2022
ACG / FGS ANNUAL SPRING SYMPOSIUM
MARCH 11-13, 2022 | In-Person
HYATT REGENCY COCONUT POINT • NAPLES, FLORIDA

COURSE DIRECTORS:
Tolga Erim, DO and Joel E. Richter, MD, MACG

EARN UP TO 13 CME CREDITS | EARN UP TO 13 MOC POINTS

2022
ACG / LGS REGIONAL POSTGRADUATE COURSE
MARCH 18-20, 2022 | In-Person
HILTON NEW ORLEANS RIVERSIDE • NEW ORLEANS, LOUISIANA

COURSE DIRECTORS:
James D. Morris, MD, FACG and Eric P. Trawick, MD

EARN UP TO 11.5 CME CREDITS | EARN UP TO 11.5 MOC POINTS
All attendees will be muted and will remain in Listen Only Mode.

Type your questions here so that the moderator can see them. Not all questions will be answered but we will get to as many as possible.
How to Receive CME and MOC Points

LIVE VIRTUAL GRAND ROUNDS WEBINAR
ACG will send a link to a CME & MOC evaluation to all attendees on the live webinar.

ABIM Board Certified physicians need to complete their MOC activities by December 31, 2022 in order for the MOC points to count toward any MOC requirements that are due by the end of the year. No MOC credit may be awarded after March 1, 2023 for this activity.

MOC QUESTION
If you plan to claim MOC Points for this activity, you will be asked to: Please list specific changes you will make in your practice as a result of the information you received from this activity.

Include specific strategies or changes that you plan to implement. THESE ANSWERS WILL BE REVIEWED.
ACG Virtual Grand Rounds

Join us for upcoming Virtual Grand Rounds!

Week 9
Update: Mitigating Burnout in Gastroenterologists
Joseph C. Anderson, MD, MHCDS, FACG
March 3, 2022 at Noon Eastern and **NEW!** 8pm Eastern!

Week 10
Update: Diagnosis and Management of HBV Reactivation
Joseph K. Lim, MD, FACG
March 10, 2022 at Noon Eastern and **NEW!** 8pm Eastern!

Visit gi.org/ACGVGR to Register

Disclosures:

**Speaker:**
Kishore R. Iyer, MBBS
VectivBio, Switzerland: Grant support, scientific advisor
Zealand, Denmark: Grant support
Takeda, Massachusetts: Grant support; scientific advisor
Hanmi, S Korea: Scientific advisor
Ipsen, France: Scientific advisor

**Moderator:**
Carol E. Semrad, MD, FACG
Dr. Semrad, moderator for this activity, has no relevant financial relationship(s) with ineligible companies to disclose.

*All of the relevant financial relationships listed for these individuals have been mitigated.*
Learning Objectives

1. Describe best practices in the evaluation and management of SBS
2. Understand the importance of GI anatomy in managing SBS
3. Describe principles of dietary and medical management of SBS
What is short bowel syndrome?

■ Malabsorptive syndrome generally related to reduced gut length
■ Results in inability to maintain nutrition, hydration, electrolytes/micronutrients consuming a normal diet
■ Wide range in normal SB length: 300-800 cm
  - Tremendous functional reserve

<200 cm small bowel remaining (Medicare states <150 cm)

■ Note that SBS is distinct from Intestinal Failure (IF)
  - Need for parenteral support
  - May be due to SBS but also functional causes


BPA1: Bowel anatomy

■ When evaluating patients with SBS, clinicians should define
  the anatomy of the residual gastro-intestinal tract with specific reference to the length of remnant small bowel, measured beyond the duodeno-jejunal flexure, and also define whether the colon is in continuity, whether the ileo-cecal valve is present, or whether the bowel ends in a stoma.
SBS bowel anatomy types

- **End-Jejunostomy**
  - Rapid transit
  - Acid hypersecretion
  - Poor adaptation
  - Large fluid losses
  - Malabsorption
  - Worst prognosis
  - < 100 cm

- **Jejuno-colonic**
  - Rapid transit
  - Poor adaptation
  - B12 and bile salt malabsorption
  - Variable calorie and fluid absorption
  - < 65 cm

- **Jejunoileocolonic**
  - Adequate absorption until about 75% resected
  - Good adaptation
  - Slower transit
  - Uncommon; best prognosis
  - < 30 cm

BPA 2: Nutrition assessment

- A comprehensive nutrition assessment and nutrition support history should be performed at baseline and periodically on all SBS patients.
**BPA 2: Nutrition assessment/monitoring**

- Weight change, medication usage (including supplements), presence of GI and other symptoms that affect oral intake or fluid loss, symptoms of micronutrient deficiencies, and physical assessment for signs of dehydration, malnutrition, and micronutrient deficiency
- Pertinent past medical, psychiatric, and surgical history including the presence of bowel complications (anastomotic strictures, chronic obstruction, enterocutaneous fistulae) and drains
- Nutrition support history including information regarding any enteral and/or central venous access device, formula used, route and method of administration, and prior complications

**BPA 2: Nutrition assessment/monitoring**

- Regular monitoring of renal function and fluid balance; adequate hydration generally based on urine output of >1 L/day and urinary sodium concentration >20 mEq/L
- Serial weight measurements as a warning of compromise in nutrition/hydration status
- Serum vitamin/trace element concentrations should be measured at least annually depending upon the presence of existing/prior deficiencies
- Bone density testing and repeated every 2–3 years; annually in the osteoporotic
The major emphasis of dietary therapy for SBS should be on maintaining compensatory hyperphagia rather than on excessive dietary restrictions.

| General | • ≥6 small meals/snacks per day  
|         | • Chew foods well  
|         | • Tailor diet to individual  |
| Fluids  | • ORS and/or hypotonic  
|         | • In some, all fluids may need to be limited & IV given  |
| Carbohydrates | • Complex CHO; limit simple sugars & sugar alcohol in both foods/fluids  |
| Fat     | • Limit fat to <30% in those w/ a colon; may need to limit in those without; ensure oils w/ essential fatty acids  |
| Protein | • High-quality protein at each meal  |
| Fiber   | • Some fiber is good in those with a colon segment  |
| Oxalate | • Limit in those w/ a colon; ENSURE adequate urine output first  |
| Salt    | • Usual intake in those w/ colon; increased salt intake  |
BPA 4: Enteral (tube) feeding

- Use of enteral nutrition (EN), i.e., tube feeding, in combination with oral feeding should be considered in patients with SBS-IF in whom the expected gain with tube feeding may allow weaning from PN.

Enhance intestinal adaptation

- Facilitate weaning from PN when oral intake insufficient
  - Gastric, continuous administration
  - Optimal EN formula (elemental vs. polymeric)
  - More frequent use in pediatric population
  - Prokinetic use may improve enteral tolerance in SBS patients with dysmotility

Promote reversal of PNALD
BPA 5: Parenteral nutrition (PN)

- *PN should be considered the primary treatment for patients with SBS-IF.*

BPA 6: Oral rehydration solution

- *SBS-IF and SBS patients with chronic borderline dehydration or sodium depletion, especially patients with a high output end-jejunostomy, should use an isotonic high sodium oral rehydration solution to replace sodium losses via the ostomy.*
End-jejunostomy require glucose-electrolyte solution (ORS)
- 90 mEq/L sodium

Fluid composition less important to those with a colon

All should avoid hyperosmolar fluids

Commercial and ORT-like recipes


*Available at no cost at: www.shortbowelsupport.com.

**BPA 7: Pharmacologic therapy**

*Conventional pharmacologic approaches, typically anti-motility and anti-secretory medications, should be used aggressively as first-line agents in the management of SBS-related diarrhea/excessive stoma losses*
BPA7: Conventional SBS Treatment Options

<table>
<thead>
<tr>
<th>Diet</th>
<th>Fluids</th>
<th>Drugs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Antisecretry</td>
<td>Antimotility</td>
</tr>
<tr>
<td>• Limit simple sugars</td>
<td>• PPI/H2RA – available PO/IV</td>
<td>• Best if taken 30 min ac/hs</td>
</tr>
<tr>
<td>• Lactose okay if tolerated</td>
<td>• Octreotide – subcutaneous (? IV)</td>
<td>• Loperamide and diphenoxylate – 1 to 4 tablets up to 4 times/d</td>
</tr>
<tr>
<td>• Complex CHO preferred</td>
<td>• Clonidine – PO/transdermal</td>
<td>• Loperamide preferred</td>
</tr>
<tr>
<td>• Limit fat with colon</td>
<td></td>
<td>• Role of combination of agents unclear</td>
</tr>
<tr>
<td>• Ensure EFA oils</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• High quality protein</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• +/- soluble fiber with colon</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Increase salt without colon</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

ORS, oral rehydration solution
PN support in those with SBS-associated intestinal failure

BPA 8: Drug dosing

- Drugs should be prescribed to SBS patients recognizing the absorptive capacity of the remaining bowel and the pharmacologic properties of the drug. Whenever possible, drug dosing should be titrated according to measurable clinical effects or measurement of plasma concentrations.
BPA 8: Drug dosing

- Medications in solid dosage forms need to undergo disintegration and dissolution before being absorbed
  - Alternative drug delivery methods (e.g., liquids, topical) should be considered as should the monitoring of medication levels
- Most oral medications are absorbed within the first 50 cm of jejunum
  - Sustained- and delayed-release medications should be avoided
- The solution in response to a lack of clinical response of a drug
  - Escalating the dose
  - Changing to a different dosing schedule or frequency
  - Changing to a different drug formulation (e.g., crushed tablet, capsule, liquid) or route of administration (e.g., intravenous, subcutaneous, transdermal)

BPA 9: Surgery

- The role for surgery in SBS patients should be considered judiciously, periodically and within the context of multidisciplinary care. Surgical intervention may be of value to recruit unused distal bowel or to augment the function of residual bowel through specific lengthening and tapering operations or procedures designed to slow intestinal transit.
BPA 9: Surgery

■ Preserve as much bowel as possible
  - Restore continuity/take-down stomas
  - Relieve obstruction
  - Repair fistulae
  - Recruit bypassed/unused bowel

■ Autologous GI reconstruction
  - Optimize function
    ■ Increase length (Bianchi, STEP)
    ■ Taper dilated segment
  - Slow transit
    ■ Reversed intestinal segment

BPA 10: Glucagon-like-peptide-2 (GLP-2)

■ Use of glucagon-like-peptide 2 (GLP-2) analog should be considered for patients with SBS-related intestinal failure (SBS-IF) who require PN support after optimization of routine medical and surgical therapy and if there are no contraindications to GLP-2.
BPA10: Teduglutide: Reduction in days on PN/IVF

Baseline Characteristics of 18 Patients

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Median (Range)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>7M; 11F</td>
<td></td>
</tr>
<tr>
<td>CIC</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>End stoma</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Age (yrs)</td>
<td>47 (20–81)</td>
<td></td>
</tr>
<tr>
<td>Time between last bowel resection and initiation of teduglutide (yrs)</td>
<td>4 (1–13)</td>
<td></td>
</tr>
<tr>
<td>Time on PN/IV prior to teduglutide (months)</td>
<td>36 (4–96)</td>
<td></td>
</tr>
<tr>
<td>Weekly PN/IV volume prior to teduglutide (L)</td>
<td>9.9 (2.7–30)</td>
<td></td>
</tr>
<tr>
<td>PN/IV calories prior to teduglutide (kcal/day)</td>
<td>682 (0–1823)</td>
<td></td>
</tr>
<tr>
<td>Small bowel length (cm)</td>
<td>55 (6–180)</td>
<td></td>
</tr>
</tbody>
</table>

- 18 patients on teduglutide from 2009 – 2015
- 16/18 decreased PS (‘responders’)
- 11 (61%) patients discontinued PS
- 10/11 patients with CIC
- Median time to discontinuation: 10 months (3–36)
- Conditional autonomy in some

CIC, colon in continuity; PS, parenteral support (parenteral nutrition and/or intravenous fluids); PN, parenteral nutrition; IV, intravenous

Lam K et al. JPEN J Parenter Enteral Nutr. 2018 Jan;42(1):225-230
BPA10: Precautions with teduglutide use

- Risk for acceleration of GI neoplastic growth
  - Colonoscopy before treatment and 1 year later
- Intestinal obstruction
- Fluid overload
- Pancreaticobiliary disease
  - Labs before and every 6 months
- Potential to increase concomitant drug absorption
- Reduce dose in mod-severe chronic kidney disease
- Active malignancy (< 5 years) is a contraindication to GLP-2

BPA10: Considerations before using GLP-2

- Patient meets criteria for SBS
- PN/IV fluids required >3 times/week for ≥1 year
- Patient has been optimized on:
  - *Diet therapy*
  - *Anti-secretory drugs*
  - *Anti-diarrheal drugs*
- Is compliant/reliable with therapies
- Partnership exists between treating team and patient
SmPC guidance for selecting teduglutide-eligible patients

Teduglutide is indicated for the treatment of adult patients with Short Bowel Syndrome. (SmPC 4.1)

Patients should be stable following a period of intestinal adaptation after surgery. (SmPC 4.1)

Treatment should not be initiated until it is reasonable to assume that a patient is stable following a period of intestinal adaptation. (SmPC 4.2)

Optimisation and stabilisation of intravenous fluid and nutrition support should be performed before initiation of treatment. (SmPC 4.2)

Contraindications (SmPC 4.3)
- Active or suspected malignancy.
- Patients with a history of malignancies in the gastrointestinal tract including the hepatobiliary system within the last five years.

Patients eligible for teduglutide

- No Surgery
- Surgery
- Not yet adapted
- Stable after adaptation
- PS not optimised stabilised
- PS is optimised stabilised
- Malignancy
- No Malignancy

BPA 11: Prevention of complications

- An important priority of care in SBS is the prevention of complications related to SBS and those related to the need for parenteral nutrition, which are often inter-related.
**BPA11: Complications/challenges in SBS**

- **Diarrhea/Malabsorption**
  - Multifactorial
  - Weight loss/Malnutrition,
  - Micronutrient/EFA deficiencies
  - Metabolic bone disease

- **Fluid and electrolyte disturbances**
  - ‘Net secretor’, hypomagnesemia

- **Renal dysfunction**
  - Stones (oxalate), CKD

- **Small intestinal bacterial overgrowth**

- **D-lactic acidosis**

**Other SBS management challenges:**
- PN/IF-related – liver disease
- CVC – sepsis; loss of access

---

**BPA12: Referral for intestinal transplantation**

- For patients with SBS-IF and any evidence of PN-failure
  in the form of onset of life-threatening complications
  associated with PN, clinicians should consider timely
  referral for intestinal transplantation (ITX).
Intestinal Transplant: Indications

- Irreversible intestinal failure with TPN dependence

PLUS

- TPN failure*
  - Blood stream infections
  - Liver dysfunction
  - Loss of vascular access
  - Recurrent dehydration despite TPN/IVF

- ≥2 line sepsis with hospitalization in a year
- 1 fungemia
- 1 line sepsis with shock or ARDS
- Metastatic infection

PLUS

- Impending or overt liver failure
- Thrombosis of ≥2 central veins

• Other indications
  - Massive enterectomy/Desmoids
  - Very poor QOL

* As defined by Center for Medicare and Medicaid Services

---

Can we predict TPN failure?

B

Survival probability (%)

Years after bowel resection

Managing SBS - associated intestinal failure

PN still frequently necessary
• Does not enhance bowel function
• Costly (>$100K/yr)
• Reduced quality of life
• 1–2 hospitalizations annually/patient

Attempt to wean PN

Successful

Unsuccessful or incomplete

Use of GLP-2 analog

Autologous GI reconstruction

Tolerating home PN

Intolerant of home PN

Continue home PN and monitor for complications

Intestinal transplant

C a r e f u l m o n i t o r i n g o f s t a t u s

• Micronutrient supplementation

Successful

Unsuccessful or incomplete

BPA 13: Education & support for pts/caregiver

■ *Due to the physical, psycho-social and financial burdens*

  *confronting those with SBS and/or SBS-IF, and the*

  *frequent dependence on intrusive chronic therapy in the*

  *form of PN, clinicians should encourage ongoing*

  *education for patients and caregivers and their*

  *participation in sources of psycho-social support.*
ACG/LIFT-ECHO Module on Intestinal Failure
- coming soon...

- Co-directed by Dr Carol Semrad & Kishore Iyer
- Case-based learning in intestinal failure & Home PN (IF 101)
- Eight one-hour virtual clinics over 4 months
  - 1st & 3rd Tuesdays, 1-2 pm Eastern US
  - Anonymized self-administered pre- and post-test
- Free CME/CE credits
- Numerous cash prizes & incentives
Questions?

Speaker:
Kishore R. Iyer, MBBS

Moderator:
Carol E. Semrad, MD, FACG

CONNECT AND COLLABORATE IN GI

ACG & CCF IBD Circle
ACG Hepatology Circle
ACG Functional GI Health and Nutrition Circle
ACG Women in GI Circle

ACG GI Circle
Connect and collaborate within GI

ACG’s Online Professional Networking Communities
LOGIN OR SIGN-UP NOW AT: acg-gi-circle.within3.com

American College of Gastroenterology