Feeding Tubes: A Review of Enteral Nutrition

Enteral nutrition is defined as the act of supplying nutrients through a tube directly into the gastrointestinal tract. Over the past 20 years there has been a shift from using parental nutrition in critically ill patients to enteral support regardless of underlying disease. Parental nutrition while effective in supplying total macro and micronutrient needs is associated with cost and complication. To effectively administer parental nutrition a central line is required. In human patients this can be an outpatient support but in our veterinary patients this is not possible given the higher rate of infection and the methodology used to place central lines. For this reason a focus on providing nutrition enterally has become the standard of care.

In critically ill veterinary patients, supplemental enteral nutrition is often imperative for early improvement from severe disease. Documented benefits of early enteral nutritional support include maintenance of intestinal structure and function, decreased mucosal permeability, and preservation of biliary function. The need to intervene in order to provide enteral nutrition is a particularly common clinical scenario with feline and canine patients. Disease processes such as hepatic lipidosis, inflammatory bowel disease, gastrointestinal lymphoma, and chronic systemic disease often necessitate early and consistent nutritional intervention. Basic benefits include a physiologic down regulation of the immune system, reduction of oxidative stress, and improvement in patient outcome (including survival, length of hospital stay, and return for further care). It is very important to recognize that parental nutrition does not mimic nor provide the same vast array of support that enteral nutrition has proven to provide. The gut is an essential organ for balance and response to illness. There are three main components recognized both as providers of damage if left unsupported, the epithelium, the mucosal system, and commensal flora. By protecting those three components there is a decrease in mucosal atrophy, permeability, and reduction in inappropriate immune response. If dysfunction occurs this can lead to massive systemic cytokine release, translocation, and production of pathogenic bacteria, and worsening of multi-systemic disease. There is proven evidence that improved local gut immunity reduces the rate of infection of patients (both in pneumonia and sepsis). Finding a way to provide that support to our patients should and has become an important element of care. In practice addressing both acute and chronic disease becomes important.

Chronic is disease is described as a persistent disease, being present for several days or more. In the veterinary patient this often related to the gastrointestinal tract (with megaesophagus, IBD, infiltrative disease), renal insufficiency, hepatitis or
cholangiohepatitis, hyperthyroidism, diabetes, or undiscovered neoplasia. The term chronic as a descriptor can also often be applied to there nutritional state with long-term anorexia. As a disease becomes chronic so does the anorexia and intervention should be considered. These animals are malnourished and unable to reestablish a normal nutritional balance. Malnutrition is a disorder of body composition and deficiencies. Think of this as created by and in combination with chronic disease. In human nutritional studies chronic disease and malnutrition go hand in hand. There is an increased morbidity and mortality of patients with acute disease in a malnourished disease state. If you think of this in the form of an equation you have chronic disease with the presence of malnutrition leading to a metabolic imbalance of stressed starvation (vs. unstressed starvation such as trauma) There is a lack of reserves an alteration in the immune system, probable food aversion and the underlying disease. Chronic disease related malnutrition is a term recognized by the ASPEN association as a classification of malnutrition, which implies a need for greater and long-term standard of care. Providing a reliable method of enteral nutrition becomes essential. A method for long-term, minimally invasive placement, with limited side effects and complications and at home management allowed.

Feeding tubes have been this solution for people and animals. The importance of having a method to administer nutrition was not developed in just the past 50 years but has been present in society for centuries. In veterinary medicine methods for enteral nutrition have greatly advanced over the past 10 years. These can be classified into in hospital care and at home care. In hospital care including nasoesophageal tubes, nasogastric tubes, and tubes with post-pyloric options (duodenum and jejunum). Enteral feedings for at home care include esophageal tubes, and gastrostomy tubes.

Nasoesophageal and gastric tubes are essential for in hospital support. They do not require anesthesia to place and they allow for nutritional support to provided in a non-invasive method. These tubes should be considered in early intervention including: hepatic lipidosis, pancreatitis, or anorexia related to renal disease, liver disease, or central nervous system. These tubes can also be used to provide free water in cases where intravenous fluid administration is worrisome (heart disease, hypoalbuminemia). Placement is usually simple, in feline patients a 3 french or 5 french feeding tube is used, in canine patients a 5 french to 12 french tube is chosen. The tube should be long enough to reach the distal esophagus or stomach. The advantage to placing this tube into the stomach is the ability to remove residual gastric volume if needed. Placement begins with tilting the nose and instilling lidocaine or proparacaine into the nostril. While this takes effect measure the feeding tube to several centimeters beyond the last ribs. Lubricate the end of the tube. Hold the patient’s nose firmly in a normal position (avoid flexion or extension). Direct the tip of the tube medially and ventrally into one of the external nares, until it passes into the ventral meatus of the nasal passage. Pass the tube gently until you
reach the oropharynx (the animal will probably swallow). At this time move the head ventrally slightly and slowly advance the tube. It should pass easily with no coughing to major gagging. Continue to feed the tube to the point marked. The tube can be tested by using assessing for negative pressure. A finger trap suture should be used to secure the tube at the lateral nasal fold. A radiograph should ALWAYS be taken to ensure proper placement, this includes the pharynx and larynx to ensure no coiling has occurred. NE and NG can only provide liquid nutrition such as clinicare or renacare. These liquid diets are balanced and complete and generally are 1 kcal per ml. Calories can be fed at a CRI based on RER or as bolus feedings. Complications associated with these tubes are migration due to emesis or regurgitation, clogging, and inappropriate diet type. While the liquid diets are soy based they can induce diarrhea and gastrointestinal upset. They are not perfectly formulated for pancreatitis patients due to fat content. Renacare should be used in the cases of renal disease and also liver disease due to reduce phosphorus and protein content. These diets can be diluted for volume and combined with appropriate free water administration. NE and NG tubes can be left in long-term with in-hospital. Contraindications to placement would include repeated emesis, or regurgitation, thrombocytopenia (below 50,000), known food hypersensitivities.

Often with chronic disease the need for at home enteral support is recognized. In these cases a different approach must be taken to placement and procedure. The tubes commonly chosen are esophagostomy tubes and gastrostomy tubes. Both of these tubes provide a much greater flexibility in terms of care. Specific diets can be fed, medications can be provided, and CRI of nutrients is not needed. Esophagostomy tubes play a large role in feline support but should also be considered in small canine support. The contraindications for esophagostomy tubes are general anesthesia, risk of infection at the peristomal site, and animals with emesis as a prominent component of their disease. The procedure of placement with these tubes has gone through a variety of changes over the past years but the currently published and accepted procedure is as follows. The animal is placed under general anesthesia this ensures protection of the airway and the person placing the tube. A mouth gag should always be placed to protect the placer from bites. An area on the left side of the neck from the caudal mandible to the thoracic inlet should be shaved and aseptically prepared. An assistant will insert right angle forceps through the oropharynx into the cervical esophagus with the point facing laterally. Using the lateralized tip as a guide, a stoma site half way between the caudal mandible and thoracic inlet, and approximately 2/3 from the dorsal surface of the neck will be established. All large vessels will be noted and avoided (jugular and carotid vessels). Using a #11 blade scalpel, a small incision will be made over the tip of the right angle forceps. The stoma site should be only large enough for tight passage of the tips of the right angle forceps. A sterile 14 french red rubber catheter should be pre-measured to reach to the 8th to 10th rib, and marked with a sterile surgery marker. The tip of the catheter is placed within the tips
of the of the right angle forceps. The assistant will then pull the red-rubber catheter through the stoma sight and out the oropharynx. The surgeon will then redirect the red rubber catheter back through the oropharynx and into the cervical esophagus. The position of the red rubber catheter will be adjusted to the previous mark. The catheter is secured to the skin of the stoma using a single purse string suture around the red rubber catheter at the stoma site. A Chinese finger trap suture along the body of the red-rubber catheter should be used to secure the catheter to the skin. A lateral and ventrodorsal radiograph of the thorax should be completed to ensure appropriate placement. Again the e-tube placement any diet can be fed. They will all need to be blenderized with at least 30mls of water and some will need straining. With cats it is essential to slowly increase RER due to refeeding syndrome. Total calories should be fed at 15% the first 24 hours then a 25% increase daily after this point. Research extrapolated from human literature and these types of enteral feeding devices reports infection as a common complication. Therefore at home care of these tubes is essential with chlorhexidine scrub used twice daily to clean peristomal site and regular rechecks. Multiple episodes of emesis after placement warrant a recheck radiograph. Misdirection of the tube can lead to major complications such as aspiration.

Gastrostomy tubes are another method for providing at home enteral support to both felines and canines. It is very appropriate for any type of esophageal disease that must be bypassed, chronic regurgitation, cancer cachexia, or severe systemic disease. We often recommend this method for any canine patient greater than 25kg. There are several methods described in the literature include blind percutaneous placement, percutaneous endoscopy assisted, gastrostomy with endoscopic assistance, or surgical placement. All of these techniques are equally adequate but recent review of the literature would promote a method in which the tube can be visualized from both the outside and inside to ensure appropriate placement. This is important as misplacement to close to the lower esophageal sphincter or to low in the body of the stomach can lead to motility disorders. These types of tubes require strict maintenance after placement. A seal must for between the gastric site and the body wall. Complications include inflammation and infection at the peristomal site, peritonitis, or loss of the tube. The initial tube that is placed with all of these procedures is not the permanent tube. All owners should understand that 10-14 days is needed for healing regardless of future plans, and that in one month the stoma should be measured and a low profile tube acquired. Again the benefit of this type of feeding tube is ease of feeding, ability to feed any food product, and long-term support.

There are circumstances where none of the before mentioned enteral feeding devices are appropriate. Post-pyloric feeding provides a method that bypasses these sections of bowel (esophageal and gastric). Post-pyloric feeding becomes especially important in cases of refractory vomiting, or regurgitation, functional or mechanical ileus, or recurrent
aspiration. Jejunal feeding methods have become an accepted and appropriate method for providing EN in critically ill patients. Over the past decade techniques including surgically placed jejunostomy and gastrojejunostomy tubes, laparoscopic assisted jejunostomy tubes, endoscopic assisted gastrojejunostomy tubes, and fluoroscopy assisted nasojejunal tubes have all been described in veterinary medicine.

Post- pyloric feeding was first supported in veterinary medicine through surgical intervention and placement of jejunostomy tubes. Unfortunately these tubes have been associated with a high rate of complications such as osteotomy inflammation and infection, tube dislodgement, tube occlusion, or septic peritonitis. Complications have been reported between 17.5-40%. While both surgically and laparoscopically placed gastrojejunostomy tubes have far fewer major complications, inflammation and infection were still reported at osteotomy sites, as well as tube migration, kinking and tube dislodgement reported in 46% of cases. Laparoscopic placement while less invasive in all publications extended the procedural time to 76 minutes twice that of other techniques and still required surgical intervention. Less invasive endoscopic placement has been described but only in healthy animals. The tubes also required placement verification with fluoroscopy, and complication rates of approximately 40% were noted including: jejunostomy tube removal, retrograde tube migration and ostomy inflammation. In humans endoscopically placed gastrotomy and gastrojejunostomy tubes are associated with a significant incidence of ostomy site infection; presumably due to passage of the tube across the oropharyngeal mucosa. The most recently reported technique is fluoroscopically guided nasojejunal (NJ), esophagojejunal, or gastrojejunal tube placement. These tubes can be placed quickly and with minimal invasion in most cases. In patients where post-pyloric feeding appears to be warranted referral to an appropriate institution who can provide one of these tube types maybe essential for the survival of the patient. These tubes are for in-hospital support, in the future we maybe able to separate jejunal components from esophageal or gastric components allowing for an at home portion to stay in place.

Enteral nutrition should be considered an essential tool in supporting both the acute critically ill patient and the chronically ill patient. Different clinical presentation and underlying diseases warrant different enteral feeding devices and considerations. Part of the supportive plan for any anorexic patient greater than three days should be a way to provide enteral support. It’s important to offer clients these options and possibilities for support that may improve survival and recovery times.

Citations


Crowe DT, Devey JJ. Clinical Experience With Jejunostomy Feeding Tubes In 47 Small Animal Patients.


