



Feeding Tube Placement and Management

Nutrition is a very important component of patient management especially in the critical care setting. There is significant information indicating that animals may be hypermetabolic during many disease states. For this reason understanding and meeting nutritional requirements cannot be overlooked when managing a critically ill animal. Other factors such as immune system function and maintaining a healthy gastrointestinal mucosal barrier may also play a role in managing diseased dogs and cats.

For the most part the old adage "if the gut works, use it" applies in most situations. Although there is some controversy as to the benefit of total parenteral nutrition (TPN) in animals, if the gastrointestinal tract is functioning, enteral nutrition is the most appropriate choice. It is also the most cost-effective choice.

Indications for nutritional support

- Significant anorexia (>5 days)
- Significant weight loss (>10%)
- Increased nutritional losses
- Increased nutritional requirements
- Anticipated loss of appetite
- Bypass of specific parts of alimentary canal

Nasal gastric tube

This route has been used successfully in both dogs and cats. The technique involves passing a 3.5-8 F tube via the external nares to the distal esophagus or cardia. Less complications are seen with nasal esophageal placement.

Advantages:

- Inexpensive
- Non-invasive
- Quick
- Equipment readily available

Disadvantage:

- Some patients will not tolerate
- Small tube size
- May cause vomiting or gastroesophageal reflux

Esophagostomy tube

These tubes are generally placed in the mid-cervical esophagus and are tolerated very well. There are minimal complications associated with the esophagus. There are several techniques described for placing this type of tube, and all are minimally invasive and require minimal surgical skill. The easiest technique is to use Carmalt forceps and pass them per os. The tips of the forceps can be palpated in the mid-cervical esophagus and a cutaneous incision is made until the tips are visualized. A 20 F feeding tube can then be placed.

Advantages:

- Inexpensive
- Large tube
- Quick
- Tolerated well

Disadvantages:

- Invasive
- Chronic changes to esophagus
- Fistula formation
- May cause vomiting or gastroesophageal reflux

Gastrostomy tube

Traditionally this type of tube has been placed surgically, but more recent advances have allowed for endoscopic placement. Percutaneous endoscopic gastrostomy (PEG) is now common practice in veterinary medicine. Alternative techniques include blind percutaneous gastrostomy. Blind percutaneous gastrostomy can be performed with specially designed instruments or inexpensive gastric tubing.

Advantages:

- Large tube
- Well tolerated

Disadvantage:

- Cost
- Equipment
- Invasive
- Peritonitis
- May cause vomiting and gastroesophageal reflux

Jejunostomy tube

This technique still requires surgery. Most often this tube is placed via laparotomy although there are laparoscopic techniques being investigated.

Advantages:

- Distal GI tract
- Well tolerated

Disadvantages:

- Cost
- Invasive
- Peritonitis
- Small tube size

Tube maintenance

Most tubes require low maintenance. The tube sites must be kept clean and bandaged enough to keep animals from interfering with them. Tubes should be routinely flushed following feeding to prevent blockage. If blockage occurs flushes with warm water, Coke or pancreatic enzyme may be useful.

Feeding

Tube feeding is widely used in critically ill patients. The larger bore tube that can be placed, the easier feeding. Generally blenderized diets are the most cost effective and work well in larger bore tubes. In small bore tubes, commercially available liquid diets, such as Hills A/D or Iams Recovery Diet can be used. Blenderized commercial diets can also be diluted, but energy density may be a problem. Other commercial liquid diets that are available include polymeric and monomeric diets. Polymeric diets include Osmolite HNÒ, JevityÒ and ClinicareÒ. These diets require digestion before absorption. Monomeric or elemental diets include Vivonex HNÒ and Vital HNÒ. These diets require slight or no digestion. Monomeric diets tend to be more expensive and hyperosmolar. Additional protein can be supplied by products such as ProMod a powdered protein supplement.

Feeding can be initiated 24 hours after tube placement. The calculated amount of diet required should be gradually met over a period of 3 days ie give 1/3 on day 1, 2/3 on day 2 and full requirement on day 3. Each day a partial volume of diet is given the remainder of the volume should be made up of water. Feeding can be accomplished by bolus or continuous rate infusion. Stomach capacity 90ml/kg for dogs and 45 ml/kg for cats should not be exceeded.

Selected Enteral Diets

Product	Calories (kcal/ml)	Protein (g/100 kcal)	Protein (g/ml)	Fat (g/100kcal)	Osmolarity (mOsm/kg)
Hills a/d	1.20	8.75	0.105	5.5	-
Iams recovery	2.10	7.48	0.017	7.1	-
Feline p/d*	0.80	9.29	0.074	6.22	-
Feline k/d**	0.90	4.36	0.039	7.54	-
Feline c/d**	0.62	8.87	0.055	5.96	-
Canine k/d**	0.62	3.06	0.019	5.29	-
Canine u/d**	0.66	1.94	0.013	5.13	-
Canine i/d**	0.57	5.86	0.033	3.41	-
Jevity	1.06	4.20	0.045	3.48	310
Osmolite HN	1.06	4.44	0.047	3.68	310
Vital HN	1.00	4.17	0.042	1.08	460
Vivonex HN	1.00	4.60	0.046	0.90	810

Clinicare feline	0.92	7.00	0.064	4.60	368
Clinicare K9	0.99	5.00	0.050	6.10	340

* Blenderized ½ can (224 g) + ¾ cup (170 ml) water

** Blenderized ½ can (224 g) + 1 ¼ cup (284 ml) water

Calculating nutritional requirements

Animals < 2 kg

Basal Energy Requirement = $70(\text{BW})(\text{kg})^{0.75}$

Animals > 2 kg

Basal Energy Requirement(BER) = $30(\text{BW})(\text{kg}) + 70$

Maintenance Energy Requirement(MER) = BER(X)

Cage rest X=1.25

Post surgery X=1.25-1.35

Trauma X=1.35-1.50

Cancer X=1.35-1.50

Sepsis X=1.50-1.70

Burns X=1.70-2.00

$\text{MER}(\text{kcal}/\text{day})/\text{Caloric content}(\text{kcal}/\text{ml}) = \text{Volume}$

Protein Requirement

Canine 5.0-7.5g/100kcal

Hepatic or renal disease < 3.0 g/100kcal

Feline 6.0-9.0g/100kcal

Hepatic or renal disease < 4.0 g/100kcal

Tube removal

- Nasogastric tubes can be removed without concern
- Esophagostomy tubes can be removed without concern and will close with granulation tissue
- Gastrostomy tubes should be left in place for at least 5 days to allow gastropexy to occur