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Peg-Tubes for the Nutritional Management of Renal Failure

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Dietary therapy has remained the cornerstone of management of renal failure for decades.[1] The objectives of dietary modification are to meet the cat's nutrient and energy requirements, alleviate the clinical signs and consequences of uremia, minimize disturbances in fluid, electrolyte, vitamin, mineral and acid base balance, and slow the progression of disease. However, adequate daily dietary intake is hampered by uremic manifestations of anorexia, nausea, vomiting, and gastric ulcerations. In addition, an altered sense of taste and smell may contribute to reduced caloric intake and refusal of the diet. Clients often complain of waxing and waning appetite and become frustrated with the finicky appetites of their cat. Malnutrition is the ultimate result of chronic reduced caloric intake. Indeed, malnutrition is a significant factor that influences outcome in humans with renal failure. Therefore, prevention of malnutrition by ensuring adequate nutrient intake is crucial in the management of renal failure. When to initiate nutritional support requires early assessment of the cat to identify those either at risk of malnutrition or who already require nutritional support. Nutritional assessment requires evaluation of the history, physical examination, body weight (BW), body condition score (BCS) and laboratory data. The type, amount and frequency of food intake and the incidence of vomiting should be noted. A food diary can be used to record daily intake. Manifestations of inadequate nutrient intake include loss of BW or BCS, hypoalbuminemia, and anemia. However alterations of common laboratory indicators of malnutrition (albumin, BUN, cholesterol, RBC's and lymphocyte counts) are often indistinguishable from those that can occur with renal failure. Other markers of nutritional status including prealbumin, transferrin, and ceruloplasmin, have not been evaluated in cats.[2] Objective determination of changes in fat mass or lean body mass using total body water, dual energy x-ray absorptiometry or bioelectrical impedance analysis are not widely available.[3]

Practical measures to improve food intake include the use of highly odorous foods, warming the foods prior to feeding and stimulating eating by positive reinforcement with petting and stroking behavior. Appetite stimulants like benzodiazepines or serotonin antagonists may be judiciously administered, however these are often ineffectual in renal failure cats. The placement and use of enteral feeding devices like gastrostomy tubes (G-Tubes) may facilitate effective dietary management. G-Tubes can be placed using a surgical or percutaneous approach. There are two percutaneous techniques, one using an endoscope (percutaneous endoscopically placed gastrostomy tubes) and the other is a blind technique.[4] G-tubes should be instituted for nutritional support upon documentation of a 10–15% loss of BW in conjunction with a declining BCS and a history of poor dietary intake. In addition, G-tubes circumvent the need for S/Q fluid therapy and ease the administration of oral medications.

18–20 Fr G-tubes are appropriate for cats.[4] Tubes are constructed of latex or silicone. Latex tubes are less expensive but generally require replacement within 8–12 weeks due to tube wear and tear. Silicone tubes typically survive 6–12 months and are less irritant at the stoma site. The most common initial placement design is a latex Pezzar-type mushroom catheter. Replacement tubes are typically a Foley balloon style. An array of feeding adapters can be attached to the gastrostomy tube; I prefer a Y-port device that has catheter and luer tip syringe ports. Blended food can be delivered using the catheter port and oral medications can be administered via the luer port. Low profile gastrostomy tube devices (LPGD's) have been developed for both initial and replacement procedures. These devices are positioned flush with the body wall. Client and cat acceptance is much higher than with traditional tubes as the cat appears "normal" without a long tube attached to the body or the need for a stockinet cover. LPGD's are constructed of silicone and appear to cause less stoma site inflammation. In addition, the mushroom tip has an anti-flux valve design to prevent reflux of gastric contents. A feeding adapter is attached to the end of the device during the feeding procedure. LPGD's are expensive but have been documented to last at least 12 months.

Several diets specifically formulated for the management of renal failure are available. Human enteral products are inappropriate due to expense and nutritional inadequacy for the cat (protein, taurine, arachidonic acid, arginine, etc). Upon selection of the diet the daily energy and protein requirements should be calculated. The energy requirements of cats with CRF are presumed to be similar to healthy cats (60–80 kcal/kg/day). Caloric requirements can vary by 25%; hence actual caloric intake needs to be individualized based on serial BW and BCS. Attention should also be given to ensure appropriate protein intake. Cats should receive 3.8–4.4 g/kg/day (20–25% ME). The diet is blended with the least amount of water required to achieve syringability. The total volume of food is divided into 4–6 equal sized meals, which

should not exceed the gastric capacity of the cat (45–90mls/kg). With time and adaptation to the feeding procedure, the meal frequency may be reduced to a convenient BID to TID schedules. Appetite waxes and wanes, hence the meal should be offered orally, and if not consumed, blended and administered via the tube.

Water is introduced through the gastrostomy tube 12–18 hours following initial placement and feeding is scheduled to begin within 24–36 hrs. Generally, one third of the daily caloric intake is administered on the first day. If no complications occur, the amount fed is successively increased to reach total caloric requirements by the third or fourth day. Prior to every meal, the gastric contents should be aspirated with a syringe. If more than 50% of the prior feeding is present, the contents should be returned to the stomach and the feeding skipped until the next scheduled time. Frequent aspiration of the previous meal may suggest delayed gastric emptying and warrant medical management (e.g., metoclopramide 20–30 minutes prior to feeding). Oral medications should be administered prior to feeding, with the exception of phosphate binders, which must be mixed directly with the food. The food should be warmed to room temperature and administered slowly, over 5–15 minutes. Salivation and discomfort suggest nausea, which may be handled by slowing the rate of feeding. Upon completion, the tube should be flushed with 5–10 mls of water. The position of the tube on the body wall should be examined daily for migration and the stoma site inspected for pain, redness, odor and discharge. The site should be cleaned daily with an antiseptic solution and antimicrobial ointment applied. Food residue should not be left near the stoma.

Splenic laceration, gastric hemorrhage, pneumoperitoneum, displacement into the peritoneal cavity, and peritonitis have been reported as infrequent placement complications. Abnormalities at the stoma site including discharge, pain, tissue swelling, erythema, abscess formation and ulceration can be minimized by strict attention to cleaning and prohibiting the cat from licking the site. Warm packs containing antiseptic solution placed on the stoma site will minimize problems or hasten recovery. Inappropriate cat removal of the tube is undoubtedly the most problematic complication. Approximately 20% of cats have removed their G-tubes, which emphasize the importance of restraining the gastrostomy tube in a stockinette and utilizing e-collars. Inappropriate removal of the gastrostomy tube is an emergency.

In most situations, a new tube can be placed through the existing stoma site using a guide catheter. Appropriate replacement should be verified radiographically following injection of an iodinated contrast agent. If the tube has been in place for less than 7 days, or there is evidence of peritonitis or radiographic contrast agent leakage, an exploratory laparotomy is required to correct the situation. The use of LPGD's may reduce the incidence of inadvertent gastrostomy tube removal. Complications during the feeding process including salivation, gulping, retching and vomiting can be minimized by reducing either the total volume (increase the frequency) or the rate of administration. Simultaneous management of fluid, electrolyte and acid base disturbances contributing to uremic gastritis may reduce the incidence of vomiting. Periodically tubes will become blocked with food. Techniques to facilitate removal of the obstruction include massaging the outside of the tube while simultaneously flushing and aspirating with water; instilling carbonated drinks, meat tenderizers or pancreatic enzyme solutions for 15 to 20 minutes; or *gently* using a polyurethane catheter to dislodge the obstruction. The final resort is tube replacement.

CRF is a progressive disease that ultimately results in death. The goal of medical and nutritional management is to ensure the highest quality of life for the longest period of time. Regular monitoring of dietary intake, BW and BCS is crucial to ensure that dietary management remains optimal for the needs of the cat. Anecdotal evidence suggests an improved quality of life and well being of many of the cats in which I have employed G-tubes. We have recorded weight gains, improvements in BCS, and alterations in the hair coat. Success depends on owner acceptance and compliance and a coordinated medical approach.

REFERENCES

1. Allen TA, Polzin DJ, Adams LG. Renal disease In: Hand MS, Thatcher CD, Remillard RL et al eds. Small Animal Clinical Nutrition. 4th ed. Marceline: Walsworth Publishing Company, 2000;561–604.
2. Remillard RL, Armstrong PJ, Davenport DJ. Assisted feeding in hospitalized cats: enteral and parenteral nutrition In: Hand MS, Thatcher CD, Remillard RL et al eds. Small Animal Clinical Nutrition 4ed Marceline, Walsworth Publishing, 2000;351–99.
3. Elliott DA, Cowgill LD. Body composition analysis in uremic dogs: methods and clinical significance. American College of Veterinary Internal Medicine Veterinary Medical Forum 1998;661–663.
4. Marks SL. The principles and practical application of enteral nutrition. Veterinary Clinics of North America: Small Animal Practice. 1998;28:677–707.

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