

# AGA Clinical Practice Update on Management of Short Bowel Syndrome: Expert Review

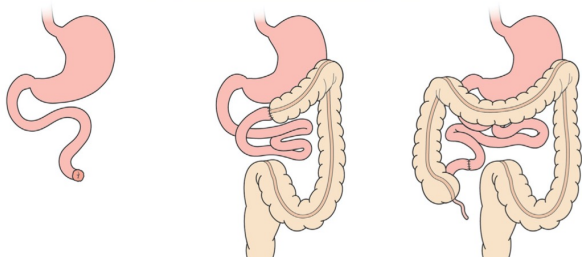
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**Short bowel syndrome (SBS)** – when residual bowel length < 150-200cm. Loss of digestive and absorptive surface area leads to diarrhea, dehydration, electrolyte abnormalities, and weight loss  
**Intestinal failure (IF)** – when gut function decreases below the minimum necessary for the absorption of water, electrolytes and micronutrients. Parenteral nutrition (PN) is required to maintain health or growth

## BPA 1: Bowel Anatomy

- Report the residual length of bowel remaining ✓
- **AVOID** reporting length of bowel resected ✂-⊘
- Strong relationship between group and phenotype/prognosis
  - Group 3 – most favorable phenotype
  - Group 1 – most severe phenotype – most challenging SBS patients to manage
- Conversion from group 1 to group 3 -> better prognosis

Group 1: End-jejunostomy      Group 2: Jejunocolic      Group 3: Jejunoleo-colic



## BPA 2: Nutrition Assessment

- Obtain initial nutritional assessment experienced dietician in SBS
- Monitor for chronic dehydration, CKD, nephrolithiasis, Na<sup>+</sup> deficiency (often without HypONa<sup>+</sup>), recurrent HypOK<sup>+</sup>, HypOMg<sup>+</sup>, HypOCa<sup>+</sup>
- Water soluble vitamins/mineral deficiencies are uncommon
- Common to have fat-soluble vitamins/essential fatty acids deficiencies
- Obtain annual serum vitamin and trace element concentration monitoring
- DEXA every 2-3 years

## BPA 3: Diet

- Hyperphagic diet (Increase intake by 50% of estimated needs) required due to significant malabsorption associated with SBS
- 5 - 6 meals a day with guidance by experienced dietician
- SBS patients with preserved colon should consume high carbohydrate and low fat diet
- Consider tube feeding in addition to oral intake in stable patients with SBS-IF when oral intake alone is insufficient despite use of appetite stimulants, stool output <2 L/day, and expected gains may allow for PN weaning

## BPA 4: Parenteral Nutrition

- Majority of patients require PN in initial period following resection
- Over 50% SBS patients can be completely weaned off PN within 5 years
- PN is preferred management for patients with SBS-IF
- Adjust PN to meet fluid, electrolyte, protein, energy and micronutrient goals
- ↓PN when oral intake can maintain weight without excessive ostomy or stool output
- Need periodic monitoring of micronutrients – may require supplementation along PN

## BPA 5: Oral Rehydration Solution

- Group 1 SBS – water loss through ostomy more than oral intake. Need fluids to maintain urine output of > 1L/day
- Limit low sodium/hypotonic (water/tea/coffee) and hypertonic (juice/soda) solutions
- Excess water intake -> ↑ostomy output -> fluid + electrolyte imbalance
- Glucose-electrolyte oral rehydration solution (ORS) is preferred to maintain hydration instead of excess water

## BPA 6: Pharmacologic Therapy

- Acid suppressing medications (PPI and H2 blockers) should be used sparingly beyond 12 months, especially if small intestinal bacterial overgrowth (SIBO) has been documented
- Octreotide – reserved for patient with high volume stool losses in whom fluid and electrolyte management is difficult (ex: high output end-jejunostomy).
  - Avoid octreotide during intestinal adaptation period (1-2 years)
- Loperamide is preferred agent (over opiate drugs) to reduce diarrhea symptoms
  - Often need high doses – up to 32mg daily
- Avoid use of bile acid sequestrants since they may worsen steatorrhea and fat-soluble vitamin losses

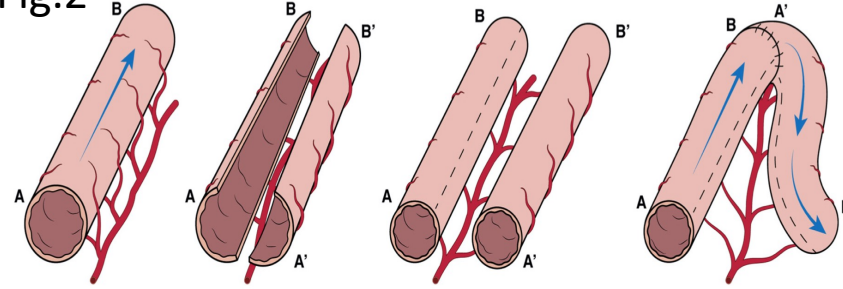
## BPA 7: Drug Dosing

- Most oral medications are absorbed in proximal jejunum, and can be used in patients with SBS
- Avoid sustained- and delayed-release medications
- Serum drug monitoring advised if there's questionable absorption
  - Consider alternative delivery methods (liquid, topical, IV)

## BPA 8: Surgery

- Surgical intervention in patients with SBS have value in 3 different contexts
  - 1. Recruit unused distal bowel
  - 2. Augment the function of residual bowel through specific lengthening and tapering procedures
  - 3. Slow intestinal transit
- Take all possible measures to prevent need for massive bowel resection and subsequent SBS
- Restore intestinal continuity and recruitment of available distal bowel soon to improve bowel function and ↓ risk for PN dependency (ie: converting group 1 to group 2 or 3)
- Bowel can become dilated at anastomoses/watershed areas -> ↑ risk for stasis and SIBO -> worsening malabsorption/diarrhea
- Goal of surgical management of dilated bowel is to achieve intestinal tapering without loss of surface area.
  - Longitudinal intestinal lengthening and tapering (LILT) – Figure 2
  - Serial transverse enteroplasty (STEP) – Figure 3
  - 50-60% of those who undergo LILT or STEP may be able to wean off PN

Fig.2



**Figure 2.** Principle of the Bianchi longitudinal intestinal lengthening and tapering operation: a dilated loop of bowel (AB) is split longitudinally along the antimesenteric border of the bowel, each with essentially half the original blood supply. The 2 hemiloops (A and A') are anastomosed end-end in isoperistaltic fashion, to create a loop of bowel with twice the original length and half the diameter.

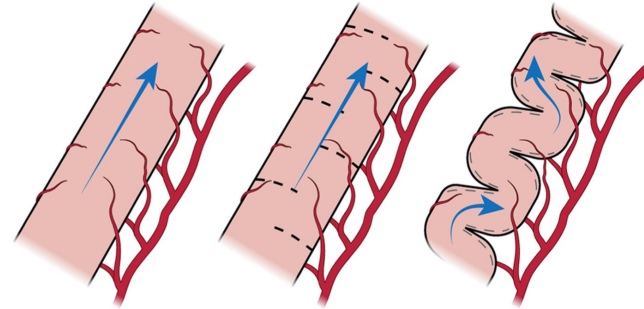


Fig. 3

**Figure 3.** Principle of the serial transverse enteroplasty operation: a dilated loop of bowel is transected partially in a crisscross fashion (usually with a mechanical stapling device), perpendicular to its longitudinal axis, to create a luminal channel of appropriate caliber, without interfering with the blood supply.

## BPA 9: Glucagon-like Peptide-2

- Glucagon-like peptide-2 (GLP-2) – secreted in response to postprandial stimulation -> intestinotrophic effects aid absorption
- **Teduglutide (Gattex) – recombinant GLP-2 – can improve intestinal absorptive function and allow weaning of PN in SBS-IF patients**
- **Avoid Teduglutide in patients with active or recent malignancy (within 5 years) – regardless the location of malignancy**
- Perform screening colonoscopy prior to and during GLP-2 therapy



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## BPA 10: Prevention of Complications

- Common complications are related to central venous catheter, hepatobiliary, metabolic bone disease, kidney injury, chronic diarrhea, and protein energy malnutrition, dehydration, and electrolyte/micronutrient deficiencies

## BPA 11: Referral for Intestinal Transplantation

- Consideration for intestinal transplantation (ITX) is recommended in IF patients with refractory PN dependency and impending PN failure
- PN failure = complications associated with PN, particularly progressive IF-associated liver disease or catheter related complications (recurrent sepsis and loss of vascular access)
- 50% of patients who need ITX also need liver transplant
- **SBS-IF patients with PN complications should be referred early for ITX**

## BPA 12: Education/Support for Patients and Caregivers

- SBS often require long term PN – patients should modify lifestyle to minimize impact of therapy
- Example – cycle PN over 10-14 hours overnight, allowing freedom from infusion pump during the day
- Encourage patient support groups (Oley Foundation)
- Educational support for non-specialist caregivers -> Learn Intestinal Failure Tele-ECHO (Expanding community healthcare outcomes) (LIFT-ECHO)
- **LIFT-ECHO project is online educational community with case-based learning in SBS, IF, and PN**