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NUTRITION INTERVENTIONS IN PEDIATRIC INTESTINAL FAILURE FROM SHORT BOWEL SYNDROME: A CASE REPORT

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OVERVIEW OF IF AND SBS

Intestinal Failure (IF) from Short Bowel Syndrome (SBS) is a complex condition that impairs nutrient and fluid absorption. Without appropriate monitoring and treatment, it can result in significant morbidity, organ complications, decreased quality of life, and suppressed growth. Complications include central line associated bloodstream infections (CLABSI), small intestinal bacterial overgrowth (SIBO), and metabolic bone disease.[1-3]
Current evidence supports early TPN initiation with SMOF lipids, enteral and oral feeds to reduce long-term TPN dependence, and medical nutrition therapy that promotes intestinal adaptation. There is still debate around the use of continuous enteral feeds to promote intestinal adaptation, versus prioritizing bolus and oral feeds to mimic physiological function and reduce risk of oral aversion.

STATISTICS

- **SBS is the leading cause of intestinal failure in children[1]**
- **40-60% of IF patients on long-term TPN develop Intestinal Failure Associated Liver Disease (IFALD)[1]**
- **The incidence of central line associated bloodstream infections (CLABSI) in SBS patients on long-term TPN is 1.3 to 10.2 per 1000 catheter days[1]**

PATIENT CASE

LB is a female born prematurely at 35 weeks with gastroschisis, requiring bowel resection after birth. The patient is left with 85 cm of small bowel and a microcolon, resulting in short bowel syndrome and intestinal failure.

CLINICAL COURSE

Age	Event
1 day of age	Bowel resection is performed and parenteral nutrition is initiated, using a SMOF lipid emulsion.
2 months	End ileostomy performed and gastrostomy tube placed. Trophic enteral feeds initiated through G tube: 1 mL/hr breastmilk over 24 hours. TPN accounting for 100% of energy needs. Feeds slowly advanced to a total of 120 mL/day and 80 kcal/day.
3 months	Patient transitions to bolus feeds during the day with nighttime continuous feed (12 mL of breastmilk QID plus 12 mL/hr x 12 hours nocturnal drip). Total calories from TPN reduced by 10% due to robust weight gain, with patient gaining an average of 23 g/day.
4 months	Patient transitions from G tube feeds to receive 24 mL bottles q3h. Nutramigen semi-elemental formula is introduced at this time when there isn't sufficient breast milk available.
5 months	Patient admitted for CLABSI and sent home on antibiotics.
7 months	Patient undergoes ileostomy takedown procedure, resulting in end-to-end ileocolic anastomosis. Immediately following the procedure, patient is NPO with 100% TPN dependence for one week due to ileus. After resolution of ileus, patient begins drinking 2 mL of formula q3h, with intake advanced as tolerated. Prior to ileostomy takedown, patient had been introduced to solids and was eating 1-2 tsp of purees 3x/day.
8 months	TPN calories decreased by 20% due to robust weight gain, with patient gaining 57 g/day since discharge and weight/length at the 86th percentile. Frequency of purees is increased, with patient eating 2 tsp of purees 3x/day in addition to receiving 30 mL bottles of Similac Sensitive 6-7x/day.
9 months	Patient admitted for CLABSI and sent home on antibiotics.
10 months	Patient admitted for CLABSI and sent home on antibiotics. G tube leakage present. Antibiotic treatment initiated for persistent bacterial overgrowth.
13 months	G tube closure considered due to lack of use. Patient taking 540 mL/day of Similac Sensitive polymeric formula in bottles. Patient continues to enjoy solid foods. TPN has been weaned to provide 50% of needs. Patient meeting anthropometric goals with growth in line with expectations.

INTERVENTIONS

> Placed on TPN at birth for 100% of her energy needs, using SMOF lipids to promote liver health

> G tube placed for enteral nutrition, with initiation of trophic feeds to stimulate the GI tract

> Once trophic feeds are tolerated, continuous feeds are initiated to promote intestinal adaptation through increased villus length, crypt depth, and mucosal thickness[1]

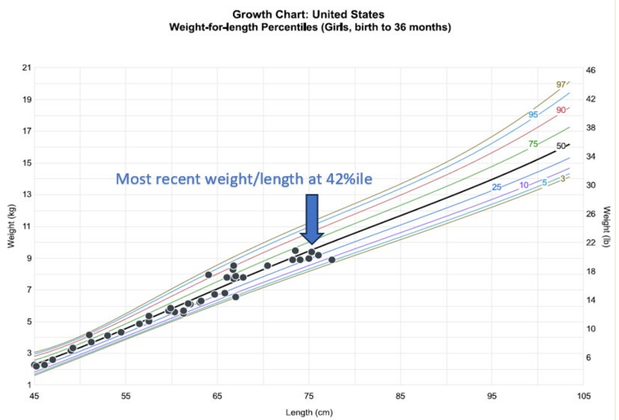
> Patient is given breastmilk for feeds, as the growth factors and glutamine content have been associated with increased intestinal adaptation and shorter duration of TPN dependence[3]

> After 2 months of continuous feeds, LB is transitioned to bolus feeds to mimic physiological processes, optimize hormonal stimulation, manage insulin secretion, and reduce risk for oral aversion development

> Solid foods are introduced around 6 months corrected age to promote normal eating behaviors and development

> TPN is continuously weaned in response to robust growth and demonstrated ability to absorb nutrients enterally

GROWTH CHART: WEIGHT FOR LENGTH



DISCUSSION

> **Ultimate Goal:**
- Promote intestinal adaptation to allow for weaning off long-term TPN while promoting normal growth and development.

> **Challenges:**
- No up-to-date MNT guidelines for pediatric IF
- Nutrition interventions are often affected by complications in the clinical course of a patient, such as CLABSI and SIBO
- Much debate over best practice with continuous feeds versus bolus feeding and oral intake. A unique approach was taken with this patient to combine continuous EN with bolus feeds and oral intake to hopefully obtain benefits seen from both approaches

> **Looking Forward:**
- Patient's capacity for enteral nutrient absorption improving over time, given growth trajectory and ability to wean TPN to 50% of energy needs at present
- Patient is currently tolerating and enjoying numerous solid foods, which appears promising for avoidance of developing oral aversion
- This case provides an encouraging outlook for a combination approach in which continuous enteral feeds are given nocturnally with bolus feeds by day

REFERENCES

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