

Enteral Feeding Techniques in Cats

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Abstract. Three methods of enteral feeding the cat have been evaluated on a total number of five patients of different breeds and ages. Several methods were elected including esophagostomy tube placement, percutaneous gastrotomy tube placement and enterotomy tube placement. Our study concluded that each of these methods represent a practical, safe, easy to perform procedure with minimal repercussions on a functional gastrointestinal tract and general status of the animal.

Keywords: enteral feeding, tube placement, esophagostomy, gastrotomy, enterotomy

INTRODUCTION

Diseases of the gastrointestinal (GI) tract are a common problem in cats, and the clinical signs associated with these diseases, vomiting, diarrhea, anorexia, or weight loss, are some of the most common presenting complaints for cats (Zoran, 2008). Nutritional treatment of such critical patients is an important component of the complete treatment plan. Assessment of nutritional status and careful consideration of the disease course will help guide the selection of the most appropriate assisted-feeding method (Perea, 2008). Nutritional supplementation and identification and appropriate treatment of underlying disease are the goals of treatment for malnourished patients.

Enteral hyperalimentation is the administration of adequate nutrients to malnourished patients or those at risk of malnutrition by means of a nasoesophageal, pharyngostomy, esophagostomy, gastrotomy or enterostomy tube. Patients in need for hyperalimentation are those with severe burns, sepsis, postsurgical stress, trauma, cancer or those with chronic anorexia or malnutrition. It can also be used whenever several days of anorexia are anticipated, such as after oral, pharyngeal, esophagogastric, intestinal, pancreatic or biliary surgery (Fossum *et al.*, 2007). However, there are several conditions in which enteral hyperalimentation is not recommended, such as ileus, small bowel obstruction or lymphosarcoma due to worsening of vomiting or diarrhea. This article evaluates common routes of enteral feeding including, esophagostomy, gastrotomy and jejunostomy feeding tubes concerning the technique and possible complications.

MATERIALS AND METHODS

The research has been carried out on five feline patients of different breeds and ages (Tab. 1).

Tab. 1

Clinical cases taken into study

Patient number	Breed	Age	Sex	Underlying disease	Surgical technique
1	Russian Blue	7 years	Female	Bronchopneumonia	Esophagostomy
2	European	3 months	Male	Mandibular fracture	Esophagostomy
3	European	11 ears	Female	Renal neoplasia	Percutaneous gastrotomy
4	European	5 years	Female	Aquired oronasal fistulae	Percutaneous gastrotomy
5	British Shorthair	1 year	Male	Gastric foreign body	Enterotomy

ESOPHAGOSTOMY TUBE PLACEMENT

Indications: disorders of the oral cavity or pharynx and anorectic animals with a normal gastrointestinal distal to the esophagus (Howard, 1999).

Contraindications: esophagitis, megaesophagus, esophageal stricture.

Advantages: good acceptance by the patient, ease of tube placement, care and feeding, patient's ability to eat and drink around the tube, possibility for removal at any time after placement (Fossum *et al.*, 2007).

Disadvantages: the need for general anesthesia and the possibility of scratching the tube out.

Complications: tube removal, tube regurgitation, jugular vein sectioning, and rarely esophagitis, esophageal stricture, esophageal diverticulum or subcutaneous cellulitis (Stephen and Robert, 2006).

Surgical technique: the cat is anesthetized and placed in right lateral recumbency, since the esophagus lies on the left side of the neck. The midcervical area, from the angle of the mandible to the thoracic inlet, is prepared for surgery. The mouth is held open using a speculum, and a feeding tube is premeasured from its insertion point to the seventh intercostal space, ensuring midesophageal placement. A curved hemostatic forceps is inserted into the mouth and advanced to the level of the midcervical region (equidistant from the angle of the mandible and the point of the shoulder) (Fig. 1). The tip is palpated as it bulges through the skin, and a small incision is made until it can be visualized. Using the scalpel blade, this incision is carefully enlarged in the subcutaneous tissue, cervical musculature and esophageal wall, to allow penetration of the forceps. The tip of the feeding tube is grasped with the forceps and pulled into the oral cavity to its predetermined measurement (Fig. 2). It is then advanced into the esophagus until the entire portion of the feeding tube disappears and the tube passes down the esophagus without bending (Fig. 3). The external part of the tube is secured to the skin using a Chinese finger-trap suture of nonabsorbable suture (Fig. 4). The exit point is left exposed, and a column of water is placed into the tube. The tube can be removed at any time by cutting the skin suture and pulling the tube out. No further wound care is necessary; the hole seals in 1 to 2 days and is healed by 4 to 5 days.



Fig. 1. Insertion of curved hemostatic forceps



Fig. 2. Grasping of the tube tip and pulling in the oral cavity



Fig. 3. Advancing of the tube into the esophagus until it disappears



Fig. 4. Tube fixation with a Chinese finger-trap suture

PERCUTANEOUS GASTROTOMY TUBE PLACEMENT WITH GASTROPEXY

Indications: patients with a functional stomach and gastrointestinal tract that are anorectic or are undergoing surgery of the oral cavity, pharynx, larynx or esophagus (Fossum *et al.*, 2007).

Contraindications: gastritis, gastric ulceration or gastric neoplasia

Advantages: ease of tube placement, quick placement, no need for special equipment, immediate seal between the gastric and the body wall, good tolerance, the tube can be removed at any time after placement.

Disadvantages: general anesthesia, opening of the peritoneal cavity.

Complications: gastric leakage into the abdominal cavity and subsequent peritonitis (Howard, 1999).

Surgical technique: the animal is anesthetized and skin preparation of the left paralumbar fossa is performed. An assistant passes a large-bore, stiff plastic or rubber tube into the stomach through the opened mouth (Fig 5). The surgeon palpates the left flank area

until the end of the stomach tube can be palpated and grasped. The tube is then manipulated to a location 2 to 3 cm caudal to the thirteenth rib and 2 to 3 cm distal to the transverse process of the lumbar vertebrae, and a skin incision is made over the end of the tube. The subcutaneous tissue and abdominal muscles are bluntly dissected to expose the gastric wall, taking care not to enter the lumen of the stomach (Fig. 6). A purse-string suture is placed in the stomach wall, around the tube, and a puncture is made in the center of it, using a No. 11 scalpel blade (Fig. 7). An infant Foley catheter is placed in the lumen of the stomach and its bulb is inflated, slowly placing traction on the purse string suture and removing the rigid stomach tube from the oral cavity (Fig 8). Traction is applied on the Foley catheter to bring the inflated bulb against the stomach wall, and the purse-string suture is tied around it. Four simple interrupted absorbable sutures are placed from the gastric wall to the abdominal wall, to firmly pexy the stomach in place. The subcutaneous tissue and skin are closed around the existing Foley catheter, the catheter is pushed 1 cm into the stomach lumen and secured to the skin with a Chinese finger-trap suture.

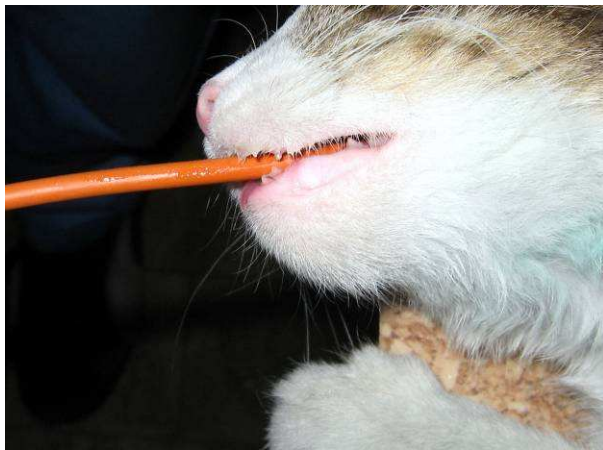


Fig. 5. Insertion of a large-bore rigid tube into the stomach

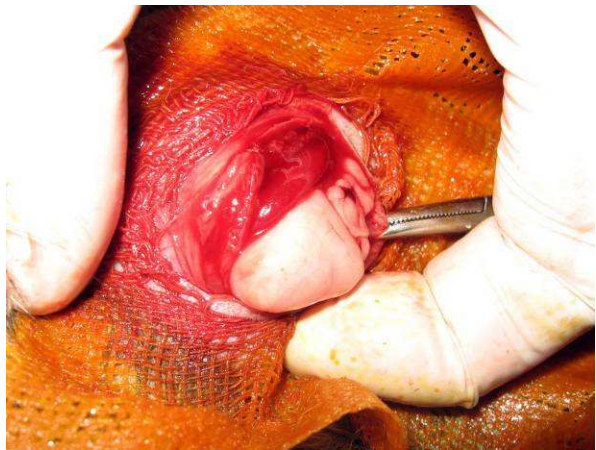


Fig. 6. Exposure of the gastric wall

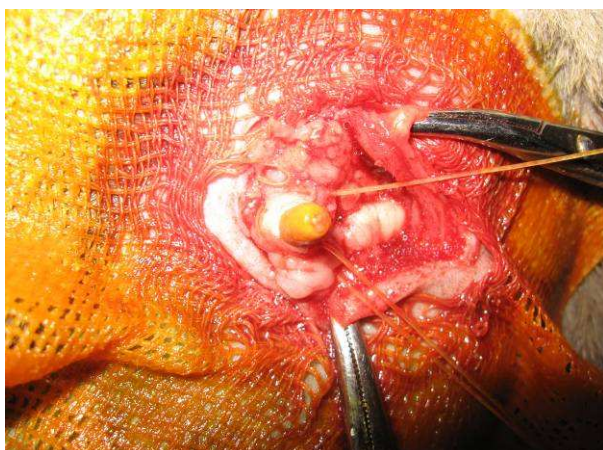


Fig. 7. Purse-string placement and gastric wall puncture

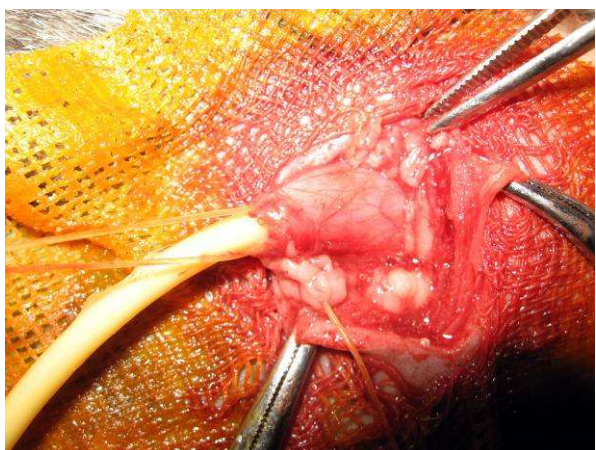


Fig. 8. Placement of the Foley catheter

ENTEROSTOMY TUBE PLACEMENT

Indications: patients with gastric, intestinal, pancreatic or biliary tract disease in which the intestinal tract distal to the disease or the surgical site is functional (Nelson and Couto, 2003).

Contraindications: intestinal disease distal to the surgical site

Complications: intestinal leakage and peritonitis, intestinal perforation, premature removal

Surgical technique: the animal is anesthetized and placed in right lateral recumbency. The distal tip of the feeding tube is brought into the abdominal cavity through a stab incision made on the right body wall with a No. 11 scalpel blade. A normal jejunal segment is identified and the normal flow direction of the ingesta is noted. A 1.5 cm linear incision is made in the seromuscular layer of the antimesenteric border of the chosen segment (Fig 9). Using the No. 11 scalpel blade, the lumen is entered at the most aboral end of the incision. The distal end of the feeding tube is inserted through this incision, and pushed 20 cm into the intestine, in an aboral direction (Fig. 10). The exiting portion of the tube is placed in the seromuscular incision, and sutured in this tunnel by inverting the seromuscular layer over the tube with several Cushing sutures of absorbable material (Fig. 11). The jejunal tube exit site is pinned to the exit site at the body wall with four simple interrupted sutures of absorbable material. A Chinese finger-trap suture is used to secure the tube to the skin. The exit point must be incorporated into bandage and a column of water maintained in the tube between feedings. Animals with enterostomy feeding tubes can be fed immediately after surgery.



Fig. 9. A linear incision in the seromuscular layer

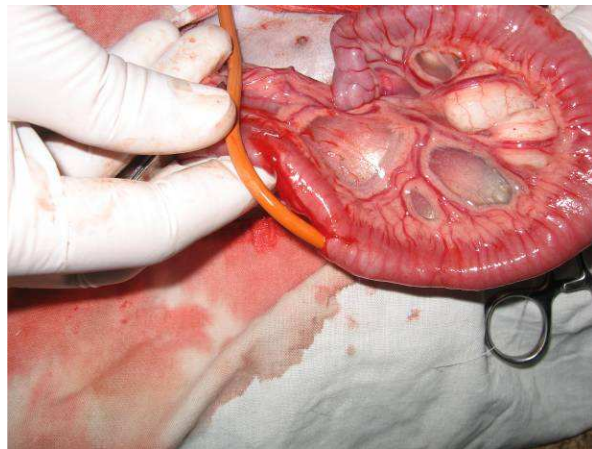


Fig. 10. Tube insertion through the intestinal incision

RESULTS AND DISCUSSION

Each surgical procedure has been successfully demonstrated. There were no intra or postoperative complications noted.

Upon removal of the Foley catheter, destruction of its balloon has been noted in both patients, probably under the action of gastric enzymes (Fig 12). This proves the importance of gastropexy to the abdominal wall.

The tubes were very well tolerated by the patients, and no noticeable discomfort has been noted.

Antibiotic therapy has been used in all 5 patients, for a period of 5 days following surgery.

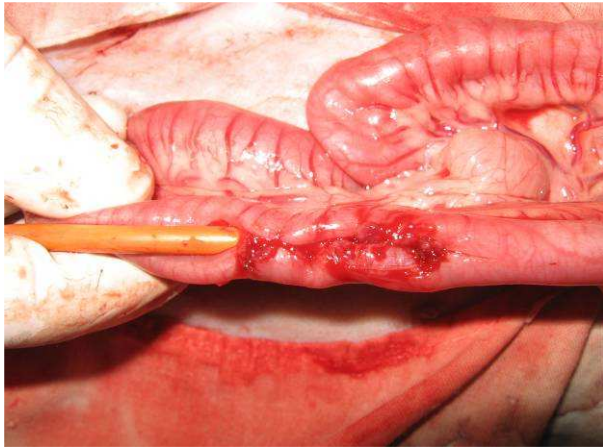


Fig. 11. Tunneled feeding tube



Fig. 12. The Foley catheter after removal

CONCLUSIONS

The surgical technique for each of the three methods is relatively simple and does not require special training or sophisticated equipment.

None of the techniques require more than 45 minutes, so they can be done in a short period of time.

Every method has its own advantages and disadvantages that should always be carefully considered when choosing one or another.

Complications can be reduced to minimum if surgical technique is carefully followed .

Enteral feeding is practical, safe, easy, economical, physiological, well tolerated and has minimum morbidity in patients with a functional gastrointestinal tract.

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