Nutritional Management of Megaesophagus

Megaesophagus (dilated esophagus) is often high on the differential list when dogs and cats have persistent regurgitation of food at various times after ingesting a meal.

Profile
If clinical signs begin shortly after weaning, a persistent aortic arch may be the cause; however, in adult dogs and cats, the cause is often autoimmune or idiopathic in nature.

Causes
The list of possible causes includes myasthenia gravis, systemic lupus, polymyositis, dermatomyositis, dysautonomia, distemper, tetanus, toxicities (lead and organophosphates) and esophageal obstructions. Occasionally conditions such as hypoadrenocorticism, hiatal hernia, gastric dilatation and volvulus, and esophagitis can cause segmental megaesophagus. Multiple diagnostic modalities can be used to rule out each of these disease processes and are thoroughly reviewed elsewhere.1,2

Examination & Assessment
Simple dorsal or lateral recumbent radiographs can often elucidate the disease easily (Figure 1), but sometimes a contrast-enhanced esophagram (Figure 2) is required. In less clear-cut cases, fluoroscopy can be used to assess esophageal motility and rule out other causes of regurgitation (or dysphagia associated with cricopharyngeal achalasia, which is often mistaken as regurgitation).

When in doubt, follow-up radiography can help compensate for normal variations that may present as atypical air accumulations or possible obstructions within the esophagus.3 It may also be indicated in persistent cases, particularly when the patient is at risk for aspiration pneumonia.

Nutritional Management
Management of megaesophagus can become problematic due to persistent regurgitation during treatment, making nutrition an important issue that should not be overlooked. There are 2 basic approaches to managing nutrient intake in patients with megaesophagus: raised oral feeding of slurry and, in more severe cases, gastrostomy tube feeding.

1 Lateral radiograph of a 9-month-old English springer spaniel showing widening of the esophagus diffusely from the thoracic inlet to the diaphragm. Arrows depict the extent of the widening. Courtesy Cornell University Hospital for Animals Imaging Department

2 Contrast-enhanced esophagram of a 1-year-old Basset hound with a history of weight loss and regurgitation. The barium-filled esophagus is diffusely enlarged with a focal enlargement in the left cranioventral thorax, suggestive of a diverticulum and distal megaesophagus. Courtesy Cornell University Hospital for Animals Imaging Department
Oral Feeding of Slurries
Many cases can be managed with this approach: 4 to 6 feedings of slurries in an upright position, then maintaining the position for an additional 20 minutes after the meal. Many methods for positioning the animal have been employed, utilizing step stools, tables, and stairs. If there is any remaining contractility in the esophagus, feeding small chunks of meat is thought to possibly have a stimulatory effect that enhances esophageal motility.

In patients with no esophageal motility, high-calorie oral slurries or gastrostomy tube feeding should be implemented. The products ($) used tend to be low in fiber and high in fat. Regardless of the high fat content, which is thought to increase gastric transit time, the lower fiber content decreases gastric transit time, making their use suitable for improved gastric clearance distally to the intestines, which is key to managing megaesophagus (Table).

Gastrostomy Tube Feeding
In cases of protracted regurgitation, aspiration, and gastric reflux, the procedure of bypassing the esophagus with gastrostomy tube (g-tube) placement is advantageous. In general, there are 2 basic options: PEG tubes ($$$) and surgical gastrostomy tubes ($$$$); details on placement and postoperative management of these tubes are described elsewhere.4

From a nutritional standpoint, we prefer a larger tube lumen (> 8 French) and a tube that can accommodate a dosing syringe rather than a catheter-tipped syringe. Dosing-tip syringes allow a thicker consistency, which simplifies the delivery of high-calorie foods and reduces clogging. Figure 3 shows how a clamp taken from an equine intravenous fluid bag can be fitted over the end of a surgically placed g-tube to help prevent inadvertent airflow down the tube or leaking of gastric contents up the tube, in the event that the Christmas tree adapter is inadvertently dislodged.

During feeding, the clamp is released and the Christmas tree adapter and port are removed,
allowing application of a dosing syringe. When using commercially available PEG tube kits, many of these clamps, adapters, and ports are included, simplifying set up and use. Appropriate g-tube management entails aspiration of gastric contents before each feeding to ensure that most of the previous meal has passed; the tube should also be flushed with 5 to 10 mL of water after each feeding.

The typical minor complications associated with tube placement include stomal swelling, redness, and persistent draining tracts; peritonitis and inadvertent patient removal are less likely but carry graver consequences. Some clinicians prefer surgical placement to PEG placement due to better stoma formation and a small, but decreased risk for complications. In our experience, dogs over 60 pounds (27.2 kg) may have fewer complications with surgical placement because the stomach is sutured to the body wall, rather than relying on the distal mushroom tip to hold the stomach to the body wall.

Typically, a sealed stoma around the tube site will develop within 10 to 14 days but may take significantly longer if the patient is malnourished or receiving corticosteroids.

### Calculating Energy Requirements

Patients with megasophagus can be underfed if they are given foods with low caloric density or if their energy requirements are not properly calculated. A good formula for calculating the resting energy requirement for dogs and cats is to use the exponential equation:

\[
\text{bodyweight}_{\text{kg}}^{0.75} \times 70
\]

An easier method that is commonly used is the linear equation, which assesses the resting energy requirement:

\[
(30 \times \text{bodyweight}_{\text{kg}}) + 70
\]

However, this linear equation will overestimate the resting energy requirement for dogs over 30 kg, which should be taken into consideration when feeding larger dogs.

After hospitalization, patients fed at home require more than the basic resting energy requirement due to increased activity. The multiplication factor for the exponential equation should be increased to 100 or more to provide the animal’s maintenance energy requirements. If using the linear equation, multiplying basic resting energy requirements by a multiplication factor of at least 1.3 is a good starting point.

### Fluid & Product Use

If intravenous or subcutaneous fluids are being used to maintain hydration, a high-calorie canned or dehydrated powdered product should be used while monitoring for reflux and regurgitation. These products will allow very small volumes to be fed either orally (with elevation) or through the g-tube (Table). Dehydrated powdered products are used because of their high caloric density (48% protein and 30% fat as fed) and can even be mixed as the primary diet. They are often not fed long-term because they are designated for intermittent or supplemental feeding. Some manufacturers, however, state that these products are acceptable for long-term use.

### Introduction & Maintenance of Tube Feeding

Typically, a good starting point for tube feeding is to introduce water 24 hours after placement. If successful, then food can be introduced on day 1 at one third of the resting energy requirement, moving to a full resting energy requirement by day 3. This conservative approach safely reintroduces food to the stomach at a capacity of 10 mL/kg body weight, which can be increased significantly over time.

During feeding, all water intake should be taken into account, and the fluid rates should be adjusted. As the patient is weaned from intravenous fluids, fluids administered orally or through the g-tube will be used to achieve appropriate hydration status. A good rule of thumb is to provide at least 1 mL of water for every kilocalorie consumed. Therefore, as water is added to the feedings, the kilocalorie density per mL should be decreased gradually to see if the increased volume is well tolerated (see Table).

### Daily Number of Feedings

Realistically, the recommended 6 daily feedings performed in the hospital setting cannot be achieved at home. Therefore, 1 or 2 days before discharge, feedings should be decreased to 3 to 4 per day and offered between 6 am and 11 pm to ensure the animal can handle the increased volume. Hence, dividing the number of calories by the number of daily feedings is essential to get the needed calories per feeding (eg, a 40-kg dog needing 1590 kilocalories/day should receive 397 kilocalories per feeding if fed 4 times daily).

### Follow-Up

#### Outpatient Monitoring

One of the most important aspects of management is knowing whether the animal is receiving the appropriate number of kilocalories daily to maintain body weight. Since initial weights can be drastically affected by lack of gastrointestinal fill or overhydration, the initial weight should be obtained 24 hours after intravenous fluids have been discontinued and the patient has returned home. Subsequent weigh-ins performed every 2 weeks will indicate whether the feeding plan is appropriate or if adjustments should be made.

For example, if a dog weighs 12 kg at baseline and 11.5 kg 2 weeks later, the daily kilocalorie intake has to be increased. Multiply the 500-g deficit by 7.5 kcal/g of lean/fat, resulting in a 3750 kilocalorie deficit; divide 3750 by 14 days to determine the daily deficit (267 kcal). Regardless of the diet chosen, these extra calories need to be added to the daily feeding regimen.

#### Future Considerations

The treatment of megasophagus is often a precarious road laden with multiple complications (including malnutrition) that can further complicate recovery from such maladies as aspiration pneumonia and regurgitation-induced esophagitis. The evolution of delivery devices and pet food manufacturing and emulsification techniques has provided many different products for consideration in these complicated cases.

continues
Drugs are available that may improve lower esophageal sphincter tone (eg, cisapride and certain COX inhibitors), thereby improving the sphincter’s ability to close and reducing the potential for regurgitation once food has reached the stomach. Their efficacy in these situations remains questionable, however, and their side effects are potentially ominous. Prudent use of high-calorie, low-volume slurries may be advantageous in managing these cases, particularly in the clinical setting where intravenous or subcutaneous fluids can be given.

If gastrostomy feeding becomes the preferred route, the original g-tube can be replaced with a low-profile gastrostomy tube that sits flush with the skin. Retrospective investigation has shown that this newer modality is equally effective for gastric delivery, requires less maintenance (wrapping and tube management), and carries a lower likelihood of inadvertent patient removal.

Although there is limited literature regarding long-term nutritional management of megaesophagus, I have successfully applied the strategies described in this article for multiple months after discharge, and there are other reports of successful long-term nutritional management of megaesophagus.

See Aids & Resources, back page, for references, contacts, and appendices.

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