

Nutritional Support in Surgical Patients



Omar Alaldaroos MSc, MD, FRCS
Associate Prof. of General Surgery

At the end of this presentation students will be able to describe:

○ *The pathophysiology & importance of nutritional support*

○ *Aims of nutritional support measures*

○ *Indications & complications of different forms of nutritional support.*

Definition

Nutritional support is an adjuvant therapy used to support the surgical patients until they are able to sustain themselves with adequate spontaneous nutrition by mouth.

❑ The principles of nutritional Support

- Pre-operative nutrition is indicated in severely malnourished patients.
- Post-operative TPN is established within 5–7 days for a depleted patient and 7–10 days for a normal patient.
- Early Enteral nutrition avoid bacterial translocation.

❑ Indications for nutritional intervention in surgical patients

Indications for pre-operative nutrition:

- ✓ Severe malnutrition with a physiological impairment
- ✓ who cannot eat,
- ✓ in whom intake is insufficient for their needs,
- ✓ in whom the gastrointestinal tract cannot be used,
- ✓ and in those with accelerated losses

➤ **Factors affect**

- ✓ Poor intake (anorexia associated with illness, chronic illness, neglect),
- ✓ Malabsorption (pancreatitis, inflammatory bowel disease, following bowel resections)
- ✓ Increased requirements (malignancies, acute illness).

➤ The results:

A malnourished patient has a significantly impaired immune system

Delayed wound healing and

reduced strength that manifests it self as decreased ventilatory function.

CARBOHYDRATE

- *Provides 30-40% of calorie in a typical diet*
- *Storage : Liver- 70 G as glycogen - Just enough to last 12-24 hours*

Muscle- 120 G glycogen - not readily available

- *Essential for: RBC, WBC, bone marrow, eye , renal medulla & peripheral nerves*
- *Brain- normally uses glucose. Switches to fat in starvation.*
- *1 Gm. = 4 kcal*

FAT- ADIPOSE TISSUE

- *Provides 25-45% of calorie in a typical diet*
- *Fatty acids are functional unit*
- *Largest fuel reserve*
- *1 Gm. = 9kcal*

PROTEIN

- *Lean body mass- 13 Kg in a 70 Kg man*
- *Used for essential nitrogenous substances* (maintenance & growth)
- *Synthesis requires non protein calorie source*
- *Inefficient source of energy, 4kcal/ gm*

SIMPLE
STARVATION

↓ *energy expenditure*

↓ *nitrogen loss*

↓ *glucose use by brain**

↑ *use of fat for fuel*

↑ *lipolysis*

* *RBC, WBC, renal medulla,
neurons, muscles & intestinal
mucosa supply maintained*

POST-SURGERY

↑ *energy expenditure*

↑ *hormonal stimulation*

↑ *cellular activity*

↑ *metabolic rate*

↑ *gluconeogenesis*

↑ *protein breakdown*

↑ *nitrogen loss*

↑ *Lipolysis*

ADULT DAILY CALORIE REQUIREMENT= 30kcal/kg/day,

ADULT DAILY PROTEIN REQUIREMENT= 1g protein/kg/day.

Since 6.25 g of protein provide 1 g of nitrogen, the average nitrogen requirement is approximately 12g/day.

Energy requirements in adults

▪ *BMI 20-25= 20-25 kcal/kg/day*

BMI 26-29= 15-17 kcal/kg/day

▪ *Uncomplicated patients= 25 kcal/ kg/ day*

▪ *Complicated/ stressed pts. = 30-35 kcal/kg/day*

- **Electrolytes:***

Sodium - 1 - 1.5 mEq / kg / day

Potassium 0.7 - 1 mEq/ kg/ day

Calcium 0.2-0.3 mEq/ kg/ day

Magnesium 0.35-0.45 mEq /kg /day

** adjusted daily*

Fluid requirements

- *100 ml/kg/day – first 10 kg body wt.*
50 ml / kg /day- for next 10 kg
20 ml / kg /day- for each additional kg
- *1 ml of water / cal. / day*
- *Adjust in patients :*
 - *who cannot tolerate large volume*
 - *additional fluid loss*
 - *febrile or septic*

Assessment of nutritional status

Physical assessment:

- ✓ Loss of subcutaneous fat (triceps skin fold)
- ✓ Muscle wasting (quadriceps, deltoids), Mid arm muscle circumference
- ✓ Ankle oedema,
- ✓ Sacraloedema and
- ✓ Ascites.

Body mass index= $\text{weight}/\text{height}^2$.

Specialized Nutrients in Critical Care

Include supplemental branched chain amino acids, glutamine, arginine, omega-3 fatty acids, RNA, others

Immune-enhancing formulas may reduce infectious complications in critically ill pts but not alter mortality

If the critically ill patient is adequately fluid resuscitated, then EN should be started within 24 to 48 hours following injury or admission to the ICU.

Early EN is associated with a reduction in infectious complications.

Hyperglycaemia (up to 200-220 mg/dl) in critically ill patients considered acceptable

Enteral nutrition

Important in **maintaining gut barrier** function

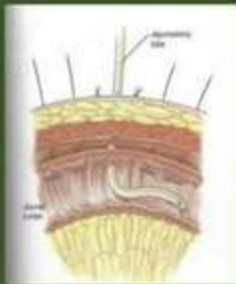
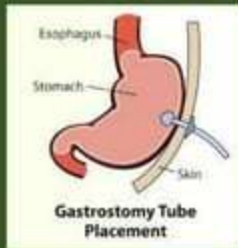
Administered **by mouth** or by a **fine-bore feeding tube** introduced under fluoroscopic control or using an endoscope.

Fine tubes can also be placed into the jejunum at surgery and feeding can begin in the recovery room after the operation is complete.

If **prolonged** enteral feeding is anticipated, a **gastrostomy** should be created, usually via the percutaneous endoscopic route.

Enteral feeding

- **Intermittent bolus**- suitable for stomach feeding
- **Continuous** - suitable for duodenum/ jejunum feeding
- **Initiate at a slow rate**, advance as tolerated
- **Initially dilute feeds**, gradually advance to full strength
- **Feeding in semi-upright position** (particularly for stomach feeds)
- **Maintain this position for 2 hours after feeds**
- **Aspirate** (stomach feeding) before next feed. >150ml- delay next feed.



- Indications for enteral nutrition

- ✓ Malnutrition with functioning gut

- ✓ Post-operative feeding

Advantages of enteral feeding

- *Simplicity*
- *Greater availability*
- *Lower cost*
- *Well tolerated*
- *Maintains gut integrity*
- *Fewer complications*

Contraindications to enteral feeding

- *Intestinal obstruction*
- *Paralytic ileus*
- *High output entero-cutaneous fistula*
- *Short bowel syndrome*
- *Severe acute pancreatitis*
- *Malabsorption*

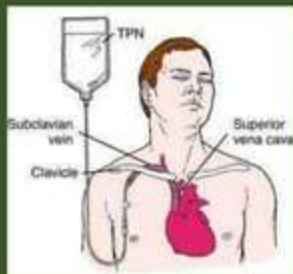
Complications of enteral feeding

- ***Mechanical:*** *tracheobronchial intubation, erosion
blockage, displacement, bowel perforation*
- ***Metabolic:*** *Fluid/ electrolyte imbalance, hyperglycemia
Refeeding / overfeeding syndromes*
- ***Gastrointestinal:*** *Diarrhea, vomiting, pain*
- ***Pulmonary:*** *Aspiration*
- ***Infection:*** *Tube site*

Total parenteral nutrition- TPN

Delivering predigested nutrients via hyperosmolar solution into venous system

- **TPN or CVN (central venous nutrition) :**
Subclavian / Internal jugular,
Catheter tip in SVC
Most commonly used



- **PVN (peripheral venous nutrition) or PPN:**
 - ✓ Solution of lower calorie, lower dextrose and higher lipid
 - ✓ Suitable for 7-10 days feeding

TPN - Indications

- ***Non-functioning GIT***

 - Short bowel syndrome*

 - Intestinal fistula*

 - Severe pancreatitis*

 - Intractable vomiting/ diarrhea*

 - Severe inflammatory bowel disease*

 - Developmental anomalies*

 - Multiple organ failure*

- ***Sever malnutrition (unable to take orally)***

Total parenteral nutrition

Approximately 50 kcal/kg body weight per day and 0.3 g of nitrogen as amino acids per kilogram per day is required to achieve gain in body protein.

Correct:

anaemia,

hypo-albuminaemia,

fluid and electrolyte abnormalities,

and deficits in trace metals.

TPN - Administration

- *Check all laboratory values before starting*
- *Nutrients given as 3in1 (common) or 2+1(lipid)*
- *Vitamin k given separately*
- *Heparin & insulin can be added*
- *Start with 1 L , increasing to desired level as tolerated*
- *Monitor- CBC, electrolytes, glucose , urea, creatinine, Ca., Mg., phosphorus, bilirubin, coagulation profile, ALP , ALT , AST*
- *Best managed by nutritional support team*

Home TPN

- *Long term nutritional support*
- *Majority have malignancy*
- *Special catheter- e.g. Hickman*
- *Subclavian vein through subcutaneous tunnel*
- *Support system*

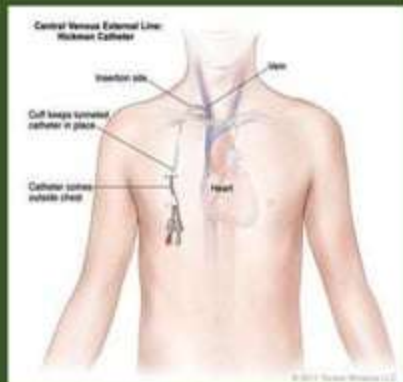
A Hickman catheter

Is a small, soft tube inserted in the neck or chest with several channels (called lumens) on the ends.



Several inches of the **catheter** are outside your skin.

A **Hickman catheter** is used for taking and giving blood, and giving medicines that need a larger vein (such as chemotherapy), and other fluids.



Postoperative Nutrition Support

- ❑ Introduction of solid foods depends on condition of GI
- ❑ Oral feeding may be delayed for first 24 – 48 hours post surgery until return of bowel sounds, passage of flatus or soft abdomen
- ❑ Traditional practice has been to progress from clear liquids, to full liquids, to solid foods

Hypocaloric Feedings

Recommended in : Class III obesity (BMI>40)

Refeeding syndrome Severe malnutrition

Trauma patients following shock resuscitation

Hemodynamic instability

Acute respiratory distress syndrome or COPD

MODS, SIRS or sepsis

Aggressive protein provision (1.5-2.0 gm/kg/day can

compromise immune function,

delay wound healing,

exacerbate muscle wasting,

and prolong the recovery of nitrogen balance and visceral protein levels.

☒ However, short-term hypocaloric feeding with 1-2 g of protein per kilogram per day, in the acute phase of postoperative stress, may reduce metabolic complications while supporting a reduction in negative nitrogen balance

THANKS