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Anorexia Management in Dogs

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Abstract

Anorexia is a common problem in dogs and occurs with a myriad of diseases. It is more than merely a sign of disease. Prolonged absence of food intake adversely effects all body systems, making it more difficult for dog to resist the effects of disease and recover and respond to therapy. A variety of products and many methods available for their delivery provide sufficient combinations to ensure that nutrient deprivation need not add further insult to injury or disease. Fasting for longer than three days result in enterocyte deterioration and decreased gastrointestinal immunity. Translocation of enteric bacteria may take place across a compromised intestinal mucosal barrier. it is a problem which must be recognized and dealt with clinically. This paper describes the selection of patient that needs nutritional support and various methods by which of nutritional support can be provided to an anorectic dog to avoid further complications of the underlying cause of the problem and to speed-up recovery from disease.

Keywords: Anorexia; dog; nutritional support; tube feeding.

Introduction

Anorexia is defined as the loss of desire for food before caloric needs have been satisfied. Anorexia that is shown due to an inability to prehend, chew or swallow food rather than because of a lack of interest in food is termed as pseudo-anorexia. Instead of viewing anorexia as a secondary problem that will improve when the primary disease has been cured, it is now well recognized that it is better to be proactive and administer nutrients early. Anorexia, if persistent, results in nutritional depletion. Its adverse consequences include impaired immunocompetance, decreased wound strength, muscular weakness, decreased resistance to infection, shock, organ failure and death. In chronic illness, loss of muscle mass is commonly observed before serum protein levels become subnormal because muscle wasting is less life threatening than decreased serum protein concentrations. Fasting for longer than three days result in enterocyte deterioration and decreased gastrointestinal immunity. Translocation of enteric bacteria may take place across a compromised intestinal mucosal barrier. Enteral infusion of even small quantities of liquid diet has proven beneficial in preventing intestinal mucosal deterioration during parenteral nutrition in piglets, human infants and adults. The severity of these effects increase with time; therefore, nutritional support should always commence as soon as possible. Anorexia is more than merely a sign of disease; it is a problem which must be recognized and dealt with clinically.

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Etiology of Anorexia

There are a number of causes of anorexia in dogs. It may be psychological due to offering of unpalatable diets, alterations in routine or environment and presence of any type of stress; neurological high intracranial pressure due to cerebral edema, hydrocephalus, neoplasia, intracranial pain, spinal pain, peripheral nerve pain, hypothalamic disorders infection, trauma and loss of sense of smell; non-neurologic pain abdominal pain, thoracic pain, musculoskeletal pain and urogenital pain; disorders involving abdominal organs enlargement or serosal distension, inflammation, infectious disease and neoplasia; metabolic disease; endocrine disease; infectious disease; toxicosis exogenous toxicosis due to medications and poisons, endogenous toxicosis due to toxins from organ failure (*e.g.,* uremia), endotoxins, immune-mediated disease; cardiac failure; respiratory disease and miscellaneous such as motion sickness and high environmental temperature.

The dogs may show pseudo-anorexia due to oral cavity disorders such as abscessed teeth, broken teeth, severe periodontal disease, neoplasia, foreign body, stomatitis, pharyngitis and tonsillitis. Mandibular dysfunction such as fracture, dislocation. and paralysis, hypoglossal dysfunction, masticatory myositis, retrobulbar disease such as abscess, inflammation and neoplasia, pharyngeal disorders such as dysfunction and inflammation, esophageal disorders such as dysfunction, inflammation, neoplasia and other mass, tetanus and blindness.

Treatment

The treatment of anorexia is of two types: specific treatment and supportive treatment. The specific treatment is the one which addresses the underlying cause. Specific treatments either slow down or eliminate the problem, which cause anorexia in the first place. For example, giving antibiotics to cure bacterial infections, surgically removing a foreign body which causes intestinal blockade and treating dental and aching tooth etc.

The supportive treatments help sustain a dog which is weak and emaciated as result of not eating. Example is fluid therapy such as IV fluids or subcutaneous fluids, hand feeding, forced feeding and using appetite stimulating drugs etc. Supportive treatment do not reverse the problem which caused loss of appetite. Nutritional support is provided to prevent complications associated with disease, provide nutrients to facilitate recovery, maintain bodyweight by meeting energy requirements and avoid complications associated with therapy. Early nutrition improves outcome in veterinary patients. If the anorexia is due to some underlying problem, a combination of specific treatment as well as supportive nutrition should be used for quick recovery of the patient.

Patient selection for Nutritional support

The animals which have been or are anticipated to be anorectic for longer than 3-5 days require nutritional support to prevent the risk of enterocyte atrophy, decrease immune functions etc. (Chan *et al*., 2006). In a very young animal, this length of time may be too long to wait. It is important to consider patient's entire duration of hyporexia or anorexia including time at home prior to presentation (Remillard *et al*., 2001). Lack of subcutaneous fat, muscle wasting, or edema are indications of chronic malnutrition. Obese anorectic dogs should be carefully examined as obesity can mask lean tissue depletion.

Since all normal body processes depend on nutrition for normal function, clinical signs specific for malnutrition do not occur. The World Small Animal Veterinary Association (WSAVA) stresses the importance of nutritional assessment in every patient in each visit (Freeman *et al*., 2011). Identification of patients in need of nutritional support is based on history of recent loss of more than 10% of usual body weight, recent surgery/trauma, increased losses due to vomiting, diarrhea, malabsorption, wounds, burns etc. and chronic diseases or organ dysfunction. Upon physical examination presence of cachexia with thin, dry, scaly skin with easly pluckable hair and non-healing wounds, muscle weakness and atrophy of muscles, growth retardation, hepatomegaly, splenomegaly or tumor may be observable. Besides history and physical examination, biochemical parameters would give complete picture of underlying disease/organ disorder due to which anorexia may be there.

The nutritional support may be provided either *via* the gastrointestinal tract (enteral nutrition) or parenterally. The method of providing nutritional support include appetite stimulation, forced oral feeding, tube feeding and parenteral nutrition. Which type of nutritional support a particular dog needs, can be determined from the following flow chart (Fig. 1).

The energy and protein supplied to the animal has to be calculated in order to decide if the animal was receiving sufficient amount of these two vital nutrients. Accordingly, the supplementation strategy has to be made. An easy method of calculation is given below:

Step 1: Calculate basal energy requirement

Body weight	**Basal energy requirement (BER) kcal/d**
Less than 2 kgs	BER = 70* (body weight in kg)$^{0.75}$
Greater than or equal to 2 kgs	BER = 30* (body weight in kg) + 70

* MER (kcal/d) = BER (kcal/d) x factor

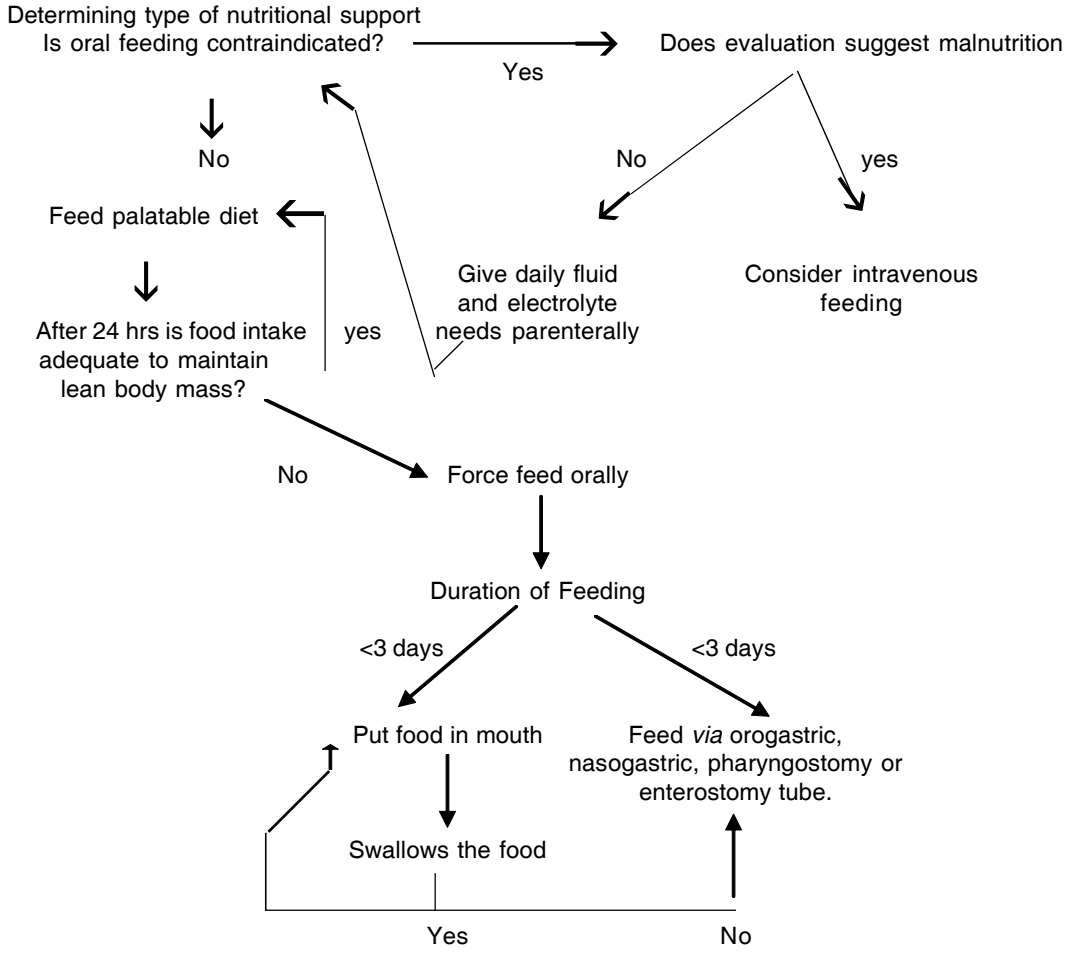

Fig. 1: Evaluating nutritional support requirements of animals

Step 2: Calculate Maintenance Energy Requirement (MER)

Status	Factor
Post trauma	1.25-1.35
Trauma or cancer	1.35-1.50
Sepsis	1.50-1.70
Major burns	1.70-2.00

Step 3: Calculate Feed required

Feed required /L = MER (kcal/d) / Energy content (kcal/kg feed)

Step 4: Calculate Protein Requirement

Choose a level of protein supplementation from the following list:

Maintenance	5.0-7.5 gm/100 kcal
Hepatic or Renal failure	<3.0 gm/100 kcal

Protein requirement (g/d) = MER (100kcal/d) x protein level (g/kcal)

Step 5: Calculate Protein Supplementation (If required)

Protein provided (g/d) = kg feed per day x protein content of feed (g/kg feed). If supplemental protein

value is negative, no supplementation will be required)

Protein to be supplemented (g/d) = (Protein requirement (g/d) minus protein provided (g/d)) divided by 0.76 (Factor 0.76 is used to compensate for the efficiency with which the protein is utilized)

Feeding

If upon investigations, the fluid volume, electrolyte levels and acid base are present, feeding should begin only after all fluid volume, electrolyte and acid-base abnormalities have been corrected. Often the loss of appetite produces serious dehydration, which can become life threatening long before the risk of starvation. Therefore, injectable fluids are given in an attempt to rehydrate the animal and provide some electrolytes as nutrients. They are not equivalent to a balanced meal, but can be indispensable for preventing dehydration. After correcting the fluid volume, electrolyte and acid base abnormalities, the dog may be fed either *via* gastrointestinal tract or intravenously. The rule is, 'If the gut works, use it!'. Feeding *via* the gastrointestinal tract is the simplest, fastest, easiest, safest, least expensive, most physiological and best method of feeding.

The simplest method should be tried first. If dog is showing loss of appetite, feed a bland diet *i.e.* boiled chicken breast and boiled rice may be tried and appetite may return. If the diet of the dog has been changed recently, try going back to the old diet should be tried. The animal should be monitored for 24 hours and if low appetite continues or absence of bowel movement or pet is having severe diarrhea or vomiting, it needs specialized care. A number of feeding methods used together are frequently effective in providing sufficient nutrients to meet the animal's needs; whereas any single procedure alone may not be totally effective. Regardless of which method or combination of methods are used, energy intake should be sufficient to maintain body weight. In malnourished animals, a diet adequate for growth should be fed unless it is contraindicated by the presence of conditions such as uremia. Lean body mass can be restored more rapidly with less food and energy intake using a higher protein-growth type diet rather than a maintenance type diet.

It is best to give small amounts of feed at frequent intervals. The dog should be fed at least three times daily. Small amounts at frequent intervals result in the best utilization of food and frequently enhance the animal's appetite sufficiently to initiate voluntary feeding.

Stimulation of food intake

The dog should not be hospitalized unless necessary, since some dogs may not eat when hospitalized due to fear induced inhibition of food intake. Staying with the dog when food is offered may encourage it to eat. Petting along with vocal reassurance also helps. Highly palatable food should be fed to the dog. Food can be increased by adding some water to dry dog food, warming food to body temperature, high fat and protein diets, canned or semi-moist food preferred, adding salt or using fresh, pleasantly aromatic and uncommon foods may increase palatability (Delaney, 2006).

Warming the food to enhance aroma or cleaning the nose to improve ability to smell may assist. Administration of B-Vitamins, zinc, potassium help in stimulating voluntary food consumption.

Drugs such as Diazepam, Nandrelone decanoate, Stanazolol and Megestrol acetate may provide some benefit to animals with decreased appetite, however, the underlying disease should also be addressed.

Forced Oral Feeding

Placing food in the pharyngeal area stimulates swallowing reflex. It is done with the help of disposable syringes which aid in forcing food into the animal's mouth. However, it is a slow, tedious process and providing sufficient nutrients by this way is difficult. Also, stress is imposed on a patient during feeding. Therefore, if feeding is necessary for more than a few days, tube feeding may be preferred.

Tube Feeding

Feeding tubes may pass through the nose (nasogastric tubes), throat (esophagostomy tubes) or stomach wall (gastrostomy tubes). There are a number of options for enteral feeding tubes. In animals where lack of eating will itself produce serious consequences, these tubes may be extremely useful. Animals that object to being forcefully fed or that are too depressed or comatose to be successfully force fed or does not eat at least 50% of its maintenance energy requirements, supplemental nutrition should be provided *via* feeding tube. No anesthesia is required for placing

these tubes and the diets used are in liquid form. Some human liquid enteral diets can be used for short term, but these diets are not complete or balanced diets and modifications may be required if they are to be used for more than one week (Parker, 2017). Feeding through esophagostomy and gastrostomy is preferred when assisted feeding is required for weeks to months. Critical care diets or blended slurry type diets are used in feeding through esophagostomy and gastrostomy tubes.

a. Diets for Tube feeding

The diets fed should supply all nutrients needed without causing gastric disturbance. Nutrients should be in such forms that are easily digested, assimilated and efficiently utilized with a minimal wastage. It should be in a form that is easily administered and concentrated enough to minimize the amount needed to meet the dog's total nutrient requirements. For tube feeding specialized diets are used which can be categorized into monomeric diets and polymeric diets. The polymeric diets are used in malnourished patients with intact digestive and absorptive functions *i.e.* when the gastrointestinal digestive process is normally functioning. These diets are more economical than monomeric diets and include blenderized diets and liquid diets. They have large molecular weight proteins, fats and carbohydrates and are iso-osmolar. They have skimmed milk, casein or egg yolk as protein source; vegetable oil, butter and lecithin as fat source and corn starch as carbohydrate source. These diets have low levels of lactose. The diets that are intended to be used for renal patients, have reduced protein level of nearly 10% of calories. The total energy content of such diets vary from 85-100 kcal/ ml and protein and fat content may vary from 10-20, 55-60% of calories, respectively. The carbohydrates content is 25% of calories. Their osmolarity varies from 260-340 M osmol/L.

The monomeric diets contain amino acids as protein sources, glucose and oligosaccharides as carbohydrate source, safflower oil or any other oil as fatty acid source. These diets may contain taurine, glutamine, arginine and carnitine. These diets have energy content of 1 kcal/ml, protein content may vary from 15-24% of calories, fat 3-13% of calories, carbohydrates 60-80% of calories and their osmolarity may vary from 575-630 m osmol/L. Monomeric diets do not require digestion before absorption, they are hyperosmolar and usually used for primary gastrointestinal disorders such as inflammatory bowel disease. Usually orogastric and nasogastric tubes are used for tube feeding. They are made-up of polyvinylchloride, polyurethane or silicone. Silicone tubes are preferred as they are easy to use and more comfortable to the patients. Tube size used for feeding depends upon the size (weight) of the animal.

b. General Guidelines for Tube feeding

The most important criteria of success are the gentleness with which the tube feeding procedure is conducted. Limited restraint and opening of mouth just far enough to introduce the tube minimizes objections. One must be careful to avoid damage to the pharyngeal or esophageal mucosa, or intubation of trachea. Many animals are initially volume sensitive after a period of prolonged anorexia. In such cases, feeding one third of their energy requirement on day-1 followed by increasing the amount by one-third every 24 hours is better tolerated. Daily food dosage should be divided into several meals according to stomach capacity. Slow rates of feeding help avoid complications like diarrhea, cramping, etc. and help maximize absorption of nutrients.

c. Complications with Tube feeding

Many complications may be related to placement and maintenance of the feeding tube. Once the tube is in place, the most common complication is premature removal by the patient. Tube placement should be checked prior to each feeding. Regurgitation and aspiration may occur due to improper placement or administration of excessive quantities. If coarse food materials are infused or if tube is not flushed adequately after use. Besides this, esophagitis (due to too large diameter of tube) or infection at the site of tube insertion may also result. The gastro-intestinal type of complications are mainly caused by too rapid administration of the feeding solution, or administration of poorly absorbed solutes or solutions of too high an osmolarity. Vomiting, cramping or diarrhea are the main indicators that the speed of injecting the food or the osmolarity of the liquid diet is not proper. Sometimes, hyperglycemia may also occur due to rapid absorption of glucose.

d. Parenteral Nutrition

Parenteral nutrition or intravenous feeding is indicated if there is a recent loss of more than 10% of optimum body weight not due to dehydration with an inability to utilize sufficient amounts of ingested nutrients to correct the loss; or in patients with marginal nutritional reserves who will be unable, for even a few days, to ingest adequate nutrients, *i.e.* when enteral nutrition is impossible, hazardous, or incapable of meeting the patient's needs.

The above may occur because of inadequate digestive or absorptive capacity, intestinal obstruction or ileus. High risk of aspiration due to unconsciousness or a neurological defect, uncontrollable vomiting, inability to tolerate food orally, a need for complete bowel rest to minimize the effects of digestive disease and allow healing of gastrointestinal tract lesions, acute pancreatitis or hepatitis.

2. Components of Total Parenteral Nutrition

Special solutions containing multiple nutrients; usually electrolytes, amino acids, sugars, and lipids can be given intravenously. They are much more balanced than the simple fluid solutions described above. Special formulations used for humans in liver and kidney diseases can be considered. Amino acid solutions with added electrolytes are the most convenient since they minimize 'hypo-electrolyte conditions'. Glucose is the most readily available and widely used source of energy, inexpensive, compatible with nearly all solutions and is a primary biochemical energy substrate. Fifty percent and 70% solutions are most commonly used in preparing intravenous feeding solutions. Fat emulsions they are used as a concentrated source of energy (about 1 kcal/ml) in an isotonic fluid for patients requiring fluid restriction and also for simultaneous provision of essential fatty acids. Fat emulsions are contraindicated in hyperlipemic conditions, severe liver disease and are more expansive. Daily administration of Vitamin B complex and once weekly administration of folate, Vitamin B_{12} and Vitamins A, D, E and K is usually done with parenteral nutrition therapy. Trace mineral deficiencies are unlikely to occur during short periods, with the possible exception of zinc as a result of zinc losses from bowel secretions. So zinc supplementation may be considered.

3. Composition of Parenteral Solutions

Parenteral glucose solutions

Glucose Conc. (%)	Energy content (kcal/l)	Osmolarity (mOsm/L)
5	170	253
7.7	262	388
10	340	505
20	680	1010
30	1020	1515
40	1360	2020
50	1700	2525
60	2040	3030
70	2380	3535
100	3400	5050

Selected parenteral crystalloid solutions

Ingredients	Ringer's lactate	0.9% saline
Na^+ (mEq/L)	130	154
K^+ (mEq/L)	4	0
Cl^- (mEq/L)	109	154
Ca^{2+} (mEq/L)	3	0
Mg^{2+} (mEq/L)	0	0
Bicarbonate lactate/ acetate (mEq/L)	28 lactate	0
Dextrose	0	0
Osmolarity (mOsm/L)	274	308

General Guidelines

The intravenous feeding solutions should be administered *via* a central venous catheter due to their high osmolarity. Their administration into a peripheral vein will result in phlebitis, thrombi and emboli formation and occlusion of vein.

Prior to inserting the catheter into the external jugular vein, the area should be prepared as for any aseptic surgical procedure. Strict aseptic techniques should be used in insertion, maintenance and use of intravenous catheter. Solution compatibility should

be ensured prior to adding new solutions. Blood products and drugs should not be administered in the feeding solution.

Administration

Equal volumes of 8.5% amino acids containing electrolytes and 50% glucose are mixed. The resulting solution contains 0.85 kcal per ml and is fed at rates as calculated before. It is infused slowly via a central vein due to high osmolarity (approximately 1800 mOsm/L). Initiate feeding with more dilute solutions (*i.e.* use amino acid solution (8.5%) with 25% glucose first, then 37.5% and finally 50% glucose). Urinary glucose concentrations should be closely monitored to avoid hyperglycemia in excess of 200 mg/dl.

The solution should be administered immediately upon preparation, using a micron (0.22) filter to avoid contamination.The catheter site should be cleaned, an antimicrobial ointment is applied, sterile gauze is placed over the skin opening and wrapped daily. Administration set should be changed every 48-72 hours or when they become contaminated. Fill the catheter with heparinized saline when not in use. Ideally, one-half of desired level of nutrients are provided on first day and increased to amount needed on the second day, if no complications occur. The flow rate should be adjusted to deliver the daily amount over 4 hours. Do not interrupt infusion abruptly to prevent rebound hypoglycemia.

The dog receiving parenteral nutrition should be closely monitored for following parameters:

- Body weight - large fluctuations indicate fluid imbalance
- Temperature, pulse and respiration for inflammation/ infection
- WBC and DLC for inflammation/ infection
- Plasma glucose concentration - control of blood glucose concentrations
- Urine glucose presence - identification of hyperglycemia
- Plasma protein and albumin concentrations - indication of response to therapy
- Plasma concentrations of Na, K, Cl, bicarbonate, Ca and P
- ALT and BUN for liver function
- Blood ammonia concentration - large increase suggests a too rapid administration of a protein hydrolysate containing ammonia

The sicker the animal, the more thorough and frequent monitoring must be done.

Complications with intravenous feeding: the complications that may develop during intravenous feeding can be divided into four categories: 1) catheter related problems include occlusion due to collection of blood samples, thrombophlebitis, vascular damage during catheter insertion and local infection, 2) mechanical problems include intravenous line breakage or clogged filters etc., 3) sepsis may develop due to infection at the site of catheter insertion and 4) metabolic complications such as biochemical or electrolyte abnormalities may be induced by the parenteral nutrient insertion and can include ammonia toxicity, metabolic acidosis, hyperglycemia, hypoglycemia, hypokalemia, hypomagnesemia, hyponatremia and hypophosphatemia.

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