

Nutrition Support



Elias arteen FRCSI
General and colorectal surgeon
E_Arteen@hotmail.com

Surgical nutrition

- Weight loss is basic indicator of surgical risk.
- There is Six Fold increase risk of complication in malnourished patient prior to surgery.
- Surgical wounds ,anastomosis are less likely to heal.

Causes of malnutrition

- Reduced food intake

(Anorexia, Fasting , Pain On Swallowing, Handicap)

- Malabsorption

(Impaired Digestion, Impaired Absorption Or
(Excess Losses From The Gut)

- Modified metabolism

(Trauma, Burns, Sepsis, Surgery)

Assessments of body composition

- ❑ Loss of 10%- 20% of body Wt over 4-6 M , or loss 5-10% over 1 M period.
- ❑ Subcutaneous fat thickness (Pinch Test).
- ❑ Mid upper arm circumference .
- ❑ Localized or generalized fluid accumulation.
- ❑ BMI less than 18.
- ❑ Assessment of physiological functions.
- ❑ Hand grip strength.
- ❑ Blow test.
- ❑ Lymphocytic count .

Biochemical analysis

- Total body content of albumin is 350 gm.
- Rate of production is 10 Gm day.
- Half life is 21 days.

Prognostic nutritional indices

- Serum albumin less than 30 gm / L.
- Serum transferrin less than 220 mg / L.
- Serum pre albumin less than 160 mg / L.
- Failure of immune system to react to skin antigen.

Nitrogen balance

- 80% of nitrogen is lost in urine.
- 2- 4 Gm of nitrogen is lost in stool, skin.
- Nitrogen balance = (Dietary proteins x 0.16) _ (urine nitrogen +2 gm skin + 2gm stool) .
- Urine urea nitrogen = Urine urea mmol x 28.
- 10gm N = 62.5gm proteins = 300gm muscle mass.
- Nitrogen requirements =urinary nitrogen +20%.

- Calories = 150 k Cal per 1 Gm nitrogen(non catabolic).
- 135 k Cal per 1gm nitrogen(hyper catabolic).
- Cal requirements = (25 - 35 k Cal /kg/day).
- Nitrogen requirements = 0.2 gm - 0.3 gm N/kg/day.

Nutrition Support - Amount

Illness severity	Nitrogen gN/kg/day	Calories kcal/kg/day
Reduced intake	0.17	28.6
Mod injury/sepsis	0.26	34.3
Severe injury/sepsis	0.34	34.2 - 42.9

Frequency of malnutrition in GI surgical patients

- ▣ Hospital population 40%
- ▣ Patients undergoing GI surgery
 - ▣ **mild** 50%
 - ▣ **moderate** 30%

SO : All patient have major GIT surgery should be evaluated by dietitian 7-10 days before surgery.

Malnutrition and Outcome of major surgery

- Delayed wound healing.
- Impaired immune resistance.
- Weak muscles.
- Apathy.
- Depression.
- Loss of morale.

Impact of Malnutrition on Survival after GI surgery

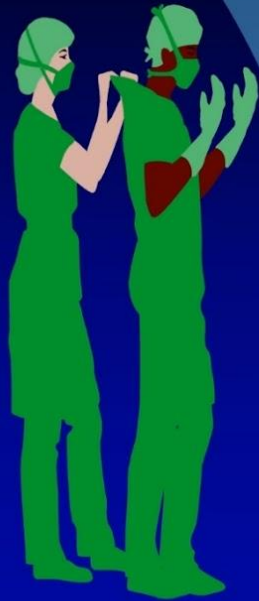


Peptic ulcer surgery

Weight loss >20%
8 x increase in post-operative mortality

Studley et al JAMA 1936

Impact of Malnutrition on Complications of GI surgery



GI Surgery

Pre-op severely malnourished
6 x increase in significant complications

Prevention of Malnutrition

- Avoid unnecessary fasting.
- Improve hospital food.
- Reduce surgical stress.
- **Minimal access approach.**
- **Optimal pain relief.**
- Provide support to those at high risk .

Nutrition Support and Outcome

- Reduces post-op weight loss.
 - Improves muscle function.
 - Reduces post-op complications.
 - Reduces length of hospital stay.
- **vs** —————
- Complications associated with NS.

**Who
should
receive
Nutrition
Support?**



Indications for Artificial NS

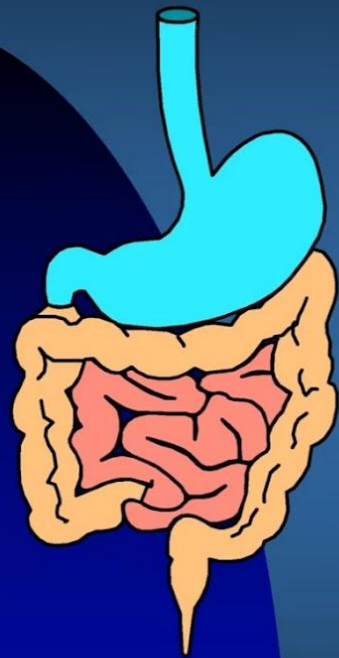
- Severe anorexia .
- Moderate or severe malnutrition but unable to eat sufficient orally.
- Pre-op patient with wt loss **>10% BW.**
- Unable to eat or swallow .
- Oral diet not anticipated for ≥ 10 days
- Intestinal failure.

Postoperative Parenteral Nutritional Support

- The effect of postoperative TPN on surgical outcome (meta-analysis)
 - increased Cx by 10% with no differences in the mortality.
- Sandstorm et al, higher Cx rate in prolonged NPO (> 14 days) .
 - *Postoperative nutrition support must be administered to the patients who are not expected to resume an oral diet for 7 to 10 days.*
 - *Routine use of postoperative TPN is not recommended and may increase septic complication.*

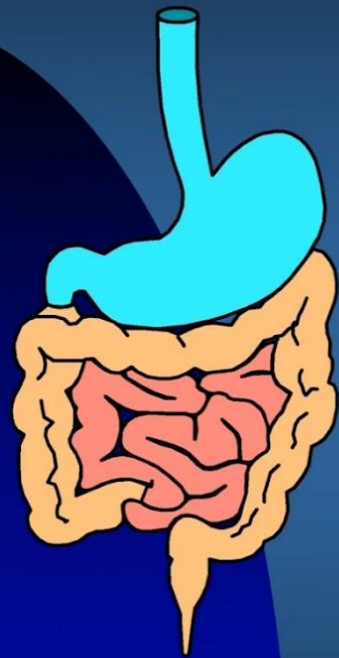
Contraindications to EN

- Intestinal obstruction.
- High output intestinal fistula.
- Intractable vomiting.
- Intractable diarrhea.
- Severe Malabsorption.
- Ischemic intestine.



**If the gut works,
Use It!**

**Anderson
and Steinberg 1986**



How
should
Nutrition
Support
be
given?



Enteral Nutrition is superior to PN with respect to

- Maintenance of intestinal structure and function.
- Outcome (infectious complications).
- Complications associated with NS.
- Cost.
- *N.B Enteral Nutrition is Contraindicated in Haemodynamic Unstable Patient.*

**How
should
Enteral
Nutrition
be
administered?**



Sip Feeds

- Increased intake between meals.
- *Partial esophageal obstruction.*
- Elemental if intestinal inflammation.

Tubes

Indications

- Inability to swallow
- Lack of palatability of liquid feeds
- Volume of feed

Methods

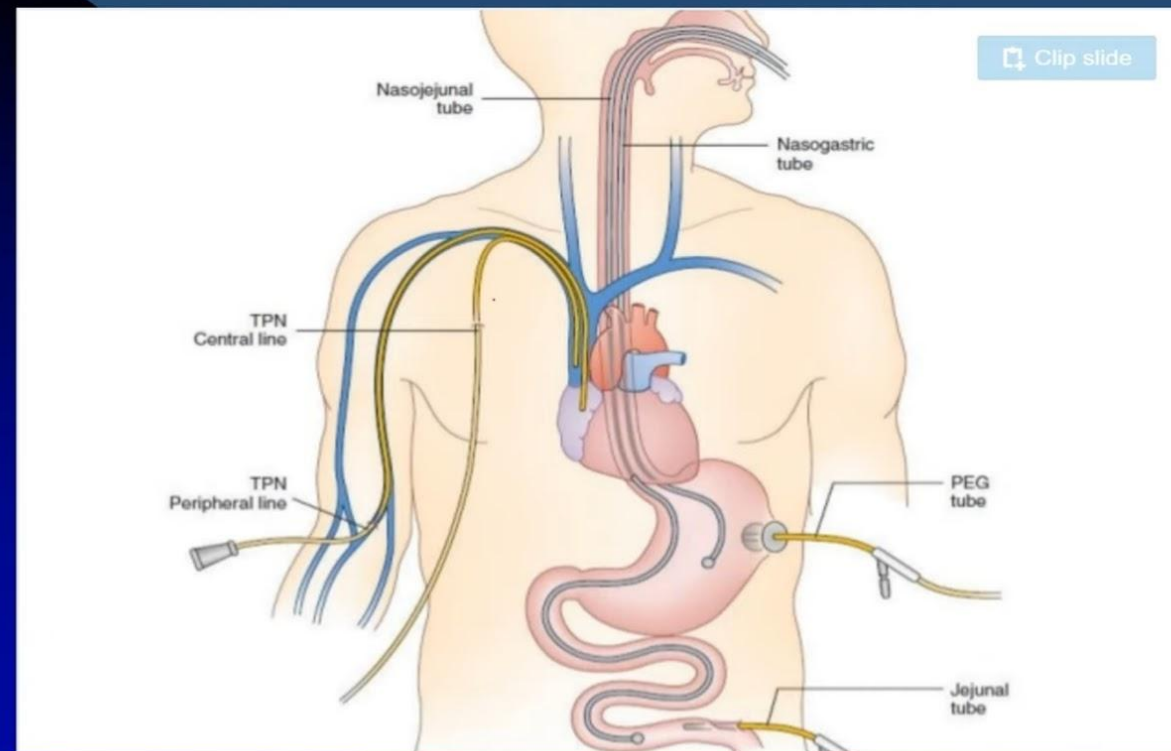
- Naso-enteric
- Percutaneous
- Gastrostomy
- Jejunostomy

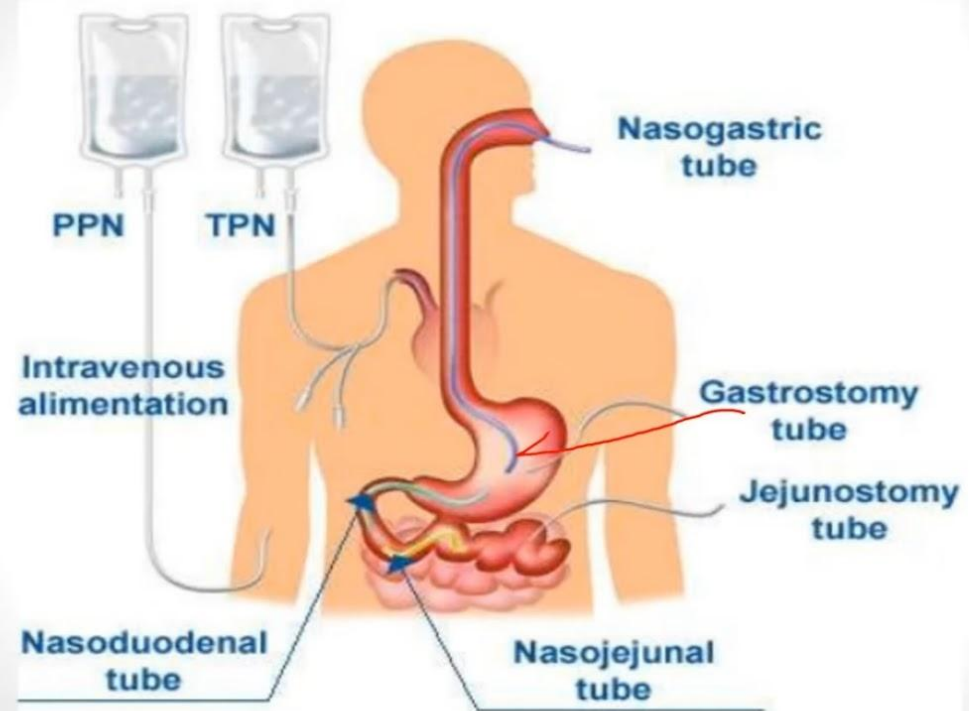
Fine Bore Nasoenteric Tube

- Comfortable
- Allow feed to be given
- Independent of appetite.
Independent of swallowing.
Without muscular effort
Continuously



Types of Tubes





Jejunostomy

If concurrent surgery
and
patient is malnourished
or likely to become malnourished

upper GI anastomosis
Relaparotomy
Trauma

Post pyloric is superior to pre pyloric feeding

PEG Tubes

Techniques

- Pull through
- Push technique
- Direct stab

Indications

- Neuro disorders
- Prolonged feeding

Contraindications

- Coagulopathy
- Peritonitis
- Ileus
- Anorexia Nervosa

PEG



Route & Enteral Nutrition

Up to 4 weeks

Pernasal fine bore
tubes

Naso-gastric or
nasal-jejunal

More than 3-4 weeks

Percutaneous
gastrostomy

Surgical gastrostomy

Surgical jejunostomy

Complications of Enteral Nutrition

Gastrointestinal
Tube-related
Metabolic



EN- GI Complications

- ▣ **Diarrhea**
- ▣ **Reflux**
- ▣ **Vomiting**
- ▣ **Abdominal distension**
- ▣ **Hyperosmolarity**
- ▣ **lactose deficiency**
- ▣ **Bacterial contamination**
- ▣ **Hypoalbuminaemia**

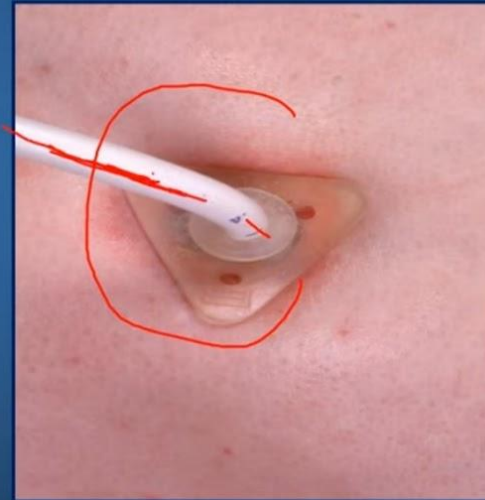
EN- Tube-related Complications

- Malposition
- Accidental removal
- Tube obstruction
- Skin ulceration or necrosis
- Tube breakage
- IV infusion of enteral diet



Complication of Gastrostomy

- Skin infections , necrotizing fasciitis.
- Leakage of gastric content to peritoneal cavity.
- Gastro cutaneous fistula.
- Mechanical blockage ,dislodgment.
- Diarrhea ,nausea , vomiting, bloating.
- Hyperkalemia , hyperglycemia, hypomagnesaemia.



How
do
you
assess
tolerance?



Jejunostomy

Advantages over gastrostomy

- ▣ Less stomal leakage.
- ▣ Gastric, pancreatic secretions are reduced.
- ▣ Less nausea , vomiting, bloating.
- ▣ Pulmonary aspiration is reduced.

Delivery of Enteral feed

- Bolus amounts 200-400 ml at 3 - 4hour interval.
- Continuous infusion 50-125 ml hour.
- Cyclic feeding 16h feed.

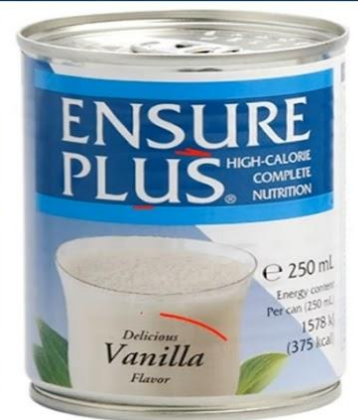
You should aspirate stomach before feed ,if
aspirate more than 100ml delay feed for 2 hours.

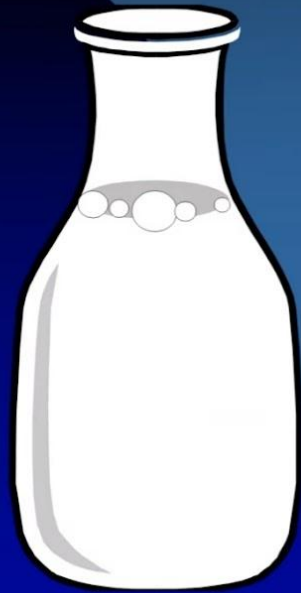
More than 400ml in 24 hour aspirate, stop feed.

Gastric emptying improve by

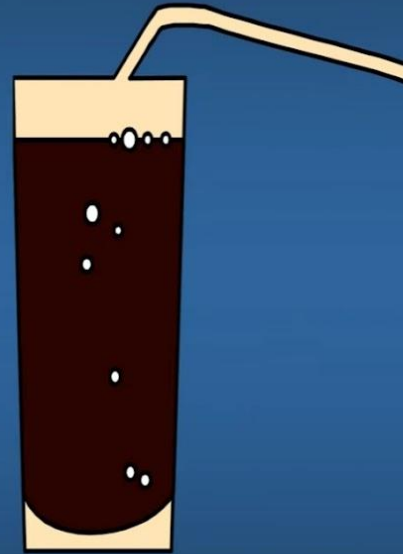
Cisapride , Erythromycin, metoclopramide.

250 ml = 250 k calorie
25 gm protein
Vitamins, trace elements





What
type
of
enteral
feed?



Types of Solutions for enteral nutrition

- Polymeric diets, nutritionally complete diet.
- Elemental diets
 - Short bowel syndrome.
 - Severe pancreatic insufficiency.
 - Special formulations.
 - Higher fat low glucose .
 - Increased branched amino acids, Low aromatic.

**When
should
Parenteral
Nutrition
be
administered?**



Indications for PN

**Malnourished
likely to become malnourished
GI tract
Not functional or not accessible.**

Specific Indications for PN

- ▣ Short Bowel
- ▣ Intestinal fistulae
- ▣ Prolonged ileus
- ▣ IBD
- ▣ Pancreatitis
- ▣ Sepsis
- ▣ Burns
- ▣ Multiple Trauma

**Parenteral
Nutrition**

**What
Route ?**



Parenteral Nutrition - Route

Peripheral

Short-term (1-4 /52)

- ▣ Marginally depleted
- ▣ Thrombophlebitis
- ▣ large fluid volumes
- ▣ lack of balance

Central

Longer term

- ▣ High requirements for fluids, or calories & nitrogen
- ▣ Internal jugular
- ▣ Subclavian
- ▣ Cut-down

Total Parenteral Nutrition TPN

Peripheral venous access

- TPN for short time.
- Avoid complication of central line.
- Central line is contraindicated.
- Sites used.
- Central vein thromboses.
- Clotting disorders.

Disadvantages

- Limit amount of nutrients used.
- Phlebitis in 50%.



How to increase life span of PL

- Narrow gauge needle for better mixing.
- Avoid sepsis.
- Large vein, frequent change of site.
- Add heparin , small dose of hydrocortisone.
- Vasodilator as transdermal GTN.
- Solutions osmolarity less than 600 mosmol L.

Intravenous nutrition in patient in catabolic state

constituent	Amount prescribed	Example of product	volume
Nitrogen	13.5gm	Vamin14	1000 ml
Glucose	250gm	Dextrose 25%	1000 ml
fat	100gm	Interlipid 20%	500 ml
Sodium	120mmol	Nacl 30%	1.97ml
Potassium	80mmol	Kcl 20%	8.36ml
Calcium	5mmol		
Magnesium	8mmol		
phosphate	17.5mmol		

Central Parenteral nutrition



- All in one bag 2.5- 3 L bag.
- Calorie to nitrogen 150:1.
- Glucose 50%.
- Fat 30 %.
- Proteins 20%
- Add water soluble vitamins (solivito).
- Fat soluble vitamins(vitlipid).
- Trace elements zinc.

**Parenteral
Nutrition -
What
composition ?**



Parenteral Nutrition - Composition

Water 2.5 3 l bag

Calories

Nitrogen

Trace elements

Vitamins

Dextrose 50%

Fat 30%

Proteins 20%

L-amino acids

Additance

MV 1-12

What about Complications?

I am dying with the
help of too many
physicians

Alexander the Great



Complication of central venous access

- ❑ Catheter related sepsis 40%. CLABSI
- ❑ Thrombosis of central vein 20%.
- ❑ Pneumothorax 5%.
- ❑ Major artery damage.
- ❑ Catheter problems.
- ❑ Brachial plexus injury.
- ❑ Thoracic duct injury.

Pragmatic approach to NS

- ▣ Nutritional support used in those Unable to tolerate oral diet for
 - 7-10 days (well-nourished)
 - 5-7 days (malnourished)
- ▣ Enteral nutrition **Safer** than Parenteral
- ▣ If post-operative **Delay predictable** then Enteral feeding tube inserted at operation.

Determine fluid and caloric needs

Caloric Distribution:

Carbohydrates	40 - 60%
Fat	20 - 50%
Protein	7 - 15%



Protein Needs

Start: 1 gm/kg/day
Goal: 3 gm/kg/day
Advance by 1 gm/kg/day
Maximum = 15% of total calories



Fat Needs

Start: 1 gm/kg/day
Goal: 3 gm/kg/day
Advance by 1 gm/kg/day
Maximum = 30 - 50% of total calories



Carbohydrate Needs

Start: 5 - 7 mg/kg/min
Goal: 10 - 12 mg/kg/min
Advance by 2 - 4 mg/kg/min
Maximum = 15 mg/kg/min or
50 - 60% of total calories

Bluffer's Guide to PN prescription

<u>Fluids</u>	30 ml/kg/day
Calories	30 kcals/kg/day
Fat	30% Total
Nitrogen	Calories/150 (g/day)
Na	1-2 mmol/kg/day (1-1.5)
K	1 mmol/kg/day (0.75-1)
Cl	1 mmol/kg/day

Per 1000 kcal

Ca 2.5

Mg 4

P 10

Nutritional pharmacology

- Nutrients given in excess of normal intake, modulate immune response, and function of normal cell.
- Certain amino acids, eg L- arginine, L- glutamine, branched chain amino acids.
- Essential fatty acids, n-3 linolenic, n-6 linoleic, and arachidonic acid.
- Polyribonucleotides, like polyadenylic polyuridylic (PAPU).