REFEEDING ENTEROCLYSIS - AN ALTERNATIVE TO TOTAL PARENTERAL NUTRITION IN SMALL BOWEL OSTOMIES

A DISSERTATION SUBMITTED TO

THE TAMILNADU DR.MGR MEDICAL UNIVERSITY

In partial fulfillment of the regulations for the award of the

Degree of M.S (GENERAL SURGERY)

BRANCH-1

DEPARTMENT OF GENERAL SURGERY STANLEY MEDICAL COLLEGE AND HOSPITAL TAMILNADU DR.MGR MEDICAL UNIVERSITY, CHENNAI MAY 2020

CERTIFICATE

This is to certify that dissertation **"REFEEDING ENTEROCLYSIS - AN ALTERNATIVE TO TOTAL PARENTERAL NUTRITION IN SMALL BOWEL OSTOMIES"** is a bonafide record of work done by **Dr. PRASANTH D**, in the Department of General Surgery, Stanley Medical College, Chennai, during his Post Graduate Course from 2017-2020. This is submitted in partial fulfillment for the award of **M.S. DEGREE EXAMINATION- BRANCH I (GENERALSURGERY)** to be held in May 2020 under the **Tamilnadu DR.M.G.R. Medical University, Chennai.**

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DECLARATION

I **Dr. PRASANTH D** solemnly declare that this dissertation **titled " REFEEDING ENTER-OCLYSIS – AN ALTERNATIVE TO TOAL PARENTERAL NUTRITION IN SMALL BOWEL OSTOMIES",** is a bonafide work done by me in the department of general surgery, Govt. Stanley Medical College and Hospital, Chennai under the supervision of **Prof. Dr.T.SIVA-KUMAR.,** and **Prof. Dr. ROSY ADHALINE SELVI M.S.** This dissertation issubmitted to the Tamilnadu Dr MGR Medical university, Chennai in partial fulfillment of the university regulations for the award of M.S,degree (General Surgery), branch – 1 examination to be held in May 2020.

"

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PLACE:

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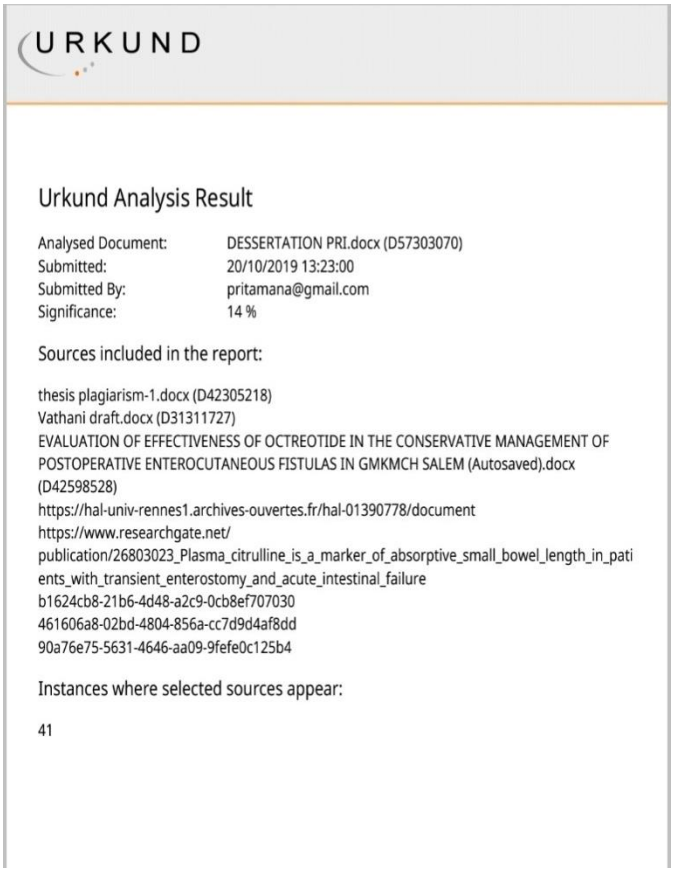

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INSTITUTIONAL ETHICS COMMITTEE

TITLE OF THE WORK : REFEEDING ENTEROCLYSIS – AN ALTERNATIVE TO TOTAL PARENTERAL NUTERITION IN SMALL BOWEL OSTOMIES.

PRINCIPAL INVESTIGATOR : DR. D. PRASANTH
DESIGNATION : PG IN MS GENERAL SURGERY
DEPARTMENT : DEPARTMENT OF GENERAL SURGERY, GOVT. STANLEY MEDICAL COLLEGE.

The request for an approval from the Institutional Ethical Committee (IEC) was considered on the IEC meeting held on 07.12.2018 at the Council Hall, Stanley Medical College, Chennai-1 at 10am.

The members of the Committee, the secretary and the Chairman are pleased to approve the proposed work mentioned above, submitted by the principal investigator.

The Principal investigator and their team are directed to adhere to the guidelines given below:

1. You should inform the IEC in case of changes in study procedure, site investigator investigation or guide or any other changes.
2. You should not deviate from the area of the work for which you applied for ethical clearance.
3. You should inform the IEC immediately, in case of any adverse events or serious adverse reaction.
4. You should abide to the rules and regulation of the institution(s).
5. You should complete the work within the specified period and if any extension of time is required, you should apply for permission again and do the work.
6. You should submit the summary of the work to the ethical committee on completion of the work.

MEMBER SECRETARY,
IEC, SMC, CHENNAI

TABLE OF CONTENTS

INTRODUCTION

In the course of an intestinal surgery procedure, several clinical situations lead the surgeon to undertake a double temporary enterostomy (small bowel resection, peritonitis, fistulae, anastomosis protection...) or could be complicated of enterocutaneous fistula (ECF) , peritonitis, anastomsis leakage, digestive adherences…). These conditions could constitute a short bowel syndrome and are often complicated with intestinal failure (IF) especially when the stoma output is equal or higher than 1500 ml/24h. These lead to serious complications resulting in hospital readmissions, such as acute or chronic dehydration, renal failure, electrolyte disturbances, micro nutrients and mineral deficiencies, and malnutrition, thus increasing healthcare-related costs and affecting patients' quality of life .

IF was recently defined by the European Society for Clinical Nutrition and Metabolism (ESPEN) as

“The 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”.

In case of temporary double enterostomy or ECF, the IF is type 2, and defines as a prolonged acute condition, often in metabolically unstable patients, requiring complex multi – disciplinary care and intravenous supplementation over periods of weeks or months . At this time, the current gold standard therapy indicated until the surgical reestablishment of digestive

continuity is home parenteral nutrition (HPN) . However, HPN has its own morbidity and, in the absence of expertise, the risks of infectious, hepatic dysfunction, mechanical and metabolic complications are increased .

Therefore, the availabilities of low cost, safer, and easy – to – use nutrition support techniques could be of high added value in these type 2 IF patients, Refeeding enteroclysis could be the technique.

AIMS AND

OBJECTIVES

- A clinical study to determine the technical principles of refeeding enteroclysis and its beneficial effects in their clinical practice and reducing the need for parenteral nutrition

METHODOLOGY

PLACE OF STUDY:

Department of General Surgery, Govt. Stanley Medical College &Hospital, Chennai

DURATION: 12 months

STUDY DESIGN:

Non Randomized single blinded open labelled control trial

SAMPLE SIZE :32

Sample size is calculated using Openepi software version 3.0 With the expected mean difference is mean number of days of TPN needed between the intervention and control group to be 28, the sample size is estimated at

16 in each arm with 95% confidence level, 80% power and ratio between intervention and control arm as 1:1

INCLUSION CRITERIA:

- Age>14 years.
- Existence of a double/loop enterostomy or at least two orifices of ECF visible on the abdominal wall.
- Absence of obstruction of digestive fistula between the mouth and the afferent stoma, and in the efferent intestinal tract;
- Ability to catheterize the efferent stoma with a feeding tube on more than 15cm;

- Full agreement of the patient to carry out enteroclysis and accept the food constraints of ingesting smooth pure meals.

EXCLUSION CRITERIA:

- Patient not willing for the procedure
- Colostomy/sigmoidostomy done patients
- Presence of obstruction of digestive tract between the mouth and the afferent stoma, and in the efferent intestinal tract
- Patients with CKD/DCLD/Malignancy

METHODOLOGY:

- To obtain informed consent from all subjects before enrollment in the study.

Patients are separated into 2 groups of 16 each control and study group.

- **GROUP A :**

  This is a test group with patients in this group are subjected to refeeding enteroclysis in a method described below and the need for total parenteral nutrition despite refeeding enteroclysis is noted.

- **GROUP B :**

  This is a control group with patients in this group are not subjected to refeeding enteroclysis but managed with Total parenteral nutrition if needed.

- Patients who are included in the study are started with enteral feeding on 1st postoperative day and the ostomy output will be monitored and

- Refeeding will be started once the ostomy starts functioning.

- Before refeeding is initiated , one liter of oral rehydration solution, together with laxatives in case of fecal residues or fecaloma in the colon are given.

- At the same time, anti – mobility drugs are stopped to prevent ileus.

- Antispasmodic agents could be useful in case of abdominal pain, and cholestyramine is given by enteroclysis in the event of diarrhea during the first days.

- Ostomy output collected from the afferent limb preserved after sieving to remove large food particle, every 6thhourly.

- A nasogastric tube after applying topical anaesthetic agent is is inserted into the efferent limb of a length 10cm and fixed out through the ostomy bag.

- The preserved collection from the afferent limb is reinfused over the efferent limb via the nasogastric tube every 6th hourly.

- Ostomy output from the afferent limb, reinfused content volume over the efferent limb are recorded.

- Patient are maintained on strict input/output chart,weight chart,renal

and hepatic parameters are monitored serially and the signs of dehydration are noted.

- Total parenteral nutrition of volume 1litre via central venous cannulation will be used in the study.

- Data were analyzed using the unpaired two-tailed t-tests and chi-square analysis and the results are tabulated.

REVIEW OF

LITERATURE

ANATOMY AND PHYSIOLOGY OF SMALL INTESTINE :

Small Intestine comprises off

DUODENUM - It is about 25 to 30cm , without any mescentry and mostly fixed . It communicates with jejunum at the DuodenoJejunal flexure and receives chyme from the stomach, and digestive juices from pancreas and liver. The digestive juices breaks proteins and bile, emulsifies fat. The duodenum has brunner gland, which secretes mucus rich in alkali material containing bicarbonate. These secretion with bi carbonate from pancreas, neutralize the acids from gastric chyme.

The upper part of small intestine is jejunum, and the rest is the ileum.

JEJUNUM - It is about (160 to 200cm, 8ft) , wider, thicker and more vascular than ileum having circular folds of mucus membrane named

valvulae coniventes. It absorbs most macronutrients and minerals mainly calcium and iron. It produces cholecystokinin and secretin. 90% of digestion and absorption is from the proximal 150cm because of tall villi, deep crypts and increased enzyme activity than ileum.

ILEUM – It is about 350cm,12ft in length and has an important role in absorption of vitamin B12 along with fat soluble vitamin and bile acids.

PATHOPHYSIOLOGY :

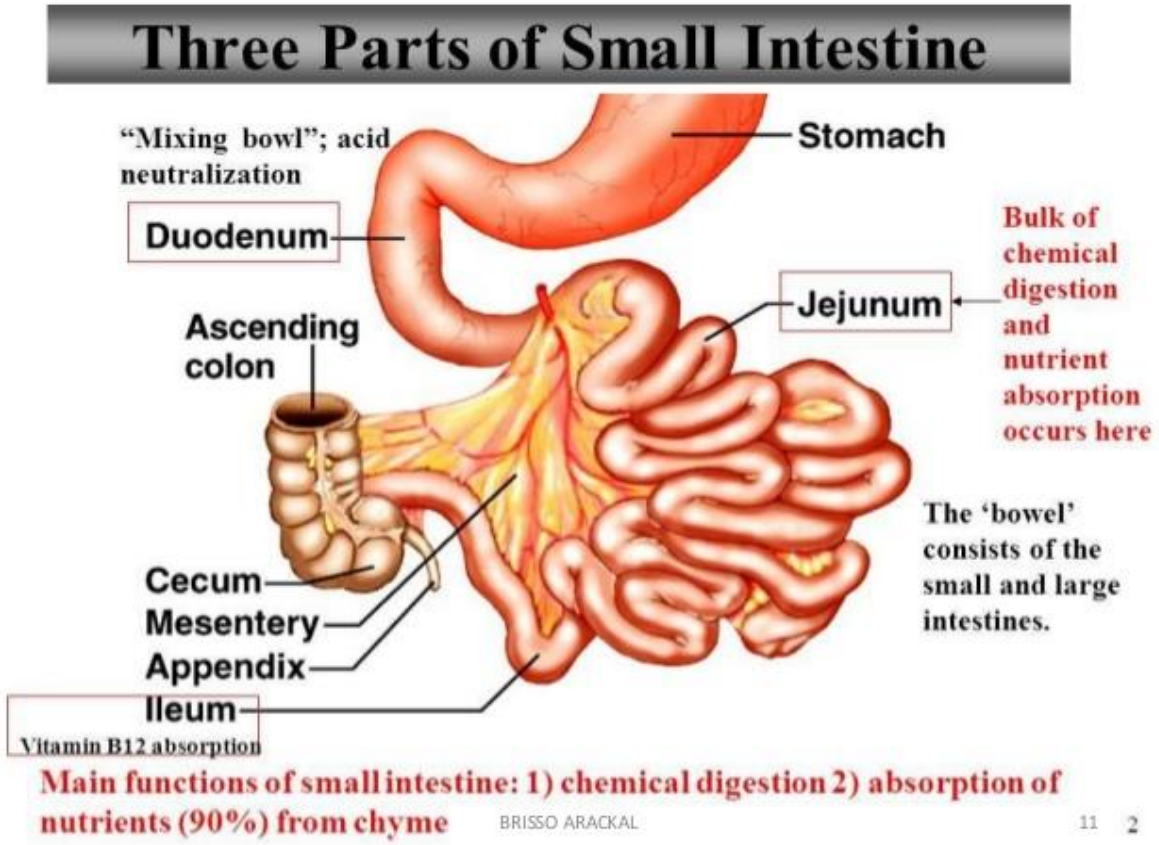
JEJUNAL RESECTION :

Jejunal fluid and electrolyte loss following resection often exceed absorption. Atleast 100cm is necessary to maintain fluid and electrolyte balance. Loss of significant portion can be unaffected due to ileal

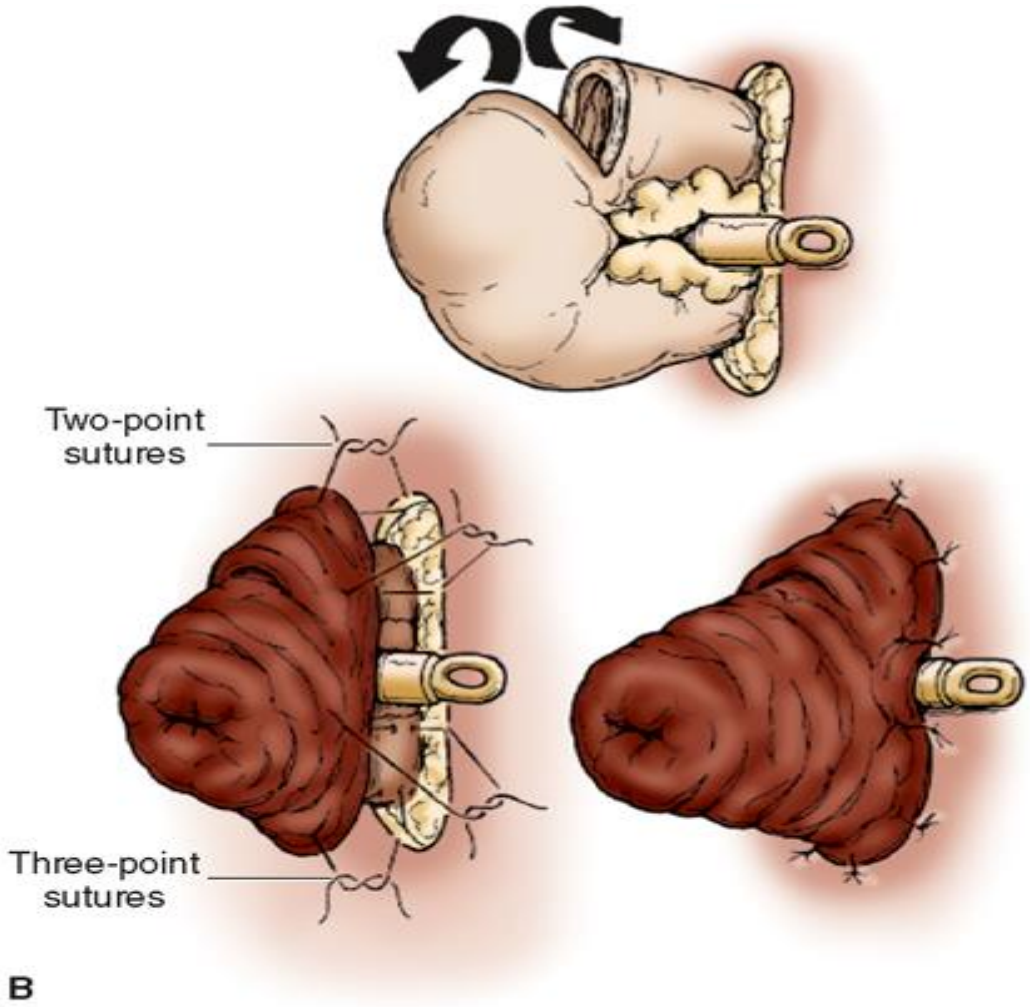
adaptation. Iron absorption is mainly in the duodenum and hence not affected. calcium deficiency can occur inspite absorption in duodenum due to vitamin D malabsorption.

ILEAL RESECTION :

Loss of bile salts may lead to fat malabsorption, steatorrhoea, and fat soluble vitamin deficiencies. Increased bile salt entering the colon lead to decreased bile salt pool and increased colonic permeability causing choleretic diarrhea, increased colonic bile salt solubilize unconjugated bilirubin and increase its absorption leading to pigment gall stones. Due to ileal resection small bowel microbes over grows leading to inflamed bowel mucosa.



(Fig showing anatomy of small intestine…)



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(Fig showing ostomy placement….)

INTESTINAL FAILURE :

Intestinal failure (IF) was defined by Fleming and Remington during 1981 as “a reduction in functional intestinal mass below the minimal amount necessary for adequate digestion and absorption of food”.The definition of IF were revised byother authors which includes, duration of disease, degree of impairment and underlying causes. In 2015 The European Society for Clinical Nutrition and Metabolism (ESPEN) established definition and classification of Intestinal Failure for adults. The recommendation consists, definition of IF as functional and pathophysiological classification for acute and chronic Intestinal Failure and clinical classification of chronic Intestinal Failure (CIF).

According to ESPEN , IF defined as reduction of gut function below minimum required for absorption of macronutrients and water/electrolyte,

such that intravenous (IV) supplementation necessary to maintain health and growth.

Balance study compares nutrient requirement with absorption, and the ideal way to identify and to quantify IF in a patient. These studies are not readily available, and hence the need for IV substitute of nutrients and fluids is used as surrogate marker for diagnosis of IF.

Micronutrients were not included in definition,. In situations where absorptive ability is impaired, but not to that of IV supplementation of fluid or nutrients required to maintain normal health, the condition is termed as “intestinal insufficiency”.

Functional classification of intestinal failure

IF has been divided into three types based on onset , metabolic

outcome and its impact and it predicts the morbidity,prognosis and financial implications

TYPE 1 :

- usually self limiting,short term usually seen perioperatively.
- it can be mechanical/non mechanical ileus
- it can less commonly occur following severe enteric infection, inflammatory bowel disease,radiotheraphy and chemotheraphy.

MANAGEMENT :

- ✓ It can be managed conservatively with 7 to 14 days of nasogastric drainage and might require a short course of parenteral nutrition

TYPE 2 :

- It is non self limiting with an exception of simple intestinal fistula where

its closure is achieved by nutritional and medical support.

- main causes remain sepsis and fistulation among 70% of patients.
- around 10% of patients will have significant bowel length discrepancy.
- more chance of morbidity.

MANAGEMENT :

- ✓ Early diagnosis and treatment of abdominal sepsis
- ✓ Adequate nutritional support in the form of parenteral nutrition.
- ✓ OUTCOME 40% requires complete intestinal rehabilitation,10% will remain dependent on parenteral nutrition,50% may develop type 3 intestinal failure

TYPE 3 :

- It occurs in a chronic condition of metabolically stable patient.

- 50
- % of type 2 patients will develop type 3 intestinal failure.

MANAGEMENT :

- ✓ Requires long term parenteral nutrition support for years under carefull monitoring.
- ✓ intestinal failure due to benign cause will usually be reversible with 20-50% patients and can be weaned from parenteral nutrition within 2 years.

(Fig showing enteral refeeding bag….)

Pathophysiological classification of intestinal failure

This classification consists of five primary pathologies resulting in IF:

- Short bowel syndrome
- Intestinal fistula
- Intestinal dysmotility
- Mechanical obstruction
- Extensive small bowel mucosal disease

Short bowel syndrome

Short bowel syndrome (SBS) may occur from extensive surgical resection due to many aetiologies or due to congenital diseases of small intestine. The normal length of small bowel varies from 300 to 850cm. The absorption of carbohydrates and protein occurs mostlyin duodenum and

jejunum, while ileum is needed for absorption of lipids bound to bile salts. The clinical features of SBS occurs with less than 200cm of small gut in continuity, even if total length of small bowel including bypassed part or without continuity is of normal length. Even though length of retained bowel correlates with patient's grade of nutritional autonomy; integrity and function of remaining bowel, the underlying conditions and remnant bowels to adapt remains major determining factor. Conditions causing SBS mostly affect the jejunoileal segment and less likely the colon. SBS is the leading cause of type 3 mode IF of around 75% in adults and 50% in children receiving home parenteral nutrition (HPN) in Europe.

The pathophysiological manner by the way SBS causing IF is due to extensive loss of absorptive surface area.

The three common modes of intestinal resections causing SBS are jejunoileal, jejunocolic and jejunostomy.

Jejunoileal anastomosis

By jejunoileal anastomosis, a part of the jejunum and a part of ileum have been resected and remaining parts will be anastomosed. Patients usually retain terminal ileum, ileocaecal valve and colon. These structural adaptation by ileum is far greater than jejunum and hence proximal bowel resections are better tolerated. Patients unlikely present with major nutrient/electrolyte deficiencies because of adequate compensation made by ileum and colon for the resected portion of the bowel. The tight junctions of ileumare less permeable than

jejunum and hence less water enterslumen of ileum following the hyper osmotic meal. Further the colon has greater water and electrolyte absorption capability. Under normal conditions colon absorbs around 1.9 litres of water in a day, but it has the potential to absorb around5 litres of fluid per day. The colon alsoutilizes undigested carbohydrates and proteins via anaerobic bacterial fermentation providing added source of nutrition. Patients with intact colon can add upto 1 000 additional calories per day from malabsorbed carbohydrates.Most of the patients with jejunoileal anastomosis have an intact duodenum and residual part of the jejunum, and hence site-specific digestion is not compromised and nutrient deficiency is relatively infrequent.

Jejunal resection results in decreased secretion of hormones by the jejunal cells. This leads to gastric hypersecretion in the immediate postoperative stage because of loss of cholecystokinin (CCK) and secretin feedback inhibition mechanisms. Gastric hypersecretion leads to decrease in pH of the proximal small bowel with alteration of pancraeatic enzymes and leads to impaired digestion. This is usually self-limiting, lasting a few weeks to months, andtreated completely with proton pump inhibitors (PPI)or H_2 antagonist.

Jejunocolic anastomosis

Ileal resection mostly result in complicated disease due to decreased adaptive capacity of the jejunum. Ileum resected patients more likely presents with diarrhea because of decreased capacity of jejunum to absorb water and increases strain over colon. If the colon is also resected partly,

in addition to ileum, diarrhoea could be worse. With ileal resection some ileal functions, such as Vitamin B_{12} absorption and bile salt re-absorption will be impaired. Patients with distal ileum resection (>60cm) should be supplemented intramuscularly (IM) with Vitamin B_{12}. Ileal resection of >100cm results in fat malabsorption, fat-soluble vitamin deficiencies, steatorrhea and choleretic diarrhea due to loss of bile salts. In balance studies investigating the result of bowel resection between 30 and 100cm post duodenal-jejunal (DJ) flexure, Absorption carbohydrate and lipid decreased to 75% and 50% respectively with protein absorption remained at 80%.

Hormonal mediators for digestion secreted by enteroendocrine cells of ileum and colon are also affected by resection. Glucagon-like peptide – 1 (GLP-1), Glucagon-like peptide – 2 (GLP-2) and Protein YY (PYY) will be

up-regulated following ileal resection even if colon remains in continuity. GLP-1 and PYY suppress the gastric emptying, gastric acid production and small bowel motility. Henceforth patients with post ileal resection, and with an intact colon, have normal gastric emptying and transit time. Gastric acid hypersecretion is more with jejunal resection than ileum. An up-regulation of GLP-2, an intestinotrophic peptidehormone, results in increased villus height andproliferation of crypt cell and hence mediates intestinal adaptation following adaptation`

Jejunostomy

Patients following end-jejunostomy, i.e. ileum and colon resected, have profound malabsorptive complications. These patients will have same loss of water absorptive capacity as those with ileum resection, but they also lack water and also electrolyte absorption ability and energy consuming capabilities of the colon.

Patients with ≤100cm of remnant bowel usually require long-term PN support since their stoma output exceed their intake due to lack of gastric secretion reabsorption. These patients may also lack definiteabsorption sites for Vitamin B_{12} and bile salts. Other nutrients absorption, will likely be affected and gives rise to hypomagnesaemia, which, despite oral magnesium supplementation remains uncorrectable.

Due to lack of colon, patients with end-jejunostomy will not experience up-regulation of GLP-1, GLP-2 and PYY and develop increased gastric emptying and intestinaltransit. This decreases contact time between the nutrients and mucosa surface for digestion and absorption.

(Fig showing total parenteral nutrition bag…)

Most of the SBS patients will require Parenteral Nutrition support in the immediate postoperative phase to maintain adequate nutritional status. Some patients can be weaned while others may require long term nutritional support. Patients with very short residual bowel and with absorption less than a third of their intake typically require long-term PN support.

SBS with lifelong PN depends mainly on the small bowel length ie.. <50cm post duodenum along with absence of ileum and/or colon in continuity. Values for separating transient with permanent IF differ based on anatomy and 100cm for an end-enterostomy, 65cm in case of jejunocolic anastomosis and around 30cm for a jejunoileocolic anastomosis. Parenteral Nutrition dependence for five years is around 45%.

Patients with SBS based on their PN or IV support classified as intestinal insufficiency or Intestinal Failure. Patients with intestinal insufficiency can

be weaned off from PN, be able to maintain nutritional status through hyperphagia. Hyperphagia is defined as a >1.5-fold increase in caloric requirements than the resting energy expenditure.

Bowel adaptation

Intestinal resection is followed by three phases of adaptation.

ACUTE PHASE: This phase starts immediately following resection and lastsfor a period of around four weeks.During this phase the intestinal mucosa and peristalsis adjust to the new environment.

ADAPTATION PHASE: This phase lasts for one to two years. Patients usually require PN or enteral nutrition support till adequate intestinal adaptation has developed to maintain adequate nutritional status without parenteral nutritional support.

MAINTAINENCE PHASE : In this phase individualized nutrition treatment should be made according to patient requirements and deficiencies.

Bowel adaptation occurs within first two years following the last surgical intervention. The degree of adaptation depends on extent of the resection, as well as the anatomy of residual bowel. Structural and functional changes occurs in the residual bowel resulting in improved nutrient and fluid absorption. Structural changes such as hyperplasia, angiogenesis, bowel dilation and bowel elongation. A Joly *et al study*, showed 35% increase of crypt depth and 22% increase in number of cells/crypt in the colon of 12 with jejunocolic anastomosis. Functional changes such as increased expression of transporting proteins and exchangers involved in nutrient and electrolyte absorption, along with an accelerated maturation of entero-

cytes. These leads to increased digestion and absorbing capacity of the remnant bowel. Other functional adaptation is decreased transit time, allowing decreased transit of nutrients through the intestine and thus increased contact time for absorption. Patients withileal resection and with an intact colon have higher plasma levels of PYY which delay gastric emptying and increases transit time.

A Nightingale *et al study*, states that there is no evidence of functional or structural adaptation with end-jejunostomies, and hence, change in nutritional and fluid needs are less likely with time.

Factors needed in intestinal adaptation mechanisms include the anatomic features, enteral stimulation, hormones and growth factors. Enteral stimulation is needed to maintain gut integrity. Without luminal nutrients, mucosal atrophy and a reduction in enzyme and nutrient transporter activity occur, even after supplementing adequate calorie and protein provision via PN support. This mucosal atrophy is reversible with the restart of enteral nutrition. Luminal nutrients enhance bowel adaptation after resection and increases nutrient complexity which increases adaptation. Individual nutrients to promote adaptation were identified. Fat helps to improve bowel adaptation and can cause significant increase in bowel weight and villus in animal models

. Long-chain triglycerides (LCT) are superior than medium chain tri glycerides (MCT) in promoting hyperplasia after bowel resection. Short chain fatty acids (SCFA) also shown to enhance intestinal adaptation.

Glutamine remains primary fuel source for enterocytes and counteracts PN-induced intestinal atrophy and improves bowel adaptation when supplemented along with PN.Glutamine given via the enteral route has not shown any positive effect on structural as well as functional bowel adaptation. However Glutamine and growth hormone (GH) have shown some efficacy.

In view of intestinotrophic factors, recombinant human Growth Hormone (somatropin) and GLP-2 analog, teduglutide, were approved for clinical use among adult patients having SBS. GLP-2 is an intestinotrophic peptide secretedby L cells in the terminal ileum and colon in response to luminal nutrients and develops structural and functional adaptations in the small bowel.

According to consensus of data received most of the adaptation occurs within the first twoyears after surgical resection. Adaptation after two years is uncommon and is generally limited to a maximum improvement of just 5 to 10 % in absorptive capacity. Citrulline is a non-essential amino acid produced exclusively by an enterocyte. Plasma levels of citrulline remains as a functional marker of intestinal function and levels of <20μmol/L correlates with PN dependence after two years post resection.

Inability to wean from PN or IV support after two years has a 95% likelihood of permanent IF.

Short bowel syndrome complications

Complications related to bowel resection involves tissues and organ systems beyond the gastrointestinal tract.

Ileal resections of more than 60 to 100cm usually result in loss of bile acids exceeding the producing capacity, leading to a decrease in bile acid pool. Decreases in bile salt concentration accompanied by an increased secretion of cholesterol into bile, lead to the formation of lithogenic bile which increases incidence of gallstones. Drugs excreted by bile have their

action prolonged by the enterohepatic circulation, disrupting this circulation impacts on the bioavailability of drugs. Drugs include mycophenolic acid, warfarin, digoxin, oral contraceptives, cyclosporine, tacrolimus and statins. Malabsorption of fat-soluble vitamins affects the absorption of drugs

FIG SHOWING PATIENT WITH HIGH OUTPUT STOMA FROM DOUBLE BARELL JEJUNOSTOMY

Unabsorbed fatty acids binds to intraluminal calcium. Calcium under normal conditions binds to oxalate excreted in stool. Further presence of bile salts in colon promotes oxalate absorption in the colon. Oxalate is excreted by thekidney and increased load leads to oxalate stones. Approximately 60% of patients with SBS develop hyperoxaluria of which 25% with jejunocolic anastomosis and with <200cm of small bowel remnant develop oxalate kidney stones. Patients with ileal resections with intact colon should follow a diet low in oxalate and increases calcium intake. Addition of cholestyramine to bind bile salts in the colon can also be considered.

Higher bile salts in the colon leads to solubilisation of unconjugated bilirubin and increases its absorption andthis leads to 3 to 10-fold increase in the bilirubin levelwith ileal resections and leads to the formation of pigment gallstones. Other factors for gallstone formation are decreased

gallbladder contractility and hypersecretion of mucin, a nucleation-promoting protein. Gallstones develops in 25 to 45% of SBS patients and the risk of cholecystitis in up to 10% of patients.. Colon continuityhas no role in the prevalence of gallstone formation.

Eventhough the colonhas lesser role in absorption compared to the small intestine several carrier-mediated transport systems are used for colonic absorption ofdrugs. With colonic resection the absorptionsite for some drugs are removed. One such groupslike β-blockers and antihypertensives.

Drugs given via pill or capsule formcan cause obstruction of stomas or strictures if not dissolved fully. Drugs causing erosion can damage the intestine just proximal to the stoma or stricture if they get stuck.

Consideration for liquid formulation, intramuscular formulations or intranasal formulations should be made.

2.1.2.2 High-output fistulae

A fistula is as an abnormal communication between the two epithelial-lined surfaces.

CLASSIFICATION OF FISTULA :

Anatomicallyfistula is classified based on the segment of gut from where it originates and the organs involved. A gastrointestinal fistula develops between the gut and skin (enterocutaneous), termed as external fistula, or in between the gut loops termed as (enteroenteric) internal fistula. The high pressure organ from where the fistulae arises is termed first.

The ***physiological***classification of fistulae is based mainly on the amount of output. Less than 200ml output per day is termed low output whereas 200 to 500ml per day is termed as moderate output. Output of more than

500ml per day in a fasted state is termedas high-output fistula andhas a a higher morbidity and mortality. Edmunds *study* demonstrated a mortality rate upto 54% in patients with high output fistulae while those with low-output fistulae had a mortality of 16%. This data was supported by Levy *et al* study also with a mortality rate of 50% and 26% respectively among patients with high and low-outputfistulae.

AETIOLOGICALLY Fistulae classified as primary (type 1) or secondary (type 2).Primary fistulae develops with an underlying disease, whereas secondary fistulae are due to an injury to a previously healthy bowel An estimate of 75% to 85% of fistulas develop from surgical complications. Usually presenting 5 to 10 days after surgical intervention. Remaining 15% to 25% of complications develop with an underlying pathology.

Crohn's disease is a major cause for a secondary fistula development with

an estimate of 40% patients develops a fistula during their course of illness. In developing countries spontaneous fistula develop in the presence of complicated infectious diseases such as abdominal TB, amoebiasis and typhoid.

An enteroatmospheric fistula is an entity with an open abdomen and an exposed viscera. Patients with open abdomens develop a high risk for fistulae formation with an incidence of 5 to 19%. The longer duration the abdomen is open with a temporary dressing more is the risk of developing an EAF. This form of fistula is seen mostly among traumatically injured or critically ill patients.

The pathophysiological by which fistulae cause IF is the loss of enteric content via proximal opening or by bypassing a segment of bowel. Fistula closes either spontaneously or by surgical intervention. Generally patients with type 1 intestinal fistulae will require bowel resection, whereas

type 2 fistulae usually closes spontaneously. Dense adhesions develop in the abdomen after major abdominal surgery. It is more dense between 3 weeks and 3 months after surgery. Attempts to re-explore the abdomen during this period resultsin further complications.

Nutritional management of high-output stoma

Over 70% of patients with fistulae develop malnutrition and malnutrition can be defined as a 10% loss in body weight along with hypoproteinemia. In Fazio et al study albumin levels of >35g/l has no mortality, whereas those with serum albumin <25g/l had a mortality rate of 42% and this was confirmed by Visschers *study.* Serum transferrin levels also have a good correlation with mortality and fistula closure.

In Chapman *et al., study* there was a decrease in mortality with a calorie intake of>1 500kCal/day. Mortality rate decreased from 58% to 16%.

Further, patients who maintain a total calorie intake of >3 000kCal/day, had an even lower mortality rate 12%, and fistula closure rates of about 90%.

Most of them were maintained on enteral nutrition. Enteral nutrition is always preferred unless it increases fistula output or causes abdominal

symptom such as diarrhoea. Enteral nutrition has added advantage than parenteral by increasing intestinal barrier function and decreases rate of infectious complications. In patients of IF with lack of intestinal nutrition leads to bowel atrophy and hence there is disparity in bowel ends leading poor quality tissue for anastomosis when re-surgery is performed. Bowel absorption capacity should be adequate for successful implementation of enteral nutrition support. Patients withfistulae should be stable enough for tolerating polymerical enteral formula. For intolerable patients a semi-elemental / elemental enteral product. The literature suggests absolute contra-indications for enteral nutrition as bowel discontinuity or inadequate bowel length of <75cm.

Patients can be allowed to have food or fluids per orally if they wish mainly for their psychological. Oralintake is usually withheld if fistula output increases todramatic levels with respect to volume and electrolyte abnormalities. The fluid given to the patient is important and patients should be askedto take isotonic fluids orally.The nutritional requirements of patients with high- or low-output fistulae are displayed

	Energy	**Protein**	**Micronutrients**
Low output Gastro-intestinal fistula	REE or 25kCal/kg/day TE	1 – 1,5g/kg	RDA High risk for VitB_{12}, Zn, Mg and selenium deficiency
High output Gastro-intestinal fistula	1,5x REE or 30kCal/kg/day TE	1,5 – 2g/kg	2 x DRI of vitamins and trace elements. 5 x DRI for Vit C and Zn High risk for VitB_{12}, Zn, Mg and selenium deficiency

Pharmacological management of high output-stoma :

Drug therapy plays a significant role in the management of high-output fistulae and Short Bowel syndrome. It can be sub classified under antimotility or antisecretory drugs.

Antimotility drugs like loperamide and codeine phosphate decreases sodium loss by approximately 30%. Loperamide is generally given 30 minutes prior to meals.

Antisecretory drugs such as PPI , somatostatin analogue like octreotide. The alteration CCK and secretin feedback mechanism in patients with entero-cutaneousfistula and high output ostomy may lead to increased gastric secretion. PPIs administration reduces gastric secretions. Somatostatin or somato statin analogues are also helpful in decreasing gastric secretions and output. The effectiveness of somatostatin is very much limited because of its short half-life, approximately one to three minutes.

The somatostatin analogue like octreotide, has a relatively longer half-life of two hours and helps in reducing fistula output by around 40% to 93%. Octreotide can negatively affect immune system function due to GH inhibition. However there is improvement in fistula output with the use of octreotide but its role in fistula closure is questionable.Octreotide plays a good role in treating electrolyte imbalance, improving wound status and also better tolerating enteral nutrition

Pharmacotherapy aimed for reducing stoma or fistula output could have an altered impact on the absorption of other pharmacological formulations. PPIs and H2 receptor antagonists can increase or decrease the bioavailability of other drugs.An increase in the pH of the stomach impairs the absorption of drugs that are weak bases, for example antifungals (ketoconazole, itraconozole, and griseofulvin), antiretrovirals (atazanavir, cefpodoxime, enoxacin and

dipyridamole), Vitamin B_{12} and iron salts. On the other hand an increase in stomach pH increases the bioavailability of digoxin, nifedipine and alendronate. If PPIs are used, alternative administration of the affected drugs should be considered.

PROGNOSIS DETERMINANTS IN SHORT BOWEL SYNDROME :

Several risk factors correlated to have a poor prognosis in non-malignant SBS. These include:

- Gastro-intestinal anatomy with an end-jejunostomy.
- Remnant bowel length <50cm.
- Primary diagnosis of arterial mesenteric infarction.
- History of cancer.
- Age >60 years.

PARENTERL NUTRITION :

Nutritional composition of parenteral nutrition

Studies have suggested that the development of hepatic steatosis is mainly due to excessive calorie supplementation.

Provision of excessive calories is found to increase hepatic fat deposition by stimulating insulin release, which stimulates lipogenesis and inhibits fatty acid oxidation

Dextrose

Parenteral formulations that contain little or no fat were found to promote the development of steatosis. Increased amounts of carbohydrates will be deposited in the liver in the form of fat, which leads to steatosis. Also, such formulations can lead to the development of essential fatty acid deficiency which could impair lipoprotein formation and triglyceride secretion, and resulting in steatosis.

Amino acids

Taurine deficiency can occur in both infant and adult patients receiving long-term PN. Taurine is necessary to solubilise bile salts and therefore for adequate biliary secretion and ileal reabsorption.

IV lipid emulsions

Chronic cholestasis and severe IFALD has a strongly association with IV fat intake of >1g/kg/day, though this doesnt seem to be related to overfeeding. MCTs are generally oxidized much faster in the liver than LCTs and even LCT-MCT mixtures less likely causes hepatic complications than LCTs alone.

The fish oil-based omega 3 fatty acids influence IFALD can be divided into direct and indirect mechanisms. The direct actions such as improved bile flow,

decreased steatosis and anti-inflammatory and immune modulatory effects.

Omega 3 fatty acids inhibit the inflammatory response by causing a shift from the omega 6-derived pro-inflammatory eicosanoids to the anti-inflammatory ones from omega 3 fatty acids. Indirect mechanisms include decreases the intake of phytosterols and provides protection against oxidative stress with the supplementation of Vitamin E to fish oil-based lipid emulsions.

The phytosterol component of IV fat emulsions also contribute to the development of IFALD. Phytosterols are structurally identical to cholesterol and derived from plant products in the diet. Only upto 5 to 10% of phytosterols are absorbed from the small bowel. Phytosterols has an important role by inhibiting the absorption of cholesterol from the gut. In PN, phytosterols are delivered directly into the circulation and hence higher than normal levels will be present.

Carnitine

Carnitine has an important role in fat metabolism and primary carnitine deficiency may lead to development of steatosis. Carnitine supplementation help mobilise hepatic fat stores and prevent steatosis in neonates.

Choline

Choline though found in many food items is not considered an essential nutrient and not a component of parenteral nutrition formulations due to the endogenous production from methionine. The change of methionine to choline might be less effective when given parenterally than the portal circulation. Steatosis however resolves with choline supplementation in study

Cyclic infusion

Cyclic infusion of PN refers to infusion of PN for a period of <24hours (generally 8–12 hours), thereby allowing a rest period from parenteral nutrition. Continuous infusion of PN result in hyperinsulinemia and fatty deposition in the liver.

Cyclic PN shown to reduce serum liver enzyme concentrations and conjugated bilirubin concentrations, than continuous infusion.

Surgical therapy

Prophylactic cholecystectomy

Complications related to cholelithiasis have a higher prevalence among patients among patients with long-term PN support than the rest of the population. Prophylactic cholecystectomy is therefore advised for these patients when laparotomy is being done for other reasons.

Bianchi procedure and serial transverse enteroplasty

These two surgical techniques have been noted to have improvement among with intestinal insufficiency. In thee Bianchi procedure the bowel is divided longitudinally and each half is made into a tube. The two tubes are then anastomosed in an end-to-end fashion, the result being increase in overall length and absorption surface.

In serial transverse enteroplasty (STEP) procedure the bowel is stapled at regular intervals in a zigzag configuration. This increases transit time leading to better absorption.

Both of these procedures are found to have 81–89% survival, 47–54% weaning off from PN and with 82–85% improvement in intestinal function.

Intestinal transplant

Indications to consider intestinal transplantation include loss of venous access, life-threatening recurrent central line-associated blood-borne infections and the development of IFALD. Intestinal transplants remains the definitive treatment for patients with SBS having failed intestinal rehabilitation. Patients with a residual bowel of less than 50cm and without an intact colon should be referred to transplant centers as they are lifelong PN dependent.

Small bowel transplant candidates should undergo a liver biopsy and if fibrosis or cirrhosis is there, they should be considered for a simultaneous liver and small bowel transplant. Intestinal transplantation is usually done in

specialized centers which is able to provide maximal and adequate medical and surgical therapies. One-year survival prognosis for isolated intestinal transplant patients at expert centers is 86–93%.

ENTEROCLYSIS

Enteral nutrition has notable advantages over PN support such as improved gut barrier function, decrease in infectious morbidity and improvement in immune function. Restorative surgery to maintain intestinal continuity is difficult among patients in whom small intestine has been deprived of enteral nutrition for longer period due to atrophy of the intestine and resulting in bowel disparity making anastomosis difficult.

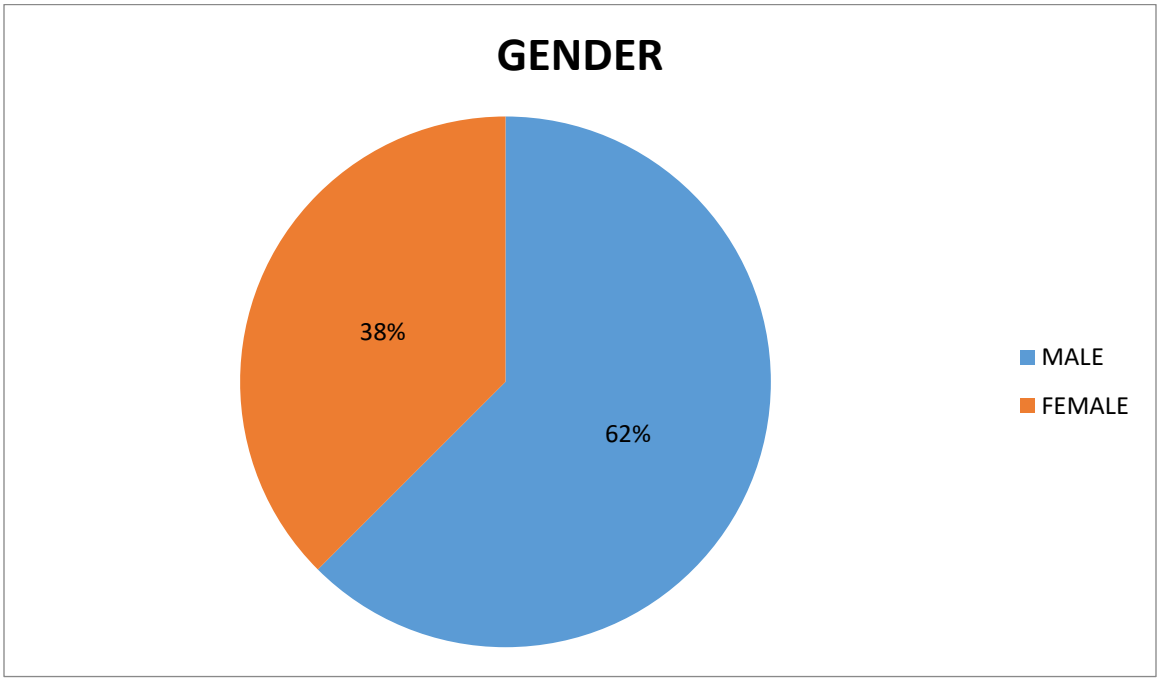
RESULTS

FINDINGS :

A non randomized single blinded open labelled control trial study was done on small bowel ostomy patients grouped among those receiving TPN alone and those receiving refeeding enteroclysis with or without TPN support was done for a period of 8 months and the effectiveness of using refeeding enteroclysis over TPN was studied among 32 patients with 16 each group.

AGE DISTRIBUTION OF THE SAMPLE :

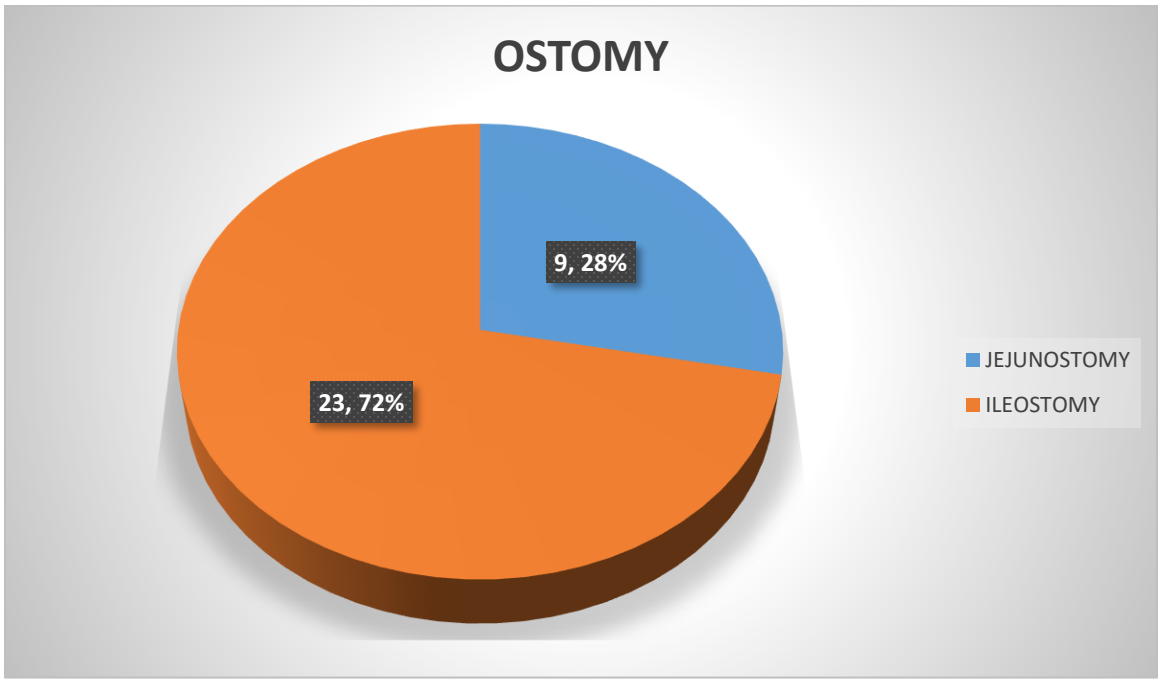
The following figure denotes the age distribution of those with small bowel surgeries needing ostomy



SHOWING GENDER DISTRIBUTION AMONG SMALL BOWEL STOMA AND THE MAJORITY BEING MALE (62%)

DIAGNOSIS	FEQUENCY	PERCENT	CUM.
BLUNT INJURY ABDOMEN	1	3.13	3.13
CAECAL PERFORATION	1	3.13	6.25
FOREIGN BODY	1	3.13	9.38
GANGRNOUS TERMINAL IL-EUM	1	3.13	12.50
ILEAL OBSTRUCTION	3	9.38	21.88
ILEAL PERFORATION(PROX)	3	9.38	31.25
ILEAL STRICTURE(PROX)	1	3.13	34.38
ILEAL PERFORATION(DIS-TAL)	1	3.13	37.50
ILEO COLIC INTUSUSCEP-TION	2	6.25	43.75
COLO COLIC INTUSUSCEP-TION	1	3.13	46.88
JEJUNAL PERFORATION	2	6.25	53.13
LIVER ABSCESS	1	3.13	56.25
MESCENTRIC INJURY	1	3.13	59.38
MID GUT VOLVULUS	1	3.13	62.50
MID ILEAL GROWTH	1	3.13	65.63
MID ILEAL STRICTURE	1	3.13	68.75
PENETRATING INJURY	1	3.13	71.88
POST CYSTOCELE INJURY	1	3.13	75.00
SIGMOID GANGRENE	1	3.13	78.13
SMA THROMBOSIS	5	15.63	93.75
SMV THROMBOSIS	1	3.13	96.88
TB ABDOMEN	1	3.3	100.00

FIGURE SHOWING PATHOGENESIS OF SMALL BOWEL OSTOMIES WITH THE MOST COMMON CAUSE BEING SMA THROMBOSIS (15.63%) RESULTING IN MASSIVE SMALL BOWEL RESECTION AND BECOMING THE LEADING CAUSE FOR SMALL BOWEL STOMAS.



OSTOMY	FREQUENCY	PERCENTAGE	CUM.
JEJUNOSTOMY	9	28.13	28.13
ILEOSTOMY	23	71.88	100.00
TOTAL	32	100.00	

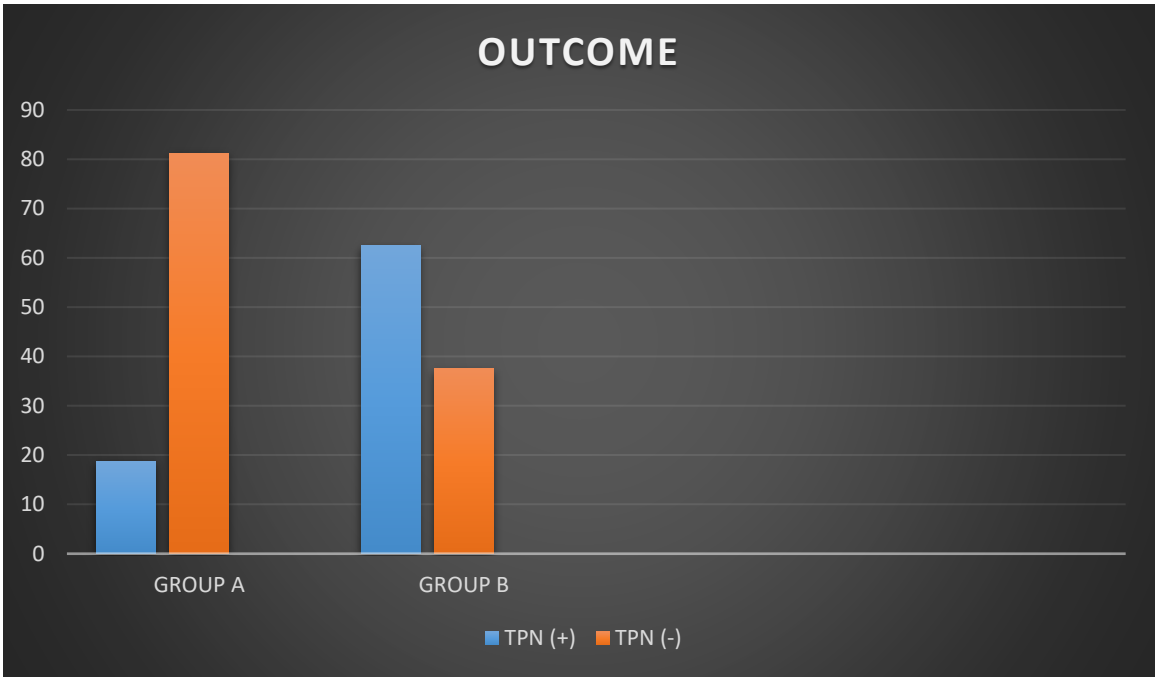
INCIDENCE OF STOMAS IN SMALL BOWEL SURGERIES WITH ILEOSTOMY BEING KEPT IN COMPARARIVELY HIGH NUMBER (71.88%) THAN JEJUNOOSTOMY

PARAME-TERS	**SAMPLES**	**MEAN**	**STAND-ARD DEVIA-TION**	**MIN**	**MAX**
AGE	32	52.375	14.54637	22	83
LENGTH OF STOMA FROM DJ FLEXURE	32	175	80.60257	50	300
MEAN AF-FERENT OUTPUT	32	2628.125	1099.629	1400	5200
MEAN EF-FERENT REFED	32	975	1228.427	0	3800
SR.UREA	32	31.59375	7.391623	22	50
SR.CREAT	32	1.015625	0.2566652	0.6	1.5
T.BILIRU-BIN	32	1.096875	0.3157013	0.8	2.4
S.ALBU-MIN	32	3.284375	0.5400773	2.4	4.2
MID ARM CIRCUM-FERENCE	32	25.75	1.934408	22	29

ANALYSIS OF VARIOUS PARAMETERS USED IN THE STUDY AND ITS MEAN AND

STANDARD DEVIATION ARE TABULATED

TPN USED AMONG STUDY GROUPS



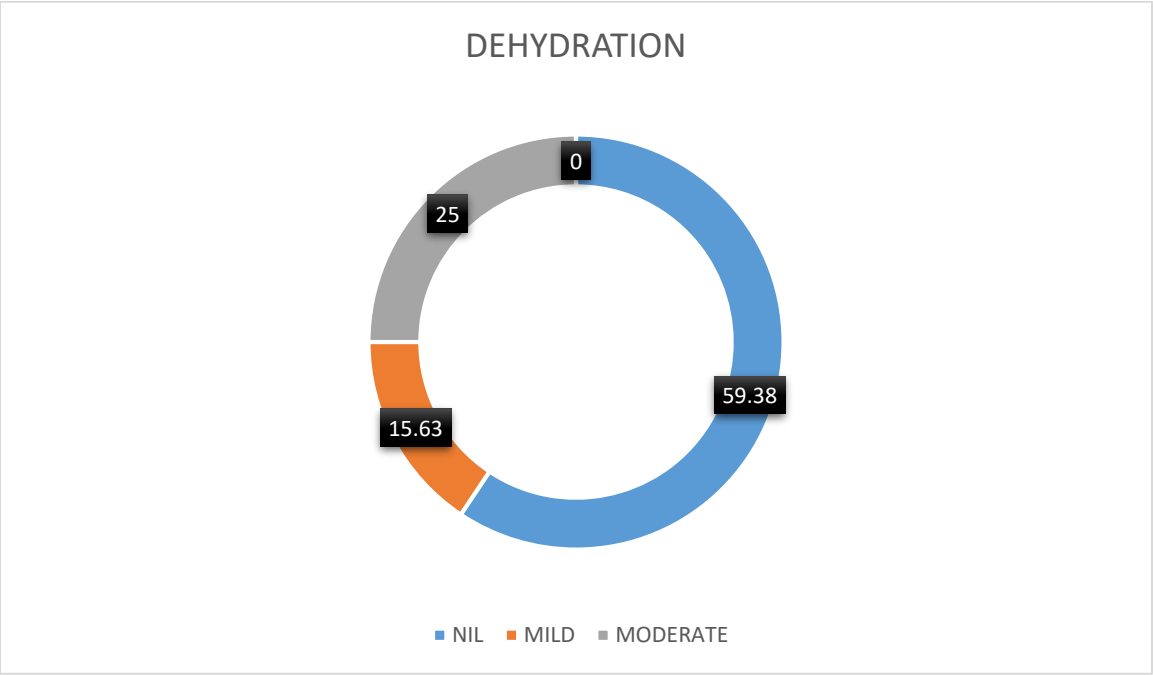
IN TEST GROUP (GROUP A) THE USAGE OF TPN WAS 18.75 % WHEN COMPARED TO CONTROLGROUP (GROUP B), 62.50 % AND IT WAS A STATISTICALLY SIGNIFICANT (P VALUE – 0.029)

GROUP	TPN USED	TPN NOT USED	TOTAL
GROUP A	3(18.75)	13(81.25)	16(100)
GROUP B	10(62.50)	6(37.50)	16 (100)
	13(40.63)	19(59.38)	16 (100)

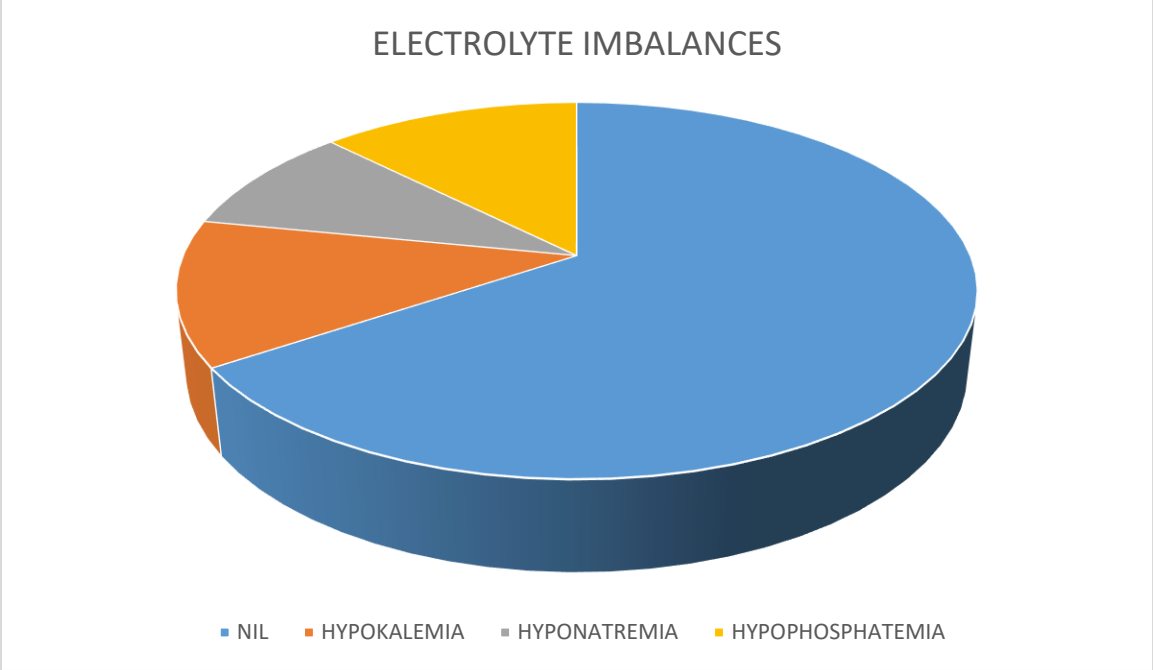
PEARSON CHI 2 (1) = 6.3482 Pr = 0.012

FISCHERS EXACT = 0.029

1 SIDED FISCHERS EXACT = 0.015



SHOWING PATIENTS DEVELOPING DEHYDRATION AMONG STOMA PATIENTS AND MOST OF THEM ARE NOT DEHYDRATED (59.38%)



SHOWING ELECTROLYTE IMBALANCES AMONG STOMA PATIENTS WITH

COMMON ELECTROLYTE ABNORMALITY BEING HYPOKALEMIA (12.50%) OVER

ALL AND HYPOPOSPHATEMIA (12.50) AMONG PATIENTS SUPPLEMENTED WITH

TPN.

MEAN REFED INTO EFFERENT LIMB OF STOMA :

GROUP	MEAN	SD	P25	P50	P75
GROUP A	1950	1044.35	1100	1750	2650
GROUP B	0	0	0	0	0
TOTAL	975	1228.427	0	300	1750

MEAN OUTPUT FROM AFFERENT LIMB OF STOMA :

GROUP	MEAN	SD	P25	P50	P75
GROUP A	2837.5	1200.486	1750	2600	3800
GROUP B	2418.75	981.9835	1700	2150	2900
TOTAL	2628.125	1099.629	1750	2300	3400

SHOWING STATISTICAL ANALYSIS OF OUTPUT FROM AFFERENT LOOP AND

VOLUME REFED VIA EFFERENT LOOP. AND ITS STANDARD DEVIATION

DISCUSSION

This study was performed in Stanley medical college for a period of 12 months and the small bowel stoma patients those who are fullfilling the inclusion criteria were divided into 2 groups such as group A ,the test group and group B , the control group.The test group were started on refeeding enteroclysis and also on total parenteral nutrition if such need arises.The usage of TPN among test group was 18.75 % and the usage of TPN among control group was 62.50 % and there is a strong co-relation between refeeding enteroclysis and the usage of tpn and it is statistically significant with p-value of 0.029.

The mean age of the study being 52 ,and the male gender being more than half of the sample than female and the most common cause for small bowel stoma SMA thrombosis followed by ileal obstruction and ileal perforation.More than

two-third of the stoma being ileostomy.The patients with jejunostomy developed higher output from stoma and almost more than half of patients requiring parenteral nutrition supplementation. With bowel length less than 75cm has parenteral nutrition dependance.The dehydration and electrolyte imbalnce and malnourishment are seen with stoma whose length from DJ flexure upto 150cm.However patients on parenteral nutrition developed elevated liver parameters and hypophosphatemia and imbalance in glycemic status.

In Teubner et al study (2004) , intestinal fistula was treated with fistuloclysis and they found fistuloclysis replaced TPN in 11 out of 12 patients In Coetzee et al study 21 patients with intestinal fistula are managed with fistuloclysis of which half of the patients were successfully managed with fistuloclysis support itself decreasing the days on parenteral nutrition.

Dehydration,electrolyte imbalances and malnutrition can be managed by refeeding enteroclysis and it is cost effective than TPN. Parenteral nutrition related local and systemic complications can be reduced by refeeding enteroclysis. However the literature lacks the clinical benefit, route & duration of feeding and the clear parameters to consider parenteral nutrition in a refed patients is not evident.

CONCLUSION

Refeeding enteroclysis serve as an alternative to total parenteral nutrition among small bowel stoma patients and their co-relation was established in the study. Refeeding enteroclysis being cost effective and also decreases the complication among high output stoma and alleviating the parenteral nutrition dependence.

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ANNEXURES

PROFORMA

SL. NO: **DATE OF SURGERY:**

NAME	
AGE/SEX	
IP NO	
DIAGNOSIS/INTRAOP FINDINGS	
OSTOMY/ECF	
AVERAGE OSTOMY AMOUNT/CONTENT	**PROXIMAL** **REFEED-ING**
TPN USAGE	**YES** **NO**
[DAYS] **OSTOMY OUTPUT**	2 6 12 20 30 40 50
SIGNS OF DEHYDRATION	
RENAL PARAMETERS/S.ELECTOLYTES	
HEPATIC PARAMETERS	
WEIGHT GAIN/LOSS/MID ARM CIRCUMFERENCE	

GOVT.STANLEY MEDICAL COLLEGE, CHENNAI- 600 001

INFORMED CONSENT

DISSERTATION TOPIC : REFEEDING ENTEROCLYSIS - AN ALTERNATIVE TO TOTAL PARENTERAL NUTRITION IN SMALL BOWEL OSTOMIES

PLACE OF STUDY: GOVT. STANLEY MEDICAL COLLEGE, CHENNAI
NAME AND ADDRESS OF PATIENT:

I, _____ have been informed about the details of the study in my own language.

I have completely understood the details of the study.

I am aware of the possible risks and benefits, while taking part in the study.

I understand that I can withdraw from the study at any point of time and even then, I will continue to receive the medical treatment as usual.
I understand that I will not get any payment for taking part in this study.

I will not object if the results of this study are getting published in any medical journal, provided my personal identity is not revealed.

I know what I am supposed to do by taking part in this study and I assure that I would extend my full co-operation for this study.

Name and Address of the Volunteer:
Signature/Thumb impression of the Volunteer

Date:

Witnesses:

(Signature, Name & Address)

Date:

Name and signature of investigator: (DR.D.PRASANTH)

MASTER CHART

S.NO	GROUP	NAME	AGE	GENDER	I.P.NO	DIAGNOSIS	OSTOMY	LENGTH FR	MEAN OUT	MEAN REFI	TPN	USAGI	SR.UREA	SR.CREAT	T.BIL	ALBUMIN	DEHYDRAT	ELECTROLY	MID AM CI
1	1	MR.APPUK	70	1	1831931	GANGREN(	1	90	3800	2500	0	32	0.9	1.1	4	0	0	28
2	2	MR.PERUM	75	1	1826600	MID ILEAL S	2	170	2800	0	1	40	1.4	1.2	3.5	1	1	25
3	1	MR.ANBAL	45	1	1876486	MID ILEAL (	2	160	2500	1700	0	26	0.6	0.9	3.9	0	0	24
4	2	MRS.MALL	60	0	1955096	POST CYST(	2	280	1400	0	0	22	0.8	0.9	3.2	0	0	24
5	1	MR.ANBU	55	1	1812188	ILEAL STRI(	2	100	3200	2200	0	38	1.1	1.4	3.2	0	0	26
6	2	MRS.THILA	50	0	1950563	SMVIS THR	1	110	3500	0	1	33	1.4	1.5	2.8	2	1	23
7	1	MR.MD KA	54	1	1821036	SMA THRO	1	70	4300	3500	1	45	1.5	1.2	2.6	2	0	24
8	2	MR.KUMAI	65	1	1956593	SIGMOID G	2	280	1600	0	0	25	0.9	0.9	4	0	0	28
9	1	MR.NATAR	65	1	1844274	ILEO COLIC	2	270	1500	700	0	24	0.8	0.9	4	0	0	28
10	2	MRS.JAYCH	39	0	1984432	ILEL PERFO	2	140	2400	0	1	32	1.2	1.2	2.7	2	3	26
11	1	MR.RAMAI	30	1	1868059	MESCENTR	2	110	1800	1100	0	22	0.9	1.2	3.8	0	0	26
12	2	MR.ASARU	83	1	1946988	ILEAL PERF	2	130	2200	0	1	40	1.3	0.9	3.3	0	0	25
13	1	MR.KUPPA	52	1	1884710	LIVER ABS(	2	280	1700	1200	0	24	0.8	0.8	4	0	0	26
14	2	MR.IYYAPP	22	1	1947376	ILEAL PERF	2	220	1800	0	0	28	1.1	0.9	4	0	0	29
15	1	MR.VENKA	40	1	1904680	BLUNT INJ(	2	250	1500	1100	0	22	0.7	1.1	4.2	0	0	29
16	2	MRS.SUBAI	67	0	1955607	ILEAL OBST	2	180	2100	0	1	34	1.2	0.9	2.8	1	0	25
17	1	MRS.MALL	46	0	1913090	PENETRATI	1	80	3800	2800	0	30	1.2	1	2.8	0	1	25
18	2	MRS.SHAN	48	0	1954871	ILEOCOLIC	2	260	1500	0	0	32	0.7	0.9	3	0	0	28
19	1	MRS.RADH	32	0	1940340	SMA THRO	1	60	4800	3500	1	32	0.9	0.9	3	2	0	24
20	2	MR.VINAYA	47	1	1949778	ILEAL OBST	2	240	1900	0	0	26	0.8	0.9	3.2	0	1	26
21	1	MRS.AMAL	55	0	1949398	SMA THRO	2	180	2200	1600	0	34	1.2	1	3.2	0	0	26
22	2	MR.ARUMI	57	1	1933178	FOREIGN B	2	210	2400	0	1	30	0.8	1.1	2.5	1	2	23
23	1	MRS.SHARI	40	0	1911072	MID GUT V	1	50	4800	3800	1	40	1.3	1.4	2.6	2	2	24
24	2	MRS.SARAS	60	0	1876599	SMA THRO	1	60	5200	0	1	44	1.4	2.4	2.4	2	3	22
25	1	MR.AROCK	66	1	1921022	SMA THRO	2	120	2700	1800	0	28	0.8	1	3.4	0	0	28
26	2	MR.GANES	65	1	1864532	ILEO COLIC	2	280	1500	0	0	24	0.7	0.8	3.5	0	0	28
27	1	MR.SHERIF	65	1	1943623	CAECAL PE	2	300	1500	600	0	24	0.7	0.8	4	0	0	28
28	2	MR.ARIVAL	45	1	1869432	ILEAL PERF	2	200	3000	0	1	50	1.2	1.2	3.4	2	3	26
29	1	MS.RAVAN	23	0	1825238	TB ABDOM	2	280	1800	800	0	26	0.9	1	3.6	0	0	27
30	2	MRS.VIJAYA	55	0	1975934	ILEAL OBST	2	220	2100	0	1	34	0.9	1.2	2.6	1	2	23
31	1	MR.DHAYA	60	1	1824645	JEJUNAL PE	1	100	3500	2300	0	30	1.1	0.9	3	1	0	26
32	2	MR.NATRA	40	1	1865242	JEJUNAL PE	1	120	3300	0	1	40	1.3	1.6	2.9	2	3	24