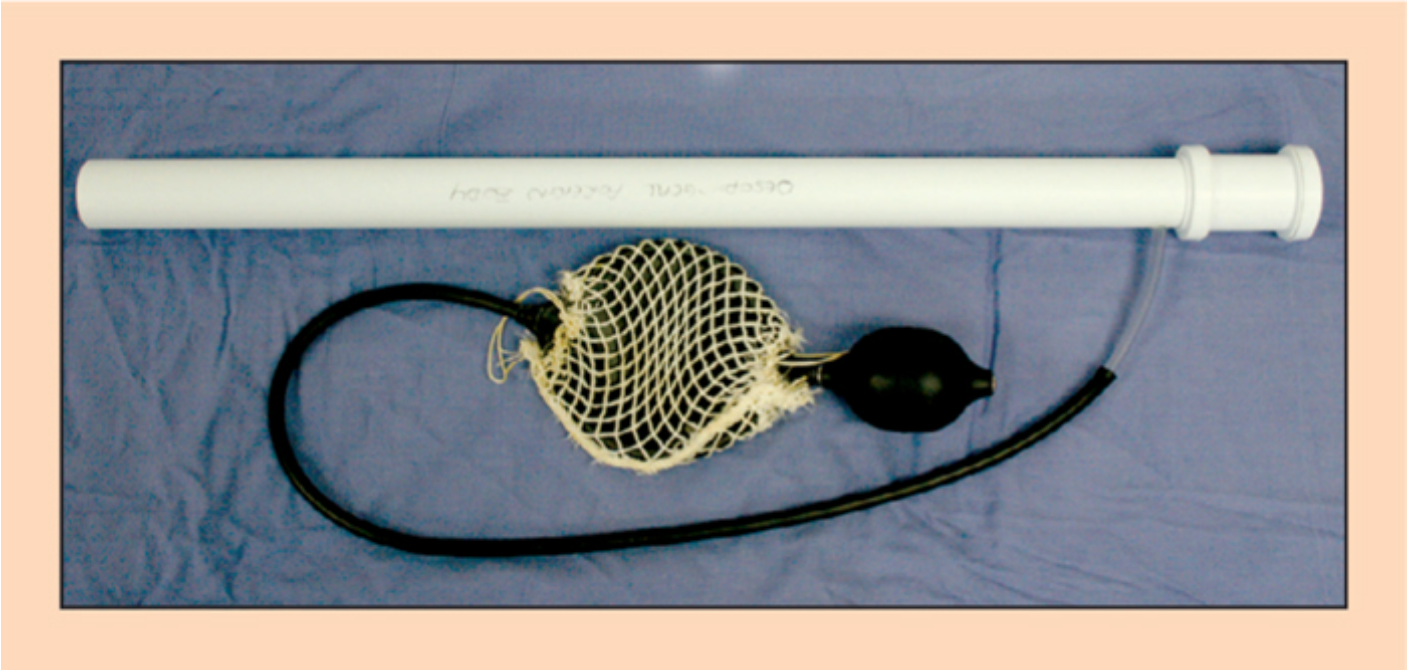

Figure 3a. A home-made rigid oesophagoscope made from unplasticised polyvinyl chloride (uPVC) available from any large home improvement store.

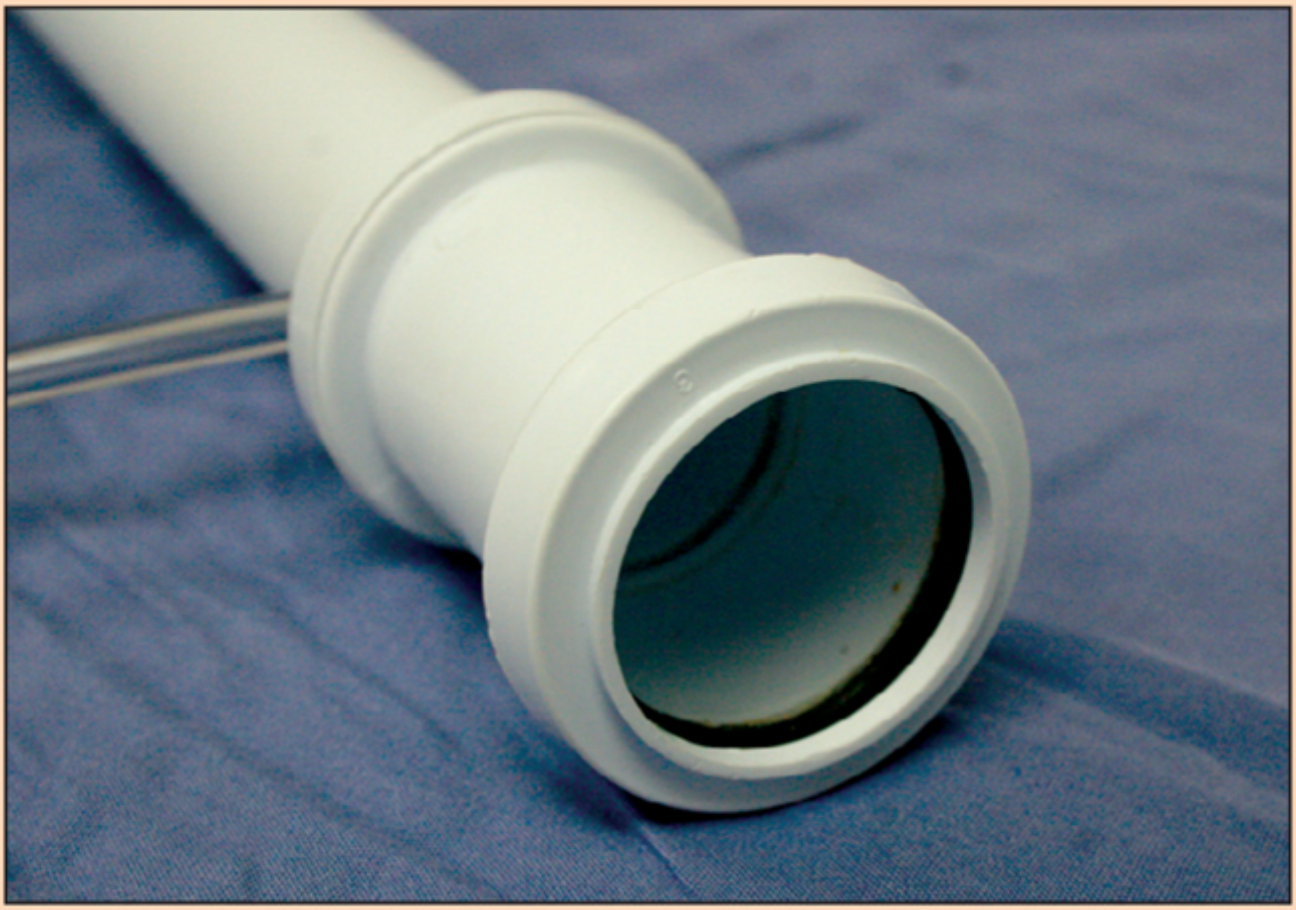

Figure 3b. The viewing window that when in place (as shown) has an airtight sealed allowing the effective use of air insufflation.

Figure 3c. The viewing window removed allowing grasping forceps to be passed down the endoscope.

Figure 3d. A view of the home-made oesophagoscope showing the grasping forceps in position for the removal of an oesophageal foreign body.

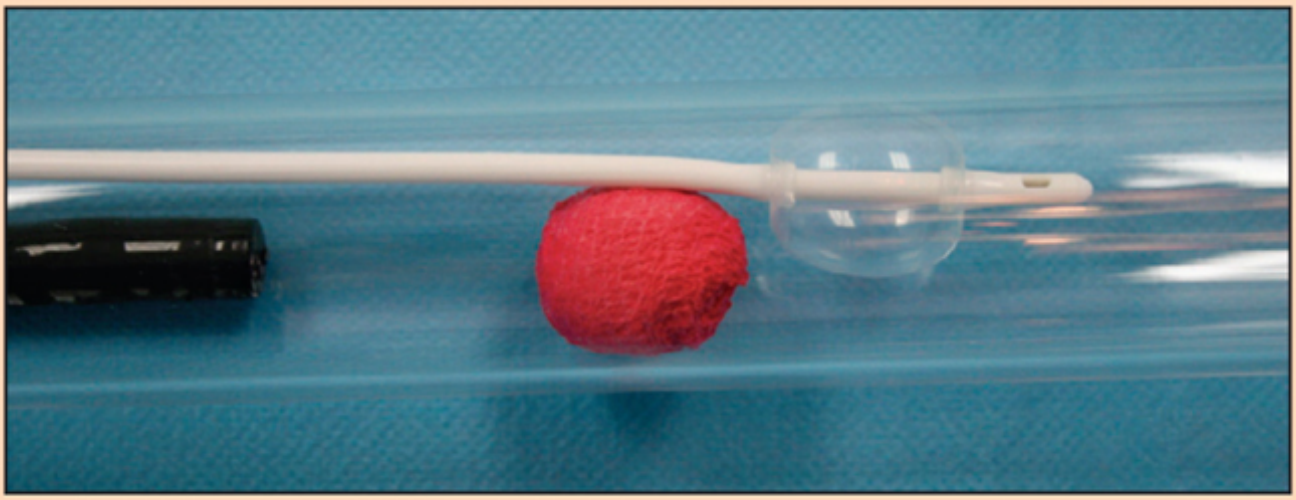

Figure 4. A mock-up to demonstrate the use of an inflated Foley catheter to remove a smooth/slippery oesophageal foreign body. The clear tube represents the oesophagus. The deflated Foley is pushed beyond the foreign body. It is then inflated and used to pull the foreign body in an oral direction. The entire procedure is performed under visual guidance; in this case using a flexible endoscope.

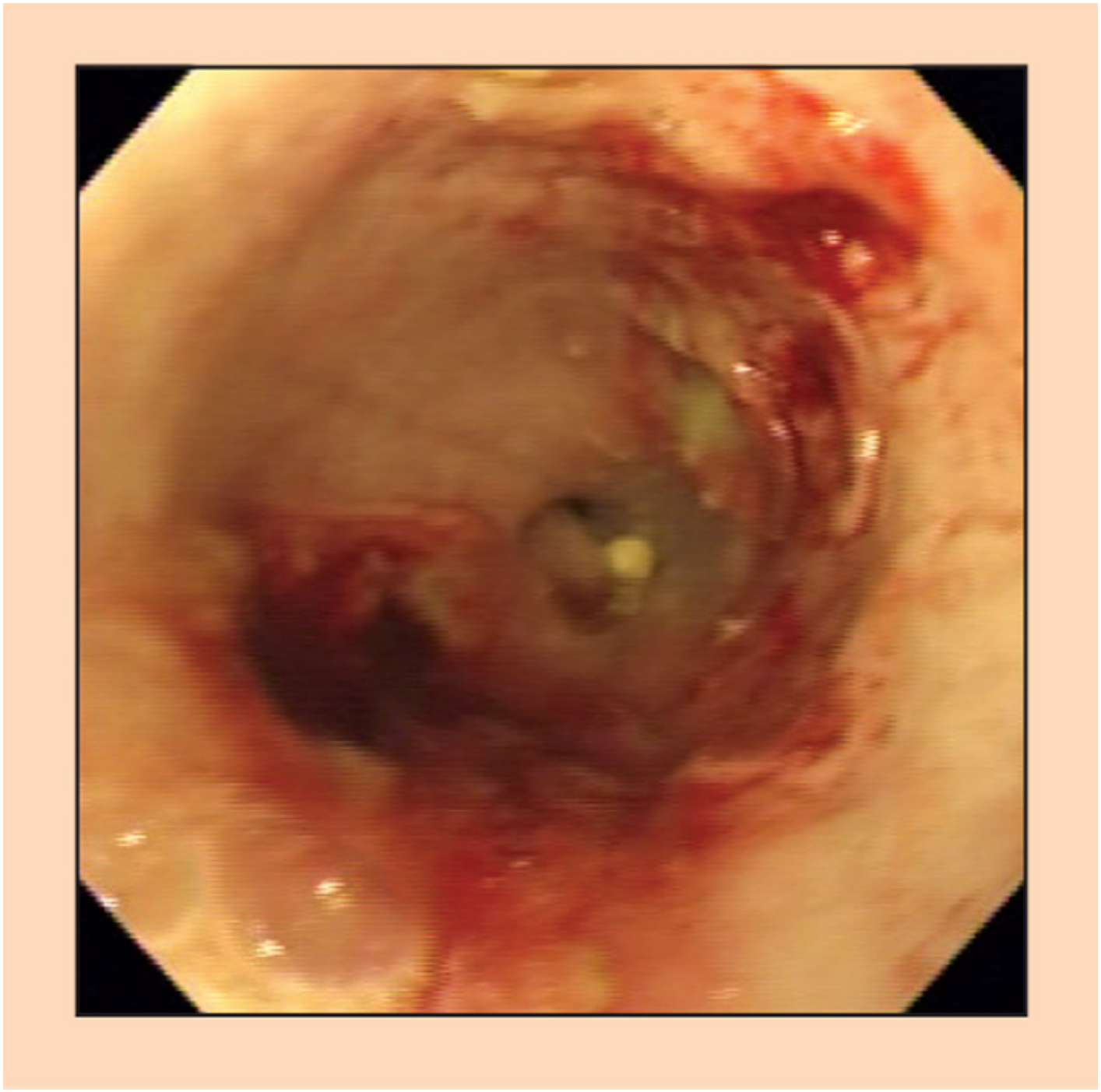

Figure 5. Post-foreign body removal endoscopic appearance of severe oesophagitis with moderate, but potential severe, mucosal damage.

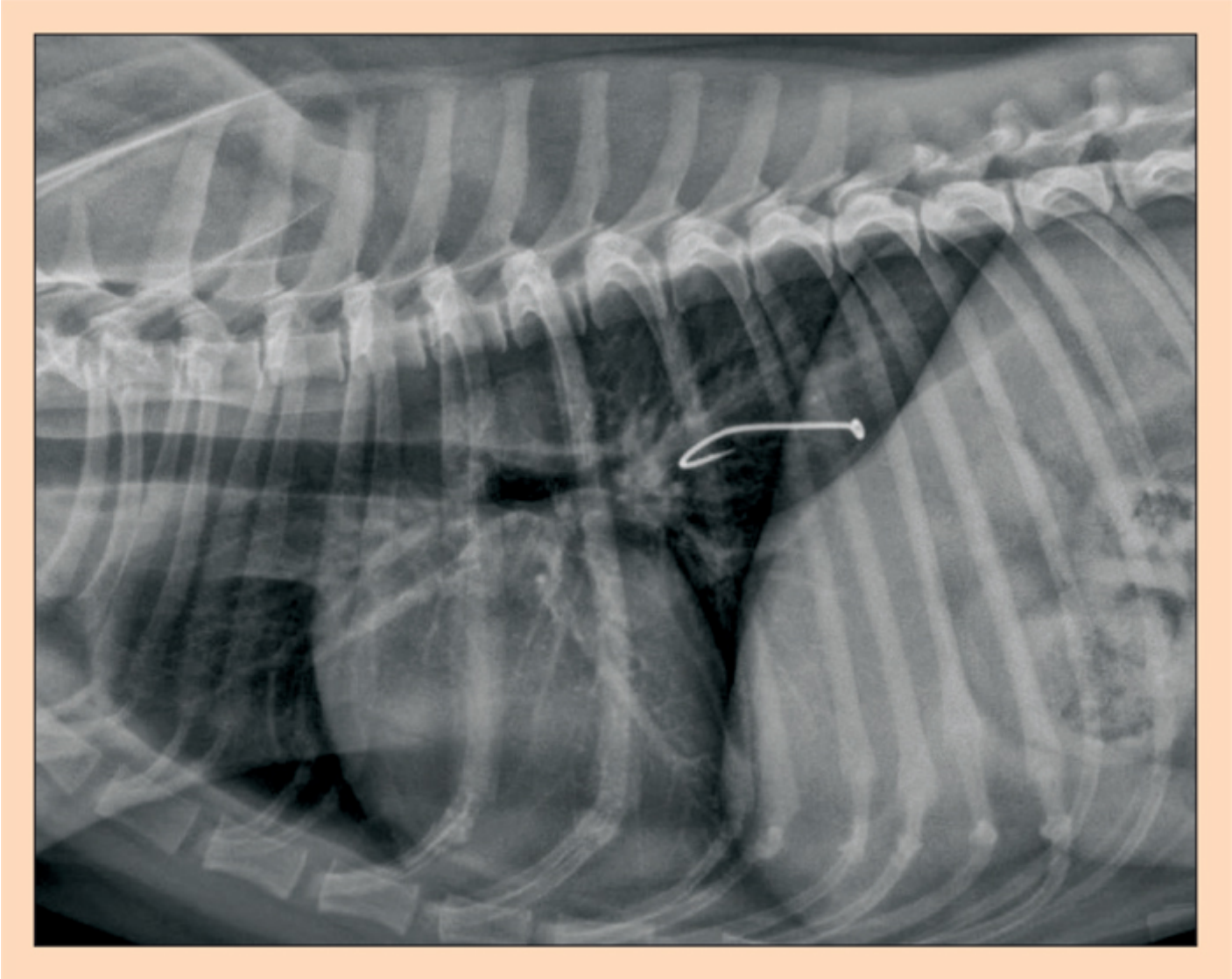

Figure 6a. A lateral thoracic radiograph of a dog showing a fish hook foreign body within the oesophagus caudal to the heart base.

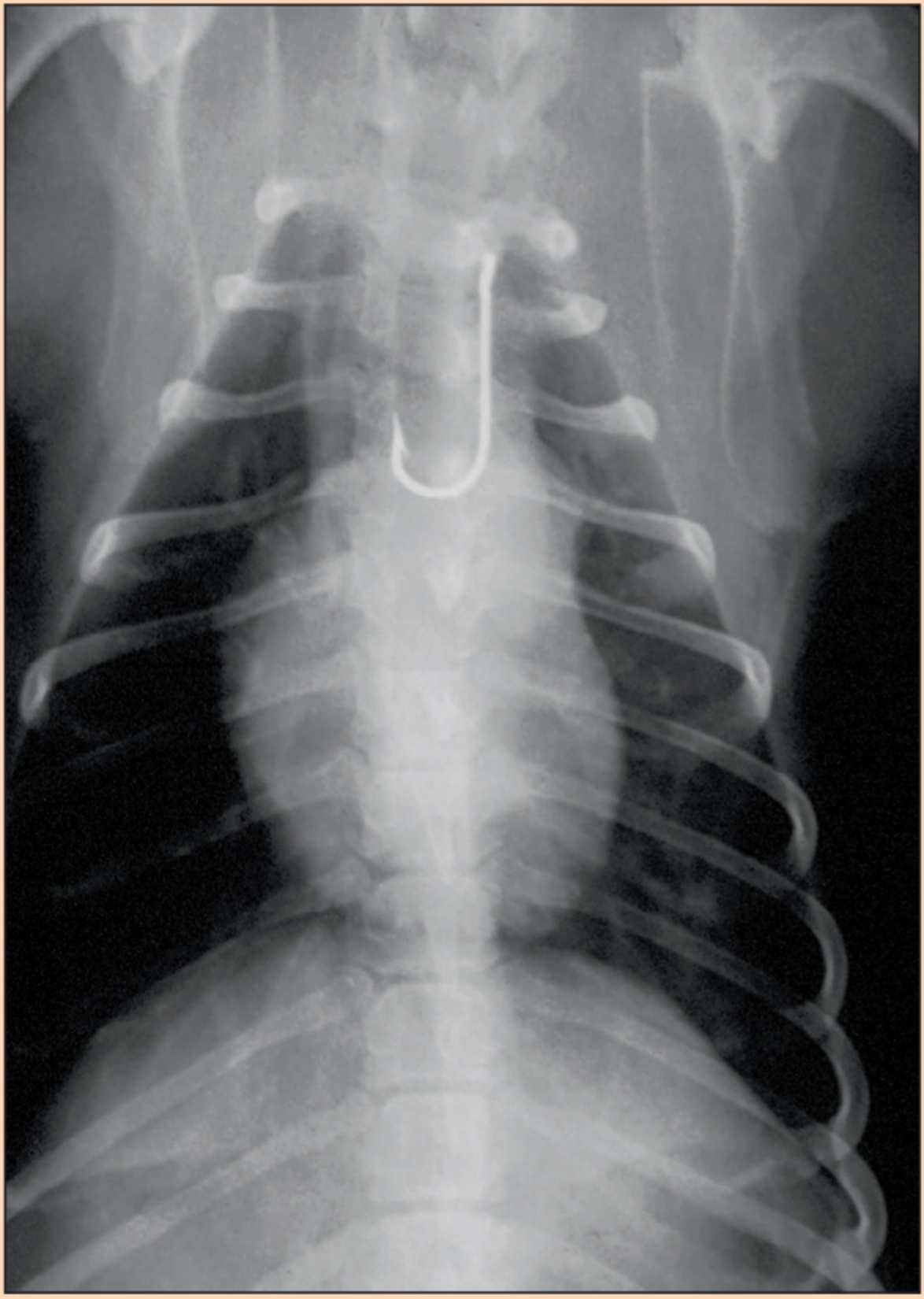

Figure 6b. A ventrodorsal thoracic radiograph of a dog showing a large barbed fish hook foreign body within the cranial thoracic oesophagus.

Figure 7a. Examples of barbed (left) and unbarbed (right) single fish hooks.


7b

Figure 7b. An example of a barbed treble hook. Note, the “eye” of the hook, which is used to attach the hook to the line.

Figure 8. An endoscopic view of an oesophageal fish hook with associated line in situ prior to its removal with grasping forceps.

	No mucosal damage	Mild mucosal damage (bruising)	Moderate mucosal damage (small perforation or local ischaemia)	Severe mucosal damage (full thickness perforation/tear)
0-24 hours	Frequent, smaller sized meals of a soft low-fat, high-protein content to enhance LES tone and minimise reflux.	Water only per os (plus IVFT) for first 12 hours, then if no complications, feed frequent, smaller sized meals of a soft low-fat, high-protein content. Sucralfate suspension (0.5g to 1.0g orally, three times a day).	Water only plus IVFT. Sucralfate suspension (0.5g to 1.0g orally, three times a day). Omeprazole* (1.0 mg/kg orally once a day) .	Nil per os and IVFT. Omeprazole (1.0mg/kg slowly intravenously once a day).
24-48 hours	Frequent, smaller-sized meals of a soft low-fat, high-protein content.	Frequent, smaller-sized meals of a soft low-fat, high-protein content. Sucralfate suspension (0.5g to 1.0g orally, three times a day).	Water only plus IVFT. Sucralfate suspension (0.5g to 1.0g orally, three times a day). Omeprazole* (1.0mg/kg orally once a day).	Feed via PEG-tube. Omeprazole (1.0mg/kg slowly intravenously once a day).
48-72 hours	If no complications, introduce normal diet.	Frequent, smaller sized meals of a soft low-fat, high-protein content. Sucralfate suspension (0.5g to 1.0g orally, three times a day).	If no complications, frequent, smaller sized meals of a soft low-fat, high-protein content to enhanced LES tone and minimise reflux. Sucralfate suspension (0.5g to1.0g orally, three times a day). Omeprazole* (1.0 mg/kg orally once a day).	Feed via PEG-tube. Omeprazole (1.0mg/kg slowly intravenously once a day).
More than three days	Feed and treat as normal.	If no complications, introduce normal diet. Sucralfate suspension administration can be stopped after five to seven days post-FB removal.	Continue to feed a soft diet for five to seven days. If no complications, gradually introduce normal diet after five to seven days. Sucralfate suspension administration can be stopped after five to seven days post-FB removal. Omeprazole (1.0 mg/kg orally once a day) for five to seven days post-FB removal.	Feed via PEG-tube for five days then introduce water for the next 24-48 hours and, if no complications occur, start to feed frequent, smaller-sized meals of a soft low-fat, high-protein content. Sucralfate suspension (0.5g to 1.0g orally, three times a day) for 14 days post-FB removal. Omeprazole* (1.0 mg/kg orally once a day) for 14 days post-FB removal.
*An alternative to a proton pump inhibitor would be an H_2 receptor antagonist, such as famotidine (0.5mg/kg to 1.0 mg/kg orally once or twice a day), although proton pump inhibitors are more efficacious at suppressing gastric acid production.				
FB, foreign body; **IVFT**, intravenous fluid therapy; **LES**, lower oesophageal sphincter; **PEG**, percutaneous endoscopic gastrostomy				

Table 1. Post-removal medical management