

ESOPHAGOSTOMY (E-TUBE) TUBES

“Feeding tubes in cats, the good, bad, and ugly”

Steven J. Bailey, DVM, DABVP (Feline Specialty)

ECats Veterinary Hospital, Michigan, USA

INDICATIONS

- Inadequate nutritional intake
 - o Metabolic disorders
 - o Neoplasia
 - o Trauma
 - o Neuromuscular disorders (including CNS trauma)
- Inadequate water intake
 - o Chronic kidney disease
 - o Neoplasia
 - o Trauma
 - o Neuromuscular disease (including CNS trauma)
- To facilitate oral medications or nutritional supplements
 - o Using injectable routes, or feeding tubes can enhance owner and patient quality of life, the alternatives can be life savers for cats with chronic disease

GENERAL GOALS

- Start before malnutrition starts
- For the gut to function, it needs to be fed
- Earlier intervention shortens hospitalization time
- Use the simplest, least expensive, approach with the fewest complications
- Bigger is better: generally, use larger tubes
- Minimize impact on the owner and patient’s quality of life

CONSIDERATIONS & CONTRAINDICATIONS

- Uncontrolled (frequent) vomiting
- Anesthesia
- Esophageal disease¹
- Lack of cervical access (wounds, dermatitis)
- Preexisting laryngeal hemiparalysis
- Ostomy site hemorrhage
- Ostomy site infections

ALTERNATIVES & OPTIONS

- Orexigenic drugs
- Forced (hand) feeding

- Oral gavage (syringe) feeding²
- Orogastric tube gavage (intermittent)²⁻⁵
- Nasoenteric tube placement⁶
- Pharyngostomy tube placement
- Gastrostomy tube (PEG, surgical, low profile)⁷⁻¹¹
- Gastroduodenostomy tube placement¹²
- Jejunostomy tube placement^{13,14}
- Partial or total parenteral nutrition

OREXIGENIC DRUGS

- Steroids
 - o Megestrol acetate
 - o Prednisolone
- Benzodiazepines
 - o Diazepam, others
- Cyproheptadine
- Mirtazapine
- Anesthetic drugs
 - o Isoflurane, Propofol, others
- Cannabinoids
- Ghrelin and Orexin receptor agonists

E-TUBE TUBE PLACEMENT

- Indicated for enteral feeding needs of greater than 48 hours
- Prepare owners expectation regarding
 - o Appearances
 - o Frequency and volume of feedings
 - o Care and cleaning of the ostomy site
 - Empirically, the author prescribes a quinolone x 30 days as this seems to have reduced stoma infections
 - Flushing the tube, after feeding (before?)
 - o Nutritional supplements
 - o Stigma and Prognosis
 - To many, feeding tubes in man represent the “beginning of the end” and discussing the cats quality of life, and uninhibited feline mobility, is important¹⁵
 - Having a slide show of feline glamor shots as a visual aid supports this contention
- IV fluids and Pressure support as indicated
- Anesthesia induction (Propofol, alfaxalone, isoflurane)
 - o Note that Propofol¹⁶ and isoflurane are orexigenic drugs

BEFORE PLACEMENT

- Verify normal laryngeal movement (abduction of the arytenoid cartilages) prior to tracheal intubation
 - o A common complication following surgery of the neck including esophagostomy tube surgery is laryngeal paralysis due to damage of the recurrent laryngeal nerve (RLN)
 - o In man, dogs and cats the left RLN is most often affected presumably due to its longer course and fewer fibers^{17,18}
 - o Most recommendations are to place e-tubes on the left side, presumably due to the anatomical left laterality^{4,19-21}. Recently, a study in man found a left sided laterality in only 35%, compared to right sided, or no laterality at all²²
 - o Further, in the author's practice this anatomical significance has not been appreciated, and more recent publications in cats have supported placement on either side¹
- Evaluate for concurrent oropharyngeal disease prior to placement
- Endotracheal intubation, cuffed
- Lateral recumbency, no side preference

SUPPLIES AND EQUIPMENT

- 18F x 43cm Orogastric feeding (Surgivet #1843)
- No. 15 scalpel blade
- 4-0 Nylon suture & needle holders
- Laryngoscope, spay hook for misplacements
- Kelly Forceps (7" or similar)
- Tissue adhesive (finger trap insurance)
- Sterile 2 x 2's
- Bandage of choice

CREATING THE STOMA

- Use long 8" Kelly forceps gently placed over the endotracheal tube and ties, into the cranial esophagus just caudal to the cricopharyngeal muscle
 - o Assure that you are in the esophagus and have not ensnared the soft palate
- Once in place, use rock (tilt) the forceps so the tip creates an outward tenting of soft tissues in the lateral cervical region
- With the instrument in the esophagus strum the lateral cervical soft tissues to visualize the jugular vein (superficial), carotid artery, and vagosympathetic trunk
 - o To avoid these, and avoid damaging the RLN, a more lateral placement is safer
- Retract cervical skin/fascia caudally during incision so the non-retracted (relaxed) ostomy tract runs cranial to caudal
- Locate the stoma approximately 1-2 cm caudal to the wing of the atlas
- Create a very small, 3mm, incision overlying the tip of the stationary hemostats

DELIVERING THE TUBE ORALLY

- Exteriorize the hemostat tips just enough (< 1 cm) to open the jaws to receive the male end of the feeding tube.

- To avoid trauma (and a loose ostomy tract) open the jaws only as much as needed to receive the rounded male end of the feeding tube. The end of the soft tube is forced (compressed) side-ways into the open jaws.
- With controlled traction, pull the tube through the neck, into the esophagus, and out the mouth.

PLACING THE TUBE INTO THE CAUDAL ESOPHAGUS

- Transect the male end of the feeding tube (on a bias) just above the side holes
- Using the Kelly forceps redirect the tube back down the esophagus
 - Do not wrap the tube around the endotracheal tube
 - Do not wrap around the endotracheal tube ties
 - Do not force the tube into the pairesophageal tissues and down into the mediastinum
- It may take several attempts to get the oral bend to straighten out and flip down into the esophagus
 - Note that this bend may hide from view above the soft palate
- The female end of the tube may need to be pulled out a bit while the male end feeds (flips or pops) down the esophagus.
- When you're done, the e-tube should slide freely within the ostomy site and the esophagus
- Assess the placement of the tube to ensure it is not looped or kinked within the esophagus
 - Assess the caudal oropharynx to be sure the tube is not looped within the pharynx
 - With a lighted laryngoscope (note this is harder than one would think) assess the intraesophageal ostomy site and tube placement
 - The non-working end of the spay hook may assist in opening the cranial esophagus
 - The working end can be used to grab the body of the e-tube if needed
 - Pass a lubricated 5F red rubber tube down the lumen of the feeding tube, it should slide freely if the tube is not kinked
 - Radiograph to confirm placement
 - If certain the tube is correctly placed then place the sutures first (then obtain the radiographs)

SECURING THE TUBE

- Do not leave excess tube protruding from the neck
 - Unnecessary dead space
 - This appendage likely annoys the cat
 - The excess tube is prone to snagging, or dislodgement via the hind foot
- Apply a Finger Trap suture (4-0 Nylon) to the maintain the tube in the ostomy site
 - Anchoring this suture near the periosteal tissue of the wing of the atlas will prevent migration of the suture externally, and keep it in place longer
 - There is a branch of the jugular vein in this region, but it has not be reported as a problem
 - The first bite of the suture is deep (encircling skin, subcutaneous, and periosteal tissue) followed by 2 to 3 throws of a square knot intending to have the suture in contact with the skin and subcutaneous tissues, but not compressing them. After

- these 2-3 throws, then encircle the e-tube and start the finger trap pattern with a surgeon's knot.
 - Note: prior to bandaging the finished product, the author applies a line of tissue glue to the finger trap suture line as added insurance against tube slippage
- Place a second 'accessory suture' to encourage the end of the tube to 'lay down' cosmetically against the neck
 - This suture provides a bit of insurance against an accidental snag. If the tube is pulled, this suture will feel the force
 - This minimizes annoying tube "bounce," and helps prevent snagging and premature removal
 - This suture is placed several centimeters dorsal, over the back of the neck
 - A deep bite, in contact with the skin, but not compressing the subcutaneous tissues
- Do not place a purse string suture around the stoma¹
 - Leave it open, to drain, if needed
 - Often there may be exudation, if trapped an abscess may form and drain inwardly; and occasionally, during vomiting, ingesta is forced into the ostomy tract,
- Extubate the patient while still deep enough to allow assessment of laryngeal function (abduction) and to document normal laryngeal function
 - E.g. this is the time to discover iatrogenic damage to the RLN
- Apply a light dressing and (reusable) bandage of choice
 - Home-made products
 - Commercial products (e.g. KittyKollar.com)
 - Bandaging that adheres to itself (e.g. Vetrap)
- Feedings can begin when recovered from anesthesia if the patient is otherwise metabolically stable
 - Recall, isoflurane & Propofol are orexigenic and the cat may readily eat, voluntarily (but transiently) following e-tube placement
- The ostomy site should be inspected, cleaned, and disinfected daily

REMOVING AN E-TUBE

- Can be done any time following placement (hours, days, months)
- No special care if the tube site was not infected
- No sutures or dressing required

Videos on YouTube Channel: ECats, Feline Medicine & Surgery

E-tube placement, Finger Trap Suturing: <https://www.youtube.com/watch?v=iKAotdz3ZxQ>

Feline Esophagostomy Tube Placement: <https://www.youtube.com/watch?v=eKexe-NoHCK>

Replacing a damaged esophagostomy tube: https://www.youtube.com/watch?v=Wc_8927eo0g

Removing an e-tube from a cat: <https://www.youtube.com/watch?v=bzuef6YqKvA>

E-TUBE COMPLICATIONS

- Surgical Traumas
 - Laryngeal hemiparalysis: RLN injury
 - Horner's syndrome: vagosympathetic trunk injury
 - Bleeding: jugular, carotid, others, muscle bellies
 - Placement of the tube through the neck and the soft palate
- Misdirected tubes
 - Threading the tube into the mediastinal tissues
 - If suspected (and esophageal placement cannot be visualized with a laryngoscope) remove the tube orally, and replace it.
 - Trial a test infusion with a water-soluble radiographic contrast agent
 - Loop-de-loop & Hair pin turns
 - Around the endotracheal tube, or the endotracheal tube tie
 - Rectifying these misplacements does not require removing the tube from with ostomy tract and starting over
 - Typically, a spay-hook will facilitate grabbing the tube and delivering it back out of the oral cavity if necessary. Then you start the process over
 - A laryngoscope and Kelly Forceps can also help
- Misplaced tubes
 - Incorrect skin tension: tube 'wants' to lean caudally, thus the tube in the lumen of the esophagus wants to bow in a cranial direction stimulating the pharyngeal reflex (gag)
 - Unfortunately, this placement is going to be pain in the neck to the cat, and will trigger the pharyngeal reflex (gagging). Pull the tube completely out, start over, possibly on the contralateral side
- Ostomy site infections (bacterial, fungal)
 - Dermatitis
 - Cellulitis
 - Abscess
 - Treatment
 - Empirically antibiotic coverage until the ostomy tract is lined with well healed granulation tissue reduces this frequency
 - Pull the tube and replace on the contralateral side
- Esophagitis from placing the tube into the stomach
 - Gastric acids 'wick' along the tube causing a lower esophageal stricture
 - Ostomy site infection leading to a cranial esophageal stricture
 - Treatment
 - Pull the tube
 - Place a gastrostomy tube
- Aspiration pneumonia

- Vomiting and aspirating food
- Feeding into a flaccid esophagus, passive reflux
- Flaccid full stomach or esophagus + anesthesia = reflux and aspiration
- Vomiting the tube
 - Feeding after a tube has been vomited & chewed off
 - Removing a tube, only to make a new ostomy site
- Gastric FB from swallowing a chewed tube
- Feeding Complications
 - Too much/little volume
 - Feeding too fast/too slow
 - Too hot, too cold
- Noise after placing an e-tube
 - Oropharyngeal Noise
 - Laryngeal noise
 - Noise from the tube

NOISE FOLLOWING E-TUBE PLACEMENT

- Associated with feeding
 - Noise from the tube, when the cap (stopper) has been removed from the female end (feeding end) of the tube
 - Negative pressure in the thorax, during inspiration, can draw air into the esophagostomy tube and create gurgling
 - The greater the intrathoracic pressure gradient (inspiratory effort, with upper airway disease) the greater the noise will be
- Oropharyngeal or laryngeal noise, not associated with feedings
 - There are a few reasons why you might have more upper airway noise, following tube placement (unrelated to the stopper being out)
 - Preexisting Disease. As most cats needing e-tubes are ill, it is very possible that preexisting upper airway disease was already present.
 - Iatrogenic Unilateral Laryngeal Paralysis. When placing the e-tube it is possible to damage the ipsilateral RLN.
 - As a rule, document laryngeal abduction before and after tube placement to assess this.
 - Temporary neuropraxia and permanent damage happen more than appreciated. This is one reason to use the same ostomy site (side) whenever possible when replacing a damaged tube. The technique of pairing the new tube with old tube to facilitate atraumatic passage through the same ostomy site helps in this regard.
 - Misdirect tube that curls within, or back toward the cranial esophagus or pharynx
 - Mislaid tubes, or improper angle of the ostomy tract
 - When tube is properly placed, it will naturally lay with the male end pointing down the esophagus and the female end laying toward the head. If the cervical skin and subcutaneous were retracted cranially during placement of the tube, then this tension will pull the female end of the tube caudally when they are released. This causes the tube to arch into the cranial esophagus or pharynx. Understandably this will make effective swallowing difficult, contributing to fluid collection and gurgling (and gagging)
 - Esophageal dysfunction, GERD, Gastroparesis, or placement of the e-tube into the gastric lumen
 - All the above can result in fluid accumulation in the esophagus
 - If the cricopharyngeal muscle is not tight (upper esophageal sphincter) this esophageal fluid communicates with the airways and gurgling is heard
 - The bandage (e-tube dressing) is too tight
 - Discomfort and exaggerated swallowing
 - Compromised pharyngeal airway (stertor)

SLECTED REFERENCES

1. Hodshon B, Tobias KM. Esophagostomy Feeding Tubes. *Clinicians Brief* 2014;66- 72.
2. Teeter S, Collins D. Intra gastric intubation of small animals. *Veterinary medicine, small animal clinician: VM, SAC* 1966;61:1067.
3. Little S. Playing Mum Successful management of orphaned kittens. *Journal of feline medicine and surgery* 2013;15:201-210.
4. Crowe Jr D. Nutrition in critical patients: administering the support therapies. *Veterinary medicine (USA)* 1989.
5. Lewis LD. *Small Animal Clinical Nutrition*, 3rd ed. Topeka, Kansas: Mark Morris Associates; 1987.
6. Crowe Jr D. Clinical use of an indwelling nasogastric tube for enteral nutrition and fluid therapy in the dog and cat. *The Journal of the American Animal Hospital Association* 1986.
7. Gauderer MW, Picha GJ, Izant RJ, Jr. The gastrostomy "button"--a simple, skin-level, nonrefluxing device for long-term enteral feedings. *J Pediatr Surg* 1984;19:803-805.
8. Stevenson MA, Stiffler KS, Schmiedt CW. One-step placement of a percutaneous nonendoscopic low-profile gastrostomy port in cats. *J Am Vet Med Assoc* 2000;217:1636-1641.
9. Campbell SJ, Marks SL, Yoshimoto SK, et al. Complications and outcomes of one-step low-profile gastrostomy devices for long-term enteral feeding in dogs and cats. *J Am Anim Hosp Assoc* 2006;42:197-206.
10. Fulton Jr R, Dennis J. Blind percutaneous placement of a gastrostomy tube for nutritional support in dogs and cats. *Journal of the American Veterinary Medical Association* 1992;201:697.
11. Mathews K, Binnington A. Percutaneous incisionless placement of a gastrostomy tube utilizing a gastroscope: preliminary observations. *The Journal of the American Animal Hospital Association (USA)* 1986.
12. Jergens AE, Morrison JA, Miles KG, et al. Percutaneous endoscopic gastrojejunostomy tube placement in healthy dogs and cats. *Journal of veterinary internal medicine* 2007;21:18-24.
13. Swann H, Sweet D, Michel K. Complications associated with use of jejunostomy tubes in dogs and cats: 40 cases (1989-1994). *Journal of the American Veterinary Medical Association* 1997;210:1764-1767.
14. Orton E. Enteral hyperalimentation administered via needle catheter-jejunostoma as an adjunct to cranial abdominal surgery in dogs and cats. *Journal of the American Veterinary Medical Association* 1986;188:1406-1411.
15. Fink L, Jennings M, Reiter AM. Esophagostomy Feeding Tube Placement in the Dog and Cat. *Journal of veterinary dentistry* 2014;31:133-138.
16. Long JP, Greco SC. The effect of propofol administered intravenously on appetite stimulation in dogs. *Journal of the American Association for Laboratory Animal Science* 2000;39:43-46.
17. Schachter S, Norris CR. Laryngeal paralysis in cats: 16 cases (1990-1999). *J Am Vet Med Assoc* 2000;216:1100-1103.
18. Birchard SJ, Bradley RL. *Surgery of the Respiratory Tract and Thorax*. In: Sherding R, ed. *The Cat: Diseases and Clinical Management*, 2nd ed. New York: Churchill Livingstone; 1994:1097-1115.
19. Vannatta M, Bartges J, Snow P. Esophagostomy feeding tubes. *Veterinary medicine* 2004;99.

20. Levine P, Smallwood L, Buback J. Esophagostomy tubes as a method of nutritional management in cats: a retrospective study. *Journal of the American Animal Hospital Association* 1996;33:405-410.
21. Dyce KM, Sack WO, Wensing CJG. *Textbook of veterinary anatomy* Elsevier Health Sciences; 2009.
22. Seta H, Hashimoto K, Inada H, et al. Laterality of Swallowing in Healthy Subjects by AP Projection Using Videofluoroscopy. *Dysphagia* 2006;21:191-197.