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REVIEW

Medical and surgical management of short bowel syndrome

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KEYWORDS
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Trophic factors;
GLP-2;
Rehabilitative surgery

Summary Short bowel syndrome (SBS) is a rare disease, resulting from extensive resection of the small intestine. Depending on the severity of malabsorption, it will lead to intestinal failure, defined as the reduction of gut function below the minimum necessary for the absorption of macronutrients and/or water and electrolytes, resulting in a situation where intravenous supplementation is required. The risk of developing intestinal failure is related to the remaining length of small intestine and the anatomy of the remnant bowel. SBS incidence has been estimated to range from 5 to 10 patients per year per million population. The main consequence of SBS is a marked reduction of intestinal absorption surface and its main complication is undernutrition and hydro-electrolytic abnormalities. Parenteral nutrition (PN), the major treatment of intestinal failure, has long-term complications. In case of PN dependency, treatment with trophic factors can be proposed. Glucagon-like peptide-2 (GLP-2) analogs allow significant reduction of PN dependency and improve quality of life. Rehabilitative surgery should always be proposed, with the primary goal of restoring digestive continuity. Sometimes, an additional surgical procedure, such as an antiperistaltic reversal of a small bowel segment, is performed when restoring digestive continuity in patients with insufficient length of remnant small intestine to enhance the possibility of PN withdrawal. Intestinal transplantation is proposed as a last resort.

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Essential points

- Short bowel syndrome (SBS) is the leading cause of chronic intestinal insufficiency; in such cases, parenteral nutrition (PN) consisting of intravenous hydro-electrolytic or caloric supplementation is required.
- Evaluation of the severity of intestinal insufficiency following extensive intestinal resection includes: measurement of the length of remaining small intestine, type of intestinal montage and evaluation of the length of the remaining in-continuity colon.
- The main complication of SBS is the risk of undernutrition and hydro-electrolytic disorders.
- Home parenteral nutrition is the standard treatment for severe intestinal insufficiency due to SBS. PN is administered to supplement oral nutrition, which should be maintained as much as possible.
- Trophic factors, such as GLP-2 analogues, have a privileged place in the medical management of patients with SBS and must be prescribed in an expert center.
- Restoration of intestinal continuity must always be proposed. Closure of ostomies makes it possible to reduce the risk of dehydration and hydro-electrolytic disorders, but also and especially, reduces PN dependence.
- In patients who do not have sufficient small bowel length to hope for withdrawal from PN, a complementary gesture should be discussed and performed at the time of restoration of continuity. The main technique used is antiperistaltic reversal of a segment of small bowel.
- Intestinal transplantation should only be proposed as a last resort in patients who are totally dependent on PN and whose condition becomes life threatening in the medium term due to a severe complication of PN.

Definition and causes

Short bowel syndrome (SBS) is a rare disease resulting from extensive small intestinal resection. Its anatomical definition, which is rarely used in current practice, is based on a post-duodenal residual small intestinal length $\leq$ 150–200 cm, i.e., when less than half the normal length of the small intestine remains in the adult [1]. Intestinal insufficiency will result depending on the severity of the malabsorption, defined as the reduction of intestinal function below the minimum necessary for the absorption of macronutrients and/or water and electrolytes, such that intravenous supplementation is necessary to maintain health status and/or growth [2].

The incidence of SBS is poorly known but estimated at about 5–10 patients per year per million population. In adults, the incidence of SBS requiring home parenteral nutrition (HPN) is estimated at two adult patients per year per million population [3]. The main causes of SBS are: mesenteric infarction (in about 45% of cases) secondary to mesenteric arterial or venous ischemia, chronic enteropathy (post-radiation, refractory sprue...) (25% of cases), surgical complications (10% of cases), Crohn's disease (5–10% of cases), and volvulus or trauma (5% of cases), along with other rare causes [1].

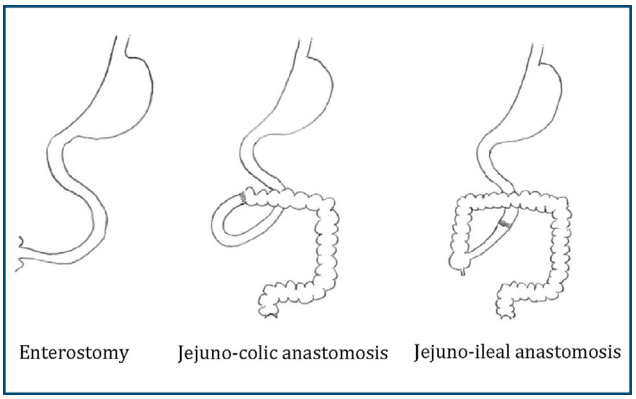

Figure 1. Types de short bowel syndrome according to the anatomic montage.

A recent functional classification distinguishes three types of intestinal insufficiency:

- acute, short-term and usually self-limited;
- acute and prolonged, often in unstable patients and requiring complex multidisciplinary management with PN over a period of several weeks or months;
- and chronic, in stable patients requiring parenteral supplementation for months or years [2].

Finally, SBS can be characterized by the anatomical montage and in particular the presence or absence of the colon and the ileocecal valve in the digestive circuit. Indeed, the presence of the colon in continuity with small bowel improves overall intestinal function and prognosis of the patient. Thus, we can distinguish three anatomical types of SBS:

- the patient with a terminal enterostomy (formerly called type I);
- the patient with a jejuno-colonic anastomosis (formerly called type II);
- and the patient with a jejuno-ileal anastomosis (with the entire colon and ileocecal valve in continuity) (formerly called type III) [2,3] (Fig. 1).

This latter classification has the advantage of a satisfactory correlation with the risk of PN dependence [1].

Consequences of intestinal resection

Gastric function

Following extensive intestinal resection, hypergastrinemia accompanied by postoperative acid hypersecretion initially causes significant fecal losses with high stoma flows, resulting in fluid and electrolyte depletion and, sometimes, later, by peptic ulceration [4].

Intestinal function

The main consequence of SBS is a marked reduction in intestinal absorptional surface. In addition, the optimal absorption of nutrients requires sufficient contact time between nutrients and the intestinal villi, but transit is accelerated in SBS. The severity of the malabsorption syndrome after bowel resection depends on the extent of resection, the site of resection, the integrity (healthy or pathological character) of the remaining bowel [5,6], as well as whether or not the colon remains in continuity. Specific factors affecting the severity of the malabsorption syndrome

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