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The importance of nutrition in the post-operative recovery of cats and dogs

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ABSTRACT: Providing nutrition to patients following surgery is often within the remit of the veterinary nurse, and it is important to understand the role of nutrition as well as when and what to feed. A patient's cardiovascular system should be stable and any pain must be controlled, after which nutrition must be addressed, as this plays an important part in the recovery process. Particular attention should be paid to nutritional assessment and the creation of a tailored feeding plan. Regular monitoring allows for adaptations to be made to ensure that the patient receives optimal nutrition, not only during hospitalisation, but also once discharged.

Introduction

Veterinary nurses are usually responsible for the post-operative care of patients in the hospital, and so it is important that they are familiar with all aspects of post-surgical care. Following surgery, the patient will be closely monitored to ensure a smooth recovery from anaesthesia, medications will be administered and, depending on the type of surgery, other nursing duties such as wound management, catheter and/or tube care and pain management will be carried out. Monitoring cardiovascular stability, correcting any electrolyte, fluid and acid base abnormalities and controlling pain are priorities, but, once the patient is stable, nutritional support is also essential as it has a significant impact on morbidity and mortality (Holden, 2003).

Importance of nutrition

In any animal, poor nutritional status is a result of inadequate nutrient intake and/or absorption of nutrients. In the post-surgical patient this may be caused by the deliberate withholding of food (consider also that the patient is likely to have been starved pre-operatively) and/or anorexia or inappetence. Either way,

a reduced food intake is likely to lead to a protein and/or calorie deficiency (Delaney, Fascetti, & Elliott, 2006). Other causes include: serious underlying disease (for example, sepsis, pancreatitis, gastrointestinal disease), compromised nutrient digestion and absorption due to vomiting and/or diarrhoea (Remillard, Armstrong, & Davenport, 2000) and/or protein losses (for example, when there are draining wounds) (**Figure 1**).

Inadequate nutrient intake leads to malnutrition, which in turn may lead to complications such as decreased tissue synthesis and repair, altered drug metabolism and decreased immunocompetence (Saker & Remillard, 2010). Any of these could delay recovery and unnecessarily increase hospitalisation times and cost to the client.

Vigano, Fragio, Goy-Thollot, Felix, and Robben (2009) comment that "Nutrition must be given consideration within the first 24 h of hospitalisation to prevent the risk of malnutrition", confirming that prevention is better than cure. Veterinary nurses are at the forefront of providing nutritional support to hospitalised patients, and so understanding the



Figure 1. Patients with draining wounds such as this dog with septic peritonitis are prone to nutritional deficiencies
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importance of nutrition and implementing feeding plans as part of post-operative recovery is a vital part of the nurse's role.

Simple vs. stress starvation

The consequences of malnutrition are very different in healthy cats and dogs compared to sick ones. During the initial stages of fasting in the healthy patient, glycogen stores are used as the primary source of energy. Within days, a metabolic

shift occurs towards the preferential use of stored fat, sparing catabolic effects on lean muscle tissue. This process is known as "simple starvation". In sick patients, however, the inflammatory response triggers alterations in cytokines and hormone concentrations and rapidly shifts metabolism towards a catabolic state. Glycogen stores are quickly depleted, and this leads to an early mobilisation of amino acids from muscle stores.

Sick or traumatised patients catabolise lean body mass when they are not



Figure 2. A sick patient will suffer from stress starvation if nutritional requirements are not met
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provided with sufficient calories ("stress starvation"), which may lead to cachexia (the loss of lean body mass) (Figure 2). It can therefore be deduced that the health of the patient prior to surgery and the length of starvation/anorexia will both have an impact on recovery time, and confirms the importance of providing appropriate nutrition to hospitalised patients.

Principles of post-operative nutrition

Corbee and Van Kerkhoven (2014) describe the post-operative recovery period as being divided into two phases.

Phase 1 begins during surgery and lasts for up to 24–48 hours post-surgery. Fluid circulation is important during this phase so that the intestinal tract is provided with sufficient nutrients. It is recommended that the patient eats and drinks as soon as possible post-surgery, and that the "recuperation" nutrients – glutamine, taurine, arginine and omega-6 and -3 fatty acids – are provided.

Phase 2 focuses on energy requirements, aiming for the patient to take in sufficient calories. Optimal recovery time following surgery is approximately 14 days, during which time the recuperation nutrients should continue to be provided.

Diet selection

This will depend on factors such as any underlying/concurrent disease processes and whether or not the patient is eating voluntarily. Generally, a recovery-type diet can be used for most post-surgical patients unless contraindicated (as in cases of pancreatitis in dogs, due to its high fat levels).

There are several key nutrients which are important for the nutritional support of cats and dogs post-surgery.

Energy

Contrary to historic belief, hospitalised patients do not have an increased energy requirement, and so should be fed to their resting energy requirements (RER) (Delaney et al., 2006). The goal is to prevent further loss of lean tissue and provide sufficient nutrients for healing (Chan, 2007). A study by Brunetto et al. (2010) demonstrated that energy supply close to RER appears to be positively associated with hospital discharge in cats and dogs.



▲ **Figure 3.** Overweight or obese patients should not begin a weight loss plan until fully recovered
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Overweight or obese patients should not be excluded from nutritional support simply because they need to lose weight, and a weight loss diet should not be instigated in the hospital. Instead, wait until the patient has made a full recovery before embarking on this (**Figure 3**).

Protein

Sufficient dietary protein must be provided to maintain albumin levels, immune response and muscle mass, as well as to aid in wound healing (Remillard et al., 2000). Protein should be highly digestible, meaning that a high proportion is available for absorption, as well as providing all the essential amino acids.

Amino acids of particular importance in recovery include:

- glutamine – especially important in the health of intestinal cells, glutamine provides fuel for enterocytes and to help maintain the intestinal mucosal barrier, thereby reducing the risk of bacterial translocation; Goy-Thollot and Elliott (2008) describe glutamine as “conditionally essential” in critical patients
- arginine – involved in sustaining immune function, wound healing and lean body mass (Kirk, 2007)
- taurine – an essential amino acid in the cat, taurine plays an important role within the immune system, as well as being a potent antioxidant, and being involved in osmolar regulation of cells (Kirk, 2007)

Fat

Some patients may have a poor appetite, and palatability can be enhanced by using a high-fat diet (Remillard et al., 2000). This also has the benefit of reducing the

total volume of food necessary for RER, due to its energy density.

The provision of long-chain polyunsaturated omega-3 fatty acids in the diet may have benefits in patients with conditions which predispose them to cachexia (Freeman, 2012). Eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) are the most effective omega-3 fatty acids as they alter eicosanoid (inflammatory mediator) production and thereby exert an anti-inflammatory effect (Corbee & Van Kerkhoven, 2014).

Prebiotics

Fermentable fibres such as beet pulp or fructo-oligosaccharides may help stimulate the growth of beneficial bacteria such as *Lactobacillus* and *Bifidobacterium* in the intestinal microbiome. These beneficial bacteria reduce the growth of pathogens as well as providing fuel for enterocytes in the form of short-chain fatty acids such as butyrate (Elliott & Biourge, 2006).

Antioxidants

Illness, general anaesthesia and medications can all increase the production of free radicals (unstable molecules which cause oxidative damage to the body). The addition of antioxidants such as vitamins C and E, lutein and taurine to the diet can help combat the effects of free radicals.

To feed or not to feed?

In the past, some patients may have had solid food withheld following gastrointestinal surgery in the fear that enteral feeding may cause complications such as wound breakdown. Nutritional support post-surgery is now recognised as playing an important role in patient recovery, and the patient should be encouraged to eat as

soon as possible following gastrointestinal surgery to encourage intestinal motility, which in turn increases blood flow to healing areas (Friend, 2013). Although Friend advises that dehiscence will not be prevented by withholding food, Corbee and Van Kerkhoven (2014) do not recommend enteral feeding in patients with excessive gastrointestinal bleeding, volvulus, severe constipation or other gastrointestinal tract blockage or excessive vomiting.

How to feed

Enteral feeding (using the gastrointestinal tract) is preferred in most cases as it stimulates the systemic and gastrointestinal immune systems, helps to maintain the intestinal mucosa and avoids metabolic complications (Saker & Remillard, 2010). However, parenteral nutrition may be considered in patients with dysfunctional gastrointestinal tracts or other complications.

Assisted feeding should be implemented when the patient has been anorexic/inappetent for more than 3 days (including days prior to admission), or in cases where an animal is unlikely to eat, for example those with a fractured mandible (**Figure 4**). Patients who are consuming less than 80% of their RER also require intervention with assisted feeding. Feeding tubes should be selected based on whether the patient can tolerate anaesthesia and the length of time required to place one.

Other considerations

Other considerations include delayed onset of nutritional support, poor management of patients and poor communication. A study by Remillard et al. (2001) observed that, during 73% of their time, hospitalised dogs were consuming less than 95% of their RER. This negative energy balance was attributed to:

- poorly written orders (22%)
- withholding food (34%)
- refusal to eat (44%)

From this it is clear that good communication and handover during shift changes is vital, as well as recording what food the patient has been offered and when, and how much of it they ate. Procedures which require withholding of food should be carefully planned so that the patient still has the opportunity to take in its daily nutritional requirement.



Figure 4. It is wise to pre-emptively place feeding tubes in patients which are unlikely to eat within a few days
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Monitoring

A patient's nutritional needs should be reviewed at least daily, with body weight, body-condition score and muscle-condition scoring forming part of routine daily checks. In 2011, the WSAVA launched its Global Nutrition Guidelines and have since developed a Nutrition Toolkit. This includes useful documents such as feeding guides and feeding and monitoring charts for hospitalised patients as well as other useful tools including muscle-condition scoring charts and nutritional assessment checklists.

Reviewing what the patient is eating and whether there is any regurgitation, vomiting or diarrhoea is also an important aspect of monitoring. The diet choice, route of feeding and feeding volume should be adapted based on these observations. In the hospital situation, the aim is to prevent the nutritional status of the patient deteriorating, so do not expect any underweight patients to regain weight immediately – this is something which takes time and can be incorporated into the nutritional plan once the patient has recovered from surgery.

Discharge

The pet owner should be fully informed of the importance of nutrition and advised of the best diet and feeding regime for their pet on discharge from the hospital following surgery. The veterinary nurse is often involved with discharging cases, especially

those which have undergone elective or routine procedures, and so will need to make a clear recommendation to the client regarding this. Providing the client with a suitable diet with clear instructions on when and how to feed will improve compliance, and thereby provide the patient with the nutritional support required to aid recovery. For some patients, this may consist of a few days' supply of a highly digestible, recovery-type diet, but for those patients with underlying conditions or those with feeding tubes, more specific recommendations and instructions supported by demonstrations on how to tube feed will be required.

Summary

The importance of nutrition for cats and dogs recovering from surgical procedures is widely recognised, and the veterinary nurse plays a significant role in identifying and providing patients with nutritional support. Considerations include:

- Ensure the patient is cardiovascularly stable, correct any fluid/electrolyte imbalances and provide pain relief before implementing a nutritional plan
- Nutrition should be addressed within the first 24 h of hospitalisation
- Malnutrition delays recovery and may increase hospitalisation times
- Metabolic processes differ between healthy patients and sick patients when they are starved

- Hospitalised patients should be fed to their RER with the aim of preventing deterioration of health status
- Except in certain circumstances, patients should not be starved post-surgery
- Assisted feeding will need to be considered if the patient does not or cannot consume at least 80% of its daily nutritional requirements
- Organisation and communication play a key role in meeting nutritional needs
- Patients must be closely monitored and dietary adaptations made accordingly
- The pet owner must be advised about nutrition on the patient's discharge, and clear recommendations/instructions given

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