Nutritional Support in the Perioperative Period

Module 17.4

Nutritional Goals in the Perioperative Period

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Learning Objectives

- To learn about common methods used to assess nutritional state in preoperative patients;
- To review caloric and protein requirements before and after surgery;
- To decide what is the most appropriate route of nutrition in various surgical diseases.

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2. Caloric and protein requirements before and after surgery
3. Routes of nutrition in the surgical patient

Key Messages

- Only in intestinal failure should parenteral feeding be used;
- Subjective global assessment (SGA) is a simple and highly accurate "nutritional" test to predict post-operative complications;
- Preoperative parenteral feeding in malnourished patients for five to ten days is associated with a reduction in post-operative morbidity. Preoperative oral or enteral nutritional support in malnourished patients needs further evaluation;
- Post-operative caloric and protein requirements are not highly elevated in modern surgical care;
- Early oral nutrition is safe after lower gastrointestinal surgery, and decreases infectious morbidity and enhances recovery;
- Parenteral feeding in the post-operative patient who cannot be fed orally or enterally for a prolonged period has not been evaluated. Expert groups recommend waiting for at least five days before total parenteral nutrition is started in well-nourished patients.

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1. Nutritional assessment in the preoperative patient

Even in modern surgical practice as many as 25% of surgical patients have been reported to be malnourished on admission (1). There is little doubt that malnutrition adversely affects outcome from surgery (2). Preoperative parenteral feeding in malnourished patients for five to ten days is associated with a reduction in post-operative overall complication rates from approximately 40% to 30% (3) (Fig. 1). Therefore, it is important to identify patients who are malnourished before surgery.

Unfortunately, all tests available in clinical practice today to assess nutritional status are also affected to various degrees by the metabolic abnormalities that are associated with most surgical disease, such as malignant and inflammatory conditions. For example, serum concentrations of proteins (e.g. albumin) are affected more by physiological stress than by malnutrition (see also Module 17.1).

The Subjective Global Assessment (SGA) (4) and experimental muscle function tests are the tests with the best track record in predicting post-operative complications of all current tests for malnutrition. The SGA is based on a careful history and physical examination and this simple and inexpensive assessment predicts post-operative morbidity with high accuracy (2).

Although it would be of great use to follow the nutritional state in the post-operative patient day-by-day, this is made virtually impossible by the fluid shifts and acute stress responses to surgery. Body weight, for instance, normally increases by 5-10 % due to fluid retention, masking any loss of body cell mass (see also module 17.1). One pragmatic way to ensure adequate post-operative nutritional intake is to keep a careful daily record of all nutritional intakes. The daily caloric intake is compared to calculated or measured energy expenditure, and adjusted if necessary.

2. Caloric and protein requirements before and after surgery

There is good evidence that five to ten days of total parenteral nutrition (TPN) at 30-35 kcal/kg\(^{-1}\)/day\(^{-1}\) and 0.16 - 0.20 g nitrogen/kg\(^{-1}\)/day\(^{-1}\) before major abdominal surgery in malnourished patients decreases overall post-operative morbidity (5 - 7) (Fig. 2).

Although similar beneficial effects would be expected from preoperative oral nutritional support in patients who tolerate it, no trials testing this hypothesis have been reported.

Routine TPN in the post-operative phase, in contrast to preoperative TPN, has been found to significantly increase post-operative morbidity in meta-analysis (3, 8).
Caloric and protein requirements after major surgery in current perioperative care are lower than those quoted in traditional literature on post-operative metabolism (Fig. 3). Resting energy expenditure increased by only 13% after major colorectal surgery in recent study in an enhanced-recovery protocol, while urinary nitrogen losses were no higher than those in healthy volunteers (9). Thus, a guideline for uncomplicated, mobilising post-operative patients is to provide at least 25 kcal/kg/day and 0.15 g N/kg/day.

A field of current intense investigation is so-called immuno-nutrition with various specific nutrients such as arginine, glutamine, nucleotides and omega-3 fatty acids, given before or after surgery and often in various combinations. A recent meta-analysis found that such immunonutrition significantly reduced morbidity in critical illness, but not after elective surgery (10). In malnourished patients, preoperative immunonutrition has been associated with decreased post-operative morbidity and quicker recovery (11).

### 3. Routes of nutrition in the surgical patient

It has been firmly established that the enteral route should be used for total or partial nutritional support as tolerated, as this route is associated with lower complication rates than the parenteral (12). Additional caloric needs are covered via the parenteral route. Contrary to traditional belief, early (< 24 h post-operative) feeding above a bowel anastomosis has not been associated with an increased risk of anastomotic dehiscence; indeed there was a near-significant risk reduction in a recent meta-analysis of trials comparing early feeding with late reintroduction of oral diet after gastrointestinal surgery (13) (Fig. 4). Significant reductions of post-operative infectious complication rates and lengths of hospital stay were found with early feeding as compared to the traditional gradual reintroduction of diet (13). Patients with an anastomosis in the upper gastrointestinal tract, however, are a subgroup for which trials of early oral intake of nutrients are lacking. Therefore, it may be prudent to feed these patients via a feeding jejunostomy or, perhaps more safely (14), via a naso-jejunal tube through the anastomosis.

In patients with gastrointestinal paralysis for any reason, partial or total parenteral nutrition must be initiated. Although no data has been reported on the effects of delayed TPN in prolonged post-operative ileus, expert groups recommend waiting at least five days before starting TPN in well-nourished patients, as too aggressive parenteral nutrition will increase complications in this group (3, 8). In malnourished patients, however, parenteral nutrition should be started earlier in post-operative ileus (8).
References