

## **Intestinal Transplantation**

Intestinal failure is characterized by the inability to maintain protein energy, fluid, electrolyte, or micronutrient balance due to GI disease when on a normal diet.

Intestinal failure ultimately leads to increase malnutrition and even death if the patient does not receive parenteral nutrition or become a recipient of an intestinal transplant.

Worldwide, the leading cause of intestinal failure is short bowel syndrome caused by surgical removal.

In children, the following are the leading causes of intestinal failure:

- Intestinal atresia
- Gastroschisis
- Crohn disease
- Necrotizing enterocolitis
- Midgut volvulus
- Chronic intestinal pseudo-obstruction
- Massive resection secondary to tumor
- Hirschsprung disease

The following are the leading causes of intestinal failure in adults:

- Crohn disease
- Superior mesenteric artery thrombosis
- Superior mesenteric vein thrombosis
- Trauma
- Desmoid tumor
- Volvulus
- Pseudo-obstruction
- Massive resection secondary to tumor
- Radiation enteritis

Parenteral nutrition is the current standard of care for patients with intestinal failure.

Never than less, the chronic use of parenteral nutrition is often associated with potentially life-threatening complications, including catheter-related sepsis, catheter-related thrombosis, severe dehydration, metabolic derangements, loss of sites for vascular access, and parenteral nutrition associated liver disease (PNALD).

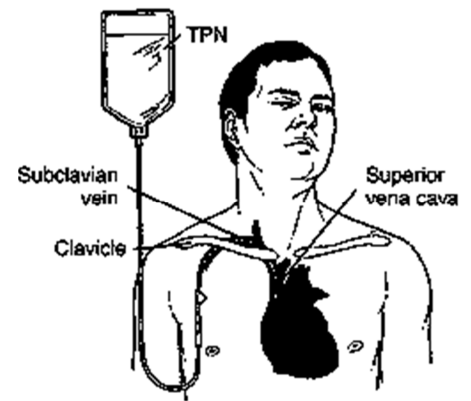
Severe liver injury has been reported in as many as 50% of patients with intestinal failure who receive parenteral nutrition for longer than 5 years; this is typically fatal.

## Parenteral nutrition

- Is feeding a person intravenously, bypassing the usual process of eating and digestion.
- The person receives nutritional formulae that contain nutrients such as glucose, amino acids, lipids and added vitamins and dietary minerals.
- It is called total parenteral nutrition (TPN) or total nutrient admixture (TNA) when no significant nutrition is obtained by other routes.
- It may be called or total peripheral nutrition (also TPN) when administered through vein access in a limb, rather than through a central port in body.
- Total parenteral nutrition (TPN) is provided when the gastrointestinal tract is nonfunctional because of an interruption in its continuity (it is blocked, or has a leak - a fistula) or because its absorptive capacity is impaired.
- It has been used for comatose patients, although enteral feeding is usually preferable, and less prone to complications.
- Parenteral nutrition is used to prevent malnutrition in patients who are unable to obtain adequate nutrients by oral or enteral routes

## Indication

- Failure of the parenteral nutrition
  - Impending or overt liver failure secondary to PNALD
  - Thrombosis of 2 or more central veins
  - Two or more episodes per year of systemic sepsis secondary to line infections
  - Frequent episodes of severe dehydration
- Severe short bowel syndrome (gastrostomy, duodenostomy, residual small bowel [ $< 10$  cm in infants,  $< 20$  cm in adults])
- Intestinal failure with frequent hospitalizations, narcotic dependency, or pseudoobstruction
- Patient unwillingness to accept long-term parenteral nutrition



## Types

1. Intestine-only
2. Intestine-liver transplants
3. Multivisceral transplants. (multivisceral transplant is one that includes the intestine and liver and either the pancreas or kidney; however, several combinations may be used)

## Source of the graft

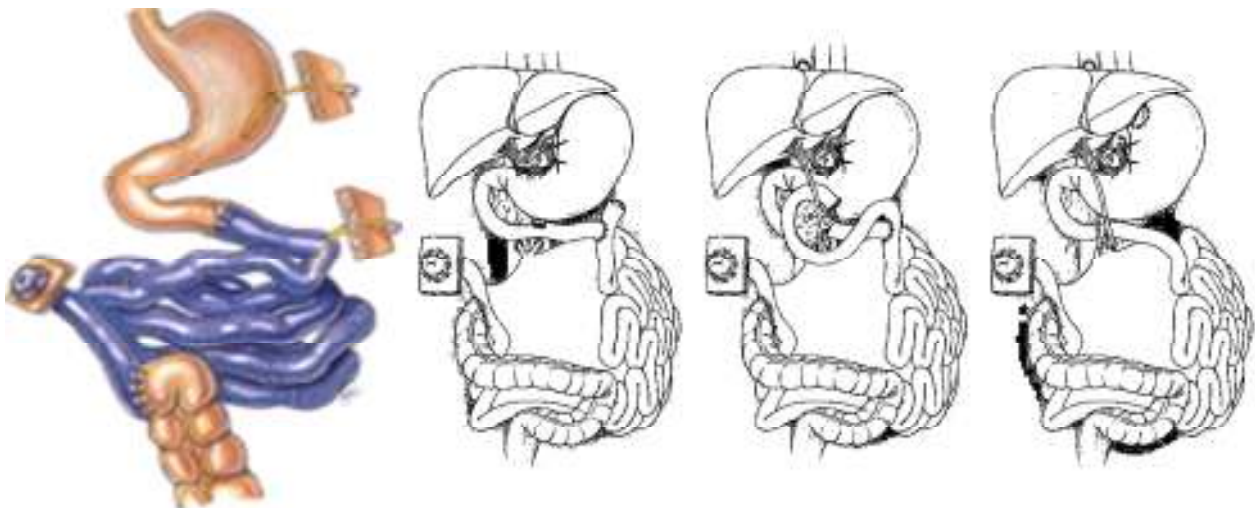
- The graft can be taken from
  - Cadaver.
  - Living donor.

## Contraindications

- The contraindications of intestinal transplantation are essentially the same as is seen in other types of transplants.
- Significant coexistent medical conditions that have no potential for improvement following transplantation,
- An active uncontrolled infection
- Malignancy that is not eliminated by the transplant process,
- And psychosocial factors (eg, the lack of capability to assume the responsibilities of the day-to-day management following the transplant or)
- The absence of family support.

## Pretransplant workup

- The evaluation of a potential recipient needs to be done by a multidisciplinary team including transplant surgery, gastroenterology, nutritional services, psychiatry, social work, anesthesia, and financial services.
- Laboratory studies should include CBC count, coagulation profile, complete metabolic panel, ABO blood group determination, human leukocyte antigen (HLA) status, panel reactive antibody status, and serologies for cytomegalovirus (CMV) and Epstein-Barr virus (EBV).
- The GI tract should be assessed both radiologically and endoscopically. If liver disease is suspected, a liver biopsy should be performed
- Doppler ultrasonography or magnetic resonance venography should be performed to assess vascular access.
- Patients with dysmotility disorders may require manometry of the stomach, esophagus, and rectum.
- Children with necrotizing enterocolitis (NEC) require a full neurologic and pulmonary workup to exclude the possibility of associated intraventricular hemorrhage and bronchopulmonary dysplasia.
- Although some transplant programs perform a decontamination of the donor bowel via a nasogastric tube, this is not uniformly performed.
- Immunosuppression is given to the donor by some transplant programs just before or at the time of the procurement. Antithymocyte globulin, muromonab, basiliximab, and steroids are most frequently used.
- University of Wisconsin Universal Organ Preservation (UW) solution for both in situ flushing and cold storage is most frequently used



## Postoperative Details

- Patients require ICU monitoring postoperatively.
- Induction therapy with monoclonal (alemtuzumab, basiliximab, daclizumab) or polyclonal (Thymoglobulin) antibody preparations is often administered intraoperatively or preoperatively in the recipient.
- Tacrolimus via enteric administration and intravenous steroids are typically begun immediately after the surgery and are maintained at discharge.
- High levels of immunosuppression are maintained early in the postoperative period
- Broad-spectrum intravenous antibiotics are administered for about 1 week after the transplant.
- Check laboratory findings regularly for evidence of bleeding.
- Monitor serum pH and lactate levels to detect any evidence of intestinal ischemia.
- Initiate appropriate antiviral prophylaxis with ganciclovir and/or cytomegalovirus (CMV) immunoglobulin (CytoGam).
- At regular intervals, perform CMV antigenemia, quantitative Epstein-Barr virus (EBV) polymerase chain reaction (PCR) surveillance, routine cultures, transplant ileostomal endoscopy, and biopsy. Additionally, monitor fluid status, stool losses, and serum electrolytes.
- The transplanted intestine initiates peristalsis immediately after reperfusion but in a less orderly fashion secondary to the extrinsic innervation being disrupted during the procurement.
- The dysfunctional residual native intestine, stomach or colon in a patient with a primary dysmotility syndrome could aggravate this problem.

## Complications

- Infection due to high immunosuppression and translocation of bacteria. (Bacterial, Viral and Fungal)
- Rejection

## Graft Versus Host Disease

- Immune cells (white blood cells) in the tissue (the graft) recognize the recipient (the host) as "foreign". The transplanted immune cells then attack the host's body cells.
- The small intestine is an immunocompetent organ; its population of lymphoid cells can mount an immunologic response to the host (ie, a graft versus host disease [GVHD] reaction. Once diagnosis is confirmed, promptly institute treatment with high-dose steroids and antithrombocyte globulin or with OKT3.