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Extended Abstract
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World Congress on Gastroenterology & Urology: Intestinal lengthening surgery - Debra Sudan - Duke University Medical Center

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Children with short intestine syndrome are unable to consume the required nutrients and fluids, and often need complete parenteral nutrition (TPN or intravenous feeding). The aim of bowel lengthening procedures is to enable food to spend more time in the digestive system, where it can naturally be absorbed into the body. Parenteral feeding can be used to treat patients with short bowel syndrome, but this may lead to significant complications such as liver disease and venous thrombosis. In these patients, two surgical procedures for bowel-lengthening may be used: the Bianchi procedure, conceived in 1980; and the serial transverse enteroplasty (STEP), developed in 2003. Sudan and colleagues have reviewed their 24-year experience at the heart by using each of these procedures.

After less extensive resections, SBS can be avoided because the remaining small intestine adapts through villi lengthening, increased bowel-absorbing surface area, and improved digestive and absorptive functions. These adaptations can be aided in fostering colonocyte proliferation by administering growth factors. Post operational SBS management is a multi-stage process. A patient initially requires parenteral nutritional administration. The monitoring and correction of large fluid and electrolyte losses is another important aspect of postoperative management. After stabilization, the patient can slowly return to normal feeding, usually using individual amino acids and/or di- and tri-peptides as a protein source based on an elemental diet. Complex diets may also be offered, and while more difficult to digest than simple diets, these may be more successful in promoting bowel adaptation. As recovery progresses, parenteral feeding may be decreased gradually, with enteric feeding being the prevailing nutritional help process. SBS diagnosis can also require the administration of antidiarrheal drugs, antisecretory agents, and antimicrobials to treat patients with overgrowth of bacteria. Many patients lack the digestive capacity to obtain enough nutrients from enteric diets, resulting in them being permanently dependent on total parenteral nutrition (TPN) for some or all of their caloric needs. Unfortunately, parenteral feeding involves several chronic complications, including TPN-induced liver disease, recurrent catheter sepsis, small bowel bacterial overgrowth and nutrient deficiency. The need for enteroplasty or intestinal transplantation may result from continued complications and further advancement of nutrient deficiencies.

Serial transverse enteroplasty (STEP) is identical to its main comparator, longitudinal intestinal lengthening and tapering (LILT or Bianchi procedure) by expanding the pre-existing tissue to increase the length of the small intestine. Initially, the intestine is flattened, and a line is drawn along the antimicrobial border to maintain orientation during the operation. A catheter is passed through a small incision which provides a guide to pass the larger side of a stapler for endoscopic gastrointestinal anastomosis (GIA). Application of the stapler perpendicular to the long axis of the intestine from alternating sides creates a zigzag pattern, which generates a channel width of about 2 cm. After surgery, the zigzag pattern flattens for for weeks, with the staple lines being the only evidence of extension. Dilatation of the small intestine can permit one or more additional STEP procedures ("re-STEP") after STEP. As was the case with the first human Phase procedure, this technique can also be used to further stretch small intestines that had previously undergone LILT extension. Even though STEP presents a viable replacement surgery for LILT suggests that, if the bowel is sufficiently dilated, the first option should be a LILT procedure, with the STEP procedure being best used as a follow-up procedure. Unlike LILT, I can perform the STEP procedure in patients with a foreshortened mesentery. Compared to LILT, STEP is technically less

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challenging, presents a reduced risk of intestinal ischemia as it preserves the bowel 's natural vascular anatomy, and results in a reduced risk of intraperitoneal contamination as the bowel is never opened. Move appears to have been in operation in over 20 medical centers since its inception. Most are located in the US, but institutions based in Portugal , Spain, Poland and Canada have also performed STEP surgery. The main centers for patient numbers and number of publications are in the United States , i.e. Boston Children's Hospital (where the procedure was developed and first implemented) and Nebraska University Medical Center. At the date of report preparation, the STEP procedure had been in use for seven years, although long-term data are not readily available.

Intestinal failure (IF) signifies the inability to absorb nutrients from food to maintain weight or attain normal growth. Causes of IF include resection and abnormal motility or function causing diarrhoea and poor absorption. Although parenteral nutrition (PN) has allowed for delivery of nutrients directly into the bloodstream associated complications it can be life-threatening. Several centers attempted intestinal transplantation in 1960’s and 70’s, but the field was largely abandoned due to the uniform death from sepsis and rejection in the early postoperative period. After the early abandonment of intestinal transplantation, an innovative surgical technique was introduced by Dr. Bianchi in 1980 (longitudinal division of small bowel into 2 parallel segments)l. There are over 100 patients in 11 case reports or small series that have shown the procedure to be successful in improving absorption and weaning PN in 60 % with 83% patient survival. In 2003, Kim introduced an alternative lengthening surgery called serial transverse enteroplasty (STEP). This procedure appears technically easier the longitudinal lengthening and has been rapidly adopted by many centers. The STEP registry reported in 2007 described 38 patients with mean 12 month followup from 19 centers. In the registry report, of the 29 undergoing STEP that were TPN dependent, 10 (34%) were weaned from PN and 3 died (mortality = 8%). In 2007, the University of Nebraska compared their single center outcomes of these 2 procedures in the largest series of lengthening surgeries published. There were 66 patients (43 Bianchi and 34 STEP). Survival was 91% and weaning from PN in 60% with no differences between the procedures. Although, intestinal transplantation has now become clinically successful, intestinal lengthening remains a viable alternative in many patients with IF and avoids the need for life-long immunosuppression, with its attendant risks.

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