SURGICAL PLACEMENT OF FEEDING TUBES

Kyle G. Mathews, DVM, MS, Diplomate ACVS
College of Veterinary Medicine
North Carolina State University
Raleigh, NC

This discussion will focus on the surgical placement of esophagostomy, gastrostomy and jejunostomy tubes and their postoperative use. The anatomic location of the tube is based on the disease process. It is often advisable to place the tube just "downstream" (aboral) from the area of concern. For example, patients with esophageal disease should have a gastrostomy tube placed if not vomiting. If there is concern regarding gastric function, or if pancreatitis is present, then a jejunostomy tube is preferred. Exceptions to this rule are when feeding tubes are placed oral to a resection anastomosis, or if caloric supplementation is needed in animals that are not vomiting and have no esophageal disease – in which case an esophagostomy tube is an excellent choice.1,2

Placement of an esophagostomy tube is quite simple. The tube is measured from its entry point ventral to the wing of the atlas. A stab incision is made in the skin ventral to the wing of the atlas, dorsal to the jugular vein and caudal to the larynx. The tip of the instrument is pushed into the stab incision and used to grasp the tip of the tube. The tube is pulled through the skin and out the stab incision, then redirected down the esophagus. A fingertrap suture is used to secure the tube to the skin.3 It is also quite helpful to suture a tape butterfly on the tube directly to the periosteum of the wing of the atlas, and to place a cervical bandage to prevent premature dislodgement.

Non-surgical (e.g. endoscopic) placement of gastrostomy tubes is generally preferred to surgery because of the decreased trauma associated with their placement. Surgical placement of gastrostomy tubes with associated gastropexy at the tube site is performed if 1) Long-term tube feeding is anticipated and there is concern regarding poor healing/adesion of the stomach to the body wall, 2) An abdominal procedure (e.g. liver lobectomy) is to be performed and there is concern about the patient’s postoperative appetite, or 3) The equipment to place a gastrostomy tube without surgery is not available (esophagostomy tubes should be considered if at all possible with this scenario).

A grid approach to the left side of the gastric fundus may be performed if the abdomen is not already open for another procedure, however this approach is often frustrating in that the gastric fundus is often difficult to identify (limited visibility) and retract. With the animal in right lateral recumbency, a vertical incision is made 1-2 cm caudal to the last rib. As muscle layers are encountered, the muscle fibers are separated parallel to their orientation. In this way, each successive layer is opened (external abdominal oblique, internal oblique, and transversus abdominis mm.) without transecting any muscle fibers. Once the peritoneal cavity has been entered, the stomach is grasped with forceps and elevated into the incision. This is particularly difficult in deep chested dogs. The greater curvature of the fundus is identified and stay sutures are placed in the outer wall (muscularis and adventitia) of the stomach. A mushroom tipped catheter is fed through the incision in the body wall, or through a separate caudally placed stab incision. A purse-string suture is placed in the outer layers of the stomach and a stab incision is made in the center of the purse-string. The tip of a pair of small hemostats is placed in the end of the catheter to stretch out the mushroom so that it can be inserted in the gastric stab incision. After placing the catheter in the lumen of the stomach, the purse-string suture is tightened and tied to prevent gastric leakage and premature catheter removal.

If available, laparoscopic equipment and technique should be considered as a desirable alternative to the paracostal approach which involves significantly more tissue dissection.

More commonly, gastrostomy tubes are placed surgically when the abdomen has already been opened along the ventral midline for other reasons. Tube placement in this case is similar although a grid approach is not used. Following completion of the abdominal procedure, a stab incision is made in the skin to the left of midline. A hemostat is used to penetrate the body wall and draw the tube through. The stomach is then elevated, and stay and purse-string sutures are placed as before. Once the tube is secured in the gastric lumen by the purse-string suture, the stomach is pexied to the body wall with a box-stitch using non- or slowly absorbable suture.

The box-stitch looks extremely confusing until you try it.4 This diagram outlines the placement of the sutures in the body wall and stomach. I would recommend practicing this technique by placing a pencil (simulates the tube) through two sponges (which simulate the gastric wall and body wall). Sequence 1-4 is performed...
The ends of the suture (1 and 4) are clamped and left long and loose. A second piece of suture is then used to place sequence a-d with the ends of a and d brought together. Once all sutures are in place, the stomach is pulled against the body wall by placing tension on the tube from the outside, and the two sutures are tightened and tied. An external finger-trap or flange may be created as before.

In dogs, an 18-24 Fr mushroom tipped catheter is used depending on body size, while in cats 16-20 Fr is more appropriate. The largest diameter catheter possible is used to diminish the possibility of plugging.

Tube feeding may begin as soon as the animal has recovered from anesthesia. Early feeding stimulates gastrointestinal motility and improves healing. One-third of the animal's caloric requirement is fed on the first day. This is slowly increased so that all caloric requirements are met in many cases by day 3 (may take longer with J-tube feedings). GI cramping and diarrhea may result if fed too rapidly. Continuous infusion is preferred especially for j-tubes. If intermittent feeding is used in animals with gastrostomy tubes, first make sure that the stomach is emptying properly by attaching an empty syringe to the tube and drawing back. If a significant volume is still present within the gastric lumen, replace the contents you just pulled off, skip that feeding, and observe for signs of nausea. Stop feeding if the animal acts nauseous. Never microwave the food as uneven heating may result in burning of the gastric mucosa!

The following outlines the method we use for determining a patient's caloric requirements (Thanks to Mark Jackson DVM, PhD, DACVIM, Banfield the Pet Hospital, 2550 Timber Drive, Garner, NC for providing this information):

1. Determine basal energy requirement (BER):

   \[ 70 + 30 \times \text{weight in kg} = \text{BER} \]

   BER = \text{___________ kcal}

   If your animal is <2 kg or >45 kg use the exponential equation:

   \[ 70 \times \text{weight in kg}^{0.75} = \text{BER} \]

   BER = \text{___________ kcal}

2. Determine an illness energy requirement.

   Moderate illness, cat \hspace{1em} 1.1 \times \text{BER}
   Stress, (dog) \hspace{1em} 1.3 \times \text{BER}
   Sepsis/burns, (dog) \hspace{1em} 1.5 \times \text{BER}

   MER = \text{___________ kcal}

3. Select a feeding product (see list):

   \hspace{1em} \text{________________kcal/ml}

4. Total volume to be administered in one day at full feeding = \text{_______ ml}.

5. Food administration schedule:

   a. Start feeding critically ill animals with j-tubes the day of surgery, very small amounts. Go to full feeding over 5-7 days.
b. Animals with prolonged anorexia that have e-tubes or g-tubes get 1/3 the total requirement the first day, 2/3 the total requirement the second, and full feeding the third day.

c. Animals with some oral intake that are being supplemented with e-tubes or g-tubes get ½ the total requirement on the first day and full feeding the second day.

6. Feeding schedule:
   a. Intermittent J-tube feeding is best done with very small volumes (5-10 ml, 0.25-0.5 ml/kg). Go to continuous infusion ASAP. If you are sending home a pancreatitis dog with a J-tube for home feeding, the boluses should be given over at least ½ hour.
   b. Intermittent esophageal or gastric feeding is done 2-6 times per day, depending on the volumes involved and patient tolerance. (nausea, vomiting, or obvious discomfort when feeding)
   c. Intermittent: Number of feedings to be given/day = ________
   d. Continuous: ________ ml/hr

7. Feeding instructions:
   a. Warm all food to body temperature
   b. Aspirate tube before feeding
   c. Administer gastric meal over 2-5 minutes, small intestinal meal over 15 minutes to ½ hour. Continuous feeding is best for small intestinal feeding.
   d. Recap tube after feeding and flush tube with 5-10 cc of warm water.
   e. Dirty blenders and liquid food bags that are over 24 hours old grow bacterial. Take apart the blender and wash in a dishwasher. Throw out old liquid food bags and administration lines.
   f. Ground up medication can clog small tubes. Use liquids whenever possible. Flush afterwards.

8. Make sure you are meeting and not exceeding the animal’s water needs:
   a. Maintenance fluids (40-80 ml/kg/day) = ________ ml/day
   b. Ongoing losses = ________ ml/day
   c. IV and oral fluids, water flushes of tube = ________ ml/day
   d. Total volume of enteral formula/day = ________ ml/day
   e. (a + b) – (c + d) = ________ additional mls of water needed per day

Table 1.

<table>
<thead>
<tr>
<th>Food</th>
<th>kcal/ml</th>
<th>g/100 kcal</th>
<th>Comments</th>
</tr>
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<tbody>
<tr>
<td></td>
<td></td>
<td>Protein</td>
<td>Fat</td>
</tr>
<tr>
<td>Slurry</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Feline p/d*</td>
<td>1.25</td>
<td>10.1</td>
<td>6.5</td>
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<tr>
<td>Feline k/d*</td>
<td>1.25</td>
<td>6.4</td>
<td>5.4</td>
</tr>
<tr>
<td>Feline NF*</td>
<td>1.35</td>
<td>6.0</td>
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<td>Feline multi stage renal*</td>
<td>1.10</td>
<td>6.6</td>
<td>5.4</td>
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<td>Feline i/d*</td>
<td>0.90</td>
<td>9.8</td>
<td>4.8</td>
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<td>Feline EN*</td>
<td>N/A</td>
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<tr>
<td>Feline low residue*</td>
<td>0.90</td>
<td>10.4</td>
<td>4.2</td>
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<tr>
<td>Canine k/d**</td>
<td>3.1</td>
<td>5.4</td>
<td>11.3</td>
</tr>
<tr>
<td>Canine NF**</td>
<td>3.5</td>
<td>5.9</td>
<td>10.8</td>
</tr>
<tr>
<td>Canine early/late stage</td>
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<td></td>
<td></td>
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<tr>
<td>Canine i/d**</td>
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<td>3.1</td>
<td>11.7</td>
</tr>
<tr>
<td>Canine EN**</td>
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<td>12.1</td>
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<td>5.7</td>
<td>7.1</td>
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<tr>
<td>Canine and Feline a/d**</td>
<td>1.3 (123 ml H₂O)</td>
<td>8.2</td>
<td>5.2</td>
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<tr>
<td>Max Cal</td>
<td>2.1 (134 ml H₂O)</td>
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<td>Veterinary Liquids</td>
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<tr>
<td>Clinicare Canine</td>
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<td>20% protein/calorie ratio</td>
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<td>Renalcare Canine</td>
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<td>5.5</td>
<td>22% protein/calorie ratio</td>
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<tr>
<td>Renalcare Feline</td>
<td>1.0</td>
<td>7.5</td>
<td>30% protein/calorie ratio</td>
</tr>
</tbody>
</table>

* blenderize 1 small can with 50 ml H₂O
** blenderize ½ can with ¾ cup (170 ml) H₂O, strain out chunks
1) Most slurry’s can be fed through a 14-16 Fr. tube except where noted.
2) All calculations based on 80% moisture, actual values vary from 76—82%(2.5-5% variation)
References


