

Surgical Management of a Short Bowel in Adult Patients

Phil Stevens, Gordon Carlson and the BIFA Committee

Surgery plays a role in the management of patients with a short bowel, but it should only be considered when a patient has been optimised medically and nutritionally, all healthy available small and large bowel has been brought back into continuity, and sufficient time has been given to enable intestinal adaptation. Surgery may complement the use of drugs such as teduglutide, but the relative places of surgery and peptide growth factors have yet to be fully determined.

Surgical interventions in patients with a short bowel, specifically autologous gastrointestinal reconstruction (AuGIR), are designed to increase the absorptive capacity of the remaining native bowel. They include serial transverse enteric plication (STEP) and longitudinal lengthening and tapering (Bianchi) procedures to increase effective mucosal surface area; procedures to reduce gut motility (reverse loops, colonic interposition and creation of 'valves') and, ultimately, surgery undertaken to replace 'absent' small bowel (small bowel transplantation). Surgery may also be required to address strictures and bacterial overgrowth associated with adaptive (or possibly maladaptive) gut dilatation (e.g. stricturoplasty and gut tapering).

Surgical treatment for a short bowel is highly specialised and should not be undertaken outside a specialist integrated intestinal failure unit, or without discussion with an intestinal failure multidisciplinary team and the National Adult Small Intestinal Transplant (NASIT) Forum. AuGIR procedures are currently only commissioned by NHS England for adults at Salford Royal NHS Foundation Trust.

Key points

1. The overwhelming majority of adult patients with a very short bowel can be treated successfully by home parenteral support (HPS), and with high-quality care do achieve excellent long-term survival. A proportion of patients (depending on pathology and gut anatomy) will regain nutritional autonomy either by adaptation, medical management, surgical restoration of intestinal continuity or a combination of all modalities.
2. Patients with a short bowel who are sufficiently fit may benefit from surgical procedures designed to put back into circuit available, healthy small and large intestine. This may require staged reconstruction and periods of distal enteral tube feeding/fistuloclysis to be maximally effective. Adaptation of previously defunctioned and atrophic intestine may subsequently occur. Approximately 75% of patients with a short bowel in whom healthy defunctioned small and/or large bowel can be brought back into circuit will ultimately regain nutritional autonomy.¹
3. Highly specialised procedures to surgically increase small intestinal surface area or to modify intestinal transit to enhance absorption (AuGIR) should not be considered until 'conventional' measures have been exhausted and adaptation is felt to be complete (up to 3 years for most patients with >50 cm of small bowel and the colon in continuity).¹
4. AuGIR may be considered when a successful outcome might be expected to result in weaning or a substantial reduction in the need for HPS, and/or correction of complications of a short bowel, including strictures and gut dilatation leading to/associated with bacterial overgrowth and progressive liver dysfunction.
5. AuGIR procedures are complex, highly specialised operations and are associated with significant potential for postoperative morbidity and mortality. They should not be offered to patients who need a small bowel transplant. Conversely AuGIR procedures should be considered prior to offering intestinal transplantation.

6. Reversed intestinal loops, surgically created 'valves' and colonic interposition are not currently recommended. Intestinal lengthening and tapering procedures are appropriate in selected patients, but careful case selection and counselling is vital. Patients with small bowel phenotype Crohn's disease and non-dilated bowel are not suitable for these procedures, nor are patients with radiation enteritis and some types of connective tissue disease, notably Ehler's Danlos Syndrome type 4. Patients with ultrashort (<30 cm) small bowel and their colon in continuity, or <100 cm of small bowel to an end jejunostomy are unlikely to benefit from AuGIR.
7. Small bowel transplantation should be considered early in cases of ultrashort (<30 cm) bowel syndrome, where venous access is (or is likely to become) limited and/or where there is concern regarding progressive liver dysfunction. Outcomes from small bowel transplantation have improved over the past thirty years with the five-year survival of a small-bowel only transplant approaching the survival on HPN.²

Explanations

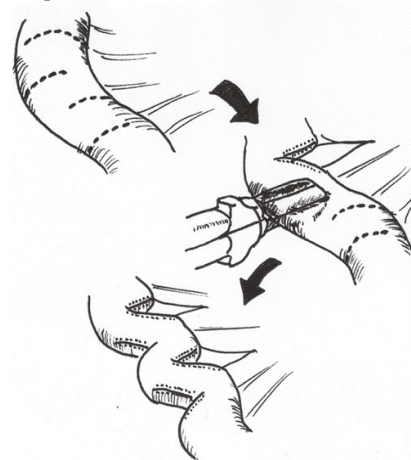
- 1-2. A significant proportion of patients with a short bowel will regain nutritional autonomy after a period of intestinal adaptation.¹ For these patients, surgical intervention (other than to restore bowel continuity) is inappropriate. More than 70% of patients with small bowel length of ≥ 60 cm anastomosed to colon and almost 80% of patients with small bowel length of ≥ 35 cm anastomosed to intact colon can achieve nutritional autonomy without the need for further surgical intervention. Adaptation typically takes at least 3 years but further adaptation may occur up to 5 years. There are only very modest further increases in adaptation between 5 and 10 years.
- 3-5. AuGIR procedures require dilated (>3.5-4 cm) small bowel and usually involve conversion of some of the width of dilated small intestine to increased length, thereby allowing intestinal surface area to increase once the narrowed 'tapered' bowel begins to recover and dilate. The required dilatation can be created (for example, by means of a balloon to cause intermittent occlusion of the bowel) or develops naturally, as approximately one third of patients with a short bowel develop dilatation over time.

Although there are several AuGIR techniques available, the most widely reported and simplest to undertake in adults is STEP, shown in **Figure 1**.

There are few reliable data relating to the outcome of these procedures and none of them is suitable for formal randomised control trial evaluation.

However, a mean increase in intestinal length of 75% has been reported, albeit in children.³ In the largest series of adults, reported enteral autonomy was said to have been achieved in 59% of patients.⁴

Figure 1: STEP



6. Reversed small bowel loops⁵ and colonic interposition may also theoretically improve nutritional autonomy by delaying intestinal transit. Although initial results in small series have been impressive,⁵ there is a high incidence of later treatment failure associated with bacterial overgrowth and chronic intestinal obstruction and these techniques are therefore not currently recommended.
7. Small bowel transplantation remains a relatively infrequently undertaken treatment for a short bowel and is usually considered when there is a loss (or impending loss) of venous access or deteriorating intestinal failure associated liver disease. Some patients with ultrashort bowel may be offered transplantation early in their clinical course, given the worse prognosis identified in this patient group. Over the last decade an average of 15 intestinal transplants in adults have been undertaken in the UK each year, but only one third were performed to treat patients with a short bowel.⁶ Roughly one quarter of patients had restricted venous access (which presumably limited their potential to receive HPS). Simultaneous liver transplantation was undertaken in 45% of cases. Five-year survival rates were 73% for isolated small intestinal transplant and 52% for combined liver and small bowel transplant.

References/suggested reading

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4. Yannam GR, *et al.* (2010). Intestinal lengthening in adult patients with short bowel syndrome. *J Gastrointest Surg*.; 14: 1931-1936.
5. Panis Y, *et al.* (1997). Segmental reversal of the small bowel as an alternative to intestinal transplantation in patients with short bowel syndrome. *Ann Surg*.; 225(4): 401-407.
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