



# FEEDING TUBE PLACEMENT

---

Howard B. Seim III, DVM  
Diplomate ACVS  
Professor and Chief of Small Animal Surgery  
Veterinary Teaching Hospital  
College of Veterinary Medicine  
Colorado State University  
Ft. Collins, Colorado 80523

As a general rule, the closer one comes to the oral route of food intake and digestion, the more efficient is the assimilation and digestion of nutrients and the greater the flexibility in formula composition. Conversely, the further aboral one gets, the less efficient is the assimilation and digestion of nutrients and greater care must be taken when choosing formula composition. Route of administration also dictates feeding tube diameter (see box on left on p. 7), which in turn determines what feed formulas (in terms of viscosity and particulate matter size) can be used. The most common routes of administration for enteral hyperalimentation include oral, nasoesophageal/nasogastric, esophagostomy, pharyngostomy, gastrostomy, gastroduodenostomy, and jejunostomy. The indications, contraindications, advantages, disadvantages, and complications for each route are discussed.

## ORAL

Oral feeding is generally the method of choice if adequate amounts of nutrients can be consumed to meet the patient's protein and calorie needs. Several techniques have been used to successfully coax an animal to eat. Sending the patient home, if the disease state permits and owners are capable of managing the patient, may prove successful. Petting and vocal reassurance, although very time consuming, are also helpful in stimulating patients to eat. Highly palatable foods or food coverings (e.g., gravy) may stimulate the appetite. Warming foods (e.g., in a microwave oven) will increase aroma and palatability. Supplementing potassium (1–2 mEq/kg orally), giving vitamin B-complex in maintenance fluids (may directly stimulate appetite), and feeding diets high in zinc (zinc deficiency may decrease sense of smell and taste)

## ROUTE OF ADMINISTRATION DETERMINES TUBE DIAMETER

3–5 Fr

- Nasoesophageal, nasogastric
- Gastroduodenostomy
- Enterostomy (jejunostomy)

>8 Fr

- Pharyngostomy
- Esophagostomy
- Gastrostomy

have all been recommended and may have a place in appetite stimulation.

Drugs may be used successfully to stimulate appetite. A list of drugs and their recommended dosages are given in the box on right, above. Such drugs may provide the stimulus necessary for resumption of eating, but patients rarely eat enough to provide complete caloric needs. Appetite stimulants are contraindicated in patients suffering from severe malnutrition.

## NASOESOPHAGEAL/NASOGASTRIC

Nasoesophageal/nasogastric intubation is an easy, effective, and efficient means of providing enteral nutritional support. The availability of small bore, soft polyvinyl and silastic feeding tubes (i.e., 3–5 Fr 36 inch<sup>a</sup>) and low viscosity, nutritionally complete liquid diet formulations and patient tolerance of tube placement has made nasoesophageal/nasogastric tube placement a popular method for feeding malnourished patients. Nasoesophageal/nasogastric tube placement is indicated in any patient with protein-calorie malnutrition that will not undergo oral, pharyngeal, esophageal, gastric, or biliary tract surgery.

### Technique

Local nasal anesthesia, sedation, or light general anesthesia may be required for placing a nasoesophageal/nasogastric tube in cats. In the majority of cases, topical anesthetic or light sedation is all that is necessary for proper tube placement.

### Anesthesia

Place 0.5 to 1 ml of 0.5% proparacaine hydrochloride (topical local anesthetic) into the nasal cavity. Tilt the head up to encourage the local anesthetic to coat the nasal mucosa. Repeat local anesthetic application to ensure adequate anesthesia of the nasal mucous

<sup>a</sup>Argyl or National Catheter Company.

## DRUGS USED AS APPETITE STIMULANTS IN CATS

- Diazepam: 2 mg/kg orally or 0.1–0.5 mg/cat IV
- Oxazepam: 2.5 mg/cat
- Cyproheptadine: 2 mg/cat PO

membrane. If the patient will not tolerate nasal intubation (e.g., if excess stress is required to place the nasoesophageal/nasogastric tube, particularly in debilitated cats), administer ketamine (1 to 2 mg/kg IV) to obtain light general anesthesia.

### Tube Placement

Select an appropriate size feeding tube (5 Fr × 91 cm should be appropriate for adult cats; 3.5 Fr × 35 cm for kittens). Estimate the length of tube to be placed in the esophagus or stomach by placing one end of the tube next to the nasal planum and running it along the outside of the patient to the 7th or 8th intercostal space (nasoesophageal) or last rib (nasogastric). I recommend that the feeding tube *not* pass through the lower esophageal sphincter, as this may result in sphincter incompetence and esophageal reflux of hydrochloric acid, causing esophagitis. Place a tape marker on the tube once the appropriate measurement has been made. Lubricate the tip of the tube with 5% lidocaine viscous prior to passage. Hold the patient's head in a normal functional position (i.e., avoid hyperflexion or hyperextension).

Place the tube in the ventrolateral aspect of the external nares and pass it in a caudoventral medial direction into the nasal cavity. The tube will generally “drop” into the oropharynx and stimulate a swallowing reflex. Pass the tube to the predetermined distance.

### Confirming Esophageal Placement

Confirm esophageal placement by injecting 3 to 5 ml of sterile saline through the tube and eliciting a cough or by placing 6 to 12 ml of air and auscultating for borborygmus at the xiphoid. Placement can also be confirmed by taking an x-ray of the chest. If the patient requires general anesthesia, visually confirm tube placement in the esophagus.

### Securing the Tube to the Patient

Once the tube is properly placed, it should be sutured to the nose and head to ensure it will not be removed by the patient. In the cat, the tube must not exit laterally nor come in contact with the whiskers. Place the tube directly over the dorsal aspect of the nose and forehead

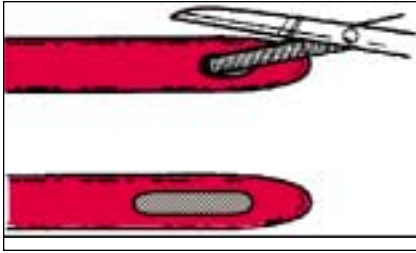


Figure 1. The two lateral openings of the feeding tube should be enlarged to encourage smoother flow of blended diets.

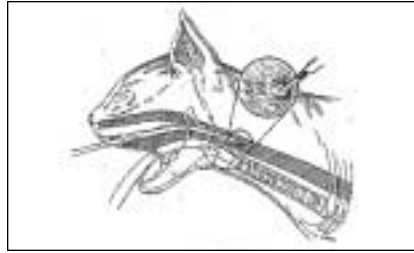


Figure 2. The oblique tip of the instrument shaft has been placed through the oral cavity and into the esophagus to the level of the mid-cervical region. A small skin incision is made over the device tip.

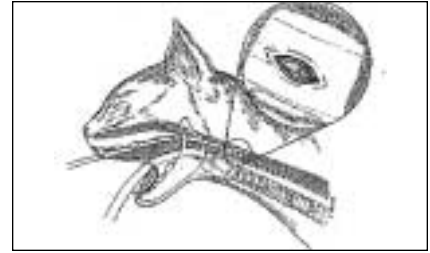


Figure 3. The incision in the subcutaneous tissue, cervical musculature, and esophageal wall is enlarged with the tip of a #15 scalpel blade to allow penetration of the instrument shaft.

and secure it with an encircling suture and Chinese finger-trap suture. An Elizabethan collar is placed postoperatively to prevent iatrogenic tube removal.

### *Tube Management*

Place a column of water in the tube and cap it when not in use; this prevents intake of air, reflux of esophageal contents, and occlusion of the tube by diet; 3 and 5 Fr feeding tubes come with appropriate size caps. Nasoesophageal/nasogastric tubes can be left in place for several weeks and are well tolerated and easily removed. The patient can drink and swallow around the tube, and repeated orogastric intubation is prevented.

## ESOPHAGOSTOMY

### *Indications*

Esophagostomy tube feeding is indicated in anorectic patients that have disorders of the oral cavity or pharynx or that have a functional gastrointestinal tract distal to the esophagus.

### *Contraindications*

Esophagostomy tube placement is contraindicated in patients with a primary or secondary esophageal disorder (e.g., esophageal stricture, esophagitis, megaesophagus) or following esophageal foreign body removal or esophageal surgery.

### *Advantages*

Esophagostomy tubes are easy to place. Additionally, the tubes are well tolerated by the patient, large-bore feeding tubes allow use of blenderized diets, tube care and feeding are easily performed by the client, patients can eat and drink around the tube, and tube removal can be performed anytime after placement. Esophageal tube placement eliminates coughing, laryngospasm, or aspiration occasionally associated with pharyngostomy tubes.

### *Disadvantage*

The major disadvantage of an esophagostomy tube is the need for general anesthesia during placement.

### *Placement*

Provide general anesthesia. Place the patient in right lateral recumbency with the left side up. The tube can be placed on either the right or left side of the mid-cervical region; however, because the esophagus lies slightly left of midline, left-sided placement is more desirable. Aseptically prepare the lateral midcervical area from the angle of the mandible to the thoracic inlet. Slightly extend the neck and hold the mouth open with a mouth speculum. Premeasure and mark a 16 to 18 Fr polyvinyl chloride feeding tube from the level of the mid-cervical region (i.e., exit point of feeding tube) to the level of the 7th or 8th intercostal space; this ensures mid- to caudal esophageal placement. Enlarge the two lateral openings of the feeding tube to encourage smoother flow of blended diets (Figure 1).

Using an Eld™ feeding tube placement device, place the oblique tip of the instrument shaft through the oral cavity and into the esophagus to the level of the mid-cervical region (i.e., equidistant between the angle of the mandible and thoracic inlet) and palpate the tip as it bulges the cervical skin. Make a small skin incision over the device tip (Figure 2). Activate the spring-loaded instrument blade until it penetrates the esophageal wall, cervical musculature, and subcutaneous tissue and is visible through the skin incision. Carefully enlarge the incision in the subcutaneous tissue, cervical musculature, and esophageal wall with the tip of a #15 scalpel blade to allow penetration of the instrument shaft (Figure 3). Place a 2-0 nylon suture through the side holes of the feeding tube and through the hole in the instrument blade (Figure 4). Tighten the suture until the tip of the instrument blade and feeding tube tip are in close apposition. Retract

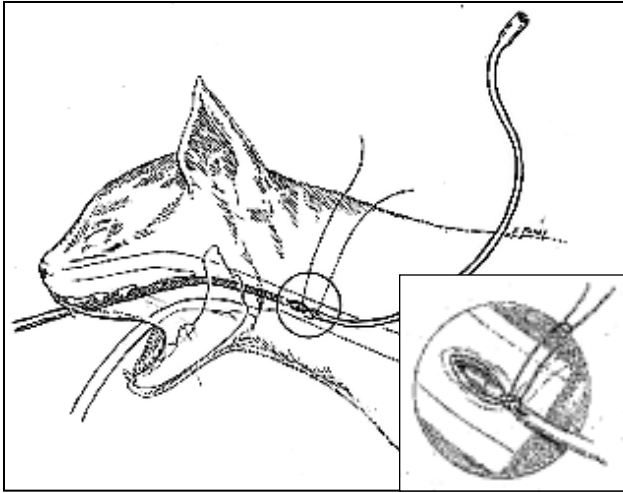


Figure 4. A 2-0 nylon suture is placed through the side holes of the feeding tube and through the hole in the instrument blade.

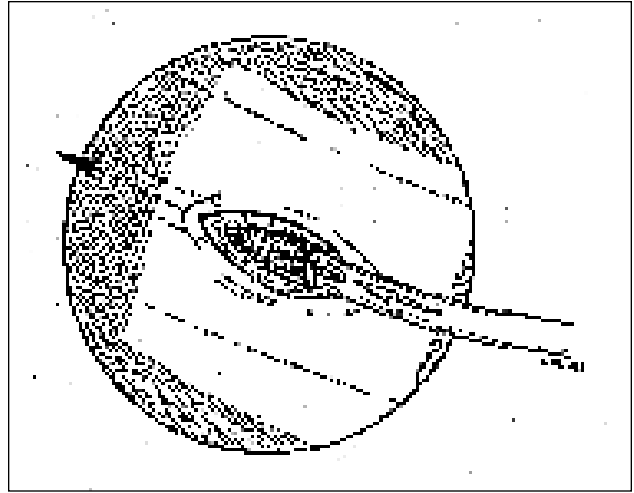


Figure 5. The instrument is retracted and the feeding tube is pulled into the oral cavity to its predetermined measurement.

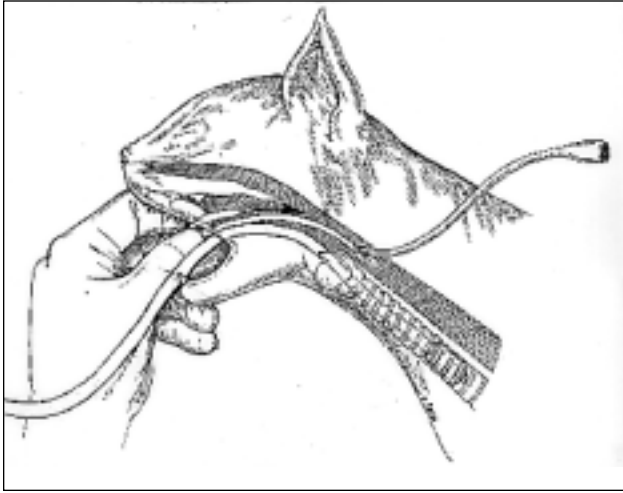


Figure 6. The feeding tube is lubricated, the tip of the tube is pushed into the oral cavity, and the tube is advanced into the esophagus until the entire oral portion of the tube disappears.

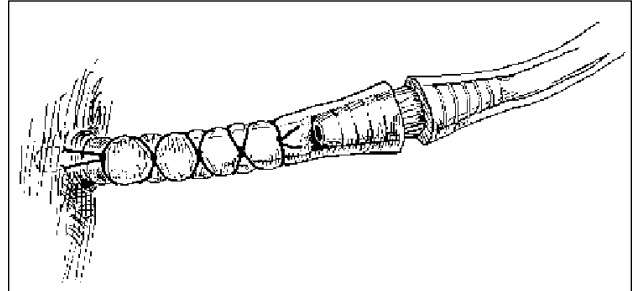


Figure 7. The tube is secured to the cervical skin with a Chinese finger-trap suture using #1 Novafil™.

the instrument blade into the instrument shaft so that the feeding tube tip just enters the instrument shaft (i.e., deactivating the instrument blade). Place sterile, water-soluble lubricant on the tube and instrument shaft. Retract the instrument and pull the feeding tube into the oral cavity to its predetermined measurement (Figure 5). Remove the 2-0 nylon suture to free the feeding tube from the instrument. Lubricate the feeding tube, push the tip of the tube into the oral cavity, and advance the tube into the esophagus until the entire oral portion of the tube disappears (Figure 6). Secure the tube to the cervical skin with a Chinese finger-trap suture using #1 Novafil™,<sup>b</sup> (Figure 7). The exit point of the tube can be left exposed or bandaged.

A column of water is placed in the tube and the exposed end is capped with a 3 cc syringe; this pre-

<sup>b</sup>Various manufacturers.

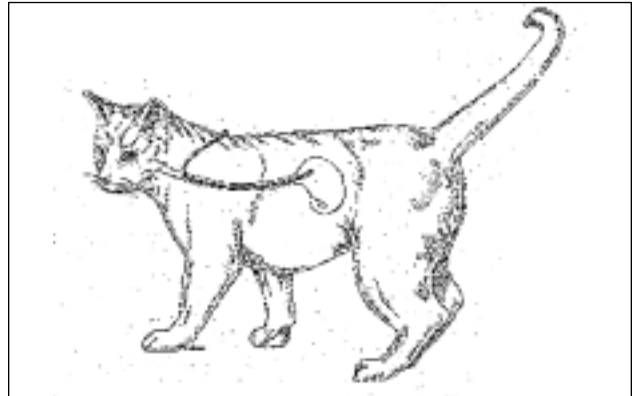


Figure 8. Esophagostomy feeding tube in place.

vents intake of air, reflux of esophageal contents, and occlusion of the tube by diet. Most patients tolerate the tube without the need of an Elizabethan collar (Figure 8). Esophagostomy tubes can be removed immediately after placement or left in place for several weeks to months. Care of the tube exit site may require periodic cleansing with an antiseptic solution. Tube removal is performed by cutting the finger-trap suture and gently pulling the tube. No further exit wound care is nec-

essary; the hole seals in 1 or 2 days and heals in 7 to 10 days.

### Complications

Complications associated with esophagostomy tube placement include early removal by the patient or vomiting the tube. No significant long-term complications (e.g., esophagitis, esophageal stricture, esophageal diverticulum, or subcutaneous cervical cellulitis) have been reported. Reflux esophagitis can occur from improper tube placement (i.e., through the lower esophageal sphincter) or esophageal irritation from the tube itself. Mid-esophageal placement of silicone rubber tubes greatly reduces the incidence of esophageal injury and eliminates reflux esophagitis.

## PHARYNGOSTOMY

### Indications

A pharyngostomy tube should be considered whenever nutritional supplementation needs to be provided to an anorectic patient (i.e., one suffering protein-calorie malnutrition) or to one that is unable or reluctant to ingest food orally (e.g., in cases of cleft palate, mandibular or maxillary fractures, oral neoplasia).

### Contraindications

Pharyngostomy tubes should not be used for nutritional management of patients with esophageal disorders (e.g., esophagitis, esophageal stricture, recent esophageal surgery, postesophageal foreign body removal, esophageal neoplasia).

### Advantages

The major advantage of a pharyngostomy tube over a nasoesophageal/nasogastric tube is tube diameter; pharyngostomy tubes are generally 20 to 24 Fr and thus can accommodate a wider variety of diets. Pharyngostomy tubes are placed in the mid-esophagus; they should never be placed through the lower esophageal sphincter. Because esophagostomy tube placement results in less complications, this method is generally preferred over pharyngostomy.

### Disadvantage

If the tube is placed too close to the laryngeal apparatus, irritation and mechanical obstruction can result in dysphagia or dyspnea.

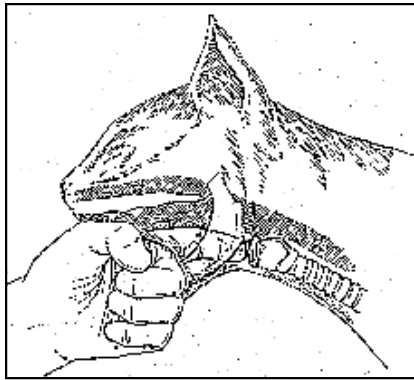


Figure 9. Placement of a pharyngostomy tube. An index finger is placed into the pharynx near the base of the tongue.



Figure 10. A 1 to 2 cm skin incision is made over the bulge, and a curved forceps is used to bluntly dissect subcutaneous tissue, pharyngeal muscle, and pharyngeal mucosa until the index finger or forceps becomes visible.

### Placement

Provide general anesthesia. Position the patient in lateral recumbency, with the side receiving the pharyngostomy incision up. Aseptically prepare a 4 cm square area just caudal to the angle of the mandible. Hold the mouth open with a mouth speculum. Premeasure and mark a 20 to 24 Fr polyvinyl chloride feeding tube to the level of the 7th or 8th intercostal space, thereby ensuring mid-esophageal placement. Place an index finger into the pharynx near the base of the tongue (Figure 9). Palpate the epiglottis, thyroid gland, arytenoid cartilages, and hyoid apparatus. Flex the index finger toward the lateral aspect of the neck and identify the junction of the intrapharyngeal ostium and laryngopharynx; this is the proper location for pharyngostomy tube exit.

Gently apply enough pressure to the lateral pharyngeal wall to create an externally visible bulge. A large, curved forceps can be substituted for the index finger to maintain the bulge. Make a 1 to 2 cm skin incision over the bulge and use a curved forceps to bluntly dissect subcutaneous tissue, pharyngeal muscle, and pharyngeal mucosa until the index finger or forceps becomes visible (Figure 10). With a curved forceps, grasp the tip of the pharyngostomy tube and pull it through the incision, into the oral cavity, and out of the mouth. Reinsert the tip of the tube into the mouth and pass it into the mid-esophagus (i.e., premarked location on the feeding tube).

Secure the tube at its exit point with a Chinese finger-trap suture (Figure 7) and to the patient's neck to encourage the tube to remain at its dorsal aspect. Place a column of water in the tube and cap it with a 3 cc syringe when not in use; this prevents intake of air, reflux of esophageal contents, and occlusion of the tube by diet.

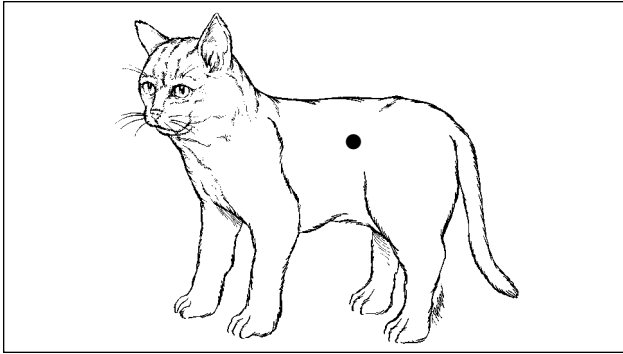


Figure 11. The exit point of the tube should be 1 to 2 cm caudal to the last rib and 3 to 4 cm ventral to the transverse processes of lumbar vertebra 2, 3, and 4.

When the tube is no longer required, cut the Chinese finger-trap suture, pull the tube, and allow the pharyngeal wound to heal by contraction and epithelialization.

### Complications

If the pharyngostomy tube is placed ventral and medial to the intrapharyngeal ostium and laryngopharynx, partial airway obstruction, coughing, and gagging may result. If the tube is improperly placed (i.e., through the lower esophageal sphincter), reflux esophagitis may occur. Vomiting the tube has also been reported.

## GASTROSTOMY

### Indications

Tube gastrostomy is indicated in anorectic patients with a functional gastrointestinal tract distal to the esophagus or patients undergoing operations of the oral cavity, larynx, pharynx, or esophagus.

### Contraindications

Gastrostomy tube placement is contraindicated in patients with primary gastric disease (e.g., gastritis, gastric ulceration, gastric neoplasia) or disorders causing vomiting.

### Advantages

Advantages of gastrostomy tube feeding include ease of tube placement, patient tolerance, use of large bore feeding tubes, and ease of tube care and feeding by the client. Additionally, oral feeding can commence while the tube is in place.

### Disadvantages

Disadvantages include the possible requirement of specialized equipment (i.e., endoscope, special tube placement instruments) and need for general anesthesia. Furthermore, feeding cannot be initiated during the first 24 hours after tube placement; depending

on placement technique used, tubes must remain in place for a minimum of 10 to 14 days before removal (to encourage adhesion formation between stomach and abdominal wall).

### Techniques for Placement

Gastrostomy tubes can be placed percutaneously (with or without the aid of an endoscope or feeding tube instrument) or via laparotomy. Tubes placed percutaneously without the aid of an endoscope can be performed with or without gastropexy.

### Percutaneous Surgical Placement with Gastropexy

General anesthesia is administered and standard skin preparation of the left paralumbar fossa is performed. An assistant should pass a large-bore, stiff plastic stomach tube (e.g., such as one used for gastric lavage) into the stomach. Palpate the left flank area until the bulging end of the stomach tube can be grasped. The tube should be grasped at a point 1 to 2 cm caudal to the last rib and 3 to 4 cm ventral to the transverse processes of lumbar vertebra 2, 3, and 4 (Figure 11). Hold the stomach tube in this position and make a 2 cm skin incision over the end of the tube. Bluntly dissect subcutaneous tissues and abdominal muscles to expose the wall of the stomach over the tube; take care not to enter the lumen of the stomach. Place a purse-string suture full thickness in the stomach wall around the tube using 3-0 Maxon<sup>TM,c</sup> suture. Use a #11 scalpel blade to enter the stomach through the lumen of the stomach tube. Place an 18 to 20 Fr Foley catheter 3 to 4 cm into the lumen of the stomach tube. Place moderate traction on the purse-string suture as the assistant slowly withdraws the stomach tube (Figure 12).

Once the Foley catheter is out of the lumen of the stomach tube, inflate the bulb and place gentle traction on the catheter to bring it against the stomach wall. Tie the purse-string suture snugly around the Foley catheter. Place three to four simple interrupted sutures of 2-0 Maxon<sup>TM</sup> from the stomach wall to the body wall to firmly fix the stomach tube in place. Close subcutaneous tissues and skin around the exiting Foley catheter and secure the catheter to the skin with a Chinese finger-trap suture of #1 Novafil<sup>TM</sup> (Figure 7).

### Advantages

Advantages of this technique include ease of tube placement, ease of finding the stomach in an anorectic patient, and quick tube placement. No special

<sup>c</sup> Various manufacturers.

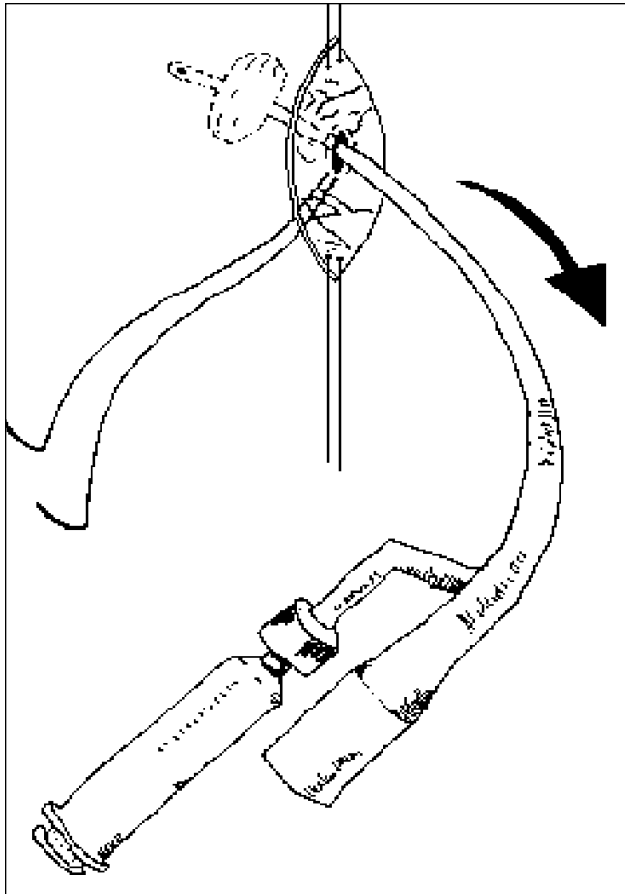


Figure 12. Moderate traction is placed on the purse-string suture as an assistant slowly withdraws the stomach tube.

equipment (e.g., endoscope or feeding tube placement device) is needed to place the tube. Surgical gastropexy ensures an immediate seal between the stomach wall and body wall, and confirmation of proper tube placement is performed during placement. Feeding tubes can be safely removed at any time after placement. This technique is my choice for placing a gastrostomy feeding tube.

### **Percutaneous Surgical Placement without Gastropexy**

Position and prepare the patient for aseptic surgery as described above. Prepare a 20 Fr Pezzer urinary catheter as follows:

- Cut off and discard the dilated proximal end of the tube
- Cut off 1.5 cm of the remaining tube and save for use as an external flange
- Cut the remaining proximal end of the tube at a sharp angle

Cut a strand of #1 Braunamid<sup>TM,d</sup> suture to the length of the prepared feeding tube. Pass either a stiff, large-

<sup>d</sup>B. Braun Melsungen AG.

bore stomach tube or a feeding tube placement device from the oral cavity into the stomach. Palpate the tube bulging against the left body wall and direct it 1 to 2 cm caudal to the last rib and 2 to 3 cm ventral to the transverse processes of lumbar vertebrae 2 and 3. If a large-bore stomach tube is being used, pass an 18 g hypodermic needle through the abdominal skin and into the lumen of the stomach tube. Place a strand of #1 Braunamid<sup>TM</sup> suture through the needle, into the stomach tube, and out through the mouth. Remove the stomach tube.

If a feeding tube placement device is being used (see esophagostomy tube placement, above), pass it into the stomach and direct it 1 to 2 cm caudal to the last rib and 2 to 3 cm ventral to the transverse processes of lumbar vertebrae 2 and 3. Activate the device and thread the #1 Braunamid<sup>TM</sup> suture through the hole in the instrument blade. Retract the blade into the instrument shaft and remove the instrument. In each technique (i.e., stiff stomach tube or feeding tube placement device), a strand of #1 Braunamid<sup>TM</sup> suture should enter the stomach through the left flank and exit through the oral cavity. Thread the end of the suture exiting the oral cavity through the narrow end of an 18 g sovereign catheter and tie it to the proximal end of the prepared Pezzer urinary catheter (i.e., feeding tube). Pull the Pezzer catheter tightly into the flange of the sovereign catheter and apply lubricant to the sovereign catheter. Pull the #1 Braunamid<sup>TM</sup> suture exiting the left flank until the sovereign catheter tip exits the skin. Enlarge the skin incision 3 to 4 mm to allow easy delivery of the Pezzer catheter. Pull the catheter until the mushroom tip is snugly against the body wall, thus ensuring a seal between the stomach wall and body wall. Secure the catheter to the skin with a Chinese finger-trap suture using #1 Novafil<sup>TM</sup> (Figure 7).

### *Advantages*

Advantages of this technique are that no special instrumentation is required for placement and it is easy to perform.

### *Disadvantages*

Disadvantages are that the stomach is not fixed to the body wall (i.e., removal prior to 10 to 14 days could result in peritonitis) and confirmation of tube placement can only be performed endoscopically.

### **Percutaneous Endoscopic Placement without Gastropexy**

Percutaneous endoscopic tube placement without gastropexy is performed as described for percutaneous

surgical placement without gastropexy with the exception that the #1 Braunamid™ suture is placed from the left flank out through the oral cavity with the aid of an endoscope. Pass the endoscope into the stomach and insufflate its lumen with air. Make a 1 mm skin incision in the left flank 1 to 2 cm caudal to the last rib and 2 to 3 cm ventral to the transverse processes of lumbar vertebrae 2 or 3. Pass an 18 g hypodermic needle through the skin incision and into the stomach lumen. Pass a strand of #1 Braunamid™ suture through the needle and into the stomach, retrieve it endoscopically, and bring it out through the mouth. Once the strand of suture is entering the left flank and exiting the oral cavity, place the feeding tube as described for percutaneous surgical placement without gastropexy.

#### *Advantage*

The advantage of endoscopic placement is the direct visualization of tube placement throughout the procedure.

#### *Disadvantages*

One disadvantage is the inability to perform surgical gastropexy to ensure an early and permanent seal between the stomach wall and body wall; also, tubes cannot be removed prior to 14 days after placement.

### **Laparotomy Placement**

From a ventral midline laparotomy approach, bring the distal end of an 18 to 20 Fr Foley or Pezzer catheter (i.e., bulb or mushroom tip) into the abdominal cavity through a stab incision in the left body wall. Exteriorize the ventral surface of the stomach, place a purse-string suture in the body of the stomach, and make a stab incision in the center of the purse-string suture with a #11 scalpel blade. Place the distal end of the feeding catheter in the lumen of the stomach and tighten the purse-string suture around the catheter. If a Foley catheter is used, inflate the bulb with saline and place gentle traction on the catheter to bring the body of the stomach in close apposition to the left body wall. If a Pezzer catheter is used, place gentle traction on the tube to accomplish same. Fix the stomach wall to the abdominal wall with four 2-0 Maxon™ sutures. Secure the feeding tube to the skin with a Chinese finger-trap suture using #1 Novafil™ (Figure 7). Close the abdomen routinely.

#### *Advantage*

The advantage of gastrostomy tube placement via laparotomy is the ability to suture the stomach wall to the abdominal wall, creating a early permanent gastropexy.

#### *Disadvantage*

The major disadvantage is performing a laparotomy to place the tube. This technique is generally performed when exploratory laparotomy is required for diagnosis or treatment of the patient's primary disorder.

#### *Complications*

The most severe complication of gastrostomy tube placement is associated with early removal causing gastric contents to leak into the abdominal cavity and subsequent generalized peritonitis. This complication can be prevented by choosing a technique that results in an early permanent fixation of stomach to body wall (i.e., percutaneous surgical placement with gastropexy or via laparotomy). Other complications include vomiting and peristomal infection.

## **JEJUNOSTOMY**

#### *Indications*

Jejunostomy feeding is indicated in any patient undergoing oral, pharyngeal, esophageal, gastric, pancreatic, duodenal, or biliary tract surgery in which the intestinal tract distal to the surgical site is functional. It may also be considered for surgical patients whose neurologic status may prevent postoperative feeding. Immediate feeding of a highly digestible, low-bulk diet in patients undergoing colonic surgery can be accomplished using a jejunostomy tube. Patients with preexisting protein-calorie malnutrition that must undergo major abdominal surgery are considered candidates for early enteral hyperalimentation via jejunostomy.

#### *Preferred Technique*

A celiotomy incision is required for placement of a jejunostomy feeding tube. A 5 Fr, 91 cm (36 inch) infant feeding tube is recommended. Bring the distal tip of the feeding tube into the abdominal cavity through a 2 to 3 mm stab incision on the right or left body wall using a #11 scalpel blade. Select a segment of proximal jejunum, identify the normal direction of flow of ingesta (i.e., oral to aboral), and ensure that the selected segment can easily be moved to the feeding tube entrance location on the body wall. Make a 1 to 1.5 cm linear incision through the seromuscular layers of the antimesenteric border of the selected jejunal segment. Using a 10 g hypodermic needle or the point of a #11 scalpel blade, enter the lumen of the jejunum at the most aboral end of the incision. Place the distal end of the feeding tube through the incision and pass 25 to 30 cm (10 to 12 inches) of the tube aborally in the lumen of the jejunum.

Lay the exiting portion of the tube in the 1 to 1.5 cm



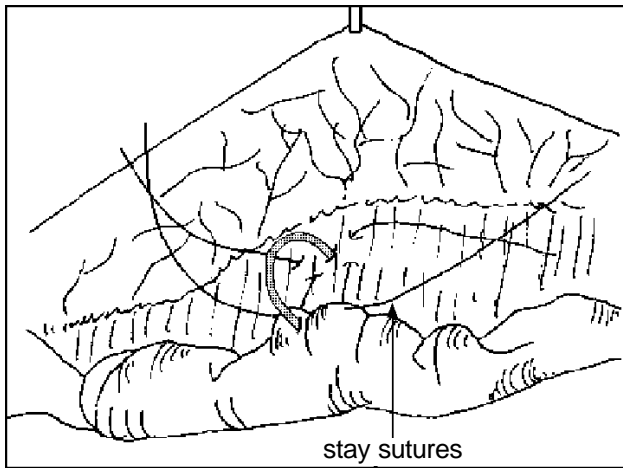


Figure 13A

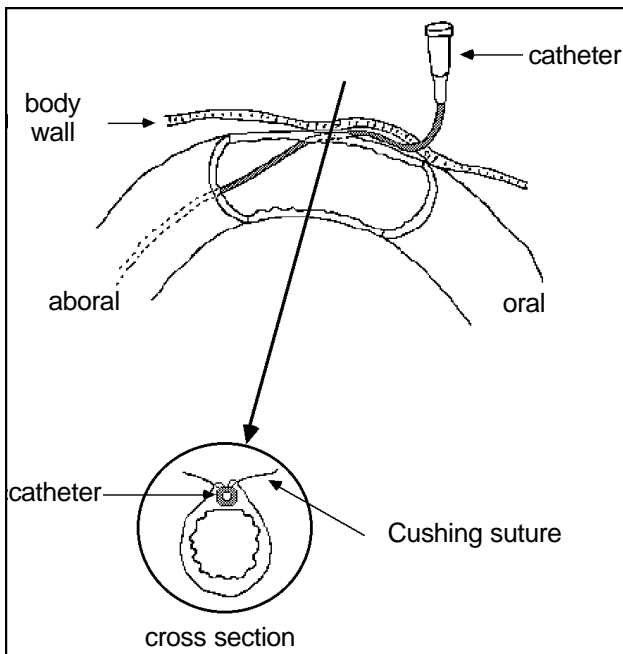


Figure 13B

Figure 13. Jejunostomy tube placement. (A) The exiting portion of the tube is placed in the seromuscular incision. The seromuscular layer is inverted over the tube, creating a “tunnel,” and the tube is then sutured in the tunnel with three or four interrupted Cushing sutures using 4-0 Maxon™ (B).

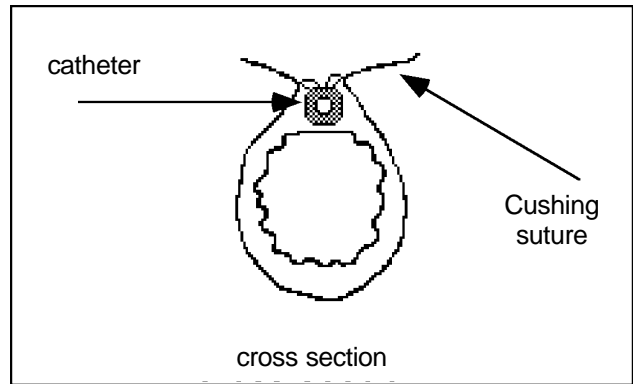


Figure 14. The tube exit site of the jejunum is fixed to the exit site at the body wall using four to five simple interrupted sutures of 4-0 Maxon™.

seromuscular incision and suture the tube in this “tunnel” by inverting the seromuscular layer over the tube with three or four interrupted Cushing sutures using 4-0 Maxon™ (Figure 13). Fix the tube exit site of the jejunum to the exit site at the body wall with four to five simple interrupted sutures of 4-0 Maxon™ (Figure 14). Omentum may be interposed between the jejunum and body wall. Insertion of an enterostomy feeding tube requires 10 to 15 minutes to perform. Secure the exiting feeding tube to abdominal skin using a Chinese finger-trap suture and 2-0 Novafil™ (Figure 7). The feeding tube exit point should be incorporated into a body bandage to prevent premature removal by the patient, technical staff, or client. Patients with enterostomy feeding tubes can be fed immediately postoperatively. A column of water should be kept in the tube between feedings.

### Complications

Complications include premature removal, tube-induced jejunal perforation, peritoneal leakage, and subcutaneous leakage. Tube-induced jejunal perforation is prevented by using soft rubber tubes designed for enterostomy feeding as opposed to high-density polyethylene plastic tubes. Peritoneal leakage is prevented by performing a 360° enteropexy. Subcutaneous leakage is prevented by securely fixing the tube to the skin.