

**PROSPECTIVE STUDY ON ROLE OF EARLY ENTERAL
FEEDING IN GASTRIC / DUODENAL PERFORATION**

M.S. DEGREE EXAMINATION

BRANCH I - GENERAL SURGERY

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Madurai – 20



THE TAMILNADU DR.M.G.R. MEDICAL UNIVERSITY

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MAY 2020

CERTIFICATE BY THE GUIDE

This is to certify that this dissertation titled “**Prospective study on Role of Early Enteral Feeding in Gastric / Duodenal Perforation**” submitted by **Dr. J. Balaji Pandian** to the faculty of General Surgery, The Tamil Nadu Dr. M.G.R. Medical University, Chennai in partial fulfillment of the requirement for the award of MS Degree Branch I General Surgery, is a bonafide research work carried out by him under our direct supervision and guidance from November 2017 to September 2019.

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This is to certify that the dissertation entitled “**Prospective Study on Role of Early Enteral Feeding in Gastric / Duodenal Perforation**”

is a bonafide research work done by **Dr. J. Balaji Pandian**, Post graduate student, Dept. Of General Surgery, Madurai Medical College And Govt. Rajaji Hospital, Madurai, under the guidance and supervision of **Dr. A.M. Syed Ibrahim M.S., FAIS.,** Prof of General Surgery, Madurai Medical College and Govt. Rajaji Hospital, Madurai.

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DECLARATION BY THE CANDIDATE

I **Dr. J. BALAJI PANDIAN**, hereby solemnly declare that this dissertation entitled “**Prospective Study on Role of Early Enteral Feeding in Gastric / Duodenal Perforation**” is a bonafide and genuine research work carried out by me. This is submitted to the TamilNadu Dr. M.G.R. Medical University, Chennai, in partial fulfillment of the regulations for the award of M.S. degree (Branch I) General Surgery.

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CONTENTS

Sl. No.	TOPIC	PAGE
1.	Introduction	1
2.	Aims and Objectives	5
3.	Study Design	7
4.	Review of Literature	9
4.	Material and Methods	60
5.	Observation and Results	64
6.	Discussion	76
7.	Conclusion	78
8.	Annexure	
	<ul style="list-style-type: none">• Bibliography• Proforma• Abbreviations• Master Chart• Anti- plagiarism chart• Anti- plagiarism certificate• Ethical committee approval	

INTRODUCTION

Perforation of gut is one of a common surgical emergency encountered in clinical practice. Patients with gastric / duodenal perforations presents with severe peritonitis and septicemia. Upper GI perforations need immediate repair mostly by Omental patch closure.

Following surgical repair of the perforation patients will be observed postoperatively regarding the improvement of vitals and return of normal bowel movements and improvements in biochemical parameters for planning of introduction of oral feeds.

Previously it is considered that introduction of oral feeds may prolong the duration of naso gastric aspirations and may interfere with the healing of perforation site and also may lead to prolongation of post operative ileus.

Conventionally patients underwent surgery for gastric / duodenal perforations will be kept nil per oral for about 5-7 days based on the return of bowel sounds postoperatively and passage of flatus postoperatively . This practice of delayed introduction of oral feeds following perforation surgery is

questioned in recent times and considered to prolong recovery of the patients due to deficient calorie supply during periods of starvation.

Withholding enteral feeds after an elective gastrointestinal surgery is based on the hypothesis that this period of “nil by mouth” provides rest to the gut and promotes healing.

During the period of ‘nil by mouth’ patients will be provided calories, electrolytes and hydration through intravenous route. This intravenous supplementation requires expertise and to be monitored accordingly. The intravenous supplementation are planned according to the biochemical values and condition of the patient.

Even though supplemented with utmost accuracy, the IV supplements is no way match to the physiological enteral absorption in correcting biochemical dearrangements. Also during the period of nil by mouth the Enteral immunity will be depressed which may delay the outcome of the patient and lead to negative nitrogen balance.

Many recent trials regarding the concept of early feeding in case of abdominal surgeries conducted proved that the delayed feeding is of no benefit for the outcome of general condition of the patient. Also early feeding found to result in shift recovery of the patients thereby leading to reduced hospital stay.

Early feeding post operatively can be started by many methods. Few examples are through Feeding jejunostomy, feeding gastrostomy, Naso enteral feeding etc. In my study I have adopted the method of Feeding nasojejunal tube which is a noninvasive method of starting feeding. I have adopted this method of early feeding in patients who have undergone surgery for repair of Gastric/ Duodenal perforations.

This method involves the delivery of food directly into jejunum, it is safe for the perforated site in not being delayed from healing and also not considered to increase the duration of naso gastric aspiration.

Patients treated by surgery for Gastric / Duodenal perforations are categorized into two groups . One group of patients were started with enteral feeding earlier than conventional duration by using Naso enteral tube and the second group of patients were started with routine method of feeding following

reappearance of normal bowel movements. Both the groups were compared clinically, biochemically and recovery of the patients were assessed in this study.

RESEARCH PROPOSAL

AIM OF THE STUDY

The study was undertaken to determine the effects and advantages of “EARLY ENTERAL FEEDING IN GASTRIC / DUODENAL PERFORATION”

OBJECTIVES:

To derive conclusions about efficacy of EARLY ENTERAL FEEDING IN PATIENTS WITH GASTRIC/ DUODENAL PERFORATION and its impact on recovery of patients after surgery monitored by clinical and biochemical parameters

ELIGIBILITY CRITERIA

A.Inclusion criteria:

- Patients more than 20 years of age groups in both sexes presenting with Gastric / Duodenal Perforation in GRH Madurai
- Patients with duration of perforation not more than 3 days

- Patients with Perforation upto the level of first part of duodenum
- Patients with both traumatic and atraumatic perforations
- Patients consented for inclusion in the study according to designated proforma

B.Exclusion criteria:

- Patients less than 20 years of age
- Patients with malignant perforation undergoing major resections
- Patients with perforation beyond the level of first part of duodenum
- Patients with duration of perforation more than 3 days
- Patient not consented for inclusion in the study

DESIGN OF STUDY: Prospective Study

PERIOD OF STUDY: 2 Years

SELECTION OF STUDY SUBJECTS:

Patients with age above 20 yrs in both sexes presenting with Gastric / Duodenal perforation at GRH, Madurai

DATA COLLECTION:

Data regarding identity, history, clinical presentation, biochemical parameters, POD at which oral feeding started and outcome of the patient.

METHODS: Observation study

ETHICAL CLEARANCE: Approval obtained.

CONSENT: Informed and written consent from all patients.

ANALYSIS: using CHI SQUARE test – p value

CONFLICT OF INTEREST: none

FINANCIAL SUPPORT: NIL FROM THE INSTITUTION

PARTICIPANTS:

Any patient above the age of 20yrs presenting with Gastric / Duodenal perforation with duration not more than 3 days and underwent surgery at GRH, Madurai were included in the study

Materials used:

Naso Jejunal Tube for providing early enteral feeding following surgery for perforation

REVIEW OF LITERATURE

Surgery is one among a condition which leads to hypermetabolism, protein stores depletion, immunity impairment and delayed recovery due to stress. Required nutritional supplementation to the surgical patient is important in order to ensure optimal outcomes.

Previously, nutrition was regarded as only an adjunctive in providing nutrients and support the patient during the perioperative times. But in modern times, nutrition is considered a medical intervention, which helps in attenuation of metabolic response to stress, prevention of oxidative cellular injury and immune response modulation.

Enteral nutrition (EN) is the provision of nutrients via the gastrointestinal (GI) tract, either through voluntary oral intake or through a feeding tube or catheter for those who cannot take nutrients orally. Usually the operating surgeon should decide regarding the provision of nutrition to the patient, its quality, quantity and the route of supply. Modern developments in enteral formulations and equipments helps in providing EN to patients in different in varying conditions and indications..

ENTERAL FEEDING VERSUS PARENTERAL FEEDING

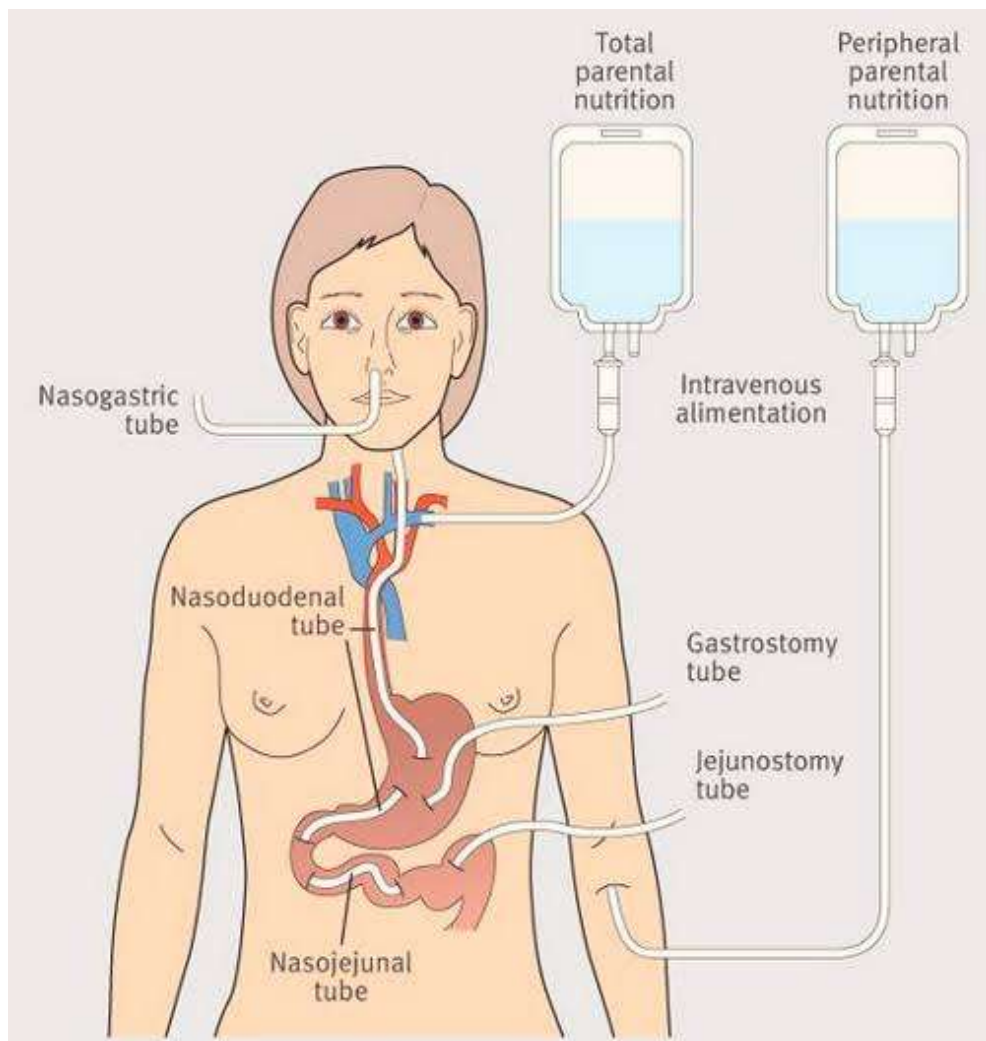


Figure 1- Enteral feeding routes & Parenteral feeding routes

The GI tract was thought to be a quiescent organ following surgery with role only in digestion, absorption, and secretion, is clearly proven in recent times that it is a metabolically active organ and have important role in transport of nutrients, nutrient exposure to absorptive mucosa, stasis and bacterial overgrowth prevention, and also immune system regulation.

If the GI tract is functional and accessible, EN is preferred over parenteral nutrition (PN) according to modern concepts of nutrition provision since it is the most physiological way of supplying energy to the body systems. PN can be used in conjunction with EN whenever necessary.

EN undergoes a very unique process of first-pass metabolism in liver which is far more superior to PN, and this process leads to promotion of their utilization efficiently.

Nutrients in the small intestinal lumen prevents the functional integrity of the organ and maintains tight junctions between epithelial cells, increases blood flow, and stimulates the secretion of cholecystokinin, gastrin, bombesin and bile salts, etc and maintains the normal GI functions.

EN also regulates normal intestinal pH and microbial flora and also serve as a energy source for the intestine.

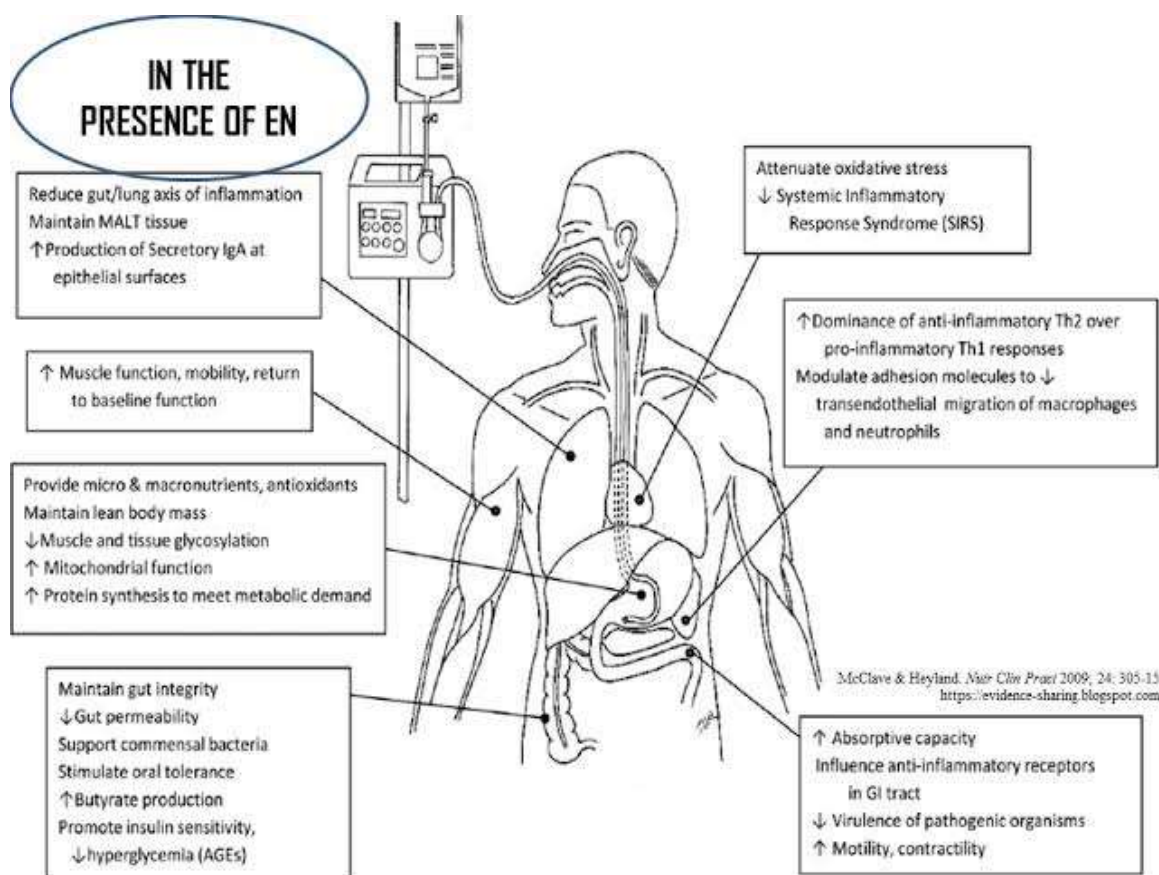


Figure 2 - Advantages of Enteral Nutrition

EN stimulates enterocyte growth and intestinal adaptation in an efficient way. Numerous prospective randomized controlled trials proved that EN is much more beneficial than the PN supply without any doubt. Results are consistent with a reduction in infections and improvement in wound healing and shift normalization of biochemical parameters where as mortality has not changed significantly. There is considerable and evident reduction in length of hospital stay and cost associated with medical care in the EN group of patients.

BENEFITS OF ENTERAL NUTRITION

Physiological

- GI mucosal integrity preservation
- Supports immunological functions of gut associated lymphoid tissue (GALT) & mucosa associated lymphoid tissue (MALT)
- Enhances Gut barrier function and first pass metabolism of liver in patients with stress
- Enhances release of cholecystokinin & other tropic endogenous agents thus preservation of GI hormone synthesis
- Diminished Catabolic response by the body
- Regulates digestion and absorption of the GI tract
- Cellular anti oxidation system enhancement
- Decreased episodes of hyperglycemia compared to that of PN
- Possess unique nutrients that are not available in PN form (i.e. fiber)

Infections

- Incidence of infections and related morbidity is significantly reduced
- Wound healing is accelerated and enhanced recovery

Economic

- Shorter length of stay than in patients with PN
- Cheaper than PN
- Easy to administer and simpler and less complicated than PN

So in short EN has many beneficial effects regarding the recovery process of post surgery patients and it also preserves the normal physiological means of nutrition supply when compared to PN as a whole.

CONTRINDICATIONS FOR ENTERAL FEEDING

- Mechanical obstruction of the GI tract, which cannot be bypassed with a feeding tube
- Vomiting and/or diarrhea refractory to medical management
- Severe mal absorptive conditions of GI tract
- Adynamic ileus
- Distal high output fistulas, which can't be bypassed with a feeding tube
- Severe GI bleeds
- Inability in gaining access to the GI tract
- Aggressive nutrition intervention which is not ensuring with prognosis or patient wishes

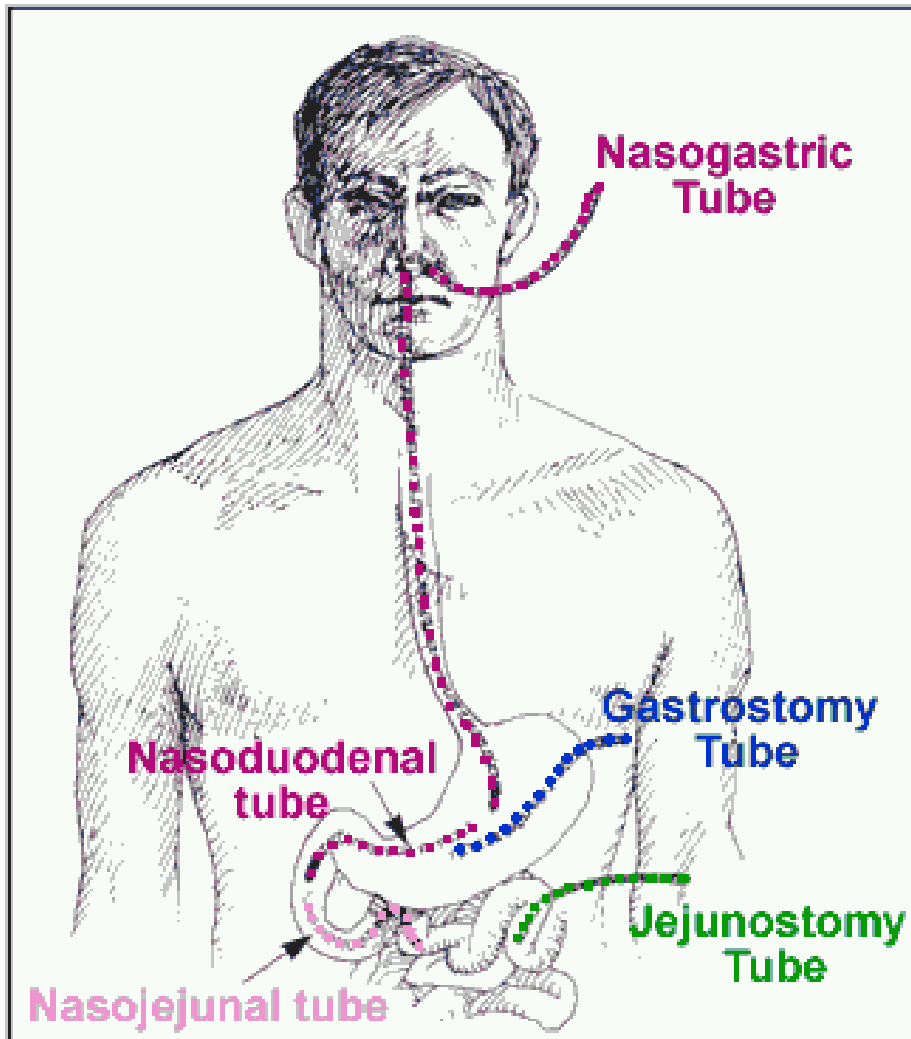


Figure 3 – Routes of Enteral Feeding

ASSESSMENT OF NUTRITIONAL STATUS

In surgical patients, malnutrition increases risk for major morbidity, including wound infection, sepsis, pneumonia, delayed wound healing, and anastomotic complications. Nutritional Risk Index (NRI) will help in identifying the patients at risk.

Nutrition Risk Index (NRI) can be calculated by the formula

$$\text{NRI} = (15.19 \times \text{Serum albumin (g/dL)}) + 41.7 \times \text{present weight/usual weight}$$

If $\text{NRI} < 83$, it implies a significantly increased rate of mortality and complications especially wound dehiscence and infection.

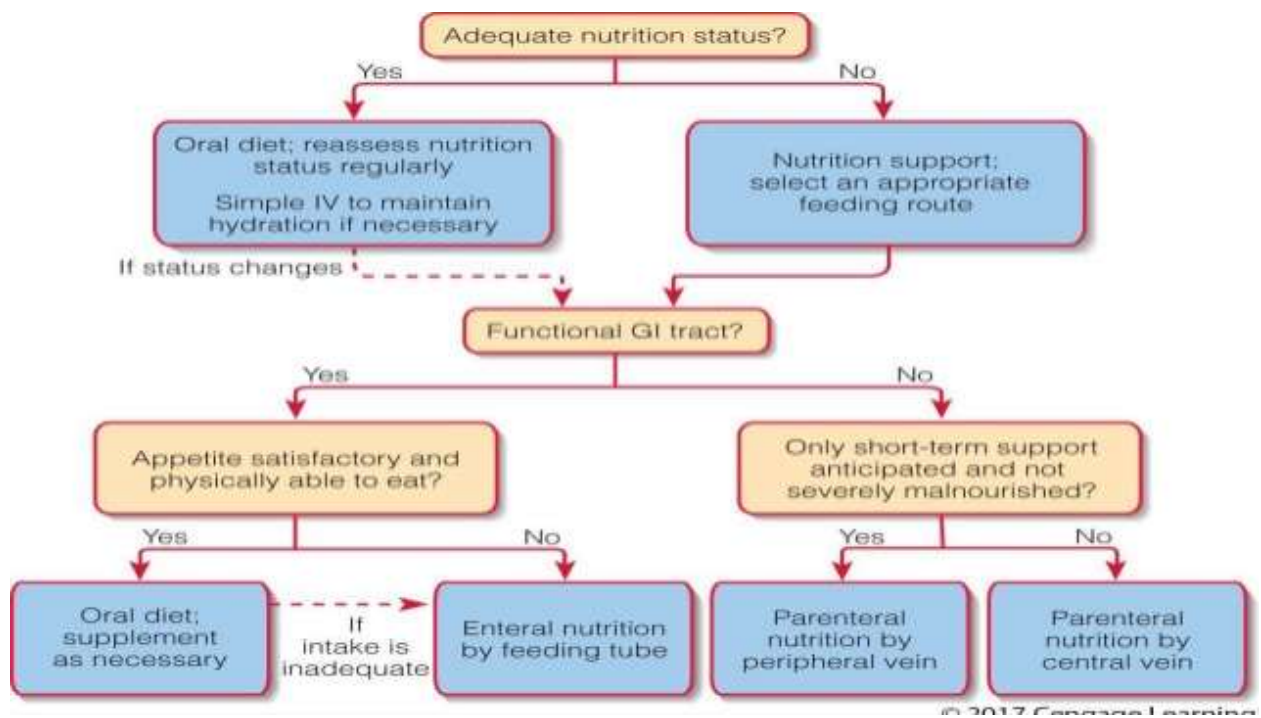


Figure 4 - Assessment of patient for planning for provision of nutrition

CONSEQUENCES OF MALNUTRITION

- Increased morbidity and mortality
- Prolonged length of stay in ICU
- Impaired tissue functioning and wound healing
- Defective muscle function , reduced respiratory and cardiac function
- Immune suppression
- Increased rate of infection
- Poor weaning from ventilator

To provide nutritional support, it is essential to classify the nutritional status of the patient. Deficiency in nutritional supply is expected after any abdominal surgery. Traditionally dextrose-containing IV fluids are infused post operatively in NPO patients in view of provision of enough carbohydrate to prevent catabolism of lean body mass.

The vital organs such as heart and brain needs carbohydrate as energy source & do not possess stores of energy as fat or glycogen.

In such instances of deficient intake of carbohydrates, break down hepatic glycogen occurs to provide glucose to those organs. If the hepatic glycogen stores get utilized which will be after about 1 day of no intake, then lean muscle mass gets converted to glucose by the process of gluconeogenesis to produce glucose to provide the vital organs.

100 g of external supply of glucose / day is enough to preserve lean muscle mass from getting broken down.

Postoperatively nutritional support must be individualized for every patient according to their needs. The enteral route is the preferred whenever possible than the Parenteral route of support, since it is proven to cause less morbidity and mortality. EN support is effective in patients with functional small bowel.

Naso gastric tubes can be used in case of short term supply of EN. If there is need of long-term EN, gastrostomy or jejunostomy tubes are placed operatively or percutaneously for the purpose of EN.

Cause for Malnutrition in Post Surgical patients

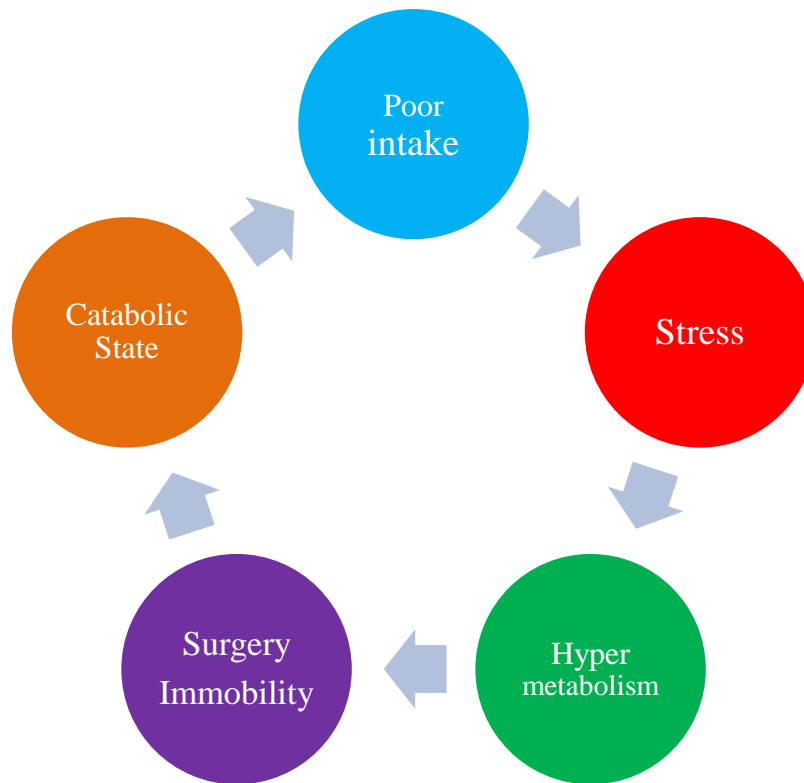


Figure 5 - *Cause for Malnutrition in Post Surgical patients*

Irrespective of the route of provision of nutrition, each patient should be assessed and calculated about the calorie needed. Several formulas exist for the estimation of Calorie requirement, considering the height, weight, age, gender, stress & activity factors. This is to prevent underfeeding or overfeeding especially in extremes of body mass index. Basal energy expenditure on adjusted body weight (ABW) is usually used in calculating the energy requirements of the patient.

The baseline calorie required for maintaining weight based on ABW is 25 kcal/kg/d. The above said value can be adjusted upward in pts with increased metabolism such as post operative stress. In normal patients, the minimum daily protein required is 0.8 g of protein/kg/d.

In postop patients with the required protein is 1.0–1.5 g/kg/day, & in critically ill pts the requirement may be 2.0 g/kg/d. Fluids about 30ml / kg / day is to be provided along with other nutrients. The provision of nutrition also includes vitamins, trace elements like zinc and selenium, EFA and essential amino acids. These trace elements are provided in abundance in EN than that of the PN.

Feeding requirements in Enteral feeding

Nutrients	Requirement
Fluids	30ml/kg/day
Energy	32 kcal/kg/day
Proteins	1g/kg/day
Sodium	30-40mMol/kg/day
Potassium	1 mMol/kg/day

DELIVERY ROUTES OF ENTERAL FEEDING

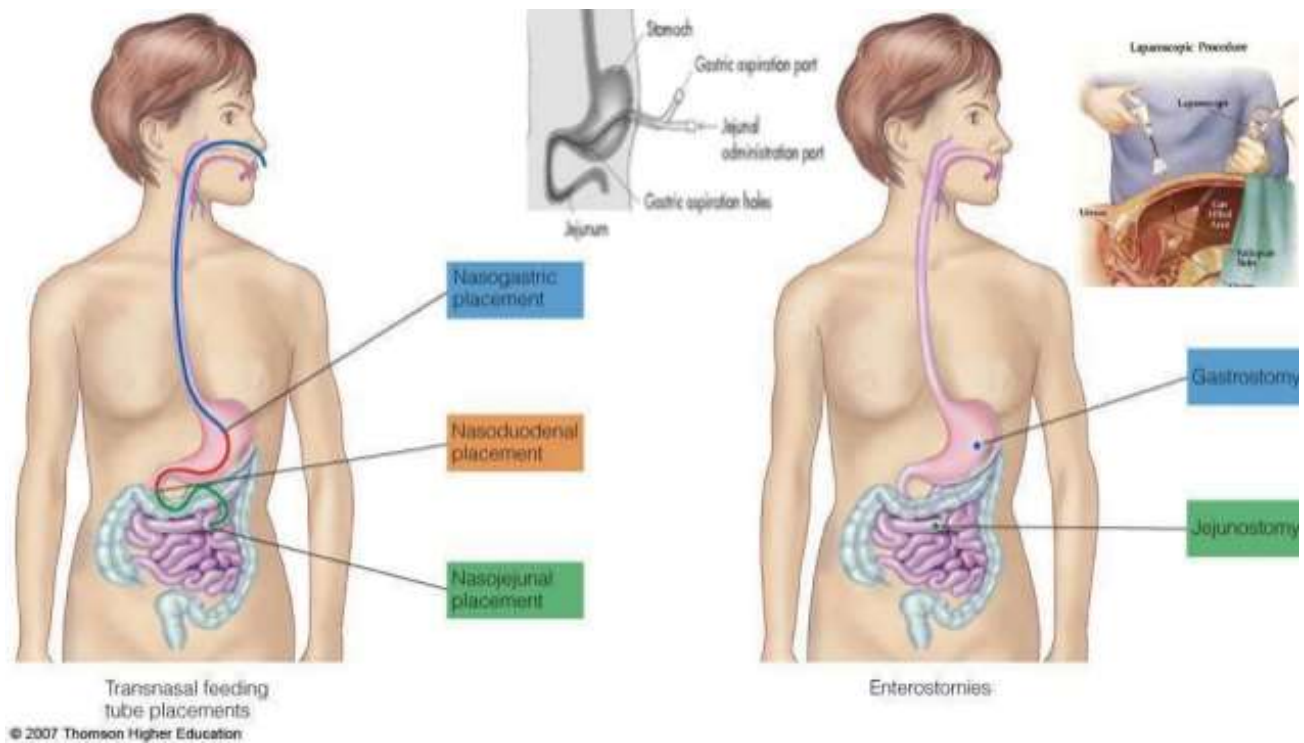


Figure 6 – Delivery Routes Of Enteral Nutrition

Most common delivery routes of enteral feeding includes

- Nasogastric / Orogastric
- Nasoduodenal / Nasojejunal
- Gastrostomy
- Jejunostomy

NASOGASTRIC / OROGASTRIC ROUTE

This route can provide EN for upto 4-6 weeks. A fine bore 5-8 FG or large bore tube is inserted via nasal or oral route upto the gastric lumen and feeding provided via the tube. Commonly indicated in patients unable to consume oral nutrition such as intubated, sedated, neurologically impaired patients and also in patients with hypermetabolism in the presence of functional GIT (e.g. Burns).

Precautions include securing the tube, verification of placement of tube by Xray. Risk with this route includes high incidence of aspiration with large bore tubes in unconscious patients.

NASODUODENAL / NASOJEJUNAL ROUTE

This route can provide EN for upto 4-6 wks. Fine bore tube of size 6-10 FG is inserted through nasal orifice upto the Duodenum/ Jejunum. Commonly indicated in cases of inadequate gastric motility or gastric intolerance (e.g. gastroparesis, delayed gastric emptying) , Partial gastric outlet obstruction, Severe aspiration risk, Esophageal reflex, Coma patients, After upper GI surgery, In high GRV.

Precautions includes securing the tube in position and confirmation of position with X ray or by endoscopy. Bed side insertion is difficult and failure rate is 70-85 % without endoscopic guidance. Aspiration risk is low compared to naso gastric route.

GASTROSTOMY

Placement of a silicone or PU tube directly into the stomach through abdominal wall by percutaneous endoscopic gastrostomy (PEG) or by open surgery. This route is preferred in patients who require medium to long term NG tube feeding (>1month), in cases of head and neck surgery, in esophageal or upper airway neoplasms with obstruction.

Caution should be there in pts with severe GERD or gastroparesis. Contraindicated in pts with ascites , coagulopathies and whose life expectancy is <3months.

JEJUNOSTOMY

This includes placement of FJ tube into the jejunum directly through abdominal wall by Percutaneous endoscopic Jejunostomy (PEJ) or by open surgery. This is done in patients with any upper GI surgery and injury or fistula

or obstruction proximal to Jejunum. Contraindicated in patients with morbid obesity and peritonitis.

CONTRAINDICATIONS OF NG/NJ INTUBATION

- Obstruction of the nasopharynx and/or esophagus
- Recent fore gut surgery that may predispose to perforation
- Craniofacial fractures
- Intolerance to prepyloric feeds
- Abdominal pain with feeding
- Repeated regurgitation of feeds
- Intestinal obstruction due to ileus

RELATIVE CONTRAINDICATIONS TO NG TUBE PLACEMENT

- Severe GERD / Coagulopathy
- Esophageal variceal bleeding
- Severe sepsis
- Choice of the Patients

CONTRAINDICATIONS TO PEG/PEJ

- Massive ascites
- Intra abdominal sepsis
- Esophageal or gastric varices
- Severe GERD
- Intestinal obstruction
- Systemic sepsis
- Life expectancy <3months
- Coagulopathy
- Multiorgan failure patients

COMPLICATIONS OF ENTERAL FEEDING

- Diarrhoea/ nausea/ vomiting
- Dehydration
- Infection
- Constipation
- Abdominal distension
- Aspiration of feeds
- High gastric residuals

- Hypo/ hyperglycemia
- Tubal obstruction due to clogging/ kinking
- Misplacement or displacement of the tube
- Refeeding syndrome

METHODS OF ADMINISTRATION

Three methods of administration includes

- Continuous infusion
- Intermittent administration
- Bolus administration

CONTINUOUS ADMINISTRATION

Used in patients who are all intubated, with jejunostomy, critically ill, with hyperglycemia to control glycemic index, during refeeding, who are intolerant to intermittent feeding. This increases the time of absorption.

Rate of administration is 20-60 ml / hr and may be advanced by 10-20 ml / hr/ 8-24 hrs

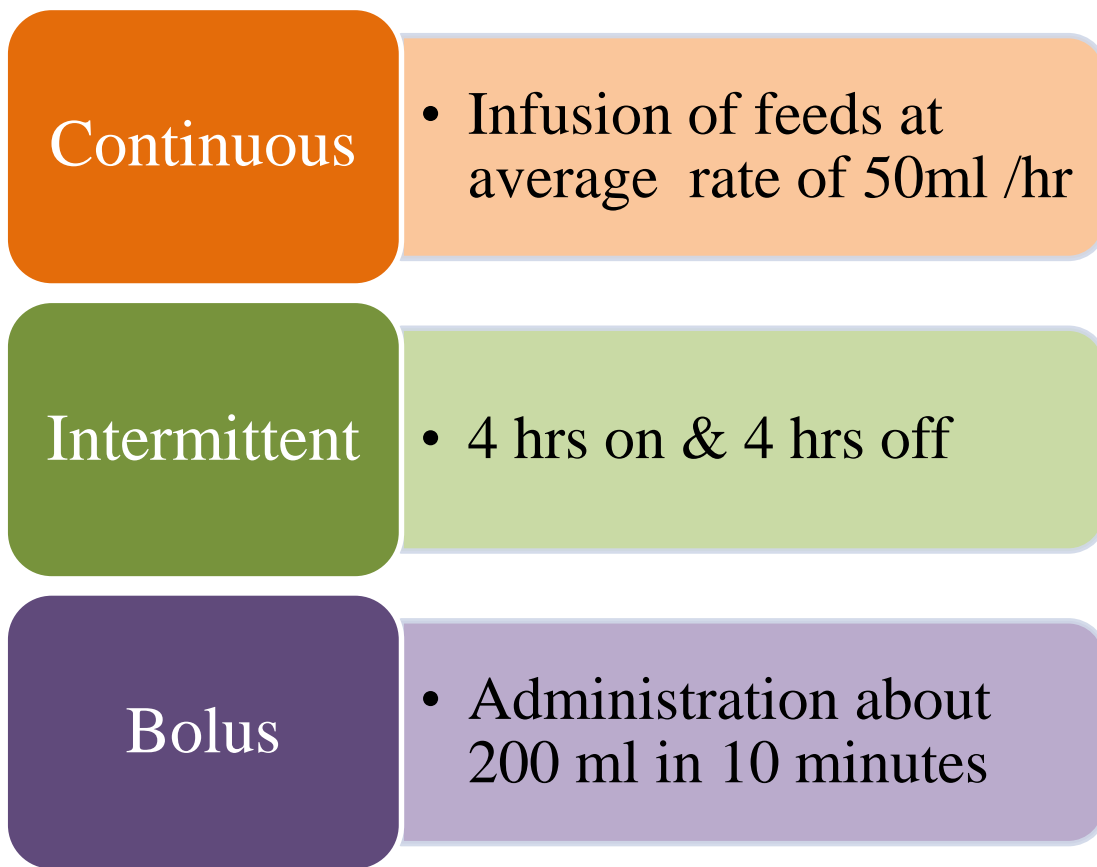


Figure 7 – Methods of Administration of EN

INTERMITTENT ADMINISTRATION

Used in patients with gastrostomy, with increased fluid tolerance. There is increased chance of aspiration. It is practiced with caution in night times and most feeds done during day time when the pt is awake to minimize aspiration. This method has improved quality of life than the previous method of continuous administration.

Rate of administration includes 240-400ml of fluids(begin with 60-120ml) in 30 to 45 mins about 4-6 times daily.

BOLUS ADMINISTRATION

This method needs a normal functioning stomach. This mimics normal eating. Cost is less and there is maximum aspiration risk than other methods. Also may cause distension, delayed gastric emptying and increased bowel movements of the patient.

Rate of administration includes 150-500ml/ 5-15 mins/ 3-6 times per day

PRESCRIPTION GUIDELINES

In case of Gastric feeding

- Start at 30ml / hr and advance in increments of 20ml every 8hrs.
- Check for gastric residuals every 4 hrs
- Then start with bolus of 120 ml and increase by 60 ml every bolus until goal volume
- Typical bolus frequency is every 3-8 hrs

In case of Small bowel feeding

- Start at a rate of 20 ml / hr
- Advance in increments of 20ml every 8 hrs to goal
- Do not check gastric residuals

FORMULATIONS OF ENTERAL FEEDING

Types :

- Standard (polymeric)
- Disease specific
- Elemental or defined (mono/ oligomeric)
- Home made
- Modular (only one)



Figure 8 – Enteral Nutrition Formulas

Formula composition (1-2 Kcal / ml)

- Carbohydrates (30-60% of calories)
- Fibers (+/-)
- Fats (15-30% of calories)
- Proteins (15- 25% of calories)
- Vitamins and minerals (RDA)
- Water (70-85% of volume at 30-40ml /kg/day)
- Osmolality (270-700 mOsm / kg)(Iso/ Hyper)
- Immunomodulators (arginine/ glutamine/ omega3 FAs)

As a general rule drugs or additives should not be mixed with enteral formulas.



Formula selection depends on

- patients condition (age / allergies / tolerance / diseases)
- GI status
- Need of fiber modifications
- Enteral route (gastric vs small bowel)
- Nutritional and fluid requirements

BASIC PRICIPLES REGARDING ENTERAL FEEDING

- Choose full strength isotonic formulas for initial feeding regimen
- Diluting formulas will increase the risk of contamination leading to sepsis and also may lead to diarrhea due to intolerance
- A pump may be used for slower administration of continuous feeding which will enhance tolerance
- All Pts should be elevated to 30° to 45° unless a medical contraindication exists. Chlorhexidine mouth wash twice daily
- Feeding rate should be titrated till the patient tolerates

- If Gastric residual volume (GRV) is $>250\text{ml}$ for two occasions a prokinetic should be added (erythromycin, metochlopramide)
- If $\text{GRV} > 500\text{ml}$ for 6hrs hold EN and reassess patients tolerance
- Consider feeding tube beyond DJ flexure if GRV consistently measures $>500\text{ml}$
- Proper catheter care is essential to prevent clogging
- Flush feeding tubes with 30ml of water every 4 hrs during continuous feeding and before & after bolus/intermittent feedings
- Sterile water is usually recommended for flushing and mixing medications
- Refrigeration of remaining enteral feed should not be practiced and it should be discarded
- Proper hand washing before handling the catheters
- Screw top connectors are better than flip top connectors

	OPEN SYSTEM FEEDING FORMULATIONS	CLOSED SYSTEM FEEDING FORMULATIONS
Advantages	<p>Formulation is in the form of powder or ready to feed</p> <p>Allows modulars such as protein and fibers to be added</p> <p>Less wastage in unstable patients</p>	<p>Sterile until the containers are spiked for hanging</p> <p>Can be used for both continuous and bolus delivery</p> <p>Less waste of formula</p> <p>Less nursing time</p> <p>Less risk of contamination</p> <p>Increases safe hang time</p>
Disadvantages	<p>Increased nursing time</p> <p>Increased risk of contamination</p> <p>Shortens hang time (4-8 hrs)</p> <p>Rinsing of bag and tubing</p>	<p>No flexibility in formula additives</p> <p>Expensive than open formula</p>
		

GASTRO DUODENAL PERFORATION

Introduction

Perforation of the Gastroduodenum is a full-thickness injury of the wall of the organ. Perforation creates a communication between the gastric lumen and the peritoneal cavity. In case of acute perforations, there is no inflammatory reaction to wall off the contents, and the gastric contents are free to enter the peritoneum cavity, leading to chemical peritonitis.

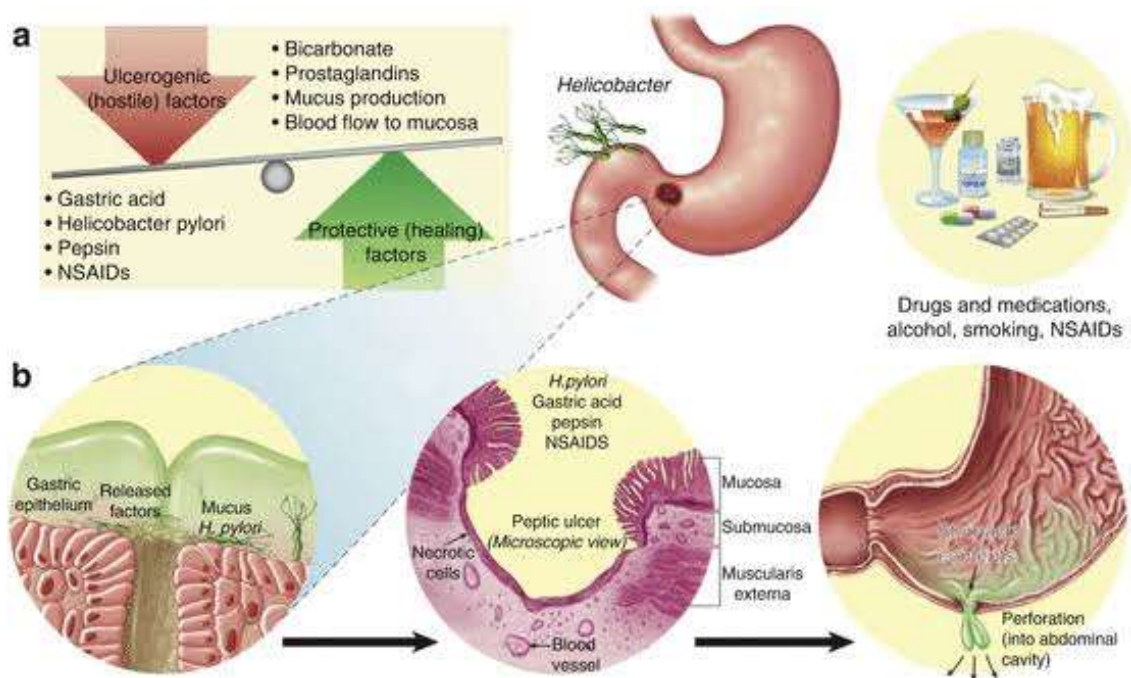


Figure 9 – Pathophysiology of GastroDuodenal Perforation

If the Perforation took some time period then it will be contained locally by the inflammation. Perforation is suspected based upon the patient's clinical presentation, and the diagnosis become obvious through a report diagnostic imaging performed to evaluate for abdominal pain or another symptom which shows 'Free Air under the diaphragm'. Surgical repair is the only treatment option. Usually perforation is closed with a patch made of omentum.

Etiology

Peptic Ulcer Disease (PUD)

PUD is the most common cause of Gastro duodenal perforation. Incidence of gastric perforation occurs in <10% of patients with PUD. Most commonly it occurs in elderly patients taking NSAIDs and due to consumption of excess alcohol. Gastric ulcer or duodenal ulcer perforate into the peritoneal cavity causes chemical peritonitis initially. If posterior wall gastric ulcers perforate, they leak gastric contents into the lesser sac, which tends to confine the peritonitis. These patients may present with less marked symptoms.

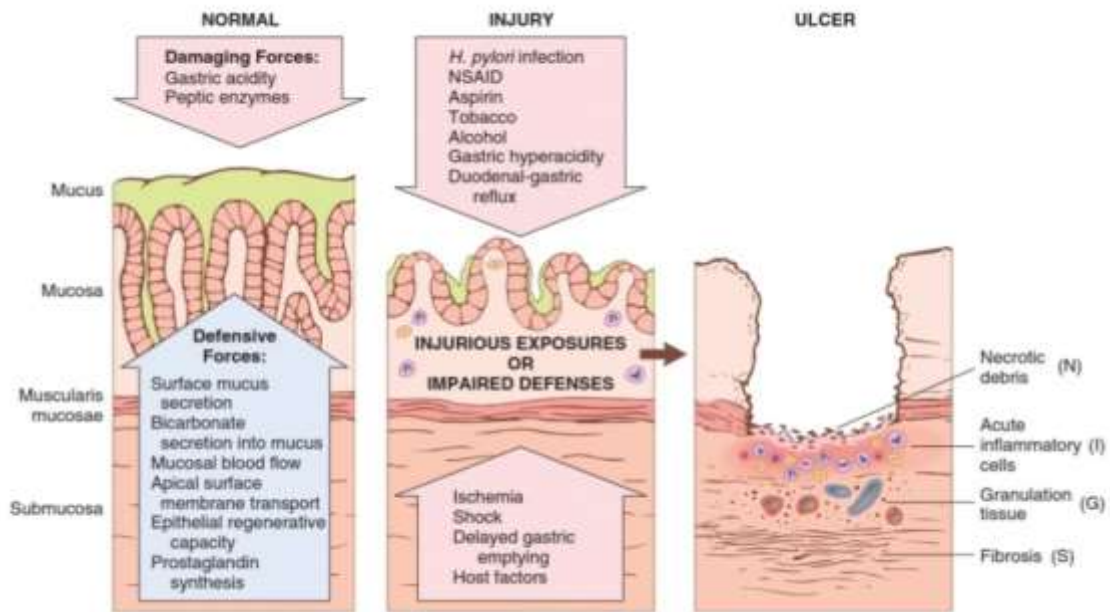


Figure 10 – Defensive & Damaging Mechanisms of Gastro Duodenal Ulcers

Spontaneous Gastric Perforation

It is an uncommon event mostly seen in the neonatal period as a cause of pneumoperitoneum. Beyond the neonatal period, perforation is usually secondary to trauma, surgery, caustic ingestion, or peptic ulcer.

Trauma

Frequently the result of any penetrating injury or iatrogenic due to

instrumentation of the stomach, although perforation with severe blunt abdominal trauma can also occur. Penetrating trauma of the abdomen includes gunshot and stab wounds. Penetrating wounds may involve both the anterior and posterior walls of the stomach, and posterior wall of the organ must always be visualized at surgery. With blunt trauma the stomach may be lacerated, or may even rupture if the organ is filled or distended. The stomach is the third most frequently injured hollow intra-abdominal organ after small bowel and colon.

Malignancy-Related Gastric Perforation

Neoplasms can perforate either by direct penetration and necrosis or by producing obstruction. Can also occur spontaneously, following chemotherapy or as a result of radiotherapy. Can be related also to interventions like stent placement for malignant GOO.

Iatrogenic

Upper endoscopy is the main cause for iatrogenic perforations.

Perforation is more common with therapeutic procedures than with diagnostic procedures. The proximal stomach is usually perforated since it is the thinnest part. More frequent in patients with pre-existing gastric pathology. Rupture of the stomach due to excessive insufflation of the stomach is typically located on the lesser curve, where it is least distensible.

Causes of Endoscopy-Related Gastric Perforation

Polypectomy

EMR-ESD

Dilation of anastomotic stricture

Scope or barotraumas

Medications or other ingested substances (caustic injury)

Foreign bodies such as sharp objects (toothpicks), food with sharp surfaces

Epidemiology

In young age group, the majority of gastric perforations are related to trauma, from both blunt and penetrating trauma.

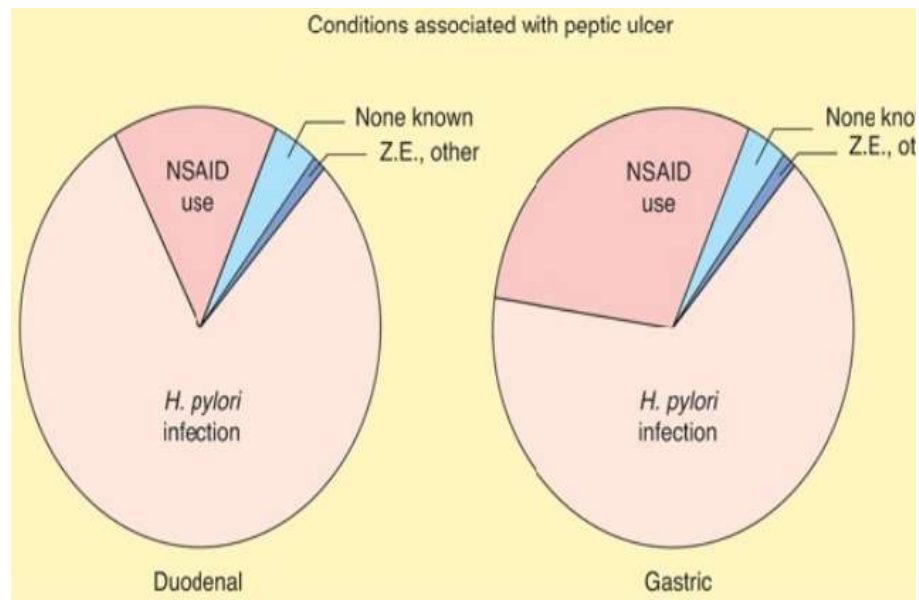


Figure 11 – Etiology of Gastro Duodenal perforation

In adults, the most common cause in the past was peptic ulcer disease. Since the introduction of the PPIs, these perforations have become very rare today.

Now a days NSAIDs abuse is also considered to be of significant cause for Gastric perforation .Duodenal perforations are more common than gastric perforations.

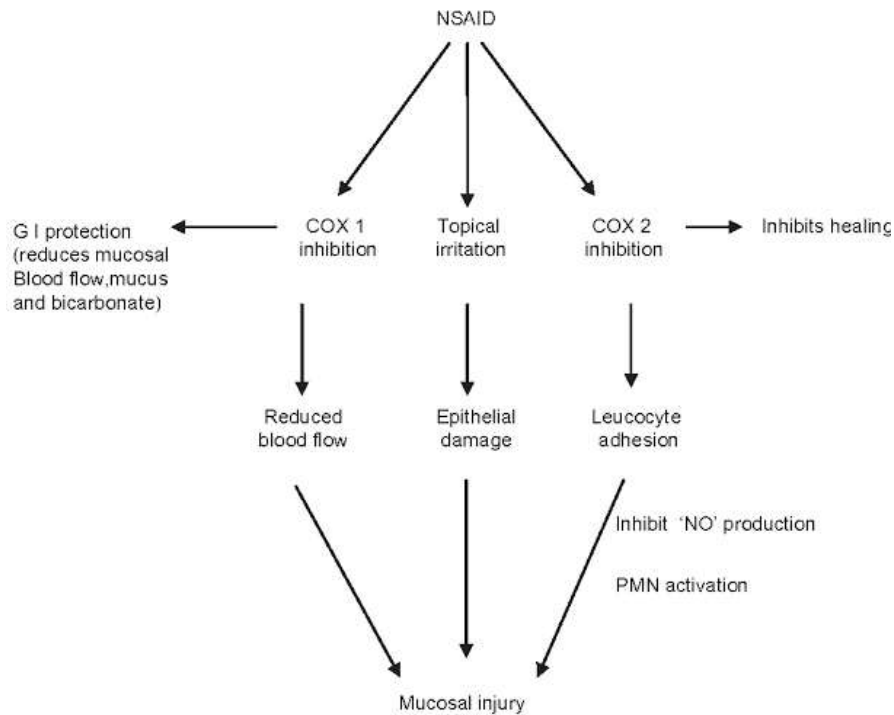


Figure 12 - Mechanism of NSAID injury to Gastric mucosa

At least 30% of gastric perforations are associated with a malignancy. A very common cause of gastric perforation in medical institutions is endoscopy related.

Pathophysiology

The Gastro duodenal part of GI tract usually has no microorganism because of the high acidity. Hence the majority of individuals who experience a gastric perforation are not at risk for immediate bacterial growth.

However, the leakage of acidic juices in the abdominal cavity can lead to severe chemical peritonitis. Within a few hours of the perforation, the patient will develop an acute abdomen and signs of peritonitis. When food leaks inside the abdominal cavity, it can lead to an inflammatory reaction and numerous pockets of an abscess. If left untreated, the patient will develop systemic sepsis followed by multiorgan failure

History and Physical

The clinical presentation is often very dramatic. Clinical symptoms may range from mild localized pain to signs of peritonitis and shock.

History

A careful history is important in evaluating patients with neck, chest and abdominal pain. It should include questions about prior bouts of abdominal or chest pain, prior instrumentation (nasogastric tube, endoscopy), prior trauma, prior surgery, malignancy, possible ingestion of foreign bodies, medical conditions (PUD) and medication (NSAIDS, glucocorticoids)

Signs and Symptoms

Patients with perforation invariably complain of acute onset of severe abdominal pain or chest pain; patient often notices the time of onset of pain. Severe chest or abdominal pain following instrumentation is highly suspicious. Patients on immunosuppressive drugs may have little or no pain & tenderness.

Many of them will seek medical attention with the onset of pain but a few will present in a delayed fashion (may present with sepsis). Irritation of the diaphragm may occur leading to pain radiating to the shoulder. Sepsis can be the initial presentation of perforation.

The ability of the peritoneal surfaces to wall off a perforation may be impaired in patients with severe medical comorbidities particularly in malnourished, elderly, and immunosuppressed patients, resulting in sepsis.



Figure 13 - A Huge Gastric Perforation

Physical Examination

Vital signs, a thorough examination of the neck, chest, abdomen and rectal examination. Majority of patients will have tachycardia, tachypnea, fever and generalized abdominal tenderness, Bowe sounds are usually absent and rebound and guarding may be present. A digital rectal and bimanual pelvic exam should be done to rule out other causes like a tubo ovarian abscess, appendicitis or perforated sigmoid diverticulitis.

Evaluation

Diagnosis usually confirmed by radiological imaging showing free intraperitoneal air. Another reported suggestive sign is the lack of an air-fluid level in the stomach in a horizontal beam view and a relative paucity of gas in the distal bowel.

Imaging

The diagnostic approach in patients with abdominal pain starts with plain films with sensitivity in detecting extra luminal free air range from 50% - 70%. Ultrasound (US) shows excellent potential for identifying pneumoperitoneum. CT scan is highly sensitive and specific for free air.



Figure 14 - Plain chest radiograph showing 'Air under Diaphragm'



Figure 15 – X ray erect abdomen showing Gas under both dome of diaphragm with dilated bowel loops

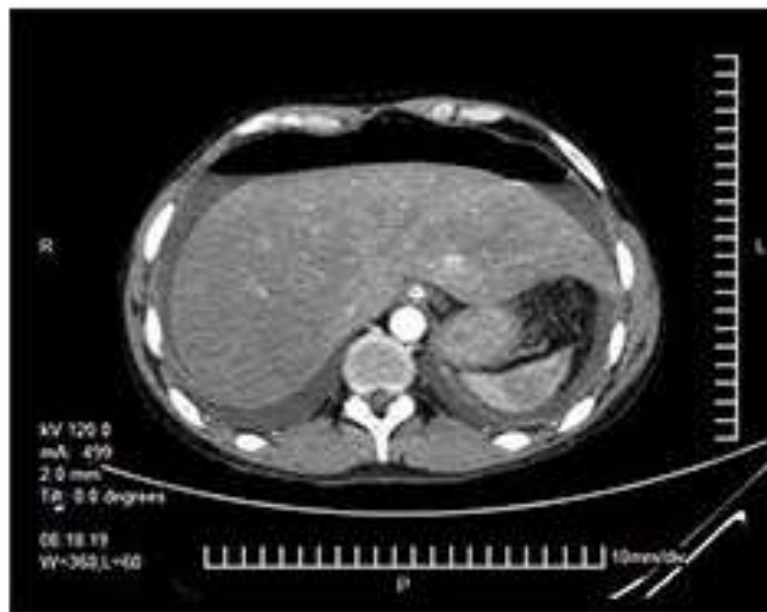


Figure 16 – CECT abdomen showing free fluid gas within peritoneal cavity indicating hollow viscus perforation

CT Findings for Perforation

Pneumoperitoneum

Mesenteric air

Discontinuity of the hollow viscus wall

Extraluminal enteric contrast

Free intraabdominal fluid

Extravasated intravenous contrast

Bowel wall thickening or edema

Mesenteric hematoma

In complex cases, one may need to perform a diagnostic laparoscopy to determine the cause and obtain fluid for culture and biochemistry

Differential Diagnosis

Other causes of abdominal pain, as well as other causes of pneumo-peritoneum, include patients on respiratory support, due to CPAP or PEEP, endoscopy, paracentesis, peritoneal dialysis, and vaginal instrumentation.

PROGNOSTIC FACTORS IN PERFORATIVE PERITONITIS

Age

With increasing age there is impairment of the host defence processes, decreased delivery of phagocytes to sites of contamination by the bacteria, reduction in the levels of the mature T-Lymphocytes, chemotactic & phagocytic activity of polymorphonuclear leukocytes are reduced leading to poor outcome in old age patients

Source of infection

In generalized peritonitis, the source of contamination was found to be an

important prognostic factor. In perforation of a duodenal ulcer or gastric ulcer, the mortality rate was found to range between 9 to 40 per cent. Colonic perforations had a mortality rate of 54%, small bowel perforation a 21% mortality rate and perforated gastric & duodenal ulcer a 12.5% mortality rate.

Duration of perforation

The time duration of peritonitis before surgical intervention has a remarkable effect on the outcome of the patient. This is mainly due to the increased incidence of Preoperative septic shock in patients who have a delayed medical intervention. Delayed intervention causes overgrowth of the gram negative bacteria and facilitates synergistic poly microbial growth.

Associated chronic diseases

Patients who have chronic diseases such as Diabetes mellitus have an immune suppressed state leading to poor outcome

Multiple organ failure

Multiple organ dysfunction syndrome is defined as the presence of potentially reversible altered organ function involving two or more organ systems in acutely ill patients such that homeostasis cannot be maintained without medical intervention.

SCORING SYSTEMS IN PERFORATIVE PERITONITIS

Mannheim peritonitis index

BOEY score

APACHE II score

All the systems are mainly use to predict death in patients with perforation peritonitis. The most commonly used scoring system is the

Manheim peritonitis index which is a simple and effective system for assessing the patients.

Mannheim Peritonitis Index (MPI)

A total of 8 factors which affect the prognosis of the patients were found to be of significant importance in determining the prognosis of patients with perforation peritonitis. The information is collected at the time of admission and first laparotomy. The maximum possible score by applying MPI index is 47.

Those patients who had score more than 26 were deemed to be at high risk for mortality. Patients can be classified as having scored less than 21, between 21 and 29 and those with score greater than 29. Those with score of less than 21 had the least risk for developing morbidity and mortality, whereas those with score greater than 29 had a high mortality chance. Patients with score between 21 and 29 were designated as having intermediate risk.

Patient with less score can be treated with minimal risks, while patient with high score may need aggressive approach with critical care monitoring. It is peritonitis specific index. Other scores like Apache-II score are not specific for peritonitis.

MANHEIM PERITONITIS INDEX SCORING

Risk Factor	Weighting if present
Age >50 years	5
Female sex	5
Organ failure	7
Malignancy	4
Preoperative duration of peritonitis >24 h	4
Origin of sepsis not colonic	4
Diffuse generalized peritonitis	6
Exudate	
Clear	0
Cloudy, Purulent	6
Fecal	12

Definitions of Organ Failure

Kidney	Creatinine level >177 $\mu\text{mol/L}$ Urea level >167 mmol/L Oliguria <20 ml/h
Lung	PO_2 <50 mmHg PCO_2 >50 mmHg
Shock	Hypodynamic or Hyperdynamic
Intestinal obstruction	Paralysis >24h or complete mechanical obstruction

Advantages of MPI

- It is easily applicable
- It allows for intra operative risk assessment
- Surgeon can know about the possible outcome and the appropriate management can be decided.

Disadvantages of MPI

- Since It's a one time score post-op complications may change the results
- Peritonitis due to colonic perforation was considered to be of low risk. This may not be applicable uniformly.

MANAGEMENT

The most important aspect of treatment is that there should be no delay in the initiation of treatment as soon as a diagnosis of perforative peritonitis is made. Management can be divided into preoperative and operative.

PREOPERATIVE MANAGEMENT

Preoperative care consists of resuscitation, general support and antibiotic therapy. A study reviewed that it is preferable to delay surgery for a period of about two to three hours if the patient's general condition is poor and is haemodynamically unstable, during which time resuscitative measures may be carried out.

Pain management

Adequate analgesia is essential to make the patient comfortable. But it is advisable to delay the administration of analgesics until a diagnosis is made.

Hemodynamic status monitoring

There should be continuous monitoring of the vital signs. If necessary, arrangements for recording central venous pressure should be made.

Naso Gastric tube insertion

A nasogastric tube of preferably large calibre should be used to evacuate the gastric contents and decompress the GI tract. Oral intake is not allowed.

Urinary bladder catheterization

Bladder catheterisation serves to keep a check on the urine output. Hourly urine output measurement can be used as an indirect indicator of the circulatory status.

Intra venous Fluid resuscitation

In cases of peritonitis there is massive fluid sequestration into the third space. Therefore it is of paramount importance to maintain adequate hydration of the patient.

Oxygen support

Patients with perforation peritonitis may require ventilator support to combat hypoxia and acidosis.

Renal support

Patients should be hydrated adequately to prevent pre renal failure. Infusion of dopamine at renal doses may benefit by increasing perfusion to renal capillary bed.

Circulatory support

Inotropes such as dopamine and dobutamine may be necessary. But they must be administered only after adequate volume replacement is given and acidosis has been corrected.

Antipyretics

Anaesthetic complication increases in the presence pyrexia, especially when the core body temperature is greater than 38.5°C. Effective antipyretic agents should be used to control the temperature.

Antibiotic Therapy

It also essential for the controlling local spread of the intraperitoneal infection and bacteremia. Antibiotic regimen that is chosen should cover gram positive, gram negative and anaerobic microorganisms.

No standard protocol has been devised for the appropriate duration of treatment with antibiotics. The usual course of treatment is for around seven days. Depending upon the clinical scenario, patients may require prolonged therapy.

OPERATIVE MANAGEMENT

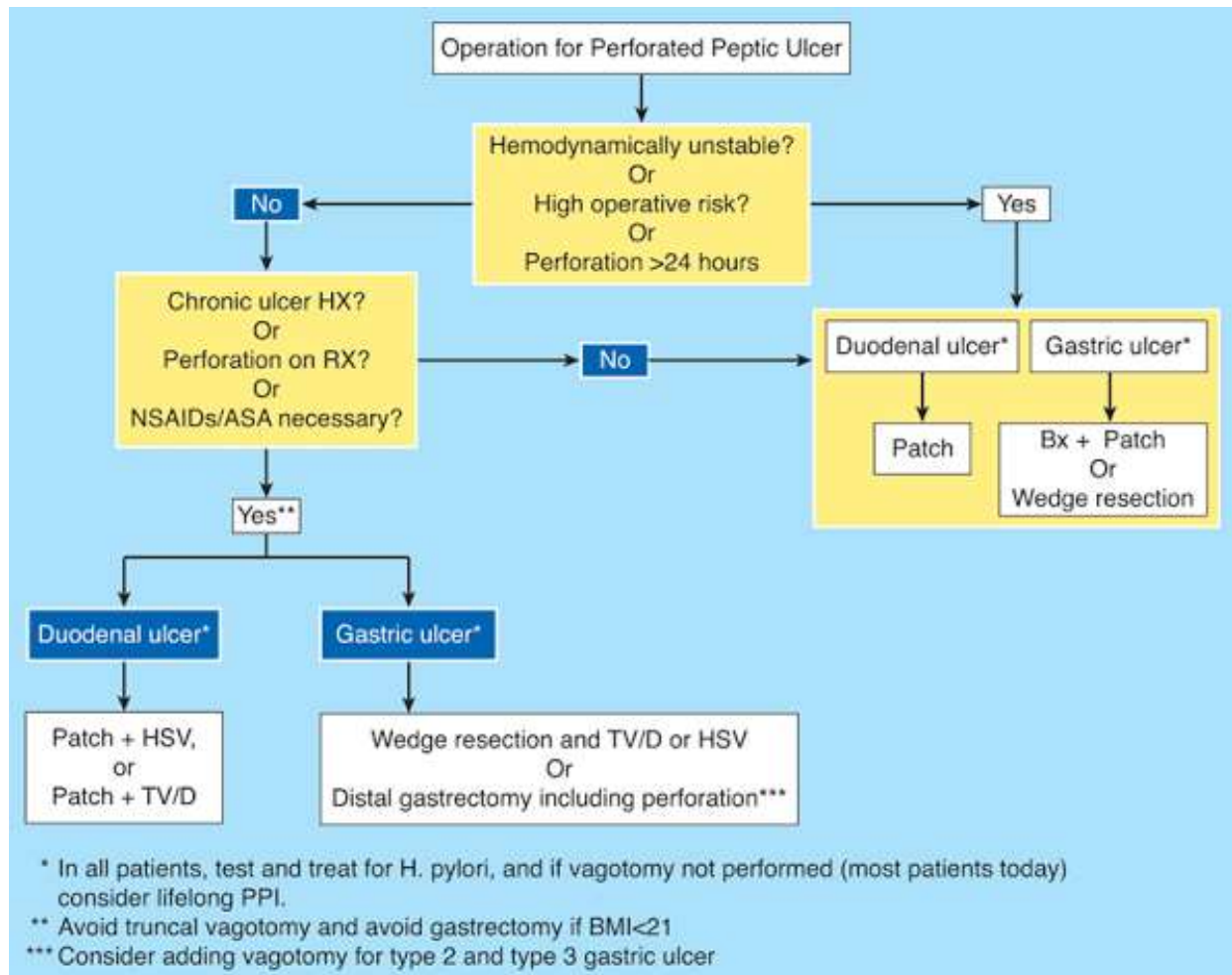


Figure 17 – Protocol For Operative Management Of Perforated Peptic Ulcer

Surgical management of peritonitis depends on the nature and location of the pathology. In cases of diffuse peritonitis, the dictum is to go for a midline incision, which makes it easier to identify the cause as well as to give proper lavage of the peritoneal cavity.

SURGICAL MANAGEMENT

Perforated duodenal ulcer

The proper management is simple closure of the perforation using an omental patch (Graham patch). The addition of a definitive ulcer operation can be considered in patients who have had a perforation for less than 24 hours, are hemodynamically stable, with minimum peritoneal soiling and have no obvious comorbidities that will limit the safety of an extended operation. Definitive ulcer surgery is especially to be considered in those patients that have a history of chronic peptic ulcer disease.

Perforated gastric ulcer

All gastric ulcer should be biopsied. Ulcers on the greater curvature and high in the gastric fundus are commonly managed by wedge resection of the stomach in order to simultaneously close the perforation as well as take biopsy

of the lesion. If it is clearly representative of a benign perforation, a patch can be applied for closure especially if it is present in a peptic area such as the prepyloric region.

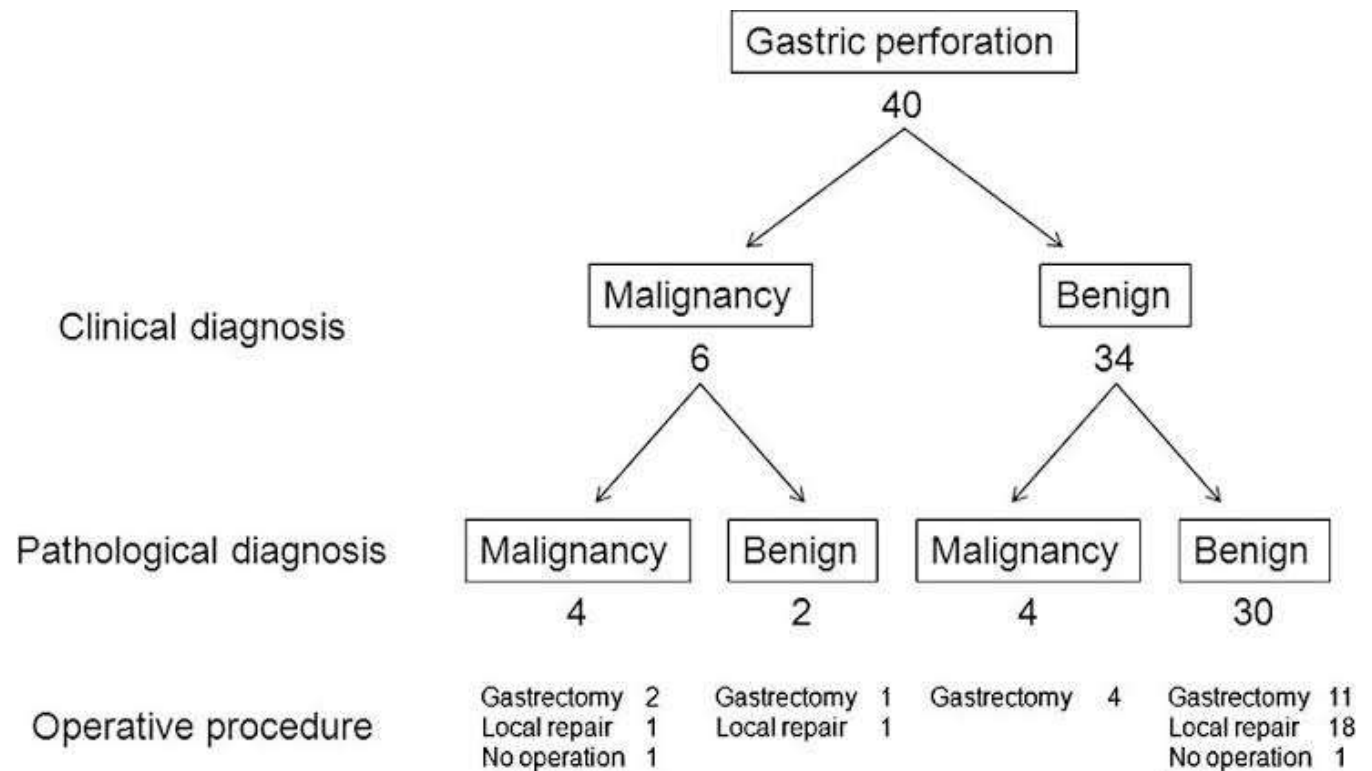


Figure 18 – Operative management of Gastric perforation

COMPLICATIONS OF PERFORATIVE PERITONITIS

- Septicaemia
- Bacterial Toxaemia
- Electrolyte imbalance
- Acute intestinal obstruction due to peritoneal adhesions.
- Residual abscesses within abdomen (Pelvic abscess, subphrenic abscess)
- Paralytic ileus
- Renal failure
- Cardiac failure
- Pulmonary complications
 - Bronchitis
 - Atelectasis
 - Pneumonia
 - Pulmonary embolism
 - Bronchopneumonia.
- Deep vein thrombosis.
- Burst abdomen.

MATERIALS AND METHODS

Aim of the study:

To study the effects and advantages of early enteral feeding in patients presenting with Gastric / Duodenal perforations in GRH, Madurai.

Materials Used: Naso Jejunal Tube

Methodology :

Patients presenting with gastric/ duodenal Perforation in GRH Madurai from November 2017 to September 2019 were recruited in this study. A total of 50 patients with gastric/duodenal Perforation were included in the study. The 50 patients were randomly divided into two groups each group consisting of 25 patients. The study group includes patients who were inserted with Naso jejunal tube intraoperatively and started with enteral feeding on POD 1. The second group includes patients who were started on oral feeds after appearance of bowel sounds and passage of flatus which will be around POD 5 to 7.

Following consent, a questionnaire will be filled to record the patient's demographic data, duration of perforation, comorbidities if any, time of medical

attention and relevant history. Then the patient's clinical status assessed and vitals recorded. Blood investigations done on admission are recorded.

Mannheim Peritonitis Index score calculated for each patients and the severity of presentation evaluated. All the patients were operated for gastric/ duodenal perforation and omental patch closure done with thorough peritoneal lavage. Patients among the study group were inserted with nasojejunal(NJ) tube of size 12FR & 120 cm intraoperatively through the same nostril in which Ryle's tube was inserted and the position of the nasoenteral(NJ) tube checked directly during the intraoperative period. Patients among the control group were done with omental patch closure and they are not inserted with naso jejunal tube.



Figure 19 - A patient with Duodenal perforation with inserted NasoJejunal (NJ) Tube

In the postoperative period patient among study group were started with enteral feeds through the NJ tube on POD 1. Initially the feeds includes 30ml /hr continuous infusion of ORS preparation via NJ tube. Later the feeds were stepped up both in quantity and quality. Usual feeds includes ORS preparations, boiled milk, protein powder dissolved in milk, home made starch preparations, white of egg with milk, powered cereals with water or milk, multivitamin syrups in therapeutic doses etc. Any patient develops Ileus, distension, nausea/ vomiting are withheld from enteral feeds for 24 hrs and then restarted. If intolerance persists iv prokinetics are administered and EN continued. Once the return of bowel movements and passage of flatus and improvement in general condition NJ tube removed and started with oral feeds.



NasoJejunum tube for insertion to provide enteral feeding

Patients in control group were started with oral feeds after passage of flatus and return of bowel sounds which will be usually on POD 5 to 7. Patients were monitored with vital parameters and biochemical investigations serially on POD 3 and POD 7. The clinical and investigation datas were recorded and outcomes of both the groups compared. Patients presenting with postop complications were treated accordingly and data regarding the outcome of patients were recorded and compared.

Clinical parameters assessed includes Pulse rate, BP, Respiratory rate. Biochemical parameters assessed includes Hemoglobin, WBC count, Urea, Creatinine, Na⁺ and K⁺ levels. All there parameters are recorded on admission, on POD 3 and POD 7.

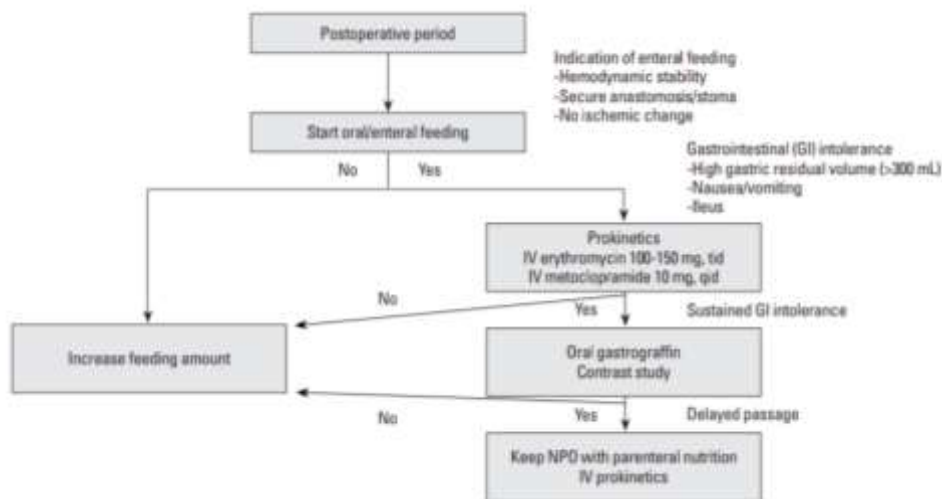


Figure 20 – Protocol for enteral feeding after emergency gastrointestinal surgery

Courtesy : Hyong Soon Lee et al., study.

OBSERVATION AND RESULTS

A total number of 50 patients were randomly divided into 2 groups with each group containing 25 patients. Incidentally all the patients belonged to male gender. One group (Test group) of 25 patients were started enteral feeding on POD 1 via Nasojejunal tube inserted intra operatively. Another group (control group) of 25 patients were started feeding conventionally after appearance of bowel sounds and passing flatus on POD 5-7.

Table 1 - Comparison of baseline variables between groups

	Study group				Control group				p value
	Mean	Std. Deviation	Median	IQR	Mean	Std. Deviation	Median	IQR	
Age	46.28	6.967	46	11	45.64	6.897	44	9.5	0.566
Duration of Perforation	1.52	0.653	1	1	1.48	0.714	1	1	0.696
Manheim Peritonitis Index Score	22.52	6.947	20	11	22.04	5.9546	20	11	0.984
Postop Ventilation	2.12	1.553	1.5	2.5	3	1.673	3.5	3.2	0.379

Mann whitney U test; Shows (*p<0.05)

In the study undertaken, there is no statistical significance in mean age, duration of perforation, Manheim peritonitis index score between the both groups. Among the study group 7 patients (28%) and among control group 6 patients (24%) presented with organ failure on admission

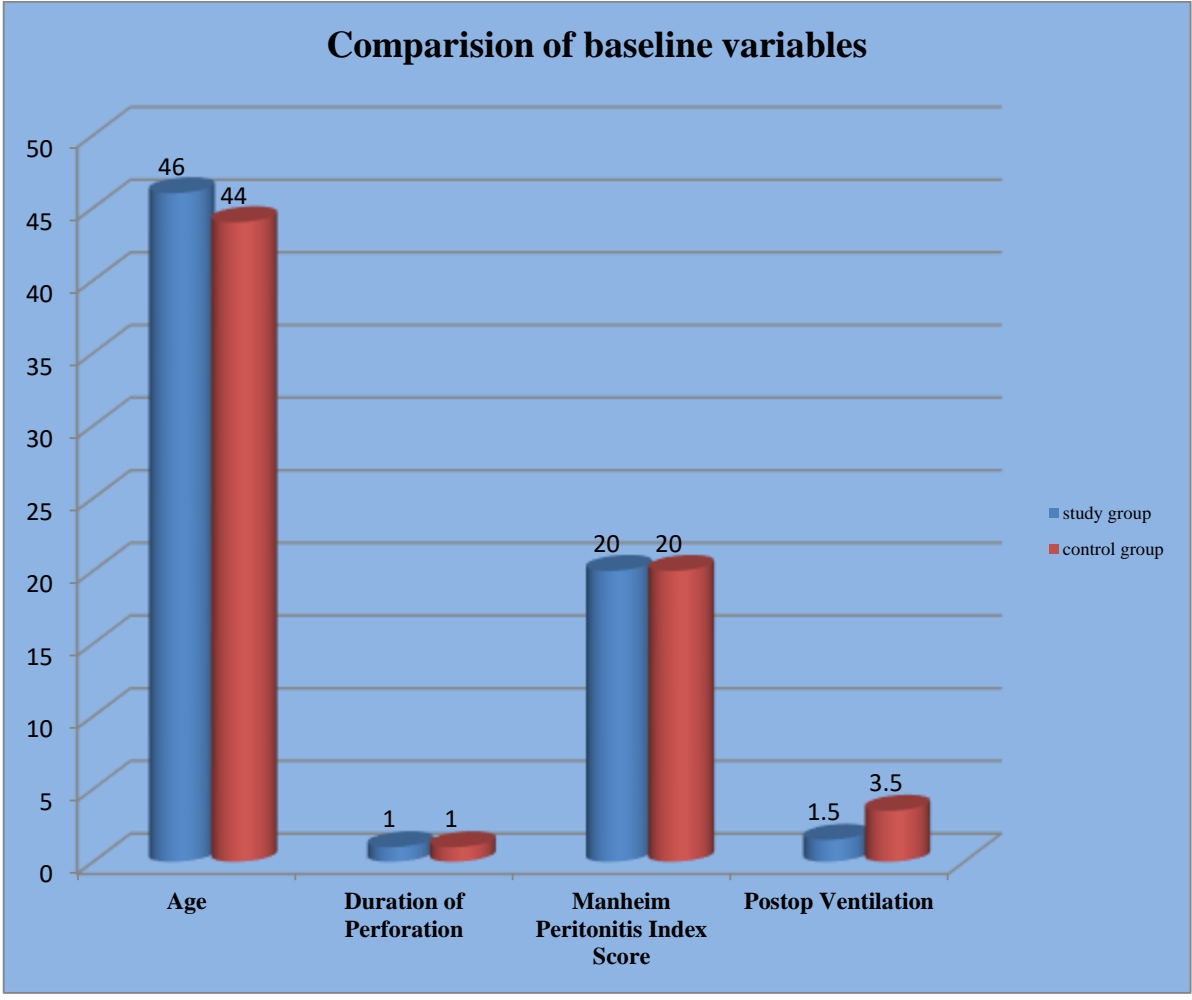


Chart 1 – Comparison of baseline variables among study & control groups

Table 2 – Comparison of Organ failure among both groups

	No. of pts with organ failure	No. of pts without organ failure
Study group	7	18
Control group	6	19

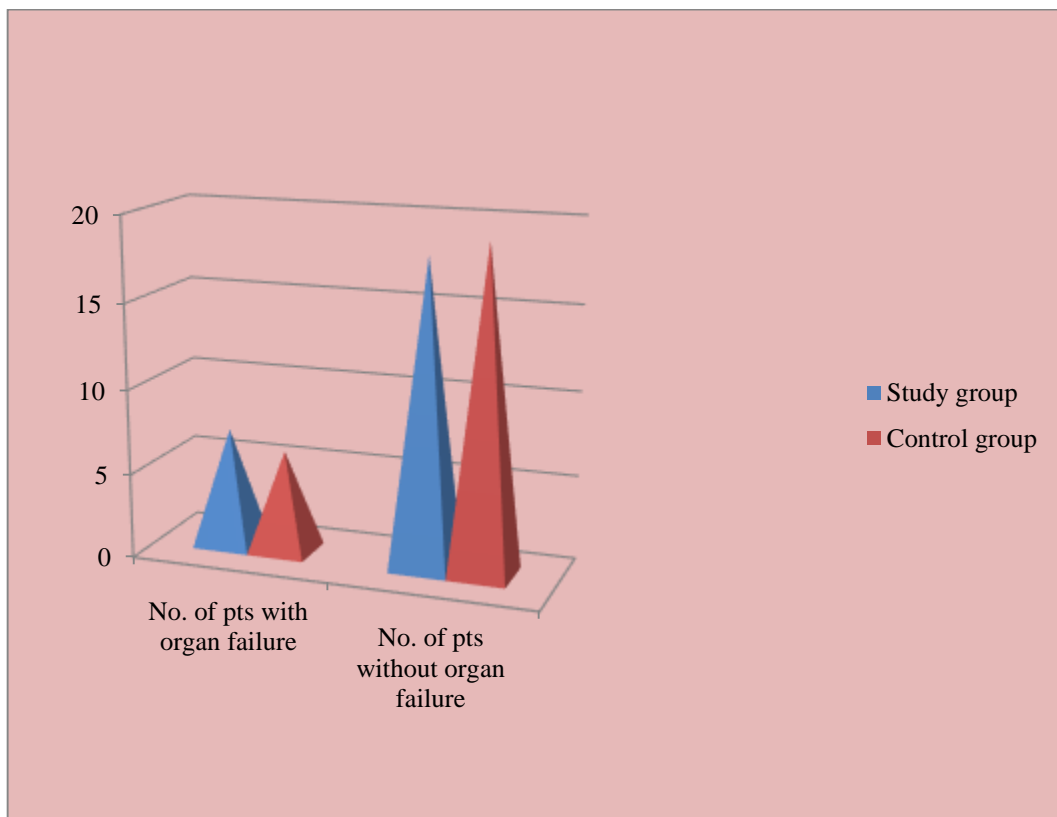


Chart 2 - Comparison of Organ failure among both groups

Table 3 - Serial comparison of Clinical parameters on admission, POD 3 and POD 7 between groups

	Study group (N=25)				Control group (N=25)				p value
	Mean	Std. Deviation	Median	IQR	Mean	Std. Deviation	Median	IQR	
Values on admission									
PR(/min)	110.6	9.206	107	11.5	114.48	11.292	109	18	0.193
SBP (mm Hg)	112.8	28.507	100	50	102.8	22.8254	100	20	0.242
DBP (mm Hg)	67.6	29.195	70	30	61.2	25.8715	70	20	0.256
RR(/min)	26.4	3.719	25	2	27.28	3.4098	27	4	0.265
Values on POD 3									
PR(/min)	90.8	9.009	88	8	102.12	12.015	98	11	0.001*
SBP (mm Hg)	116.8	18.868	120	40	106.8	18.1934	100	15	0.034*
DBP (mm Hg)	74.4	18.502	70	20	68.8	11.299	70	5	0.026*
RR(/min)	18.64	4.358	18	4	21.4	3.4881	21	4	0.001*
Values on POD 7									
PR(/min)	76.96	4.903	77.00	7	82.864	16.7397	86.000	7	0.001*
SBP (mm Hg)	120.4	10.65	120	2	120	15.119	120	2	0.627
DBP (mm Hg)	77.83	7.359	80.00	10	75.455	5.9580	75.000	10	0.288
RR(/min)	14.74	1.054	14.00	1	15.455	1.6541	15.000	3	0.151

Mann whitney U test; Shows (*p<0.05)

Above table depicts that all clinical parameters on admission were not revealed statistically significant difference in their baseline values ($p>0.05$). However on POD 3 all the parameters showed a significant difference between study and control group ($P<0.05$). On POD 7 there is statistical significance only in PR and other parameters show no statistical significance.

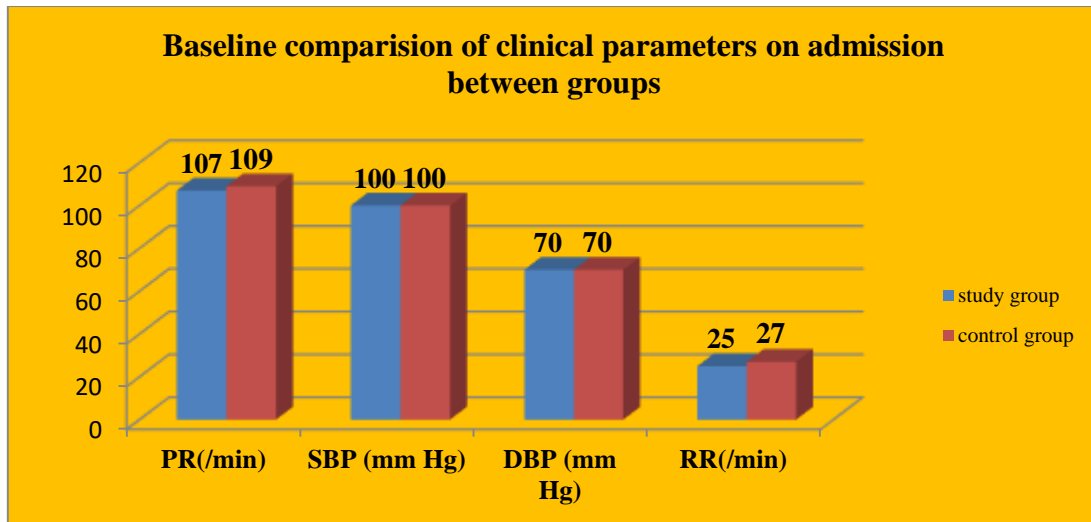


Chart 3 - Comparison of clinical parameters on admission between groups

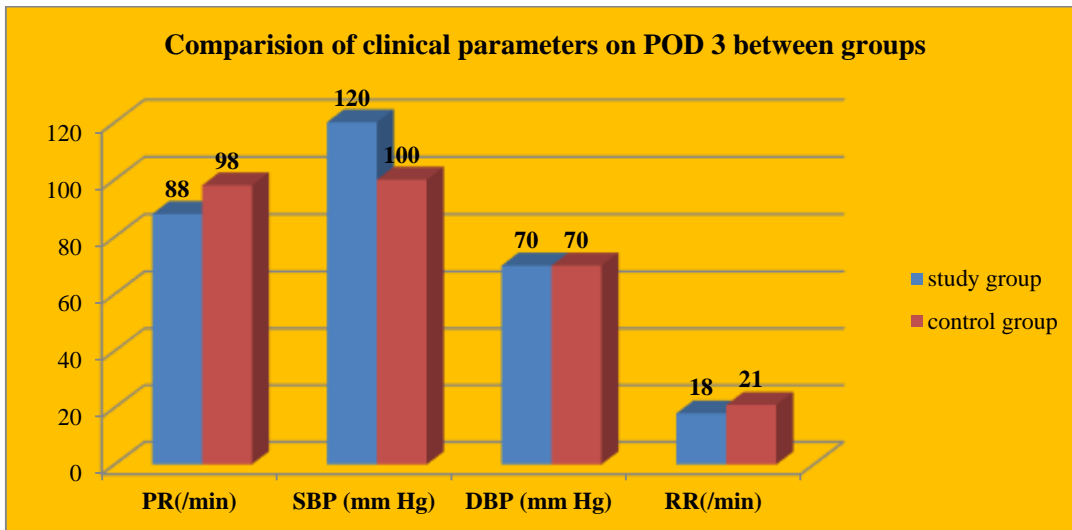


Chart 4 - Comparison of clinical parameters on POD 3 between groups

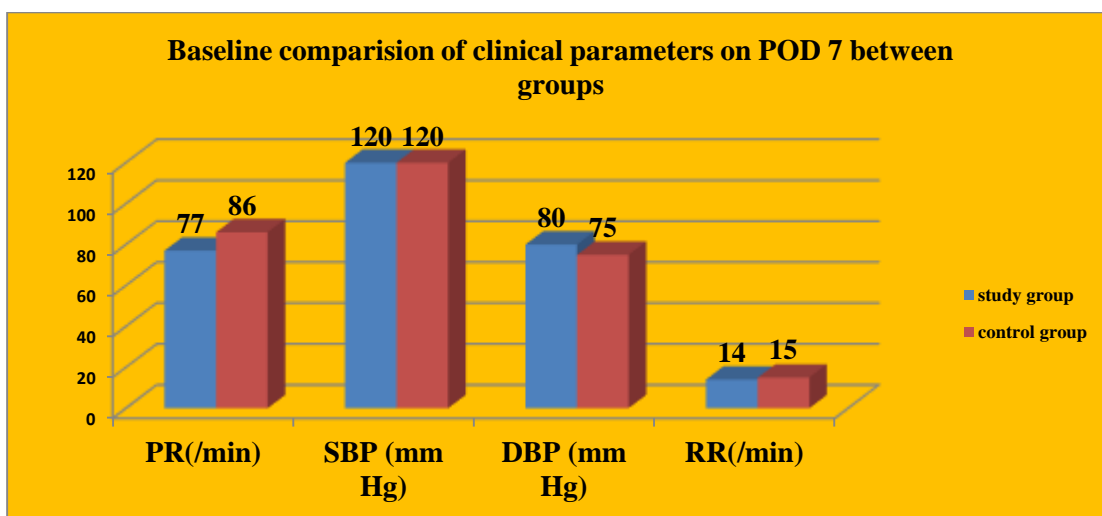


Chart 5 - Comparison of clinical parameters on POD 7 between groups

Table 4 - Serial comparison of biochemical parameters on admission, POD 3 and POD 7 between groups

Biochemical parameters	study group (N=25)				Control group (N=25)				p value
	Mean	Std. Deviation	Median	IQR	Mean	Std. Deviation	Median	IQR	
Values on admission									
Hb(g%) ^a	10.552	1.724606	10.6	1.25	9.928	0.6889	9.8	0.75	0.099
WBC Count (x10 ³ /mm ³)	9.83	2.699	9.1	3.45	9.984	3.4632	8.9	2.6	
Urea (mg%)	66.12	29.015	50	39.5	61.12	19.1818	51	28.5	0.647
Creatinine (mg%)	1.328	0.690724	1	1	1.196	0.5799	0.9	0.9	0.382
Na ⁺ (meq/L)	129.12	2.587	129	2.5	130.08	4.2615	129	3.5	0.428
K ⁺ (meq/L)	3.256	0.5116	3.2	0.2	3.18	0.3266	3.1	0.45	0.453
Values on POD 3									
Hb(g%) ^a	10.872	0.817272	10.9	0.6	10.14	0.6994	10.1	0.6	0.002*
WBC Count (x10 ³ /mm ³) ^a	9.396	2.958953	8.5	2.2	10.492	4.2898	9.1	5.2	0.298
Urea (mg%)	47.8	30.407	38	14.5	56.64	20.8524	45	32.5	0.003*
Creatinine (mg%)	1.044	0.5205	0.8	0.3	1.116	0.6263	0.9	0.8	0.914
Na ⁺ (meq/L) ^a	140.76	4.065	141	4	135.24	4.1761	134	6	0.001*
K ⁺ (meq/L) ^a	4	0.4	3.9	0.2	3.444	0.2973	3.4	0.5	0.001*
Values on POD 7									
Hb(g%)	10.61	.783	11.00	1	10.136	.7743	10.000	1	0.027*
WBC Count (x10 ³ /mm ³)	8.13	2.262	8.00	4	7.318	2.4955	6.500	2	0.145
Urea (mg%)	34.91	7.083	34.00	8	40.864	8.6866	39.000	10.5	0.001*
Creatinine (mg%)	0.73	.25	0.72	0.1	0.69	.35	0.70	0.1	0.681
Na ⁺ (meq/L)	141.43	3.0	141	5	140.	2.9	140	3	0.115
K ⁺ (meq/L)	3.6	1.9	3.8	1	3.4	1.3	3.6	1	0.285

Student t test ^a; Mann whitney U test; Shows (*p<0.05)

Above table depicts that all biochemical parameters on admission were not revealing any statistically significant difference (p>0.05) between both groups.

However on POD 3 Hb%, urea, Na, and K values showed a significant difference between both groups(P<0.05). WBC count and Creatinine levels remains same in both the groups. On POD 7 there is statistical significance only in Hb, & urea values& other values show no statistical significance.

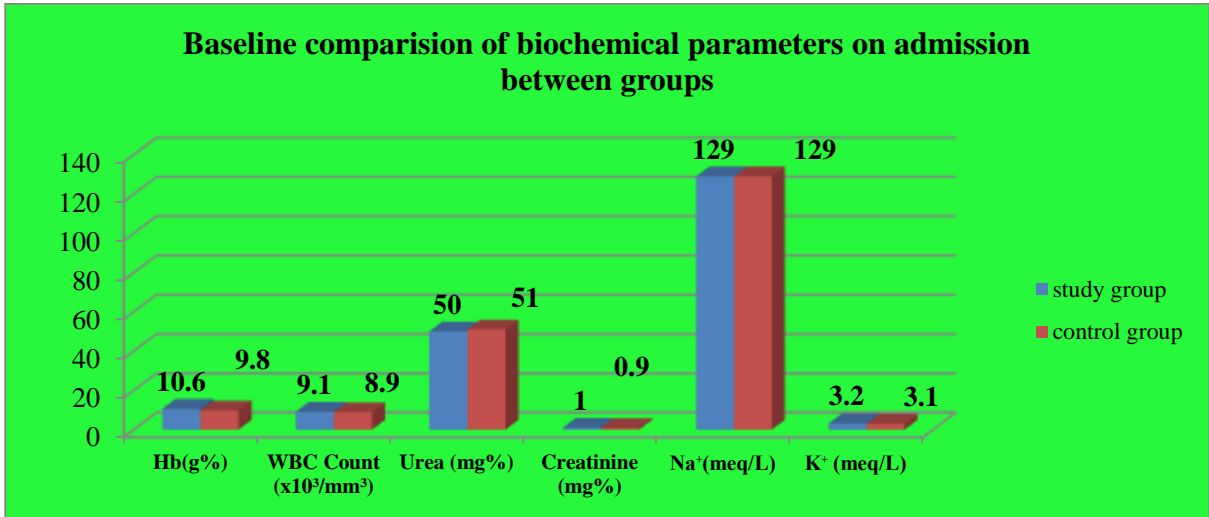


Chart 6 - Comparison of biochemical parameters on admission between groups

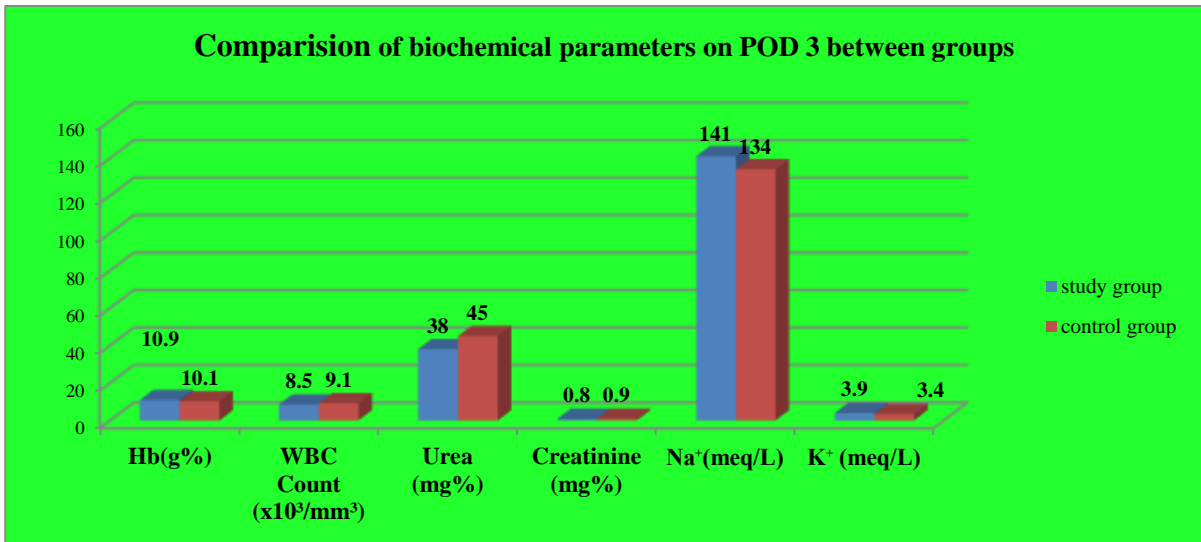


Chart 7 - Comparison of biochemical parameters on POD 3 between groups

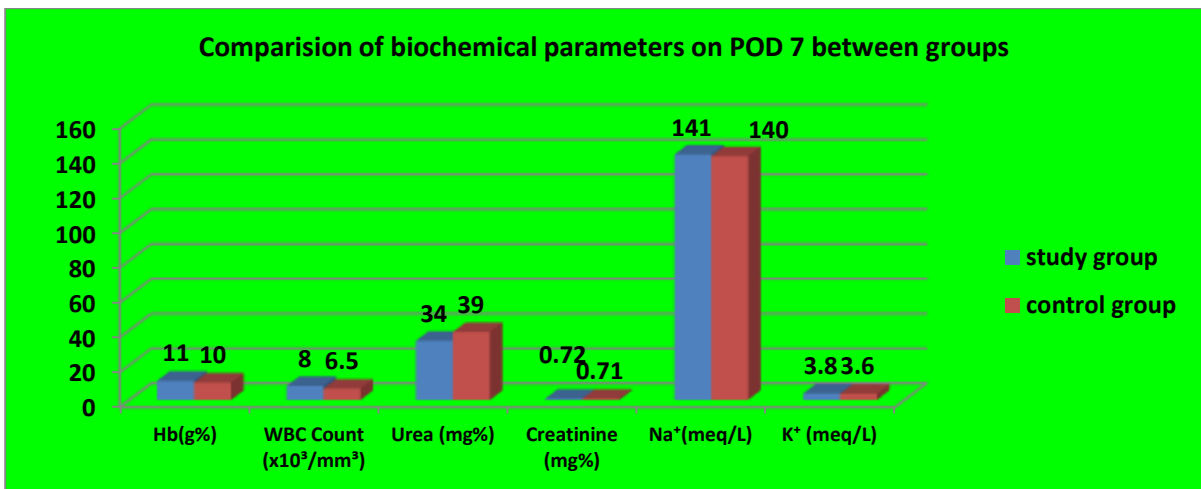


Chart 8 - Comparison of biochemical parameters on POD 7 between groups

Table 5 - Comparison of Post-operative monitoring findings between groups

Post-operative monitoring	Study group				Control group				p value
	Mean	Std. Deviation	Median	IQR	Mean	Std. Deviation	Median	IQR	
Feeding started on POD	1	0	1	0	5.318	0.5679	5	2	0.001*
Shift to ward on POD	1.5	0.887	1	1	2.636	1.4975	2	3	0.041*
Bowel sounds on POD	3.52	0.73	3	1	4.455	0.8004	4	0	0.001*
Ryles tube removed on POD	5.52	0.73	5	1	6.455	0.8004	6	0	0.001*
Passed Flatus on POD	4.52	0.73	4	1	5.5	0.8018	5	0	0.001*

Mann whitney U test; Shows (*p<0.05)

The patients among the study group are shifted from ICU to general ward on an average one day prior to patients among the control group. Bowel sounds appearance, Ryle’s tube removal, Passage of flatus on an average in the study group is one day prior to control group.

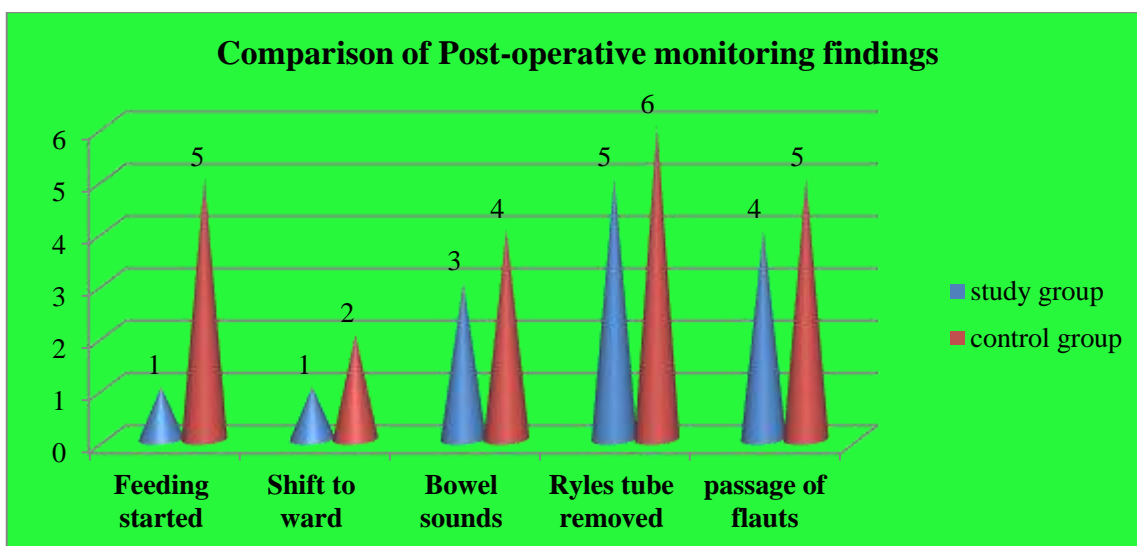


Chart 9 - Comparison of Post-operative monitoring findings

Table 6 - Comparison of Post op Major complications among test and control grp

Post OP complications	Test group		control group		P value
No complication	15	60.00%	3	12.00%	
Burst abdomen	1	4.00%	1	4.00%	
Pneumonia	1	4.00%	4	16.00%	0.021*
Septicemia	1	4.00%	2	8.00%	
Wound gaping	1	4.00%	3	12.00%	
Wound infection	4	16.00%	9	36.00%	
Mortality	2	8.00%	3	12.00%	

Chisquare test; *shows (p,0.05)

Among the study group 32% of them are with major complications whereas among the control group 76% are with major complications. This indicates there is significant reduction in complications among the study group.

Mortality among the study group is 8% and among the control group is 12% and thus there is no significant difference among the both groups regarding mortality.

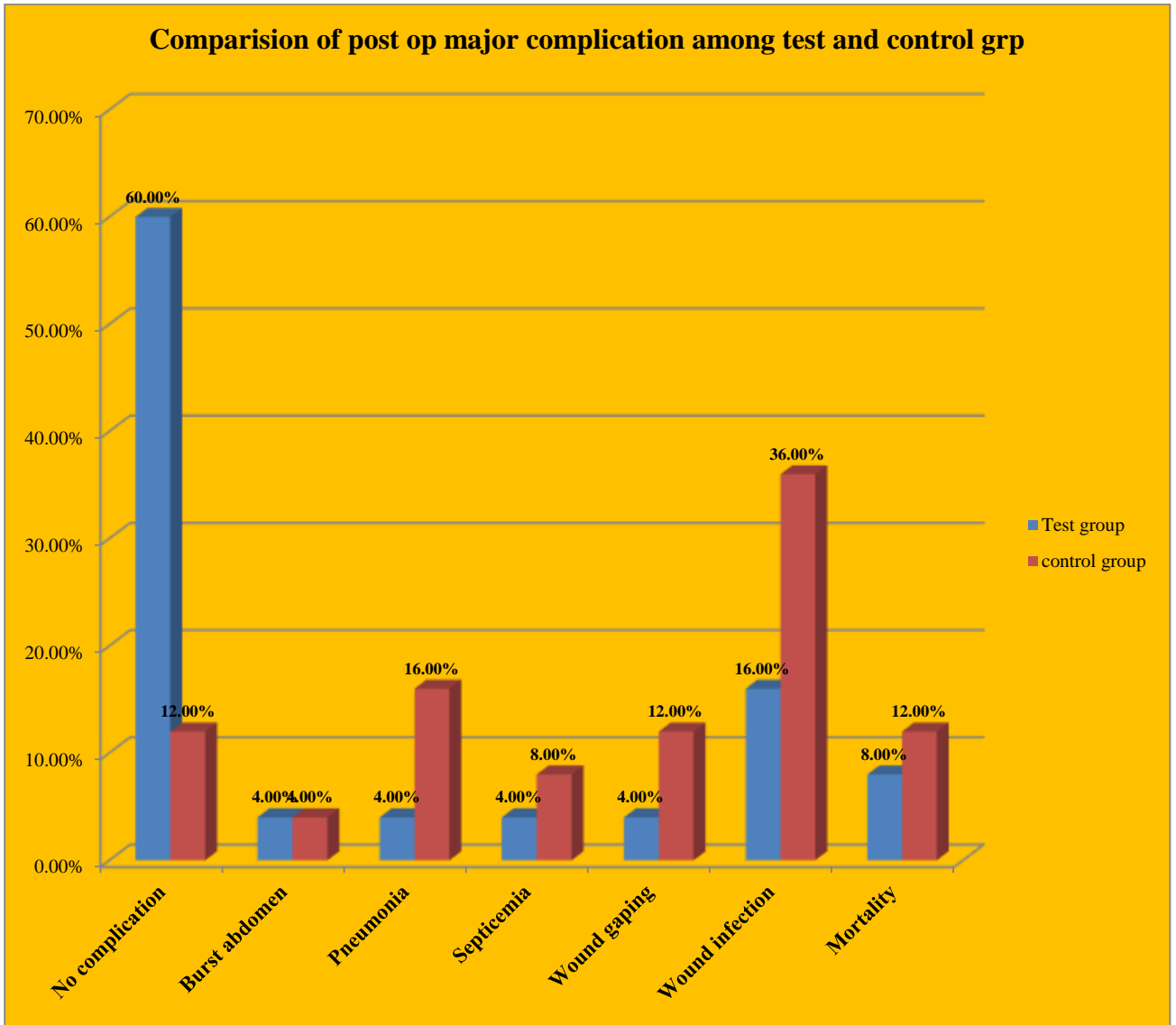


Chart 10 - Comparison of post op major complication among test and control grp

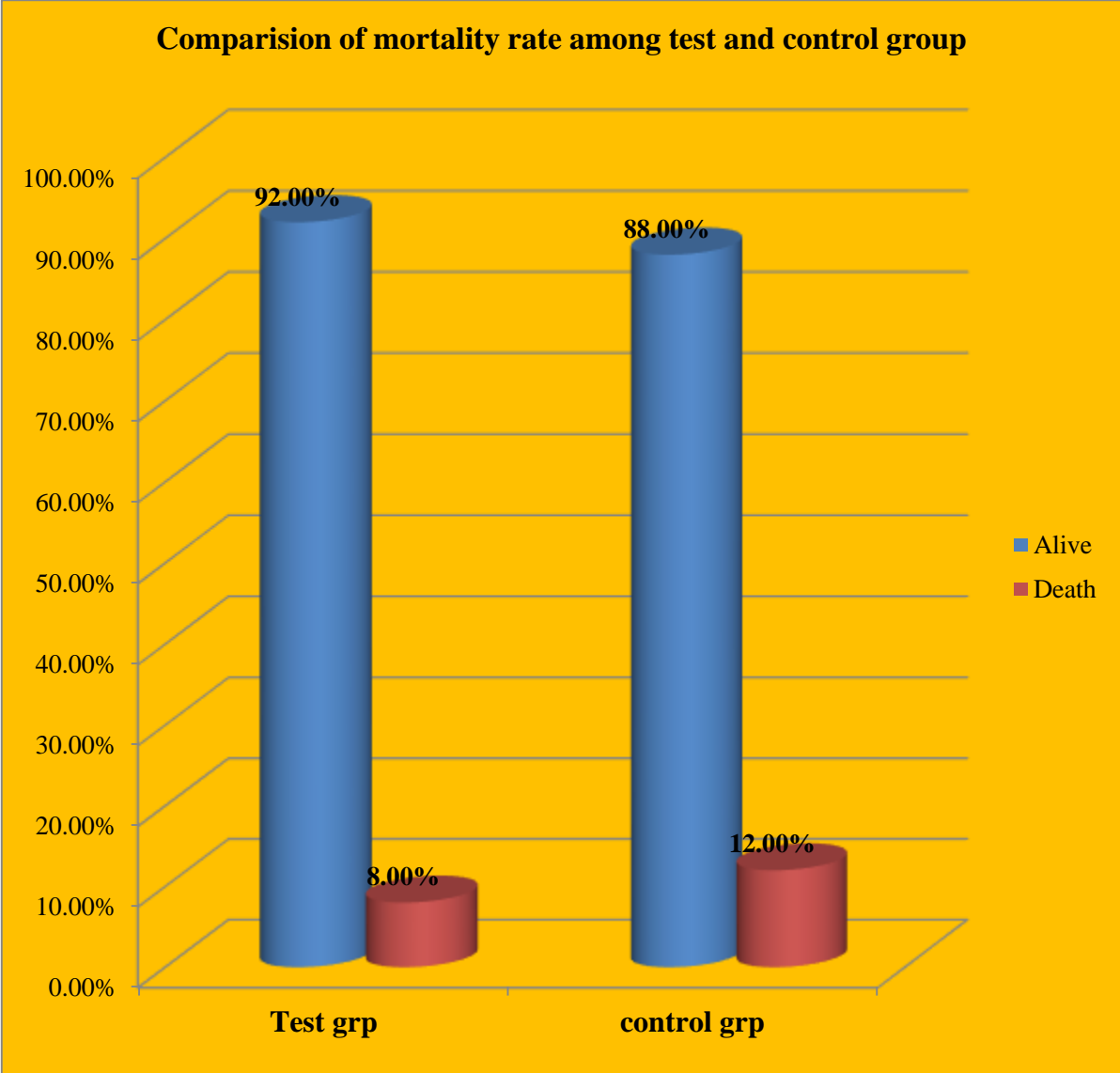


Chart 11 - Comparison of mortality rate among test and control group

Table 7 - Comparison of outcome

Day of Discharge or Death	Mean	Std. Deviation	Median	IQR	p value
Study group	13.78	3.089	13	2	0.003*
Control group	16.591	4.0315	15	4.75	

Mann whitney U test; Shows (*p<0.05)

Patients under study group got discharged on an average about 3 days prior to patients under the control group which indicates that there is significant reduction in length of hospital stay among the study group.

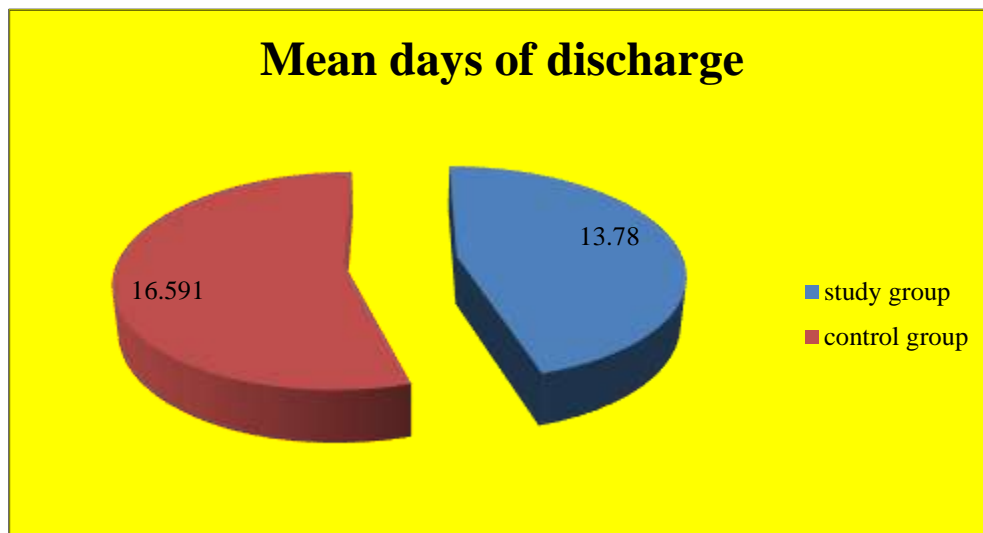


Chart 12 - Mean days of discharge

DISCUSSION

Gastro duodenal perforation is a common cause of acute abdomen presenting in the emergency department and surgery is the definitive treatment to cure the patients. Universally the most common procedure for Gastroduodenal perforation is Omental patch repair. Septic complications and mortality are high for Perforative peritonitis even after adequate medical care. In our setup Gastro duodenal perforation is commonly encountered and treated. Hence this study of Early Enteral Feeding (EEF) using Naso Jejunal tube in Gastic/ Duodenal perforation is carried out and its outcomes are observed.

Early enteral feeding has proven to be a safe and feasible method of providing nutrition to post operative patients who under go emergency GI surgeries. Lee HS, Shim H, Jang JY, et al. study in 2014 concluded that early feeding within 48 hours after emergency GI surgery may be feasible in patients without severe shock or bowel anastomosis instability(1). Singh G, Ram RP, Khanna SK. et al study in 1998 reported that immediate postoperative feeding through the feeding jejunostomy is feasible in patients with perforative peritonitis.(2). In our study none of the patients developed intolerant features of EEF and hence it is well tolerated in Gastro Duoedenal perforations.

Early Enteral Feeding (EEF) aids in normalization of the vital parameters and the biochemical values of the operated patients earlier than the late enteral feed patients. The ICU free days, Ventilator free days, infectious and septicemic complications, pulmonary complications are evidently reduced in EEF group of patients. Hyung soon Lee et al., study conducted in 2013 also reported in support of the above observation .(3).

The patients who received EEF recovered earlier than the LEF patients as observed by means of appearance of bowel sounds, passage of flatus, removal of Ryle's tube and shift from ICU to general ward. Moore et al., study conducted on 1999 reported in favour of the above observation.(5).

The length of hospital stay is considerably reduced among the patients under EEF group than that of the LEF group of patients. Lewis SJ et al., study in 2009 reported in favour of the above observation.(6)

In the study conducted there is no difference in the mortality rate among the study group and the control group. Malhotra et al., study conducted in 2003 is in favour of the results of our study.

The observations of our study reveals that the EEF group of patients who underwent emergency surgery for Gastro Duodenal perforations were benefited in recovery and also in cost effectiveness than the LEF group of patients who underwent similar surgery for Gastro Duodenal perforations.

CONCLUSION

Early Enteral feeding is a safe and effective intervention among Gastro/Duodenal perforation patients following surgical repair of the perforation in avoiding post surgical malnutrition of the patients. NasoJejunal tube placement is a easy and safe method for administering enteral feeds in post operative patients.

Early enteral feeding has a better outcome in patients operated for gastroduodenal perforation than conventional feeding of postoperative patients. Patients who were fed early through enteral route showed earlier improvement in both clinical and biochemical parameters than the other group of patients who were fed only after passing flatus on POD 5-7

The length of monitoring at the ICU is shortened in Early Enteral fed group. Also early enteral fed group showed earlier bowel movements and early passage of flatus and also early removal of Ryle's tube than the other group.

Post operative major complications are evidently reduced in enteral fed group compared to the other group. The length of hospital stay is shortened in the enteral fed group. Hence the cost of medical expenses is grossly reduced among enteral fed group both directly and indirectly.

Although the complication rates are lower in enteral fed group there is no significant reduction in mortality compared to the other group.

In any patient with Gastroduodenal perforation starting early enteral feeding via NJ tube is a safer and effective option which has direct impact on the outcome of the patient both in recovery and in preventing postoperative complications.

As the study undertaken contains a sample size of 50, high chances of sampling error are present. So further studies in a large scale, from different institutions and a longer follow up are recommended.

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PROFORMA

Name :-	I. P. No
Age :-	Unit
Sex :-	D.O.A
Occupation :-	D.O.S
Address :-	D.O.D
Phone no :	

PRESENTING COMPLAINTS

- 1) Complaints
- 2) H/o Present illness
- 3) Comorbidities
If so, duration of comorbidities
- 4) Treatment history
- 5) Mode of treatment

GENERAL PHYSICAL EXAMINATION

1. General survey
2. Body build and nourishment
3. Appearance
4. Attitude: Restless/ Quiet

5. Dehydration: Mild/ Moderate/ Severe/ Nil

6. Anaemia/ Jaundice/ Clubbing/ Cyanosis/ Lymphadenopathy/ Pedal edema

7. Pulse

8. Temperature

9. Respiratory rate

10. Blood pressure

SYSTEMIC EXAMINATION

- Cardiovascular system
- Respiratory system
- Central nervous system

ABDOMEN EXAMINATION

- Inspection
- Palpation
- Percussion
- Auscultation

Clinical Diagnosis :

Investigations : CBC , RBS, RFT, LFT, Electrolytes, Chest Xray, X Ray erect abdomen, USG abdomen and pelvis.

Manheim peritonitis index chart

Risk factor	Weighting if present
Age > 50 years	5
Female sex	5
Organ failure	7
Malignancy	4
Preoperative duration of peritonitis > 24hrs	4
Origin of sepsis not colonic	4
Diffuse generalized peritonitis	6
Exudates	
Clear	0
Cloudy, purulent	6
Fecal	12

Definitions of Organ failure

Kidney	Creatinine level > 177 $\mu\text{mol} / \text{L}$ Urea level > 167 mmol / L Oliguria < 20 ml / hr
Lung	PO ₂ < 50 mm Hg PCO ₂ > 50 mm Hg
Shock	Hypodynamic or Hyperdynamic
Intestinal obstruction	Paralysis > 24 hr or complete mechanical obstruction

CONSENT

ஆராய்ச்சி தகவல் அறிக்கை

மதுரை அரசு இராசாசி மருத்துவமனையில் வரும் நோயாளிக்கு ஒருஆராய்ச்சி இங்கு நடைபெற்றுவருகிறது. நீங்களும் இந்த ஆராய்ச்சியில் பங்கேற்கவிரும்புகிறோம் .

உங்களை சில சிறப்பு பரிசோதனைக்கு உட்படுத்தி அதன் தகவல்களை ஆராய்வோம் . அதனால் தங்களது நோயின் ஆய்வரிகையோ அல்லது சிகிச்சையோ பாதிப்பு ஏற்படாது என்பதை தெரிவித்து கொள்கிறேன் .

முடிவுகளை வெளியிடும்போது அல்லது ஆராய்ச்சியின்போதோ தங்களது பெயரோ அல்லது அடையாளங்களோ வெளியிடமாட்டோம் என்பதை தெரிவித்துகொள்கிறோம்.

இந்த ஆராய்ச்சியில் பங்கேற்பது தங்களுடைய விருப்பத்தின்பேரில் தான் நடக்கும். மேலும் நீங்கள் எந்நேரமும் இந்த ஆராய்ச்சியில் இருந்து பின்வாங்கலாம் என்பதையும் தெரிவித்து கொள்கிறோம்.

இந்த சிறப்பு பரிசோதனை முடிவுகளை ஆராய்ச்சியின்போது அல்லது ஆராய்ச்சியின் முடிவின்போது தங்களுக்கு அறிவிப்போம் என்பதையும் தெரிவித்துகொள்கிறோம்.

பங்கேற்பாளர் கையொப்பம்

ABBREVIATIONS

EEN – Early Enteral Nutrition

LEN – Late Enteral Nutrition

EN – Enteral Nutrition

MPI – Manheim Peritonitis Index

POD – Post Operative Day

EMR – Endoscopic Mucosal Resection

ESD – Endoscopic Submucosal Dissection

PN - Parenteral Nutrition

NRI – Nutritional Risk Index

CBC - Complete Blood Count

RR – Respiratory Rate

PR – Pulse Rate

LFT – Liver Function Test

SBP - Systolic Blood Pressure

DBP – Diastolic Blood Pressure

GERD – Gastro Esophageal Reflux Disease

GI - Gastro Intestinal

FJ - Feeding Jejunostomy

FG – Feeding Gastrostomy

PEG – Percutaneous Endoscopic Gastrostomy

PEJ - Percutaneous Endoscopic Jejunostomy

MASTER CHART

ANTI PLAGIARISM CHART



Urkund Analysis Result

Analysed Document: Early Enteral Feeding in Gastric Duodenal perforation.docx (D57276967)
Submitted: 10/19/2019 10:51:00 AM
Submitted By: kjbajipandian@gmail.com
Significance: 11 %

Sources included in the report:

Intestinal perforation.docx (D42419265)
PLAGIARISM.docx (D31220245)
<https://www.ncbi.nlm.nih.gov/books/NBK519554/>
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Instances where selected sources appear:

21

ANTI PLAGIARISM CERTIFICATE

CERTIFICATE - II

This is to certify that this dissertation work titled **“PROSPECTIVE STUDY ON ROLE OF EARLY ENTERAL FEEDING IN GASTRIC / DUODENAL PERFORATION“** of the candidate **Dr. J. Balaji Pandian** with registration Number **221711102** for the award of **M.S., Degree** in the branch of **General Surgery**. I personally verified the urkund.com website for the purpose of plagiarism Check. I found that the uploaded thesis file contains from introduction to conclusion pages and result shows **11 (Eleven)** percentage of plagiarism in the dissertation.

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ETHICS COMMITTEE CERTIFICATE

Name of the Candidate : Dr.J.Balaji pandian
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Course of Study : 2017- 2020
College : MADURAI MEDICAL COLLEGE
Research Topic : Prospective study on role of early
enteral feeding in Gastric/
Duddenal perforation
Ethical Committee as on : 08.04.2019

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