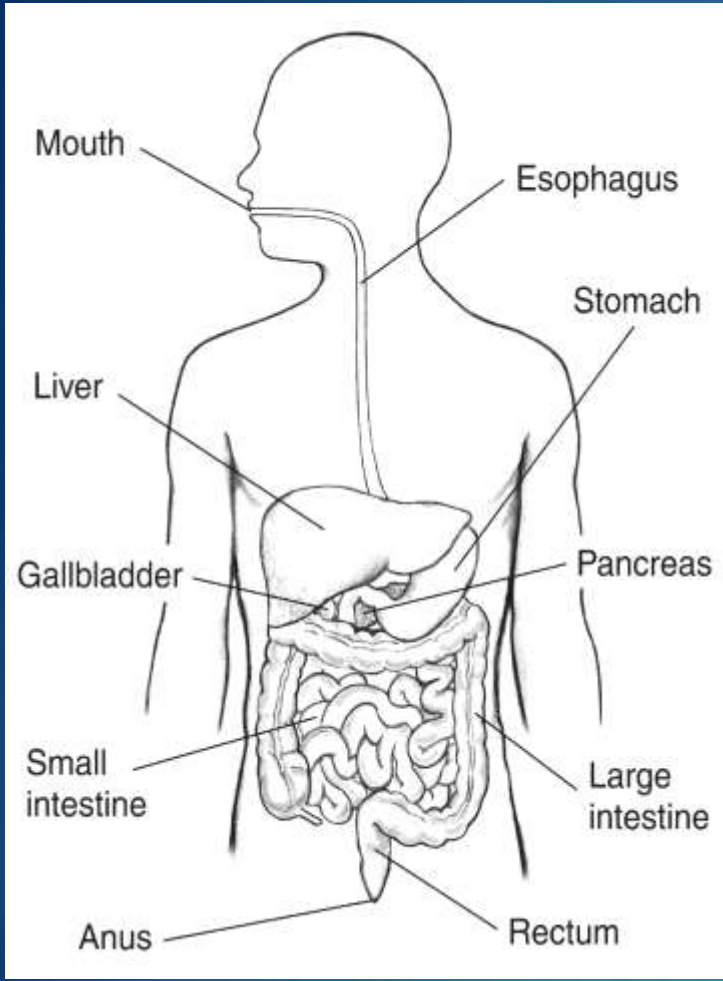
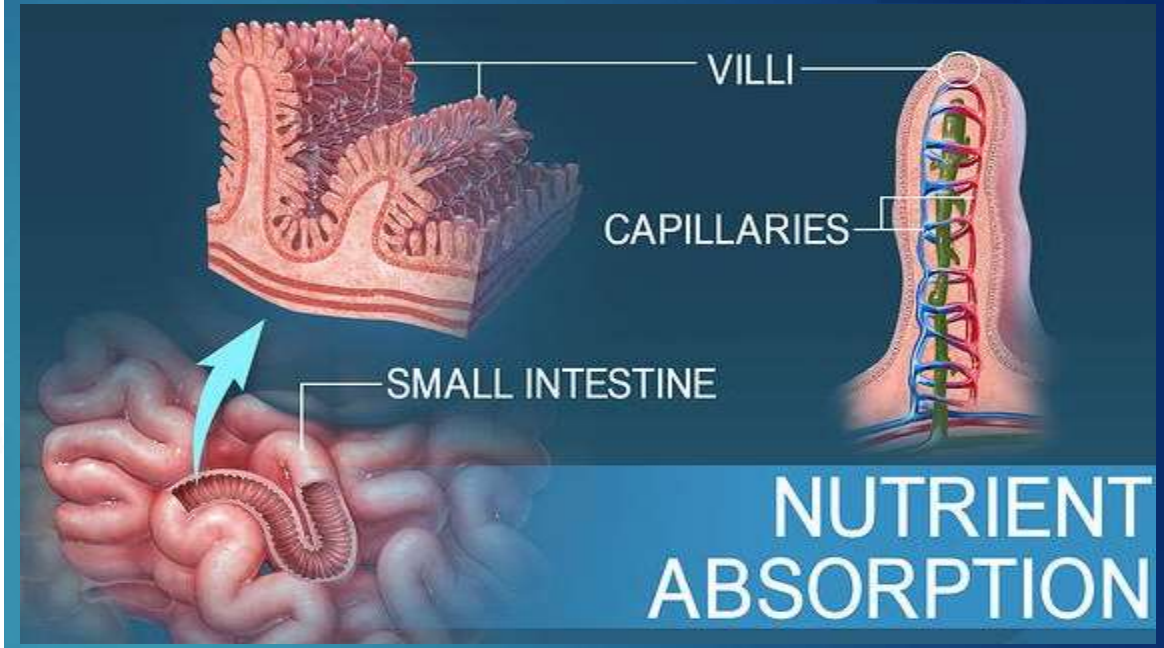
GI Nutrition

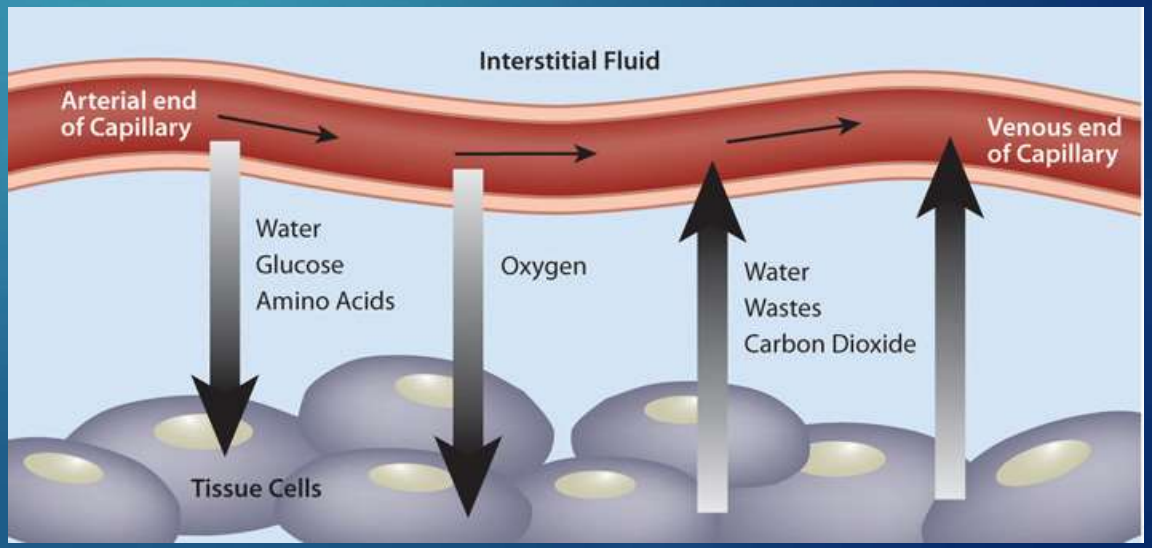
Done by:

- Abd alraheem Daragmeh
- Anas Adnan
- Osama Kamal
- Waleed Alsatari

Group:C11







Ingestion>

Digestion>

Absorption

Nutrition Support Therapy

- Nutrition Support Therapy:
- Nutritional support therapy is for patients who cannot get enough nourishment by eating or drinking.
- It is a component of medical treatment that can include oral, enteral, and parenteral nutrition to maintain or restore optimal nutrition status and health.
- The provision of enteral or parenteral nutrients is to treat or prevent malnutrition.

Nutrition Support Therapy contd.

when do Patients need it? IF they :

- Can't swallow
  -(Neuro- stroke, dementia)
  -(Develop- cerebral palsy)
  -(Obstruct- cancer, GERD, radiotherapy, esophagitis)
  -(Muscl- achalasia, scleroderma)
- Have problems with appetite
  -(Infections- gastroenteritis, cold, flu)
  -(Drug side effects- chemotherapy, antibiotics)
  -(Cancer)
  -(Psychological- depression, anorexia nervosa)
- Are severely malnourished
- Can't absorb nutrients through their digestive system

Nutrition Support Therapy contd.

Types:

- Enteral feeding
  - Oral feeding
  - Tubes feeding
    -PEG feeding
- Parenteral feeding

Enteral feeding: (Oral Feeding)

- The **Easiest** and **most preferred** method of providing nutrition.

Oral diets may be categorized as:

- Regular
- Modified consistency
- Therapeutic

Regular, Normal,& House diets

- used to achieve or maintain optimal nutritional status.
- Regular diets are adjusted to meet age- specific needs throughout the life cycle.
- Diet as tolerated (DAT): term that indicates that the gastrointestinal tracts is tolerating food and is ready for advancement to the next stage.
- Diet as tolerated is usually advised in relation to surgery.
- Once a surgical procedure is complete, individuals are given only liquids, such as water. The diet progresses to solid foods in the form of purees, chunks and finally a regular diet.

Modified consistency diet

- Provides food that have a texture that is easy to eat for people who find it difficult to chew.

Modified-consistency diets include:

- Clear liquid diets: any liquid you can see through.
  -Often used before tests, procedures or surgeries that require no food in your stomach or intestines
  (ex: before colonoscopy), or after surgery when oral intake resume after a prolonged period.
- Mechanically altered diets:
  contain foods that are chopped, grounded or soft Diets prepared in a blender provided in liquid form.
- Dysphagia diets:
  When you have dysphagia, you are at risk for aspiration(food getting in the airway).
  -dysphagia diet can help prevent aspiration, as it provide soft foods. https://www.saintlukeskc.org/health-library/dysphagia-diet

Clear liquid diets

Mechanically altered diets

Mashed

Choped

Grounded

Pureed

Therapeutic diet

- A therapeutic diet is a meal plan that controls the intake of certain foods or nutrients .
- modified or tailored to fit the nutrition needs of a particular person
- Used for the purpose of preventing or treating disease or illness.

Nutritional supplements; most are liquids , so:

- Easy to consume
- Are generally well accepted
- Tend to leave the stomach quickly
- A good choice for between-meal snacks

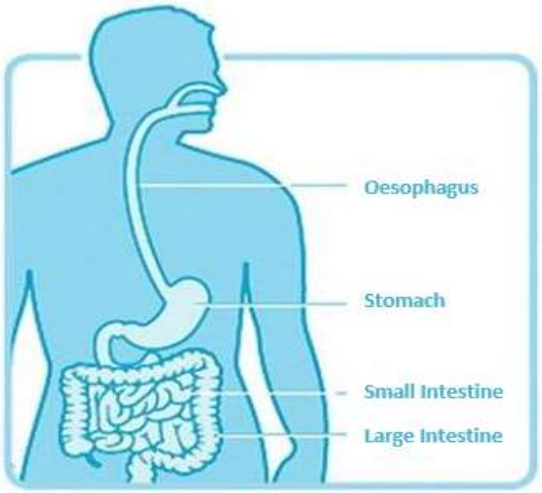
Modular formula

- Are incomplete liquid supplements that contain specific nutrients, usually a single macronutrient(carbohydrate, protein or fat), made to fit patient's specific needs.
- Less frequently used option

- Disadvantages:
  -Higher costs than standard formulas.
  -require intensive manhandling, creating an increased risk of microbiological contamination.

Enteral feeding: (Tubes Feeding)

Types of Feeding Tubes



NASOGASTIC (OR NG TUBE)

The feeding tube passes through the nose, down the throat and oesophagus and ends in the stomach.

NASOJEJUNAL (OR NJ TUBE)

The feeding tube passes through the nose, throat and oesophagus, continues through the stomach, and ends in the first section of the small intestine.

PERCUTANEOUS ENDOSCOPIC GASTROSTOMY (OR PEG TUBE)

The feeding tube is inserted directly into the stomach.

JEJUNOSTOMY (OR J TUBE)

The feeding tube is surgically inserted into the jejunum, the middle section of the small intestine.

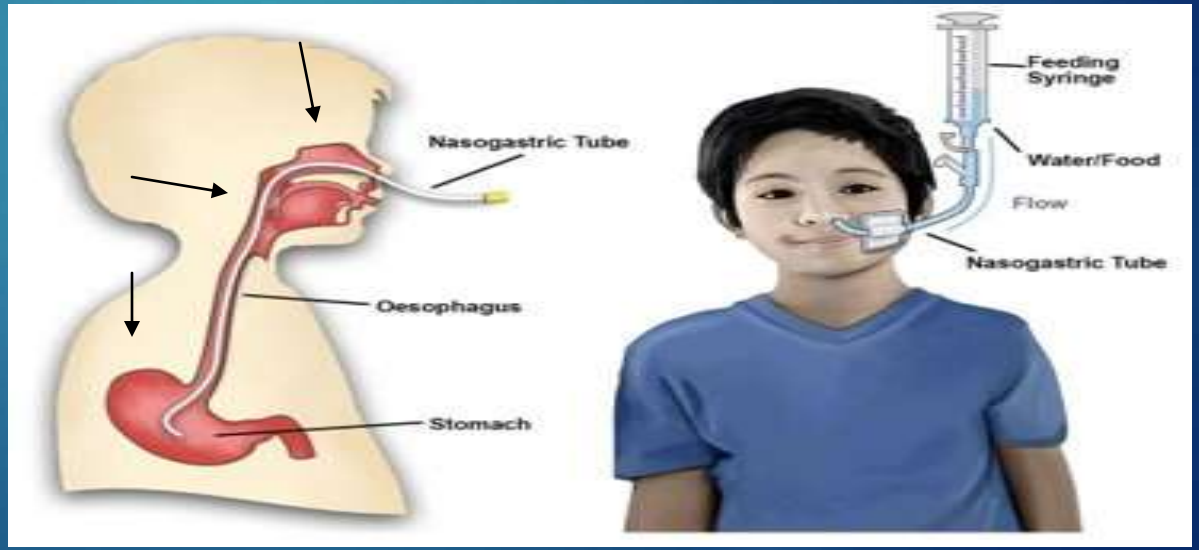
Both bypass same Gi structures

Nasogastric tube

- A way of providing nutrition for patients who are unable to consume an adequate oral intake but have at least a partially functional GI tract.

- enteral nutrition experience **less septic morbidity** and **fewer infections** and complications than patients who receive parenteral nutrition and **less cost**.

	Parenteral nutritional support *n* =48	
Complication	**Incidence**	**Density of incidence**
Complication	39.60%	6.07
Hyperglycemia	22.90%	3.51
Cholestasis	6.30%	0.97
Sepsis due to catheter	8.30%	1.27
Hypophosphatemia	12.50%	1.92
Duration in days: 652		



Indications

- patients who have:
- problems chewing and swallowing
- prolonged lack of appetite
- an obstruction, or altered motility in the upper gastrointestinal tract(bypass or suction)
- Are in a coma
- very high nutrient requirements

Contraindications

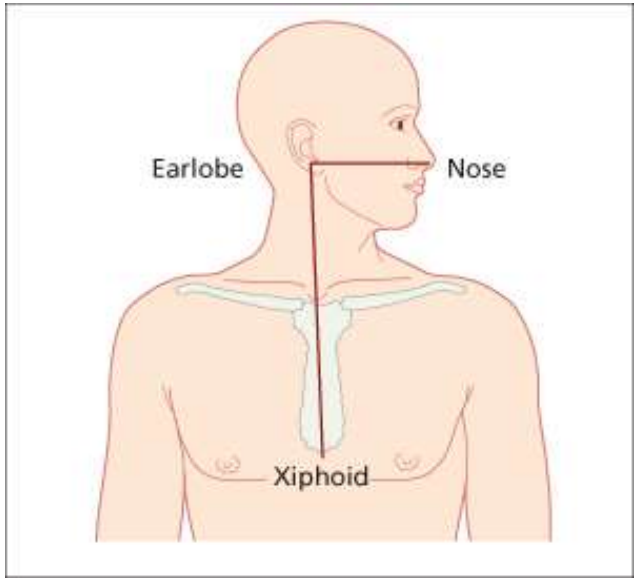
- when the gastrointestinal tract is nonfunctional
- Paralytic ileus .
- Intractable vomiting and diarrhea .

Complications

- Regurgitation and aspiration into bronchus.
- Blockage of NG tube.
- GI side effects: diarrhea is the most common
- Metabolic complications: hyperglycemia ,hypokalemia…

Procedure

- Upright position
- length measurement: tip of nose to ear then 5 cm below xiphisternum.
- use a lubricant and Insert a fine bore tube intranasally
- Confirm the position of tube in stomach by aspiration of gastric contents. (ph by indicator strip)
- Check by Xray if aspiration is unsuccessful or ph more than 5.5
- Kink the tube ,remove spigot ,connect the syringe to the tube ,put the formula feed in the syringe ,unkink tube to allow the flow ,flush with water.
- Don't allow it to be empty during feeding to prevent stomach distension by air
- https://youtu.be/WZvIw0SnYrE



Stop feeding if there is:

- difficulty breathing
- choking ,coughing
- restlessness
- drowziness or confusion
- Nausea or vomiting

	Nasogastric tube	Percutaneous gastrostomy
	Advantages	*Disadvantages*
Duration of feeding	Shorter	Longer
Cost	Cheaper	10 times more expensive than NGT
Nutritional status	Lower triceps skinfold thickness	Higher triceps skinfold thickness
Swallowing outcome	Quicker return to oral intake	Worse in long term. Longer time to oral intake
No significant differences in	✓ Complications rate ✓ Chest infection rate ✓ Overall quality of life ✓ survival	

Is it urgent? (2-3 days is okay)

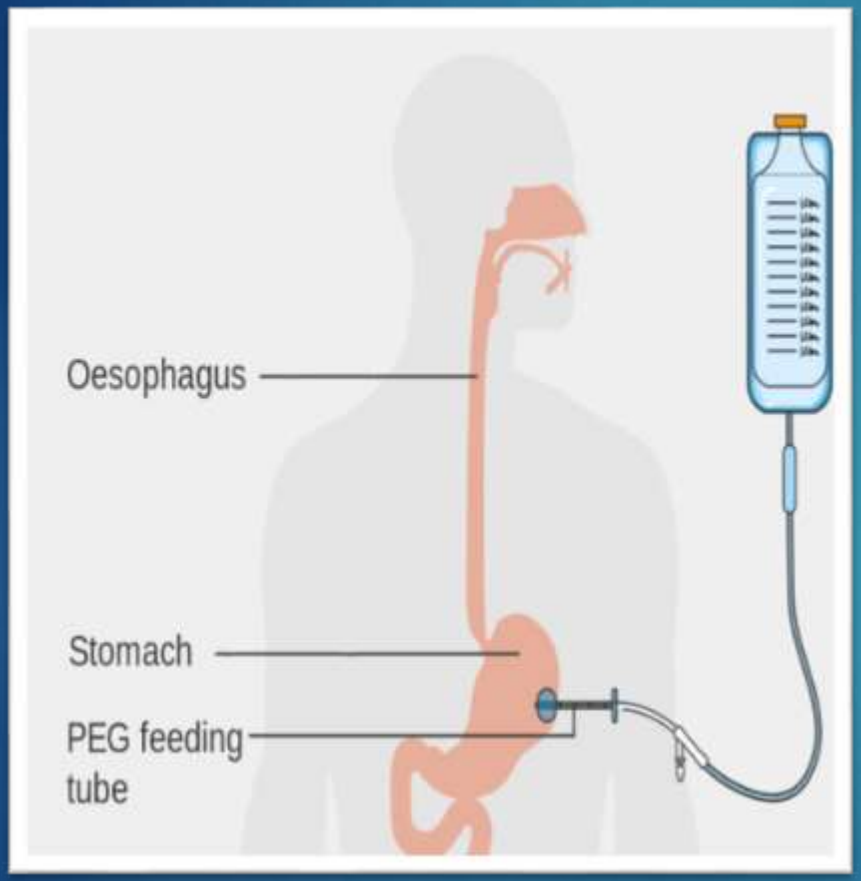
Is it necessary to deliver medications?

PEG feeding

Percutaneous endoscopic gastrostomy (PEG)

- feeding tube give food, fluids and **medicines directly into the patient's stomach** by passing a thin tube through the skin (abdominal wall) into the stomach.
- PEG feeding is used if there are problems with swallowing or if patients cannot eat or drink enough. PEG is usually the recommended method of help with feeding if the **bowel is working normally** .This method use the natural digestion process of the gastrointestinal tract ; and this provide enteral nutrition which is generally preferable to parenteral nutrition

PEG feeding contd.



Outside

Inside

Indications

- **Establishment of enteral access for feeding**

-Patients who are unable to move food from their mouth to their stomach are the ones who commonly need PEG tube placement.

-Many stroke patients, for example, are at risk of aspiration pneumonia due to poor control over the swallowing muscles; some will benefit from a PEG performed to maintain nutrition.

-In addition, patients who have trauma, cancer, or recent surgery of the upper gastrointestinal (GI) tract or the respiratory tract may require this procedure to maintain nutritional intake.

-used a lot in palliative care

- **Gut decompression(symptomatic treatment)**

-in patients having abdominal malignancies causing gastric outlet or small-bowel obstruction or ileus or cases of gastric volvulus.

Contraindications (absolute)

- Uncorrected coagulopathy or thrombocytopenia.
- Severe ascites.
- Hemodynamic instability.
- Sepsis.
- Intra-abdominal perforation.
- Active peritonitis.
- Abdominal-wall infection at the selected site of placement.
- Gastric outlet obstruction (if the PEG tube is being placed for feeding).
- Severe gastroparesis (if the PEG tube is being placed for feeding).
- History of total gastrectomy.
- Lack of informed consent for the procedure.

Contraindications (relative)

- Presence of oropharyngeal or esophageal malignancy (potential risk of seeding of the PEG tract)
- Hepatomegaly and Splenomegaly
- Portal hypertension with gastric varices
- History of prior abdominal surgical procedures (possible presence of adhesions and bowel interposition)
- History of partial gastrectomy

Preparation

- prior to PEG placement, it is important to visualize the patient's abdomen, past medical and surgical history, and any relevant imaging to optimize the location of the tract for feeding tube insertion.

- The patient is positioned supine with the head raised to 30 degrees to prevent aspiration.

- If the patient is not cooperative, the patient usually undergoes mild sedation to relax.

- The patient also receives location anesthetic, generally lidocaine, at the tube insertion site. The site is then made sterile with alcohol.

Techniques

- **There are 3 techniques for PEG tube placement:**

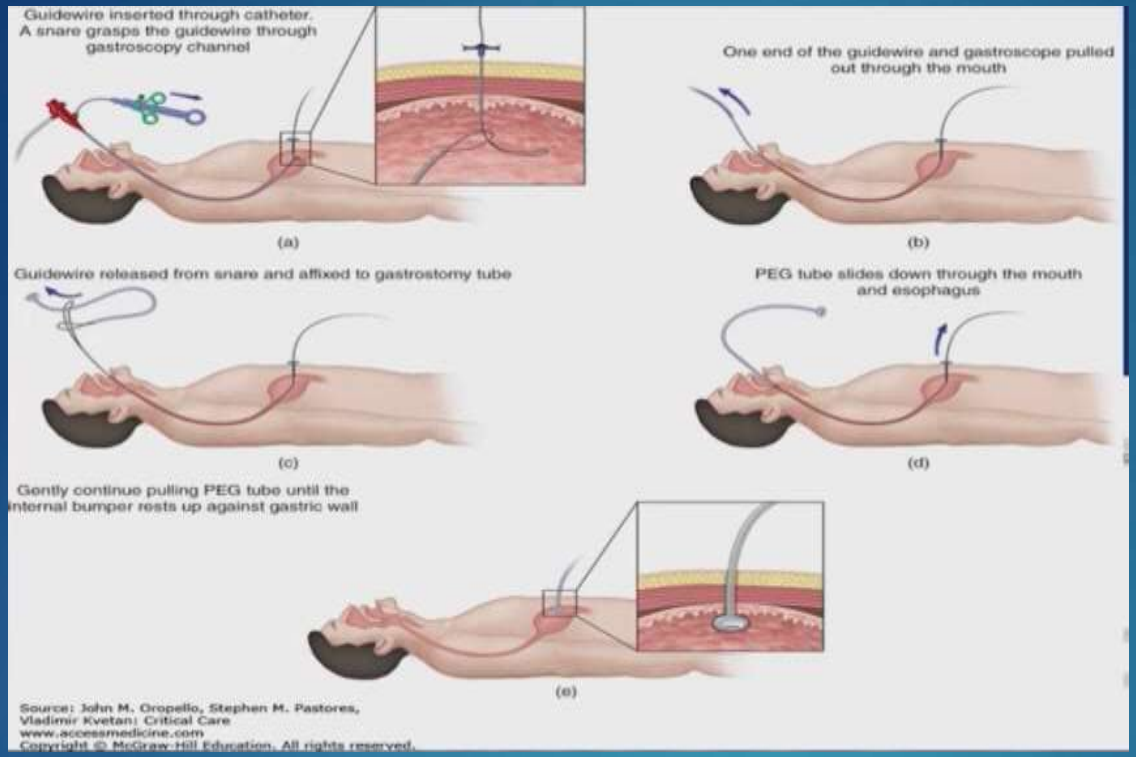
-peroral pull technique(Ponsky) (most common)

-peroral push technique(Sacks-Vine)

-direct percutaneous procedure(Russell)

- All of these techniques have the same initial steps. After the preparation mentioned above, the endoscope is passed into the stomach via the mouth and the stomach is trans-illuminated. The area is marked for insertion (about 2-cm medial to the costal margin and 2-cm below the xiphoid process), and lidocaine is injected. A small incision is made with blade and a needle is passed through the incision and identified on the endoscopy camera.

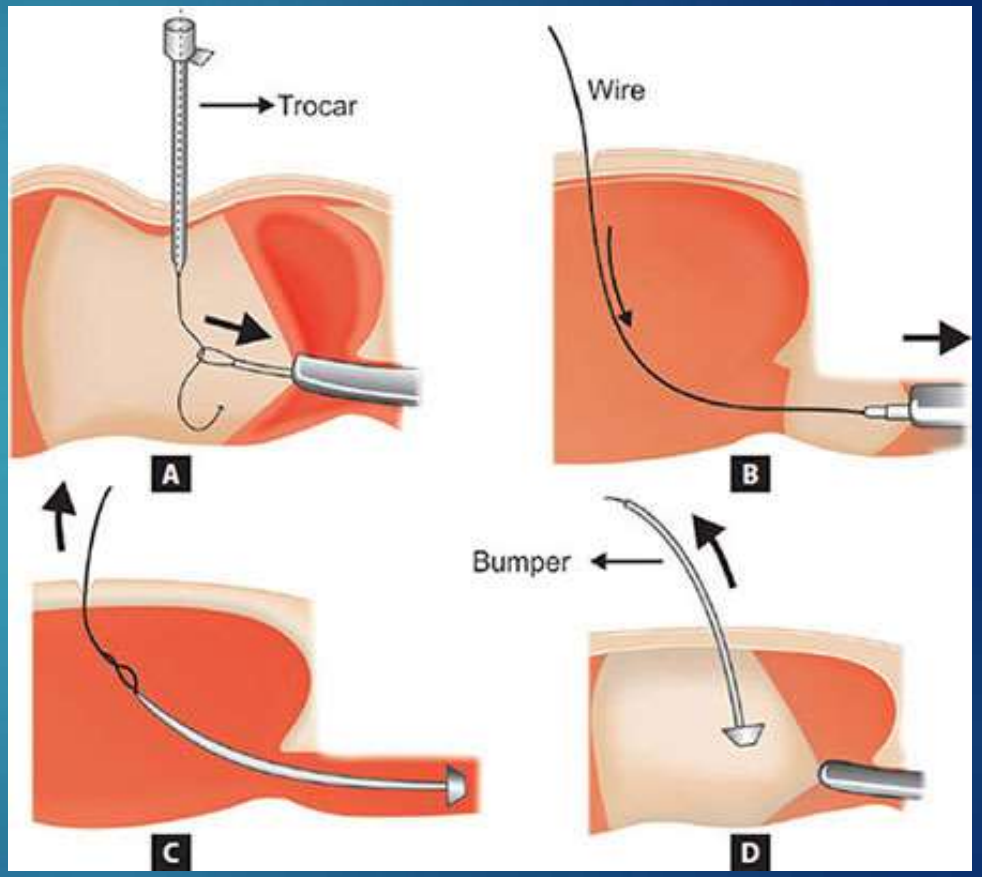
peroral pull technique



- In this method a string is inserted through a needle in the abdominal wall into the stomach, grasped with endoscopic biopsy forceps and then taken out through the esophagus and mouth. Subsequently the string is fixed to the external end of the feeding tube and the tube is pulled from the mouth to the esophagus, stomach and then out though the abdominal wall.

peroral push technique

- The first section of the "push" technique is similar to the "pull" technique. A guide wire is inserted into the stomach and pulled out through the mouth with the endoscope. The feeding tube is pushed over the guide wire into the stomach and out the puncture site. No significant differences in complication and efficacy rates between the pull and push methods have been reported.



direct percutaneous procedure

- uses the Seldinger method to place a guide wire into the stomach under endoscopic view. Afterwards, a dilating catheter and sheath are passed over the guide wire and after removal of the guide wire the feeding tube is advanced through the peel-away sheath.

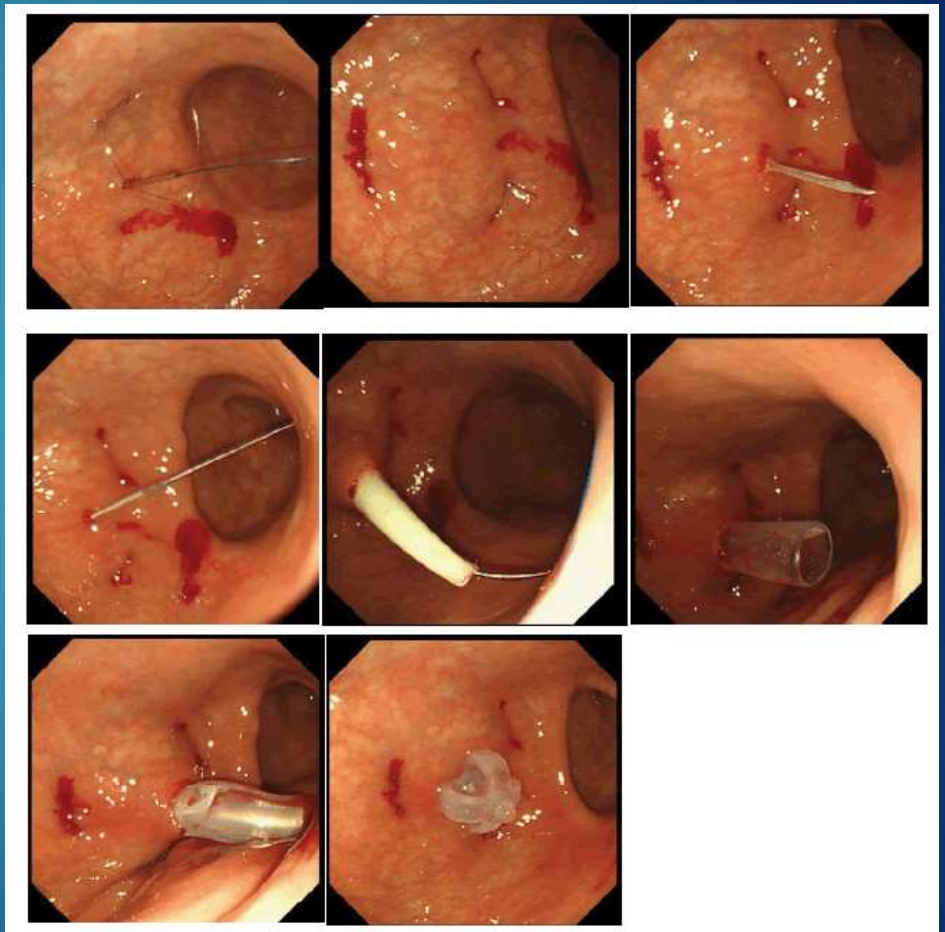


Figure2. Percutaneous endoscopic gastrostomy with Modified Introducer method.

Complications

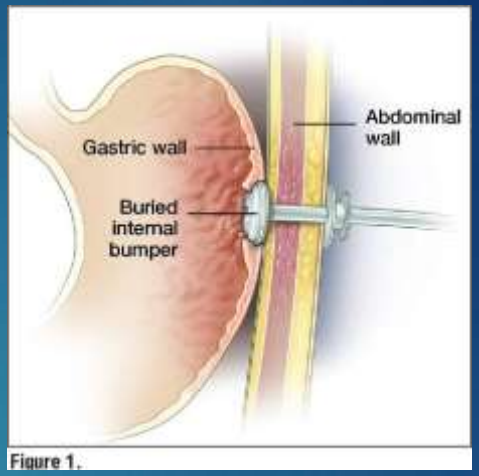


Figure 1.

- Surgical site infection around the gastrostomy site. (antibiotics can reduce infection around the gastrostomy site.
- Hemorrhage
- Gastric ulcer either at the site of the button or on the opposite wall of the stomach
- Perforation of bowel (most commonly transverse colon) leading to peritonitis
- Puncture of the left lobe of the liver leading to liver capsule pain
- Gastrocolic fistula: this may be suspected if diarrhea appears a short time after feeding. In this case, the feed goes direct from stomach to colon
- Gastric separation
- "Buried bumper syndrome" (the gastric part of the tube migrates into the gastric wall)

Formula

- Enteral nutrition formulas are very important when you are not able to eat or digest food normally. Just like regular food, your tube-feeding formula will provide calories and essential nutrients, such as protein, carbohydrates, fat, vitamins, minerals and fibers to help you maintain sufficient nutrition. Basically, there is a formula for every need.

Enteral formulas are classified by the type of protein they contain:

Standard formulas: Made from whole proteins or protein isolates

- Provide 34 to 43 g protein/liter
- High in protein, High in calories, Fiber enriched.
- Disease-specific formulas designed for patients with diabetes, immune system dysfunction, renal failure, or respiratory insufficiency

Formula contd.

Hydrolyzed protein formulas:

- Completely hydrolyzed formulas contain only free amino acids as their source of protein
- Partially hydrolyzed formulas contain proteins that are broken down
- Intended for patients with impaired digestion or absorption
- Disease-specific formulas are available for liver failure, HIV/AIDS, and immune system support

Nutritional Requirements (Adults)

- **Fluid**

Typical requirements are approximately 2–3L/day (>60 years=30mL/kg, 18–60 years=35mL/kg). Requirements are increased in patients with nasogastric aspirates, diarrhea and fever. Requirements are reduced in patients with oedema, hepatic failure and renal failure.

- **Energy**

Typical requirements are approximately (1800–2400kcal/day). Calculate the BMR. (harris-benedict equation)

- **Protein**

Typical requirements are (0.94–1.56g protein/kg per day). Extra protein may be needed in severely catabolic conditions, such as extensive burns, sepsis and major trauma.

Nutritional Requirements (Adults)contd.

- **Major minerals**

Typical requirements for Na and K are 60–100 mmol/day (1.0–1.5 mmol/kg). Requirements may be lower in patients with fluid overload (or those with hypernatremia and hyperkalemia).

The requirements for Ca and Mg are higher in enteral than in parenteral nutrition because only a proportion of these minerals is absorbed by the gut.

- **Trace elements**

For trace elements such as iodine, fluoride and selenium, which are well absorbed, the requirements are similar in enteral and parenteral nutrition. For other trace elements, such as iron, zinc, manganese and chromium, the requirements are more than the parenteral route.

Parenteral feeding

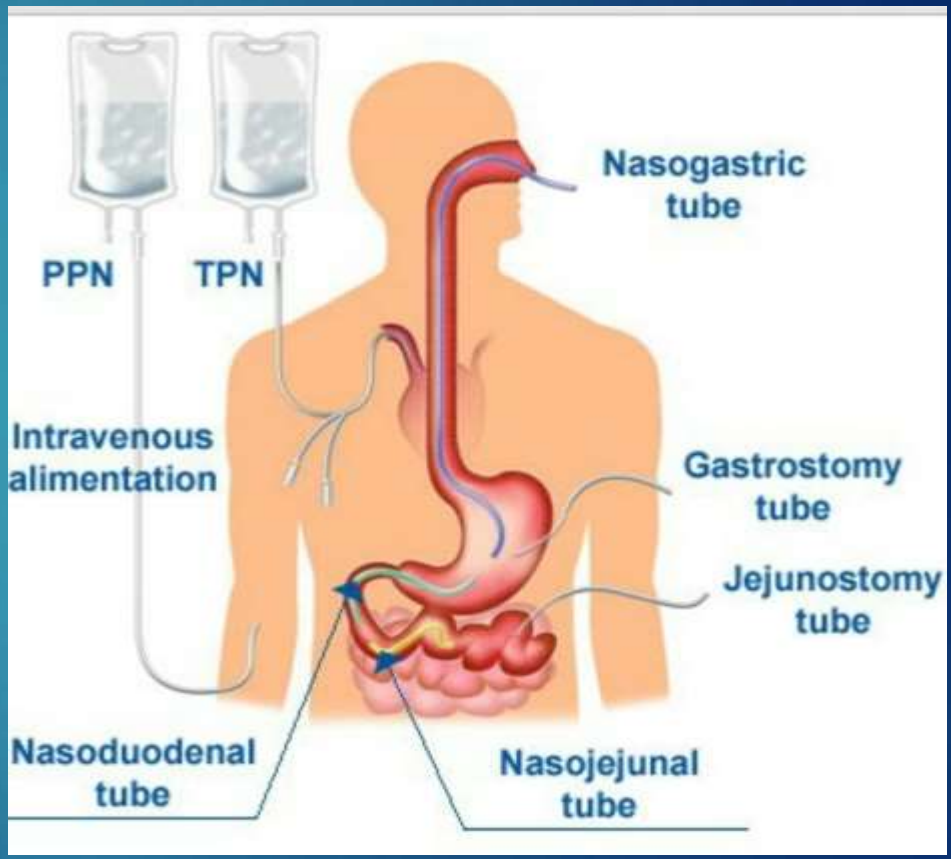
- is intravenous administration of nutrition.
- This should only be used if the enteral route cannot be used, when the digestive tract cannot adequately absorb nutrients, as occurs in severe **malabsorption disorders**.
- It is also used when the digestive tract must be temporarily kept free of food, as is needed during certain stages of **ulcerative colitis**.

Parenteral feeding contd.

Types:

- **Peripheral parenteral nutrition (PPN)** delivered into small or peripheral vein.

- Parenteral nutrition via a central venous catheter Or often called **total parenteral nutrition (TPN)** delivered into central vein.



Peripheral Parenteral Nutrition(PPN)

- It is most often used for short-term therapy up to 14 days / month so its preferred initially, allowing time to consider the necessity for insertion of a central venous catheter.

- Specially formulated mixtures for peripheral use are available; these:

1-have a low osmolality (<800 mosmol/L) -to reduce the incidence of pain and phlebities.

2-contain lipid emulsions.

3-Heparin(**anticoagulant**) and corticosteroids(**anti-inflammatory**) can be added to the infusion and local application of glyceryl trinitrate patches (nitrates→ vasodilator) reduces the occurrence of thrombophlebitis and prolongs catheter life.

Procedure

- A peripheral cannula can be inserted into mid-arm vein (20 cm) and "can be left for up to 5 days".
- A longer (60 cm) peripherally inserted central catheter (PICC) placed into the antecubital vein has its distal end lying in a central vein; here, to lower the risk of thrombophlebitis and hyperosmolar solutions can be given.

"With careful management and hygiene, PICCs can be used for up to a month or so."

Total Parenteral Nutrition(TPN)

- Indications:
- crohn's disease. is an inflammatory disease of the bowel that may cause pain, bowel narrowing and other symptoms that affect food intake and its digestion and absorption.
- Blockage of the intestine as cancers.
- Certain birth defects of GI such as biliary atresia.
- In children, diarrhea that has lasted a long time, regardless of its cause.
- Short bowel syndrome due to surgical removal of a large part of the small intestine or it can be present in infant due to abdominal wall defects.
- Ischemic bowel disease.

Procedure

- silicone catheter (central venous catheter) is placed into a central vein(subclavian,jugular or femoral vein), usually adopting an infraclavicular approach to the subclavian vein.

i. Place the patient supine with 5° of head-down tilt to avoid air embolism (Trendelenburg position)
ii. Locate a spot 1-2cm below the clavicle where the proximal 1/3 and distal 2/3 of the clavicle meet
iii. Cleanse a 15-20cm area with povidone-iodine solution
iv. Infiltrate the skin below the midpoint of the right clavicle with 1–2%.Lidocaine
v. Using the finder needle enter the skin at a 30-45 degree angle, aiming towards the suprasternal notch, always pulling back gently on the syringe.

Procedure contd.

vi. When you see a flash and easy withdrawal of dark blood, this indicates entrance into the vein

vii. Steady the needle and remove the syringe, holding a thumb over it to prevent air embolism

viii. Insert j-tipped guide wire into needle

ix. Holding guide wire, remove needle from skin.

x. Make a small incision where wire enters skin to accommodate dilator

xi. Advance dilator over guide wire

xii. Remove dilator, holding guide wire

xiii. Place catheter over guide wire and remove the guide wire

xiv. Suture catheter in place via flange with holes

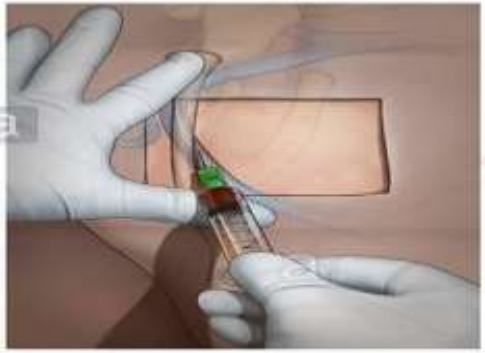
xv. Order a stat CXR to evaluate for line placement and complication. The tip of the catheter should be at the junction of the SVC and right atrium on chest x-ray

xvi. The skin-entry site should be dressed carefully and not disturbed unless there is a suggestion of catheter-related sepsis

Central Venous Catheterization

Infraclavicular Approach

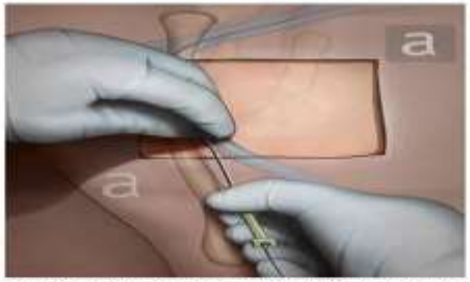
Seldinger Technique



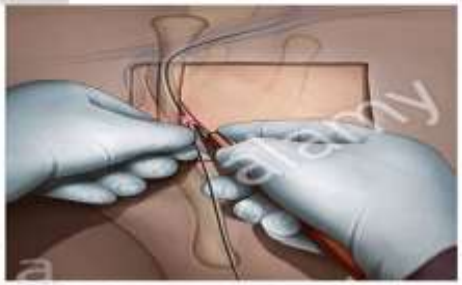
Step 1: Introduce thinwall percutaneous entry needle into subclavian vein. Venous blood should be easily aspirated to confirm position of needle tip within vessel.

Step 2: Remove syringe from needle and cover needle hub with finger to prevent air embolism.

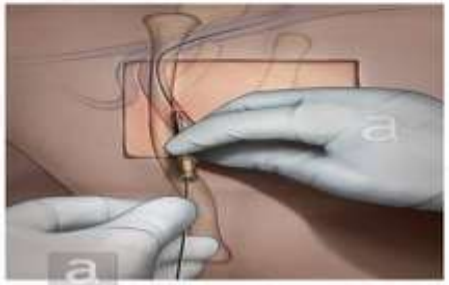
Step 3: Slide J wire guide straightener over "J" portion of guidewire, introduce into needle hub, and advance guidewire.



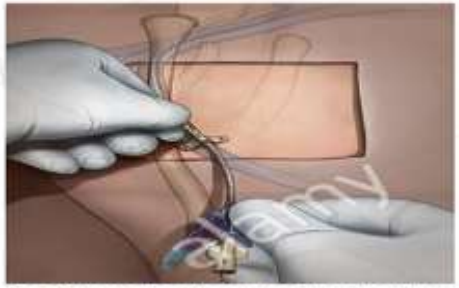
Step 4: While maintaining guidewire position, withdraw needle and J wire guide straightener.



Step 5: Enlarge puncture site with number 11 scalpel blade, if required.

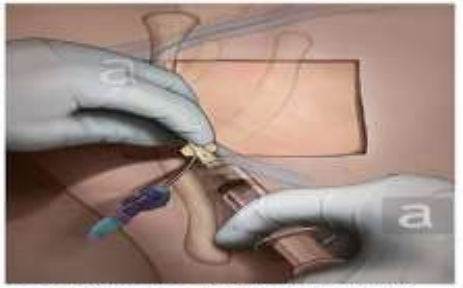


Step 6: If dilation is required, dilator can be advanced over guidewire and removed prior to insertion of central venous catheter.

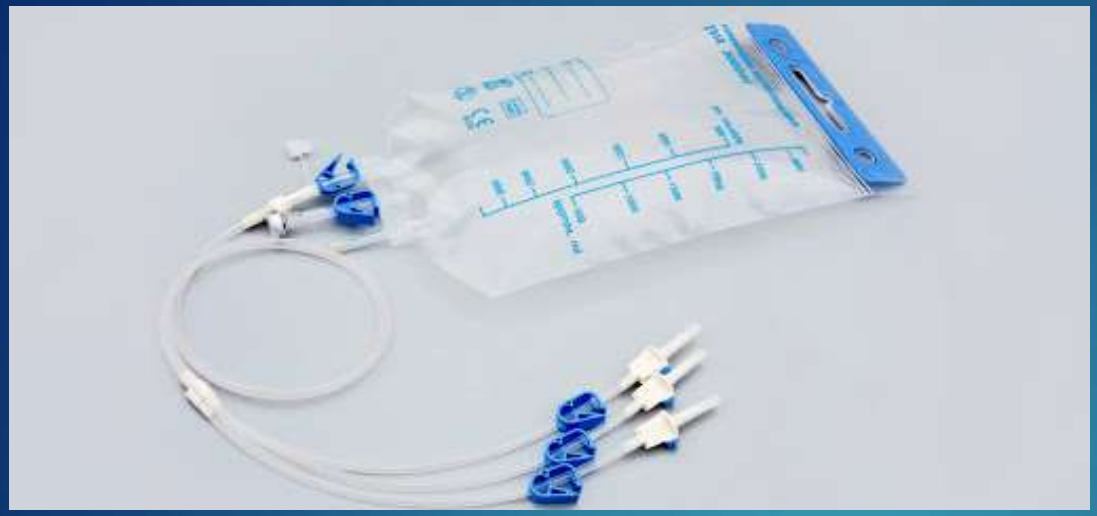


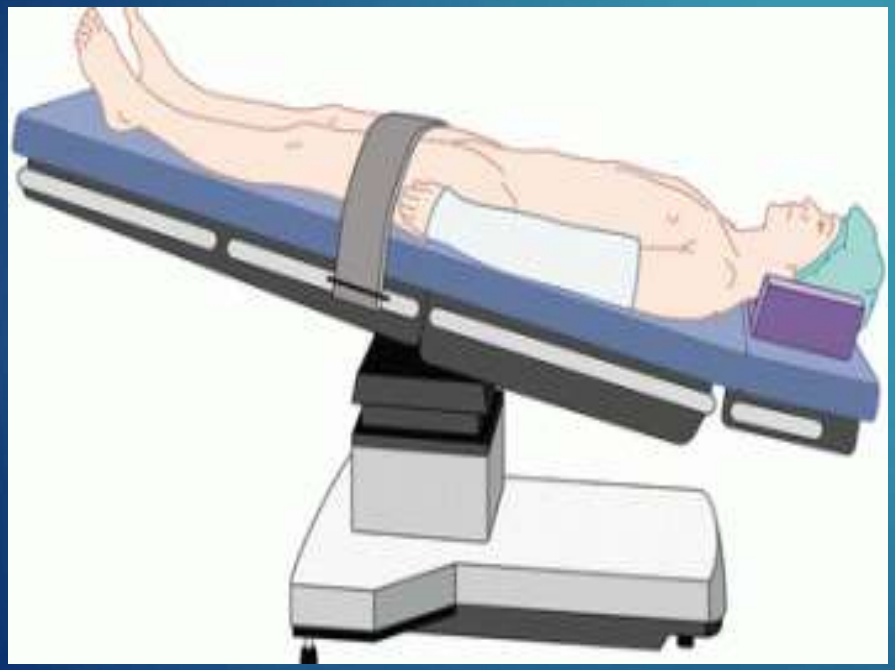
Step 7: Introduce the central venous catheter over guidewire. While maintaining guidewire position, advance catheter into vessel.

Step 8: Remove guidewire through hub and seal open hub with finger to prevent air embolism.

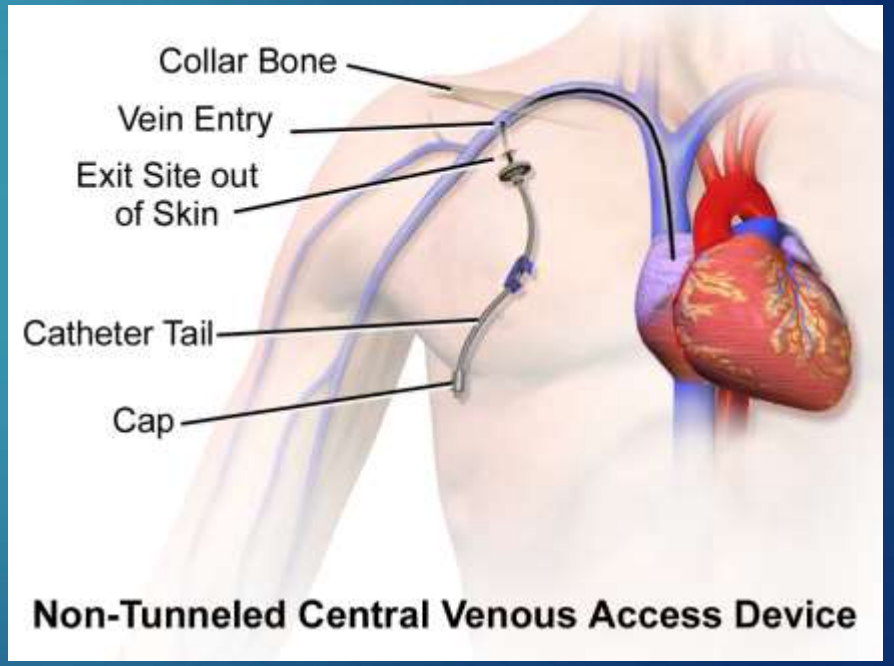


Step 9: Lumens should be flushed with 5-10 ml normal saline.





Trendelenburg position



Central venous catheterization (jagular vein).

Figure 2

Nutrients of Parenteral feeding

- With parenteral nutrition, it is possible to provide sufficient nitrogen for protein synthesis (nitrogen is a component of amino acids) and calories to meet energy requirements.

- Electrolytes, vitamins and trace elements are also necessary.

- All these substances are infused simultaneously.

Nutrients of Parenteral feeding contd.

- **Nitrogen source:**

Most patients receive at least 11–15 g N/day, in the form of synthetic l-amino acids

- **Energy source:**

Energy is supplied by glucose, with additional calories provided by a fat emulsion.

Fat infusions give a greater number of calories in a smaller volume than can be provided by carbohydrate.

Fat infusions are not hypertonic and they also prevent essential fatty acid deficiency which has been reported in long-term parenteral nutritional regimens without fat emulsions. Deficiency causes a scaly skin, hair loss and a delay in healing

- **Electrolytes, vitamins and trace elements:**

Initially, the electrolyte status should be monitored daily and electrolyte solutions given as appropriate. Fat-and water-soluble vitamins

and minerals, including trace elements(such as zinc (Zn), copper (Cu), selenium (Se),…etc) should be given routinely

Nutrients of Parenteral feeding contd.

- **Management of parenteral nutrition:**

Peripheral parenteral nutrition is administered via 3L bags over 24 hours

For a *central venous parenteral nutrition regimen, most* hospitals now use premixed 3L bags.

Box 33.28 Examples of parenteral nutrition regimens[a]

Peripheral

Nitrogen

- L-amino acids 9 g/L: 1 L

Energy

- Glucose 20%: 1 L
- Lipid 20%: 0.5 L
- + Trace elements, electrolytes, water-soluble and fat-soluble vitamins, heparin 1000 U/L and hydrocortisone 100 mg; insulin is added if required. Nitrogen 9 g, non-protein calories 7206 kJ (1700 kcal)

Central

Nitrogen

- L-amino acids 14 g/L: 1 L

Energy

- Glucose 50%: 0.5 L
- Glucose 20%: 0.5 L
- + Lipid 10% as either Intralipid or Lipofundin: 0.5 L; fractionated soya oil 100 g/L, soya oil 50 g, medium-chain triglycerides 50 g/L
- + Electrolytes, water-soluble and fat-soluble vitamins, trace elements; heparin and insulin may be added if required. Nitrogen 14 g, non-protein calories 9305 kJ (2250 kcal)

Monitoring

- **Blood tests.**

-Plasma electrolytes and glucose are checked daily(at least initially)

-full blood count, liver biochemistry and function, calcium and phosphate twice weekly

-magnesium, zinc and triglycerides weekly

- **Nutritional status.**

Weight and skinfold thickness are monitored on a weekly basis if appropriate calipers are available. "Daily weight changes reflect changes in fluid balance"

- **Nitrogen balance assessment**

This requires complete collections of urine

Complications

- **Mechanical:** insertional trauma and catheter-related.

-Complications of catheter placement include central vein thrombosis, pneumothorax and embolism, but one of the most common problems is catheter-related sepsis.

-Organisms, mainly staphylococci, enter along the side of the catheter, leading to septicemia.

-Sepsis can be prevented by ensuring careful and sterile placement

of the catheter, not removing the dressing over the catheter entry

site, and not giving other substances (e.g. blood products, antibiotics) via the central vein catheter.

-Sepsis should be suspected if the patient develops fever and

leucocytosis.

-**Treatment** involves removal of the catheter and appropriate systemic antibiotics

Complications contd.

- **Metabolic:** e.g. hyperglycemia (insulin therapy is)often necessary

-fluid and electrolyte disturbances and dehydration, hypocalcaemia,

-micronutrient deficiencies (if inadequately provided).

- **Organ or tissue dysfunction**: e.g. abnormal liver dysfunction, respiratory distress and metabolic bone disease and some evidence said that the intestinal mucosa undergoes atrophy .

- **Others:** e.g. rare allergic reactions to lipid, and psychological disturbances.

Home Parenteral Nutrition

- Home parenteral nutrition is practiced much less frequently, and usually comes under the supervision of specialist centers.

- The potential value of intestinal transplantation in patients with long-term intestinal failure is still being assessed.


THANK YOU