

# Managing high-output stomas: module 2 of 3

**Simon Gabe**

All patients with short bowel should be provided with some luminal source of nutrition if it is safe to do so. Dietary needs are very complex, and support and education through a dedicated dietetics team is pivotal and will improve clinical outcome (Culkin et al, 2009). Energy requirements are higher than in normal people if patients are to be maintained on enteral nutrition alone. These requirements can be met by eating high-energy food, having oral sip feeds, or high-energy enteral feeds at night via a naso-gastric or gastrostomy tube. If increasing the enteral intake fails to meet the requirements or leads to an unacceptable amount of diarrhoea/stoma output, parental nutrition (PN) is indicated (Nightingale and Woodward, 2006). Enteroclysis or fistuloclysis, which is the infusion of enteral feed into the distal limb of a loop stoma or enterocutaneous fistula, might be a viable alternative in some cases (Levy et al, 1988; Teubner et al, 2004).

Dietary advice will differ according to the intestinal anatomy that the patient has. There are three main categories of patients with short bowel syndrome: mid-ileal resection, jejunocolic anastomosis and jejunostomy (or high-output enterocutaneous fistula) (Figure 1).

Patients with a mid-ileal resection rarely run into nutritional or fluid balance problems. Vitamin B12 is absorbed in the terminal ileum and this will need to be supplemented in these patients. Bile acid malabsorption can also be a cause of

diarrhoea and this can be treated with bile acid sequestrants such as cholestyramine or cholesevalam. Bacterial overgrowth can also be a cause of diarrhoea and malabsorption and is under-recognised.

With regard to diet, generally a high-energy, high-protein diet is recommended, with some differences between the patients with a jejunocolic anastomosis and those with a jejunostomy or jejunal fistula.

## Protein

The products of luminal protein digestion are absorbed in the form of di- and tri-peptides, as well as free amino acids. In short bowel, the absorption of exogenous nitrogen, limited by inadequate luminal hydrolysis and reduced membrane absorptive capacity, can be significantly enhanced with small peptide and mixed diets compared with a whole protein diet (Cosnes et al, 1992). In practice, however, patients with short bowel who are stable on an oral diet will absorb 61–81% of ingested protein, which is further compensated by an adaptive hyperphagia (Messing et al, 1991).

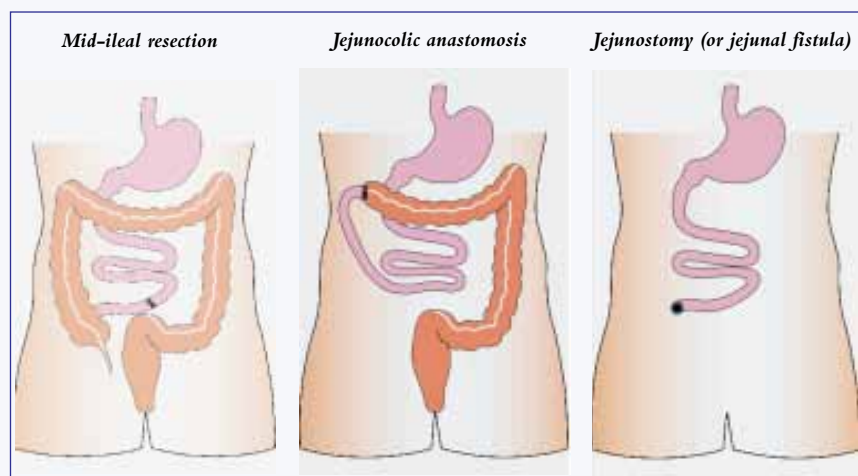
## Carbohydrate

Carbohydrate is avidly absorbed in the proximal small intestine. However, a significant amount still reaches the colon. The colonic fermentation of carbohydrates has been estimated to contribute 5–10% of energy requirements in healthy individuals (McNeil, 1984). Nordgaard and colleagues (1994) placed patients with short bowel syndrome with and without colon in continuity on diets containing differing carbohydrate:fat ratios. Patients with an end jejunostomy absorbed the same amounts, while patients with colon in continuity absorbed more energy from a low-fat, high-carbohydrate diet. Some caution is required, however, as some of the carbohydrate entering the colon may be excreted without fermentation and result in osmotic diarrhoea. In addition, a rare complication can also be D-lactic acidosis, produced from starch by the colonic bacteria and absorbed into the bloodstream. D-lactic acidosis can present with neurologic symptoms including altered mental status, slurred speech and ataxia (Peterson, 2005).

## Fat

In patients with an end jejunostomy, dietary fat should not be restricted. These patients are placed on a high-fat diet as they will absorb a proportion of their ingested caloric intake without adversely affecting stomal output (McIntyre et al, 1986). In contrast, patients with a preserved colon might need to moderate their fat intake, as undigested fatty acids can cause

Figure 1: Anatomical categories of patients with short bowel



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diarrhoea (steatorrhoea), decrease calcium, magnesium and zinc absorption (Hessov et al, 1983), and propagate oxalate renal stone formation. Sunflower oil, rubbed into the skin, helps prevention of essential fatty acid deficiency (Press et al, 1974). Medium chain triglycerides (MCTs) can be used to increase the fat intake for patients with a jejunocolic anastomosis without developing steatorrhoea, as MCTs are absorbed more directly in the small bowel. However, as MCTs do not contain essential fatty acids, long chain triglycerides (LCTs) also need to be incorporated into the diet. Jeppesen and Mortensen (1998) showed that a diet with MCTs resulted in an increased fat and energy absorption.

### Vitamins

Water-soluble vitamins are absorbed in the proximal jejunum and deficiencies rarely occur except in cases of high jejunostomies or duodeostomies. Deficiency of fat-soluble vitamins occurs more frequently owing to fat maldigestion. Most patients require vitamin B12 replacement. Zinc and selenium can be lost with diarrhoea and may need replacing.

### Fibre

In patients with a jejunostomy, fibre will increase the stomal output and consequently these patients are advised to have a low-fibre diet. In contrast, for patients with a jejunocolic anastomosis, the fibre intake should be moderate or high, as the colon will be able to absorb water and decrease the volume. In addition, the colonic bacteria can ferment some fibres.

### Oxalate

Patients with a jejunocolic anastomosis should be advised to have a low-oxalate diet to minimise the development of oxalate renal stones. This occurs as the unabsorbed fats that are present in the colon in these patients will preferentially bind calcium. Usually, the calcium in the colon will bind onto oxalate, but if the calcium is bound to the unabsorbed fats then the oxalate is free and it will be readily absorbed from the colon. The oxalate is then excreted in the urine and if calcium is also present then calcium oxalate stone can form in the renal tract.

### Methods to increase nutritional intake

#### Additional food without fortification

The simplest way of increasing a patient's caloric intake is to enable them to have additional food either with their meals or between meals. This has been shown to be beneficial in a number of conditions. The most convincing studies are in patients with liver cirrhosis who are well known to suffer from malnutrition, which adversely affects survival. When patients are given vigorous encouragement to eat the usual hospital foods, significant improvements in oral energy and protein intake can be achieved (Bories and Campillo, 1994). Benefits of improving oral intake through food alone have also been shown in cystic fibrosis (Walkowiak and Przyslawski, 2003). This has not been studied specifically in short bowel, but similar benefits are expected.

#### Food fortification and dietary counselling

Food fortification is a simple and cost-effective way of improving a patient's intake without having to increase

| Nutrient group | Mid ileal resection                           | Jejunocolic anastomosis               | Jejunostomy    |
|----------------|---|---------------------------------------|----------------|
| Energy         | High<br>30–60 kcal/kg/day                     |                                       |                |
| Protein        | High<br>0.2–0.25g N2/kg/day (80–100g protein) |                                       |                |
| Fat            | According to the degree of steatorrhoea       | Low/moderate (high proportion of MCT) | High           |
| Fibre          | Moderate/high                                 | Moderate/high                         | Low            |
| Oxalate        | Low/normal                                    | Low                                   | No restriction |

their oral intake. This can be achieved by adding readily available ingredients that are high in energy and/or protein to food in order to increase its nutrient density (for example, butter, cream, milk powder, sugar, cheese). Also, commercial liquids or powders containing glucose, fat or protein or a combination of these can also be added to normal food. There are different types of products which include glucose powders, fat emulsions, mixed glucose/fat powders, protein powders and mixed glucose/fat/protein powders/liquids. The simple addition of cream and butter to food is cost-effective and has been shown to increase energy intake by 16% and body weight by 5% (Olin et al, 1996), although this study is in the elderly and not specifically in patients with a short bowel.

### Oral nutritional supplements

When food fortification is insufficient to meet a patient's nutritional requirements, then oral nutritional supplements (ONS) can be considered. These products can be prescribed and should be regarded in the same way as medication. This means that it is the doctors' and nurses' responsibility to ensure that a patient receives the correct supplement at the correct time and that the supplement is consumed. ONS need to be used appropriately in conjunction with dietetic monitoring.

### Enteral nutrition

Generally, it is advised that artificial nutrition support is required if oral diet and oral nutritional supplements do not meet the nutritional requirements for a patient. In patients with short bowel, standard artificial enteral nutrition (via a nasogastric, nasojejunal, gastrostomy or jejunostomy tube) is worth considering and pursuing if it is going to render the patient independent of the need for parenteral nutrition or electrolytes. In circumstances where enteral nutrition does not allow the patient to discontinue parenteral support, it should be stopped, as having both enteral tube feeding and parenteral nutrition is too much of a burden for patients. In this situation, oral nutrition (with or without supplements) and parenteral nutrition should be used to meet the patient's nutritional requirements.

There are many different types of enteral tube feeds and it is recommended that these be considered together with a dietitian. All feeds are free of lactose and gluten. There are differences in the types of enteral feed—broadly, these can be polymeric, pre-digested or elemental. One factor to consider when giving an enteral feed to a patient is

the osmolarity (concentration) of the feed. The higher the osmolarity, the more it will have an osmotic effect, attracting water into the lumen on the bowel and ultimately increasing the stomal output or causing diarrhoea. The commonest example of this is the use of an elemental diet, which is perceived to be better absorbed in a patient with a short bowel, but since the osmolarity of these feeds is high, the result is a higher stomal output for these patients. This is just one example and it will always be best to work closely with an experienced dietitian.

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