INTESTINAL FAILURE MANAGEMENT AND ADAPTATION: When to call the Surgeon?

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DEFINITIONS

Intestinal Failure

*Reduction of gut function* below the *minimum necessary* for the absorption of macronutrients and/or water and electrolytes, such that *intravenous supplementation is required* to maintain health and/or growth.
Intestinal failure

Short bowel syndrome (SBS)
SBS (Adults)
- Extensive surgical resection
  - Trauma
  - Irradiation
  - Cancer
- Mesenteric vascular disease
  - Crohn’s disease
  - Desmoid tumors

SBS (Children)
- Gastrochisis
- Necrotizing enterocolitis
- Midgut volvulus
- Intestinal atresia
- Hirschsprung’s disease

Mucosal Causes
- Microvillous inclusion disease
- Tufting enteropathy
- Congenital neuroendocrinopathy

Functional Causes
- Chronic Intestinal Pseudo-obstruction
- Mechanical obstruction
  - Adhesions
  - Intestinal fistula

Intestinal Failure
Intestinal Adaptation

Natural compensatory process after extensive bowel resection

Structural
- Hyperplasia
- Angiogenesis
- Bowel dilation
- Bowel elongation

Functional
- ↑ Transporters/cell
- Accelerated crypt cell differentiation
- Slower transit time
- ↑ Nutrient and fluid absorption

Intestinal Failure → Enteral Autonomy

JPEN 2014
Nutritional Support

Medical Therapies

Parenteral Nutrition Support

Enteral Feeding Regimen

Enteral Autonomy

Intestinal Autonomy

Intestinal Adaptation

Anatomic Features

Autologous Reconstructive Surgery

Transplantation

Hormones Growth Factors

Surgical Therapies

Surgical Therapies
Anatomic Features
LONG-TERM PARENTERAL NUTRITIONAL SUPPORT AND INTESTINAL ADAPTATION IN CHILDREN WITH SHORT BOWEL SYNDROME: A 25-YEAR EXPERIENCE

Rubén E. Quirós-Tejeira, MD, Marvin E. Ament, MD, Laurie Reyen, RN, Faye Herzog, RN, Michelle Merjanian, MD, Nancy Olivares-Serrano, MD, and Jorge H. Vargas, MD

- 78 children with SBS on PN >3 months

Predictors of survival and intestinal adaptation:
1. Small bowel length >38 cm
2. Intact ileocecal valve
3. Preservation of the colon
4. Intestinal continuity
Nutritional Support
TPN Complications

Catheter Sepsis
Catheter Occlusion
Vascular thrombosis
Gallstones
Liver Disease
Kidney Stone
Kidney Function
Bone Disease
Death
Minimization of TPN Complications

1. Introduce enteral feeding

2. Prevent catheter sepsis
   - Proper line care
   - Vanco locks, Ethanol locks

3. Prevent vascular thrombosis
   - Identify coagulation disorders

4. Optimize TPN formulation
   - Fish oil emulsions (Omegaven™)
Prospective, Case Controlled Trial of 24 weeks of Intravenous Fish Oil
in Children with PN Associated Liver Disease

K. Calkins et al.
Medical Therapies
“In the last decade, most IF research has been focused on exploring the potential of these substances as supportive IF treatment. However, clinical trials so far have not demonstrated reproducible or meaningful clinical benefits with the use of glutamine or growth hormone.”

Glucagon-like Peptide 2 (GLP-2)

• GLP-2 - Natural factor produced by the body in response to intestinal resection

• GLP-2 analog - Gattex® (teduglutide)
  – FDA approved for adult use in Dec 2012

• Two phase 3 trials (24 weeks) and a long-term extension study:
  – Increased villus height
  – Decreased PN/ IV fluid requirements
Nontransplant Surgical Therapies
Autologous Reconstructive Surgery

- Fistula Management
- Stricture/Adhesion Management
- Ostomy Takedown
- Lengthening Procedures (Bianchi, STEP)
Longitudinal lengthening (Bianchi procedure)
Serial Transverse Enteroplasty (STEP)

HB Kim. JPS 2003
International STEP Registry

• 111 patients
• 9/2004 – 1/2010
• 50 worldwide centers
Intestinal Transplantation
Intestinal Transplantation

Indications

Irreversible **Intestinal Failure** associated with one or more life-threatening complications:

- Liver Disease
- Loss Vascular Access
- Recurrent Catheter Sepsis
- Complex fluid and electrolyte management
- Non-reconstructible GI Tract
Outcomes After Intestinal Transplantation: Results from a Large Single Center Review

Douglas Farmer, Elaine Cheng, Laura Wozniak, Elizabeth Marcus, Vilayphone Hwang, Stacey Crowley, Hasan Yersiz, Ronald Busuttil, Sue McDiarmid, Robert Venick.

Intestinal Transplant Program
Dumont UCLA Transplant Center

XIV International Small Bowel Transplant Symposium
Buenos Aires, Argentina, June 2015
Intestinal Transplantation Outcomes

• 136 intestinal transplants over 22 years (1991-2012)

• 5-yr overall survival 66%

• Common complications:
  • Acute Rejection 59%
  • CMV infection 7%
  • PTLD 15%

UCLA Data 2015
Intestinal Transplantation Outcomes

• Short term survival has markedly improved
  – 80-90% 1-year survival has been reported

• Medium term survival (1-5 yr) still lags
  – U.S. UNOS 5-year survival 40-50%
  – Global ITR 2015 5-year survival 56%

• Long term outcomes (>5 yr) are rarely reported
  – Global ITR 2015 10-year survival 43%
SUMMARY

**Nutritional Support**
- TPN therapy required for all
- Emphasize PN weaning
- Introduce enteral nutrition
- Minimize PN associated complications
- Fish oil-based lipid formulations may benefit infants and children with early PN associated liver disease

**Medical Therapy**
- GLP-2 analog can be considered
SUMMARY

**Surgical Options**

- Surgical options should be considered for all
- Restore intestinal continuity
- STEP best applied to patients with:
  - Dilated bowel segments
  - Dependent on PN for 25-75% of calories
  - Absence of advanced liver disease
- Reserve transplantation for patients who:
  - Fail with adaptation
  - Develop life-threatening TPN complications
Thank You!