A new technique for insertion of esophagostomy tubes in cats

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Abstract

A new percutaneous insertion technique for esophageal feeding tubes in cats is presented. It has been successfully applied in 12 feline patients. The placement technique is simple. It takes only 5 minutes and requires a scalpel blade, a curved hemostat and an applicator for the insertion of the feeding tube. In contrast to other esophageal tube placement techniques, the tube is inserted into the definitive aboral position in a one-step procedure. The shoehorn principle of the applicator allows the tube to be inserted into the esophagus safely and precisely. Placement of the tube in the midcervical area does not interfere with the function of the pharynx and avoids having the animal irritated by the presence of the tube. The chosen diameter of the tube is large enough to permit feeding of diluted, blended commercial canned food. In our patients, feeding was started after recovery from anesthesia, and tubes were removed without complications once the animal had started to eat voluntarily.

Introduction

It has become increasingly common in veterinary medicine to provide nutritional support as there is now a greater awareness of the negative influence of malnutrition on morbidity and mortality in critically ill patients (1).

There are two main ways of providing nutritional support: the parenteral route mostly using a central vein catheter; and the enteral route which involves the insertion of a feeding tube.

With total parenteral nutrition all essential nutrients are administered intravenously. The patient has to be monitored closely to prevent complications such as catheter-associated infections, catheter obstructions or electrolyte imbalances (2). It is expensive and work intensive.

The enteral route is a more physiological way of giving nutritional support (3, 4), but can only be applied if the gastrointestinal tract is functional.

Enteral feeding can be performed easily in every private practice. It is less costly than total parenteral nutrition and involves few complications (5). Feeding can also be managed at home by the owners.

Various techniques for enteral feeding have been developed. They vary according to the entrance site of the tube (nasal, pharyngeal, esophageal, gastric, jejunal) and the technique of placement itself (5 - 13).

Esophageal feeding tubes have been shown to be well tolerated by small animal patients and are associated with minimal complications. Homogenized commercial canned food as well as commercial liquid diets can be used for feeding.

Different techniques for inserting esophageal feeding tubes have been described (7, 10, 12, 13). In all techniques an esophageal stoma is first created. The tube is then inserted into the esophagus and exteriorized through the oral cavity. For the final positioning, the esophageal feeding tube has to be redirected back into the distal esophagus. This step may be difficult and is avoided by applying the presented technique. The esophageal feeding tube can be inserted in a one step procedure into the correct aboral position in the esophagus by means of a simple applicator [a]. The principle of this applicator is basically that of a shoehorn. The short surgical procedure takes 5 minutes and has been successfully applied in 12 cats.

Materials and Methods

Fig.1

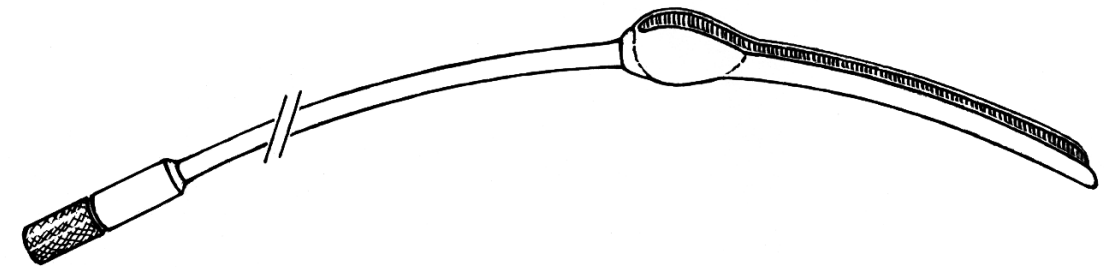


Figure 1: Esophageal feeding tube applicator. The aboral end (right) is a groove which guides the feeding tube. The bulb reinforcement makes insertion of the feeding tube easier. The applicator can be manipulated with the handle (left).

A prospective clinical study was undertaken to evaluate a new insertion technique for esophageal feeding tubes in 12 cats with a special tube applicator.

The slightly bowed applicator has a length of 250 mm. The outer diameter of the bulb is 16 mm and the groove is 8 mm wide.

Enteral feeding using an esophageal tube was integrated in the therapeutic plan in the following cases:

Number of cats	Indication	Comment
6	jaw fracture	unable to eat after operation
2	anorexia of unknown origin	provide nutrition
1	repair of a caudal abdominal hernia	obese cat, provide nutrition immediately after surgery to prevent the development of hepatic lipidosis
1	chronic foreign body, resection of small intestine	obese cat, provide nutrition immediately after surgery to prevent the development of hepatic

		lipidosis
2	nasal exploration	procedure can result in anorexia

In each case, the patient was anesthetized and intubated with a cuffed endotracheal tube. The cat was placed in right lateral recumbency. The left side of the neck was clipped and aseptically prepared for tube placement. A 18 French red rubber tube [b] was used in all cats. To ensure that the distal end of the tube was not placed through the gastroesophageal junction, it was premeasured from the entrance site in the neck to the eighth rib and marked with a permanent marker.

The esophageal applicator [Figure 1] then was introduced into the mouth with the groove oriented dorsally. After the bulb of the applicator had passed the hyoid apparatus, it was advanced further into the esophagus [Figure 2]. The correct midcervical position of the bulb, which is halfway between the head and the shoulder, was verified by palpation. The applicator was then rotated 90 degrees clockwise [Figure 3a]. The groove of the applicator was palpated easily through the skin and a 1 - 2 cm skin incision was performed with a number 10 scalpel blade over the bulb [Figure 3b]. Leveling the applicator slightly towards the lateral side of the neck helped to shift important periesophageal structures away from the side of incision by means of the bulb of the applicator. Subcutaneous tissue and cervical musculature was bluntly dissected down to the esophagus by using a mosquito forceps [Figure 3c]. After a stab incision [Figure 3d] through the esophageal wall with the number 10 scalpel blade had been made, the tube was inserted into the esophagus up to the mark on the tube. Correct placement of the tube into the esophagus was confirmed visually and by finding minimal resistance during insertion. The applicator was then withdrawn [Figure 4] and the skin incision left unsutured. The wound was covered with an antiseptic ointment.

Fig 2

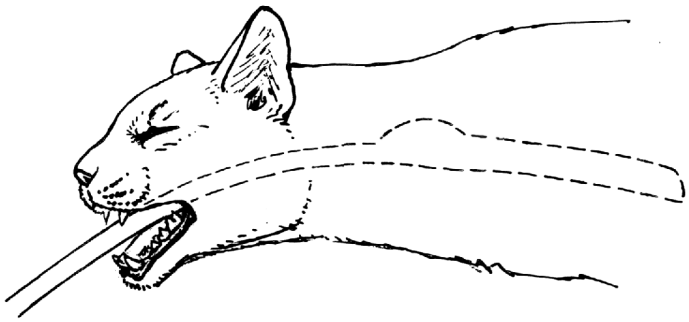


Fig 3

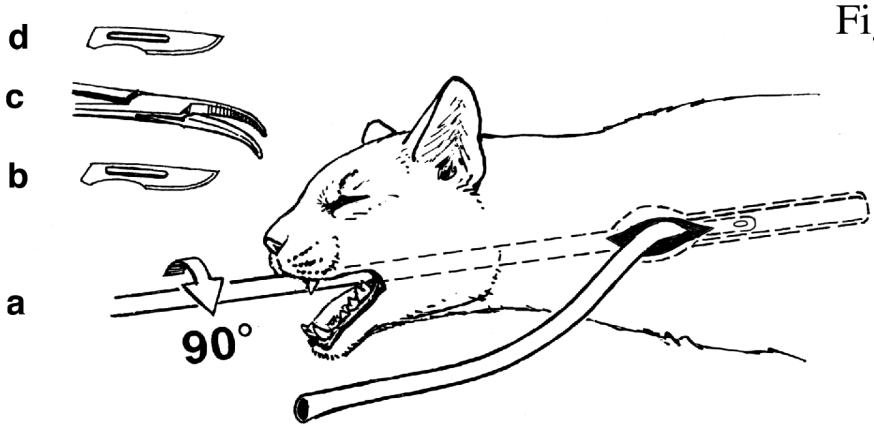
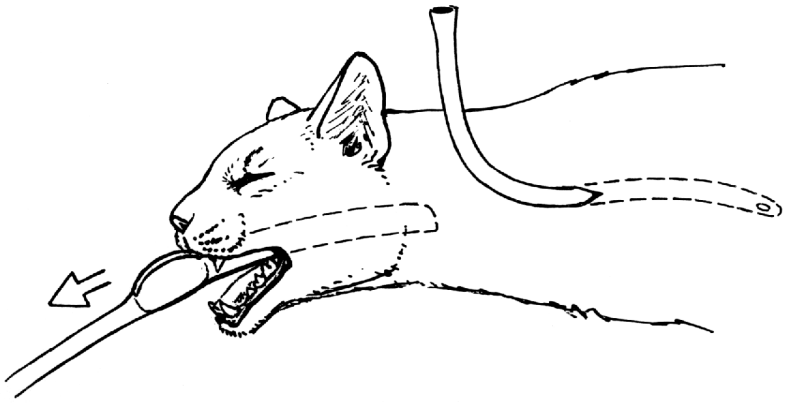


Fig 4



Figures 2 - 4 : 2 Introduction of the esophageal feeding tube applicator; 3 a - d Creation of the esophageal incision and insertion of the tube (see text); 4 Removal of the applicator.

Premature dislodgment of the feeding tube was prevented by gluing a selfadhesive tape in a butterfly fashion to the tube adjacent to the incision. This

tape was then sutured to the skin. The tube was bent 180 ^{0} caudally and wrapped in a light neck bandage once the patient was awake. Twice a week the insertion site of the tube was inspected clinically, cleaned if necessary and covered with an antiseptic ointment and a new bandage.

Tube feeding was started immediately after full recovery from anesthesia. The cats were fed up to 200 - 300 kcals per day of special diluted canned food [d]. Initially 5 - 15 ml of the liquefied food were administered over 5 minutes through the tube every two to three hours. During the next four days the amount was increased gradually up to 60 ml. The food was administered as a bolus over 10 minutes four times a day. After feeding the tube was flushed with warm water to prevent clogging of the tube. Once the animal started to eat voluntarily, the tube was removed without anesthesia and the stoma healed by second intention.

Results

There were no serious complications seen either during placement of the tube or during tube feeding. In one cat a minor complication was bleeding from the cervical musculature during placement. It stopped spontaneously. Four of the first 5 cats were obviously disturbed by the presence of the tube in the vicinity of the head. They tried to remove the tube and/or showed repetitive shaking of the head. In the following 7 cats the tube was placed further caudally midway between head and shoulder and no such complication was seen.

The median duration of tube placement was 5 days (1 - 15 days). The esophagostomy stoma healed by second intention after removal of the feeding tube. No complication such as problems with deglutination or wound healing was seen during the 3 month follow-up.

Two cats were euthanised because of the severity of the underlying disease 3 days and 12 days after insertion of the tube. Histology of the tissue around the esophageal stoma showed moderate infiltration with neutrophils, formation of granulation tissue in the deeper layers and ingrown capillaries. No bacteria were detected histologically.

Discussion

Various enteral feeding techniques have been described in the literature, but they all have disadvantages.

Nasogastric feeding tubes can be placed without anesthesia. They have small diameters that require special liquid diets. Complications include obstruction, misplacement, premature dislodgment of the tube and epistaxis (14, 15).

Pharyngostomy tube placement needs general anesthesia. Complication rates tend to be high due to damage to neurovascular structures during surgery (16). Further complications reported include airway obstruction, aspiration pneumonia and problems with deglutition (16, 17).

Gastrostomy tube placement also requires general anesthesia. During placement there is a risk of laceration of abdominal organs (18). Further complications may include inadequate gastric emptying, vomiting, local cellulitis or abscess formation and premature dislodgment of the tube (18). To prevent the development of peritonitis caused by leakage of gastric contents, feeding is started 12 - 24 hours after placement and the tube should stay in place for a minimum of 5 days (18 - 20).

Jejunostomy tubes are surgically placed feeding tubes for critically ill patients with pancreatic, hepatobilary or gastrointestinal disease, neoplasm or peritonitis. They have small diameters which require special liquid diets. Diarrhea, premature dislodgment of the tube and peritonitis secondary to leakage are the major complications in these patients (21, 22).

Esophagostomy feeding tubes were developed in the early 50s in human medicine (23) and first used in the 80s (7) in veterinary medicine as an alternative to other enteral feeding procedures. It is among the most reliable methods and has few complications.

Surgical insertion of an esophageal feeding tube takes less than 5 minutes and animals need only short-term general anesthesia. No special diet is required and feeding with blended regular canned food can be started as soon the animal has recovered from the anesthesia. Cats and dogs also are able to eat easily with the esophagostomy tube in place. It has been reported that an esophagostomy tube has been removed only one day after insertion without

complications (10). Long-term nutritional support is documented as being well-tolerated by dogs and cats (10).

Nevertheless there are complications associated with esophageal feeding tubes described in the literature (7, 8, 9, 12, 13), but all can be handled fairly simply. They include wound infection at entrance site, vomiting, scratching and kinking of the tube during its placement.

Moderate wound infection was observed in three of our cats but all were successfully managed by daily application of antiseptic ointments.

Vomiting was not a problem in our patients. With our technique the correct position of the end of the tube cranial to the cardia was premeasured before insertion. The placement of the distal end of the tube through the gastroesophageal junction may initiate vomiting (10). Wrong placement can be corrected by retraction of the tube. Positioning the distal end of the tube in the distal esophagus also minimizes injuries to the mucosa of the esophagus secondary to gastric reflux (24).

If vomiting causes dislodgment of the feeding tube into the oral cavity, a larger tube should be used (8, 10, 11). A 18 French tube [b], such as the one we used in this study with cats, seems to be large enough to prevent displacement and did not interfere with spontaneous food consumption (10). This is in contrast to Crowe´s (9) recommendation to use smaller tube sizes.

Vomiting did also not occur during feeding. We fed blended diets [d] which were administered slowly at room temperature over 5 - 10 minute periods, and the volume of a single bolus was only increased gradually (see material and methods).

Head shaking and scratching was only a problem in four of the first five cats where the insertion site of the tube was obviously too close to the head.

Kinking of the esophagostomy tube during its placement, as reported with a different insertion technique (9), did not occur with the new technique.

Four different surgical techniques for insertion of esophageal feeding tubes have been described (7, 10, 12, 13). One additional method is the percutaneous intravenous needle catheter placement (7). The catheter, however, only allows for administration of fluids and liquid diets and will not be discussed further.

All these insertion techniques involve two-step procedures: Insertion of the tube into the esophagus, followed by its definitive placement.

Before the feeding tube is inserted, an esophageal stoma has to be created. The recently published techniques (10, 13) use a special, intraluminally placed tube applicator [c] to perforate the esophagus from inside by means of a trochar. In the original technique (7), a Carmalt forceps introduced through the mouth was used to bluntly perforate the esophagus. The fourth procedure (12) requires a stiff guide tube, a venous catheter, a Carmalt forceps and a separate flexible tube.

In all four techniques, the feeding tube is exteriorized through the oral cavity after its insertion in the stoma. Definitive placement is achieved by redirecting the tip of the tube back through the oropharynx to its aboral position. This can be done with (10) or without (7) the help of a stylet. One technique first withdraws the tube back to the insertion stoma and redirects it than aborally (12, 13). Redirecting the tip caudally through the oropharynx is mechanically difficult as the pharynx is anatomically narrow. It can accidentally lead to entrapment of the feeding tube around the endotracheal tube (10, 11).

In the new technique described in this paper, the tube is placed in its definitive aboral position at the beginning of the operation. This means that the step involving the exteriorization of the tube through the mouth and its redirection into the esophagus including the described complications is eliminated.

Misplacement of the feeding tube in the mediastinum or periesophageal adventitia, which is reported to be a danger with one technique (8), is less likely with this new technique because the tube is inserted under visual control. Further its correct position is confirmed by the minimal resistance of the tube during its introduction. The appropriate midcervical tube position can be reached by gliding the applicator down the esophagus to the optimal location. This is not an option with the technique described by Crowe (7, 8). Too cranial a placement had been shown in our case study that the animal can be irritated by the presence of the feeding tube.

No misplacement or other complications, such as damage to the adjacent neurovascular structures which has been reported to occur with another technique (8), were observed in this study. In the new technique the wall of the

esophagus is stretched over the bulb of the applicator, which facilitates making the stab incision and the insertion of the tube. The bulb of the applicator also pushes the neurovascular structures away from the insertion site, which prevents them being damaged. The shoehorn principle, in which the blade is protected inside the applicator, guarantees that the stab incision into the esophagus is safe and complete.

Although extensive fibrosis and fistulation are reported complications with cervical esophagostomy in horses (25), no such complications have been found in cats (11) and none were observed in our study.

The new technique for inserting esophagostomy tubes described in this paper has been shown to work well with cats. It is to be expected that, with appropriately sized applicators, the technique can also be successfully applied in the enteral feeding in dogs.

Footnotes

[a] Esophageal feeding tube applicator, manufacturer not yet determined

b Ruesch Katheter, Pro Vet AG, CH - Lyssach

c ELD Tube applicator, Pro Vet AG, CH - Lyssach

d Hills prescription a/d diet; Pro Vet AG, CH - Lyssach

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