Life Long Learning – Module 8.3

Technique of enteral nutrition

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Routes of enteral access for artificial feeding

Enteral Nutrition
- Tube feeding
  - Jejunal
    - Nasojejunal
    - Extended gastrostomy
    - Direct jejunostomy
    - Percutaneous endoscopical (PEJ)
    - Surgical jejunostomy
  - Duodenal
    - Nasoduodenal
    - Extended Gastrostomy
  - Gastric
    - Nasogastric
    - Extended Gastrostomy
    - Gastrostomy
- Oral
  - Sip feeding
  - Supplementation
  - Percutaneous endoscopical (PEG)
  - Radiological/sonographical (PSG)
  - Surgical

Feeding route depend on:
- underlying pathology
- anticipated duration
- preference of patient

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History of enteral nutrition

Nutritional support in the ancient world

Silver tube for enteral application of fluids in the 12th century

Up to date naso gastric feeding tube with continuous delivery via a pump device

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Quality standards of feeding tubes

- Pliable
- Nonstiffening
- Nonleaching
- Antiallergic
- Smooth, self-lubricated distal tip
- Material: polyurethane or silicone-elastomer
- Strength enough for feeding pump pressure
- Easy handling
Legal regulations

Legal or institutional regulations for medical devices:

• e.g. Germany:  
  http://www.bvmed.de/Start/

• European Union:  
  http://europa.eu.int/comm/index_de.htm

• ESPEN guidelines for enteral nutrition  
  http://www.espen.org/Education/guidelines.htm
Hygienic aspects


after 4 days:

- 4 % of the feeding systems and
- ~70 % of the bottles contained $>10^2$ colony forming units (CFU)/mL.

Risk factors for bacterial contamination are:

- manipulation on feeding system
- feeding disruption
- colonisation of patients (length of hospital stay)
Routes of enteral access for artificial feeding

- **Nasogastic Tubes**
- **Nasojejunal Tubes**
- **Percutaneous Endoscopic Gastrostomy (PEG)**

Jejunal access via PEG (PEG-J) or Percutaneous Endoscopic Jejunostomy (D-PEJ)

Jejunal access via surgical placed fine needle catheter
Nasogastric/enteric tube

Polyvinyl (rigid), silicone (Ch 6 to 14), or polyurethane (less traumatic)

Length 90, 105, or 120 cm

One or up to three lumina, whereas in case of three lumina one lumen usually is positioned in the jejunum

(1 CH = 1 Charriere = 1 French = 0.33 mm)
Technic of nasogastric/jejunal tube placement
Nasogastric tubes: Problems

- **Blind insertion:** up to 16% malposition with tracheal, pulmonary, or pleural
- Air installation and auscultation are inaccurate methods for validation of position
- Confirmation of proper tube placement through aspiration of stomach or bowel content or radiological
- Only recommend for short term feeding < 4-6 weeks.
- Interference with orofacial therapy for dysphagia
- Potential for reflux esophagitis and pressure ulcers
- Visible presence of tube – potential psychological burden
Challenge of placement of nasojejunal tubes

- **Spontaneously transpyloric tube migration occurs only in 5% to 15%**
- **Using right lateral positioning, gastric insufflation, tube tip angulation, and clockwise torque during insertion results in 70% to 93% in small bowel intubation after 23 to 40 minutes**
- **But jejunal intubation is achieved only in 17%**
- **Metocloperamide or erythromycin may facilitate postpyloric tube insertion**
- **Spiral shape of the distal part of a nasojejunal tube shows advantage in jejunal placement**
Endoscopic or fluoroscopic guided postpyloric/jejunal tube placement

- Using fluoroscopy and a long guide wire results in > 90% in postpyloric tube position, but jejunal position is only reached in about 50%
- Endoscopic assistance (including transnasal) using the guidewire or pull-along method results in > 90% in postpyloric position, jejunal position can be obtained in 60% - 100%
- Decision for endoscopic or fluoroscopic assistance should be driven by local experience and facilities
Postpyloric enteral Feeding

Duodenum pars III
Percutaneous (endoscopic) gastrostomy

- Three techniques: “pull“, “push, and “introducer“ method
- Most widely used is pull technique introduced by Gauderer et al in 1980
- Problem of push techniques is the deflection of the stomach and therefore, risk of misplacing.
- The combination of a double gastropexy with a peel away introducer may overcome this problem
- Compared to surgical procedures PEG has lower morbidity and mortality rates, is less expensive and faster
Contraindications for PEG

Relative contraindications
- Massive ascites
- Severe portal hypertension
- Severe hepatomegaly

Absolute contraindications
- Failure of endoscopy due to pharyngeal or oesophageal obstruction
- Severe coagulopathy
- Failure for diaphanoscopy
PEG via pull technique
Complications of PEG

~ 13% - 40 % minor complications
~ 0.4% - 4% major complications
~ 0% - 1% procedure related mortality

- Bleeding 0.6% – 1.2%
- Tube site infection 3% - 30%
- Intraperitoneal leakage
- Perforation of small/large bowel
- Metastatic head and neck cancer to the PEG exit site (< 1%)
- „Burried bumper“ migration of the internal bumper into the gastric abdominal wall
Management of PEG

- **Peri-interventionell antibiotica prophylaxis for risk patients** (e.g. impaired immune function) with a single administration of a broad spectrum antibiotic 30 min before PEG procedure.

- **Mobilization of the PEG from outside at least every second day** to prevent buried bumper.
Percutaneous endoscopic jejunostomy

Indications:

• Tube feeding associated vomiting, aspiration
• Severe gastro-esophageal reflux
• Gastroparesis, gastric outlet stenoses
• Total or partial gastrectomy
Technique of PEJ

Jejunal access via extension of PEG (PEG-J) or direct Percutaneous Endoscopic Jejunostomy (D-PEJ)

- Modification of the pull PEG technique, but more technically difficult to perform
- Success rate between 72% - 88%
- More stable jejunal access with D-PEJ than PEG-J
Skin-level gastrostomy (Button)

Three button types are available with two different retaining elements (retention dome and balloon types)

Indications:
• Peristomal problems
• Patient’s wish (cosmetic)

Contraindication:
• Stoma existing < 4 weeks
• Active peristomal infection
• Stoma tract longer than 4.5 cm
• Fistulous stoma channel

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Surgical access

- Open surgery or laparoscopical.
- The primary operative gastrostomy has a higher morbidity and mortality than PEG.
- Majority of surgical gastrostomies and jejunostomies are done as a concomitant procedure at time of abdominal surgery.
- Fine needle catheter jejunostomy is the preferred procedure.
Fine needle catheter jejunostomy
Complications of surgical jejunostomy

- Tube obstruction in fine needle catheter (only 9 fr)
- Wound infection
- Peritoneal leakage
- Very rarely volvulus
- Necrosis of small bowel
Bolus versus continuous feeding

• **Bolus feeding may be appropriate in patients with low aspiration risk**

• **Continuous feeding should be tempered in patients with high aspiration risk (ventilated) and symptoms of gastrointestinal intolerance on bolus feeding**

• **Decision for bolus or continuous feeding depends on clinical situation**
Approach to high gastric residual or vomiting during enteral feeding

Prokinetic Agents

• **Metoclopramide**
  – Improves gastric emptying
  – Does not reduce incidence of pneumonia

• **Erythromycin**
  – Improves gastric emptying
  – Reduces gastric residual volume
  – Improves tolerance of NG feeding
  – Concerns with risk of antibiotic resistance
  – May increase risk of dysrhythmias
Approach to high gastric residual or vomiting during enteral feeding

Small Bowel Feeding Tube
- Reduces gastrointestinal complications
- Reduces gastric residual volume
- May reduce rate of pneumonia
- Can be difficult to insert
- Cost intensive

Placement of postpyloric feeding tubes
- Endoscopic
- Fluoroscopic
Algorithm for gastric reflux

Enteral nutrition
nasogastric tube/PEG

Initial flow rate
40 – 50 ml

Gastric residual volume > 250 ml
Vomiting
Abdominal tension

Further stepwise increase of feeding rate

Promotility drug:
e.g. metocloperamid

Nasoenteric feeding tube
PEG-J/D-PEJ

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