WEIGHT LOSS IN THE SURGICAL PATIENT

It is often easy to overlook malnutrition, but in patients going for surgery it can have an adverse effect on their surgical outcome. Malnutrition can be exacerbated in this patient group by delays to surgery, being on a limited diet or a gastrointestinal disorder.

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Many patients lose weight before and after surgery. For some this may be desirable, for example, in the obese patient pre-surgery. However, for many patients this can have an adverse effect on their surgical outcome and recovery from surgery. Weight loss in these patients is normally a result of malnutrition, which is defined as a state of nutrition in which a deficit or imbalance of energy, protein and other nutrients causes measurable adverse effects on tissue/body structure and functional and clinical outcome (Elia, 2003). There are many causes of malnutrition and weight loss in this patient group, however, if risks are identified early it can be managed and treated.

Why does weight loss occur?

Patients presenting for surgery may be malnourished as a consequence of underlying pathology, for example, Crohn's disease or cancer cachexia, or associated disease symptoms such as diarrhoea, nausea or vomiting. If unaddressed, all causes of excessive nutrient loss and/or increased metabolic needs will influence nutritional status and may cause weight loss.

Figure 1. Dehisced laparotomy wound. Reproduced by kind permission of Fiona Russell and David Gray (Gray et al, 2009)

The risk of malnutrition and weight loss is often increased in these patients as a result of inappropriate dietary restrictions and excessive preoperative fasting regimens. Patients are often starved for long periods before surgery (the nil-by-mouth rule) to reduce the risk of pulmonary aspiration during anaesthesia, or be 'nil-by-mouth' for long periods before tests and investigations that may be delayed or cancelled.

Patients undergoing gastro-intestinal surgery may also have had to undergo some form of bowel preparation and a limited diet: all of which can contribute to malnutrition and weight loss. Combined with the possibility of delayed surgery, many patients end up being nil-by-mouth or fasting for many days before their operations. Fasting leads to low insulin levels which initiates muscle

protein breakdown and the use of muscle as an energy source.

Surgery itself can affect nutritional status as a large amount of stress is placed on the body, inducing a catabolic state within the body, which releases stress hormones creating insulin resistance. The more invasive the procedure, the greater the stress response (Thomas and Bishop, 2007).

The injury caused by most surgical procedures leads to alterations in the body's metabolic state, which has implications for recovery after surgery. In 1930, Sir David Cuthbertson introduced the concept of the ebb and flow phases of metabolism after physical injury (Cuthbertson, 1930). The ebb or shock phase (usually 12–24 hours immediately following injury), is characterised by a catabolic state, general fuel mobilisation and hypovolaemia initiated by the sympathetic and adrenal responses which ensure the immediate survival of the patient. The subsequent flow phase is a period of catabolism characterised by a negative nitrogen balance due to loss of body protein, peripheral use of fat in preference to glucose, a reduction of the respiratory quotient and increased endogenous glucose production in spite of hyperglycaemia. The flow phase slowly shifts towards anabolism and recovery. During this latter phase, there is a positive nitrogen balance and replacement of muscle that has been lost. This phase may take several months to complete and may be associated with weight gain, but will only occur in the presence of adequate nutrition (Thomas and Bishop, 2007).

One of the most prominent metabolic responses to surgery is hyperglycaemia. The size of the glucose response is almost directly proportional to the extent of the surgery. This is because there is an increase in both glucose turnover and oxidation, and the primary disturbance is one of an increased output of hepatic glucose. There is a concomitant reduction in peripheral glucose use (Ljungqvist et al, 2002).

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Insulin resistance develops to ensure the production and delivery of essential fuels (carbohydrate and free fatty acids) to glucose-dependent but non-insulin dependent tissues necessary for survival (i.e. brain and heart). Insulin-dependent tissues such as skeletal muscle then become dependent upon fat as their source of energy. However, there is growing evidence to demonstrate that insulin resistance and hyperglycaemia are detrimental to the patient (Ljungqvist et al, 2002). This may result in complications such as dehydration, weight loss, fatigue and poor wound healing, along with the potential for increased complications from infections. Resistance to insulin affects other anabolic functions, such as minimising lean tissue breakdown. The reduction in the effect of insulin on protein breakdown leads to increased nitrogen loss and a subsequent reduction in lean body mass. Thus, insulin resistance results in poor postoperative recovery (Ljungqvist et al, 2002).

The risk of malnutrition can be exacerbated postoperatively through prolonged use of nutritionally inadequate free fluid or clear fluid regimens at a time when nutritional requirements should be increased to aid healing following major surgery. Another reason can be early satiety associated with delayed gastric emptying as a result of pain management involving opiates. All of this is likely to result in the patient struggling to meet his or her nutritional needs and can lead to further weight loss.

Consequences of fasting and the surgical procedure include:

- Depletion of carbohydrate stores
- Change in metabolism to a catabolic state
- Postoperative insulin resistance which is associated with an increase in postoperative complications secondary to hyperglycaemia
- Significant patient discomfort both pre- and postoperatively (Thomas and Bishop, 2007).

Consequences of weight loss in surgical patients

Given the precipitating factors discussed above, malnutrition and weight loss could be seen as being inevitable in

the surgical patient. Weight loss and malnutrition can have many adverse consequences on body structure and function, physical and psychological health, and recovery and outcome after disease and injury (surgery) (Stratton et al, 2003), including:

- Impaired immune function increasing susceptibility to infection and sepsis
- Delayed wound healing and an increased risk of pressure ulcers
- Muscle wasting and weakness which may affect respiratory function, cardiac function and mobility
- Altered gastrointestinal structure and function, which impairs digestion, absorption and the gut barrier
- Apathy and depression leading to loss of morale and a reduced will to recover
- General sense of weakness and illness, which impairs appetite and physical ability to eat, thereby perpetuating and worsening the state of malnutrition
- Adverse effects on learning and behaviour in children with potential long-term deficits in cognition
- Poor libido, fertility, pregnancy outcome and mother–child interactions (National Institute for Health and Clinical Excellence [NICE], 2006).

These physical and psychological consequences of malnutrition increase susceptibility to disease and impair clinical outcome. Individuals identified as malnourished or at risk of malnutrition have:

- Increased risk of mortality and complications during and after hospitalisation
- Longer hospital stays and greater hospital costs
- Greater requirement for health care post discharge
- Increased risk of admission to hospital and more visits to their GP (NICE, 2006).

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Preoperative weight loss is a recognised cause of postoperative morbidity and mortality and can impair postoperative wound healing leading to a higher chance of surgical wound dehiscence, anastomotic breakdown, development of postoperative fistulae, failure of fistulae to close, increased risk of wound infection and un-united fractures (NICE, 2006).

Weight loss will also lead to reduced muscle strength and fatigue which can cause inactivity, especially in those who are bed-bound, predisposing the patient to pressure ulcers, thromboembolism and muscle wasting (NICE, 2006). The reduction of padding between bone and skin which occurs with weight loss, greatly increases the risk of pressure ulcers in bony prominences.

The corresponding reduction in nutrients as a result of malnutrition and weight loss has implications for wound healing after surgery. For example, a reduced protein intake results in tissues of poor tensile strength which are more prone to breakage, oedema and slow wound healing. Protein levels are further decreased if a patient has an exuding wound.

Possible ways of preventing weight loss in surgical patients

There are a number of strategies to help prevent weight loss in this patient group.

NICE guidelines on nutrition support (2006) recommend that all surgical patients should be screened for nutritional and physical status on admission to hospital and at pre-surgical outpatient clinics, and reviewed weekly thereafter while in hospital. Nutrition screening should be a rapid, simple and general procedure used to detect risk of malnutrition. If identified at an early stage, malnutrition and unintentional weight loss can be easily treated. Treatment of malnutrition and weight loss involves dietary counselling, dietary modification, use of oral nutritional supplements, enteral tube feeding, parenteral nutrition, or any combination of these. Any treatment for malnutrition should be undertaken alongside management of the underlying causes of malnutrition, such as disease symptoms or side-effects after surgery.

After major surgery patients are likely to have greater nutritional requirements than they normally do. This puts them at high risk when combined with their

potential difficulties in obtaining nutrition.

Greater staff training for doctors and nurses looking after this patient group may help raise awareness of these problems. A new programme, ERAS (enhanced recovery after surgery guidelines) (Weimann et al, 2006) considers the nutritional welfare of patients during all aspects of surgery, i.e. preoperative, perioperative and postoperative. Traditional metabolic and nutritional care of patients undergoing major elective surgery has emphasised preoperative fasting and the reintroduction of oral nutrition 3–5 days after surgery.

The ERAS approach focuses on modulating the metabolic status of the patient before, during and after surgery. It incorporates immediate preoperative carbohydrate and early postoperative oral intake with strict attention to zero fluid balance, epidural analgesia and early mobilisation. This programme attempts to integrate nutritional treatment into other aspects of the surgical patient's care, as events such as salt and water overload or hyperglycaemia may negate the benefits of nutritional support. The preliminary results when using this approach on patients undergoing elective colorectal surgery indicate a significant reduction in hospital stay (Weimann et al, 2006).

Conclusion

Any method whereby patients' nutritional needs are addressed throughout all aspects of their care should help prevent weight loss. Reductions in the lengths of time patients go without food will be beneficial and a reintroduction of nutrition soon after surgery will help restore nitrogen balance and reduce insulin resistance. A study where immediate postoperative enteral nutrition was provided was done without causing hyperglycaemia and resulted in nitrogen balance (Soop et al, 2004).

It is important that all surgical patients are nutritionally screened in clinics before admission to hospital, on admission, weekly during the stay, and at follow-up clinic appointments. In this way any potential weight loss can be identified and treatment strategies implemented, which may involve challenging historical surgical practices to prevent further weight loss and improving the nutritional status of these patients to reduce morbidity and mortality. WE

Key points

- **Malnutrition can cause complications in surgical patients.**
- **All patients undergoing surgery should be nutritionally screened regularly.**
- **Any surgical patient identified as malnourished should be offered nutritional support by the most appropriate route.**
- **Patients should be kept nil-by-mouth for as little a time as possible pre- and post-surgery.**

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