Education and Culture DG
Lifelong Learning Programme

THE EUROPEAN SOCIETY FOR CLINICAL NUTRITION AND METABOLISM

Technique of Enteral Nutrition

Module 8.3

Johann Ockenga, MD
Dep. Gastroenterology, Endocrinology & Clinical Nutrition
Klinikum Bremen Mitte, FRG
Matthias Pirlich, MD
Imperial Oak Outpatient Clinic, Berlin, Germany

with special thanks to

Željko Krznarić, MD, PhD, FEBGH, Zagreb, Croatia

ESPEN

THE EUROPEAN SOCIETY FOR CLINICAL NUTRITION AND METABOLISM

Education and Culture DG
Lifelong Learning Programme

Device selection

Education and Culture DG
Lifelong Learning Programme

The choice of access to the intestinal tract for enteral nutrition is directed by several factors:

- **Underlying disease and clinical prognosis**
- **Anticipated duration of feeding**
- **Patency and motility of the gut**
- **Risk of aspirating gastric contents**
- **Experience and skills**

Routes of enteral access for artificial feeding

Nasogastric 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

ESPEN

THE EUROPEAN SOCIETY FOR CLINICAL NUTRITION AND METABOLISM

Education and Culture DG
Lifelong Learning Programme

Short-term enteral feeding

- **Short-term enteral access feeding tubes are mostly placed when EN is expected to be of less than 30 days in duration.**
- **Nasogastric tubes are the most frequent type of tubes used for short-term enteral feeding.**

Nasogastric/enteral tube

Polyvinyl (rigid), silicone
or polyurethane (less traumatic)

Length 80-130 cm, Ch 8 to 15 (5-8 in children)

Up to three lumina

(**1 CH = 1 Charriere**
= 1 French = 0,33 mm)

ESPEN

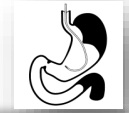
THE EUROPEAN SOCIETY FOR CLINICAL NUTRITION AND METABOLISM

Education and Culture DG
Lifelong Learning Programme

Quality standards of feeding tubes

- Pliable
- Nonstiffening
- Nonleaching
- Antiallergic
- Smooth, self-lubricated distal tip

Nasogastric tubes: Problems



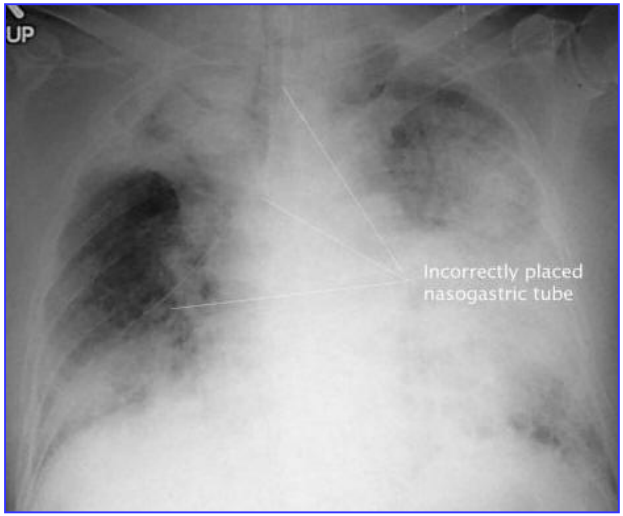
- Blind insertion: up to 15% malposition (tracheal, pulmonary, or pleural)
- Air installation and auscultation are inaccurate methods for validation of position
- Confirmation of proper tube placement through aspiration of gastric fluid (pH< 5) or bowel content or radiologicaly
- Potential for reflux esophagitis and pressure ulcera
- Potential psychological burden

ESPEN

THE EUROPEAN SOCIETY FOR CLINICAL NUTRITION AND METABOLISM

Education and Culture DG
Lifelong Learning Programme

Malposition of nasogastric tubes



Incorrectly placed nasogastric tube into the right lung

ESPEN

THE EUROPEAN SOCIETY FOR CLINICAL NUTRITION AND METABOLISM

Education and Culture DG
Lifelong Learning Programme

Challenge of placement of nasojejunal tubes

- Spontaneous transpyloric tube migration: 15% - 30%
- Using right lateral positioning, gastric insufflation, tube tip angulation, and clockwise torque during insertion results in **70% to 93%** in duodenal placement after **20 to 40** minutes
- But jejunal intubation is achieved only in **17%**
- **Metocloperamide** or **erythromycin** may faciliate postpyloric tube insertion
- Spiral shape of the distal part of a nasojejunal tube shows advantage in jejunal placement

ESPEN

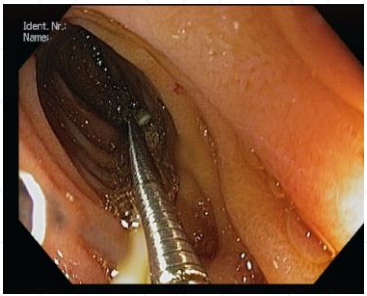
THE EUROPEAN SOCIETY FOR CLINICAL NUTRITION AND METABOLISM

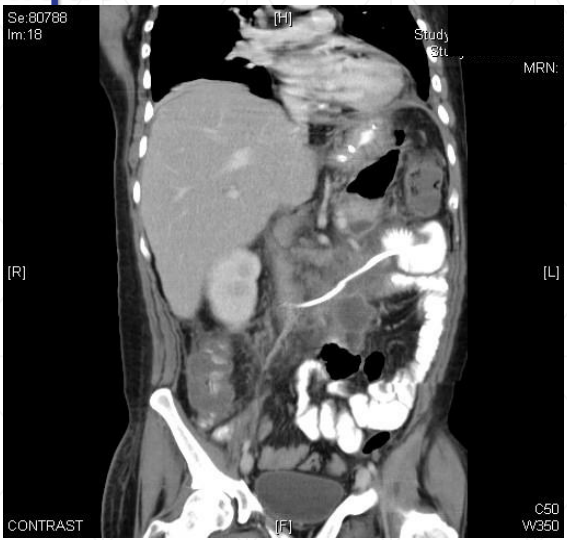
Education and Culture DG
Lifelong Learning Programme

Endoscopic or fluoroscopc guided postpyloric/jejunal tube placement

- **Fluoroscopy** and a long guide wire achieves > 90% postpyloric tube position, but **jejunal position** is only reached in about **50%**
- **Endoscopy** (including transnasal) using the guidewire or pull-along method results in > 90% postpyloric position, **jejunal position** can be obtained in **60% - 100%**

Nasojejunal tube placement
Pull-along technique





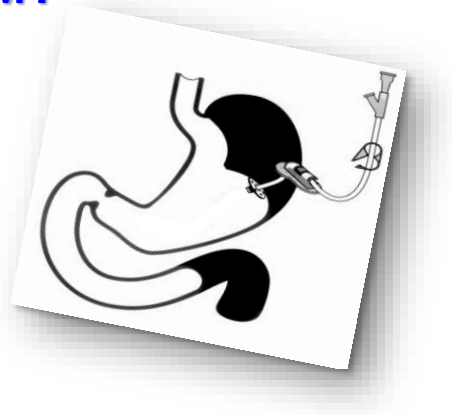
ESPEN

THE EUROPEAN SOCIETY FOR CLINICAL NUTRITION AND METABOLISM

Education and Culture DG
Lifelong Learning Programme

Long- term enteral nutrition

PERCUTANEOUS ENDOSCOPIC GASTROSTOMY (PEG)



ESPEN

THE EUROPEAN SOCIETY FOR CLINICAL NUTRITION AND METABOLISM

Education and Culture DG
Lifelong Learning Programme

PERCUTANEOUS ENDOSCOPIC GASTROSTOMY (PEG)

PEG is technically easier (and less expensive) than surgical gastrostomy, performed more rapidly, usually within 15-30 min,

PEG is performed with the use of only local anesthesia (xylocain) and i.v. sedation (propofol or midazolam)

ESPEN

THE EUROPEAN SOCIETY FOR CLINICAL NUTRITION AND METABOLISM

Education and Culture DG
Lifelong Learning Programme

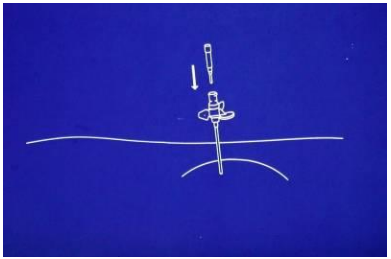
Proper patients selection
(Contraindications)

- serious coagulation disorders (prothrombin time < 50%, PTT > 50 s, platelets < 50,000/mm^3)
- marked peritoneal carcinosis, tumour infiltration
- severe ascites
- peritonitis
- severe psychosis (compliance, manipulation)
- clearly limited life expectancy

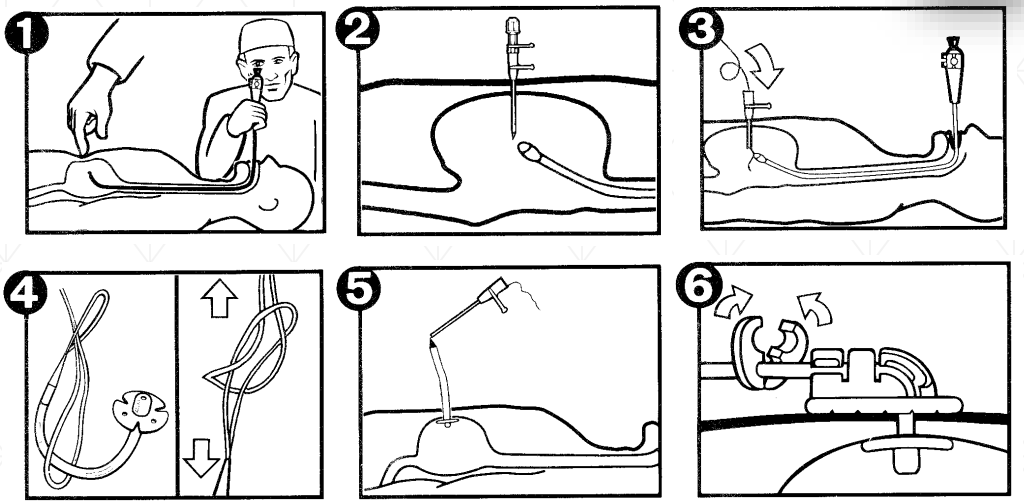
Löser C et al. ESPEN-guidelines on artificial nutrition – percutaneous endoscopic gastrostomy. Clin Nutr 2005

PEG- Methods

- **The "pull" technique** was the one originally described, and is the most popular
- **The "push" technique** (Seldinger technique) - involves pushing the tube through abdominal wall after dilatation (CT, ultrasound)
- **The "introducer" technique** with/without gastropexy, peel-away introducer, intragastric ballon



PEG via pull technique

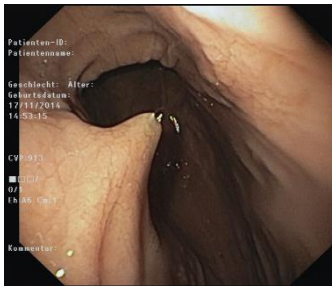


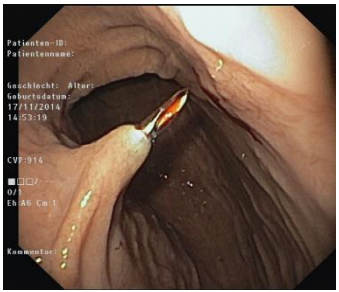
ESPEN

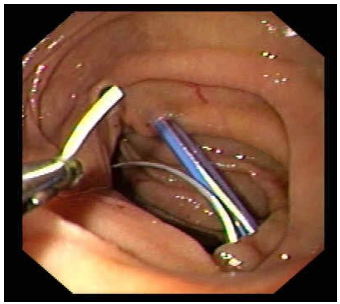
THE EUROPEAN SOCIETY FOR CLINICAL NUTRITION AND METABOLISM

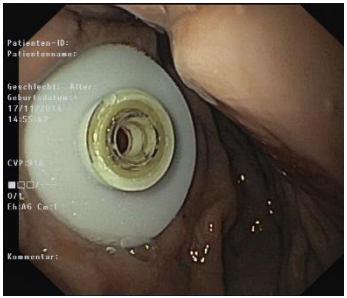
Education and Culture DG
Lifelong Learning Programme

PEG- endoscopic view









ESPEN

THE EUROPEAN SOCIETY FOR CLINICAL NUTRITION AND METABOLISM

Education and Culture DG
Lifelong Learning Programme

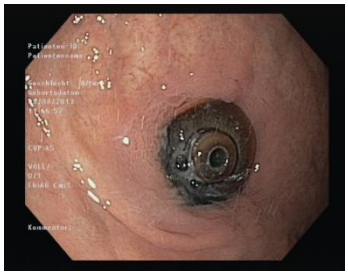
Complications of PEG

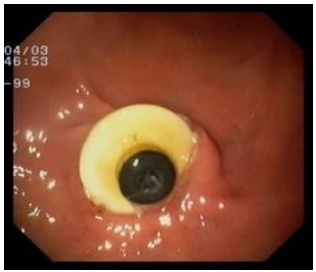
~ 13% - 40 % minor complications
~ 0.4% - 4% major complications
~ 0% - 1% procedure related mortality

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

Prevention of PEG-complications

- Peri-interventionell **antibiotica prophylaxis:** 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





Skin-level gastrostomy (Button)

Indications:

- Peristomal problems
- Patient‘s wish (cosmetic)

Contraindication:

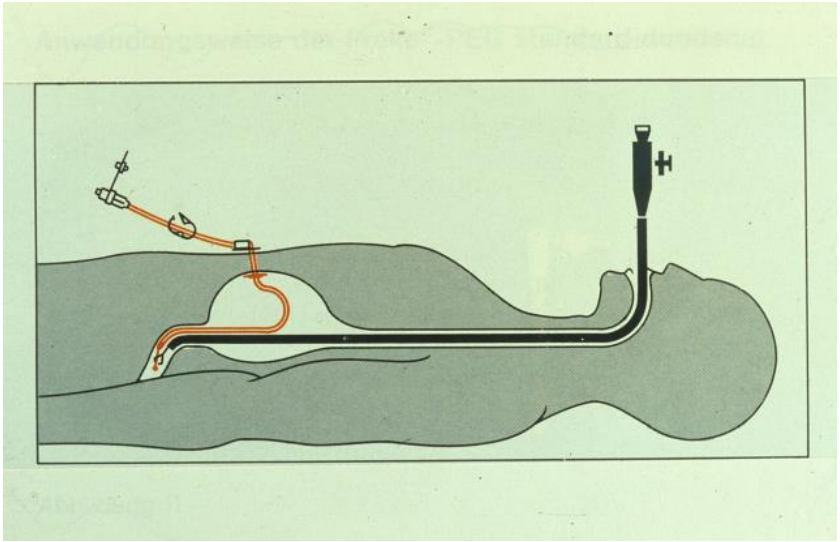
- Stoma existing < 4 weeks
- Active peristomal infection
- Stoma tract > 4.5 cm

ESPEN

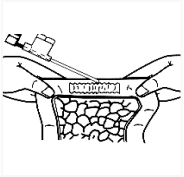
THE EUROPEAN SOCIETY FOR CLINICAL NUTRITION AND METABOLISM

Education and Culture DG
Lifelong Learning Programme

PEG-J



Surgical access



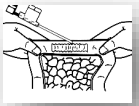
- Open surgery or laparoscopical
- The primary operative gastrostomy has a higher morbidity and mortality than PEG
- Majority of surgical gastrostomies and jejunostomies are done as a concomitant procedure at time of abdominal surgery
- **Fine needle catheter jejunostomy** is the preferred procedure

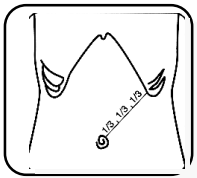
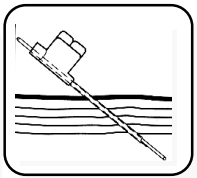
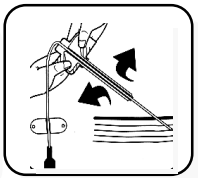
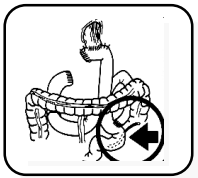
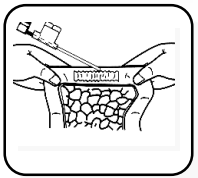
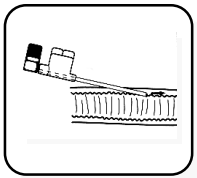
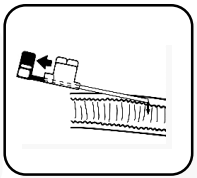
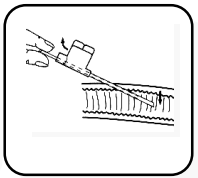
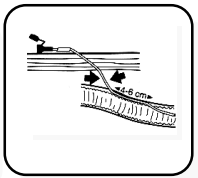
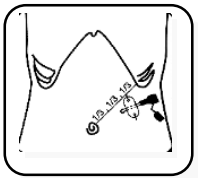
ESPEN

THE EUROPEAN SOCIETY FOR CLINICAL NUTRITION AND METABOLISM

Education and Culture DG
Lifelong Learning Programme

Fine needle catheter jejunostomy (FNJ)



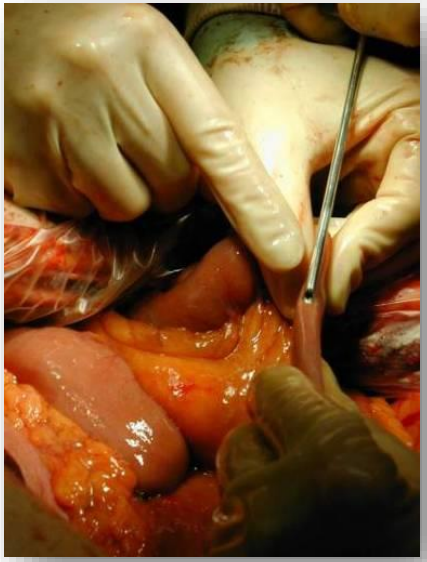











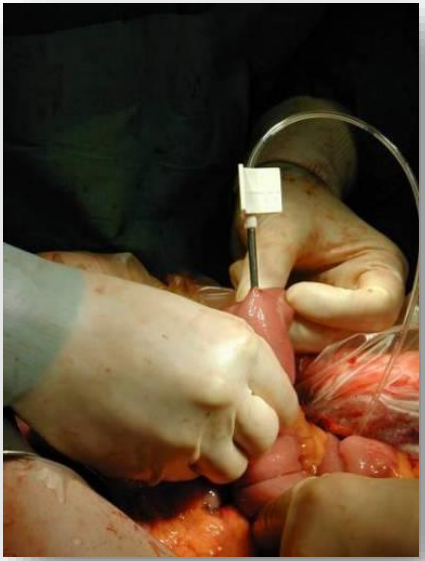
ESPEN

THE EUROPEAN SOCIETY FOR CLINICAL NUTRITION AND METABOLISM

Education and Culture DG
Lifelong Learning Programme

Fine needle catheter jejunostomy (FNJ)





photographs: M. Senkal

Fine needle catheter jejunostomy (FNJ)

Advantages

- Early postoperative nutrition
- Less aspiration

Disadvantages

- Tube obstruction (only 9 fr).
- Wound infection
- Peritoneal leakage
- Very rarely volvulus
- Necrosis of small bowel

ESPEN

THE EUROPEAN SOCIETY FOR CLINICAL NUTRITION AND METABOLISM

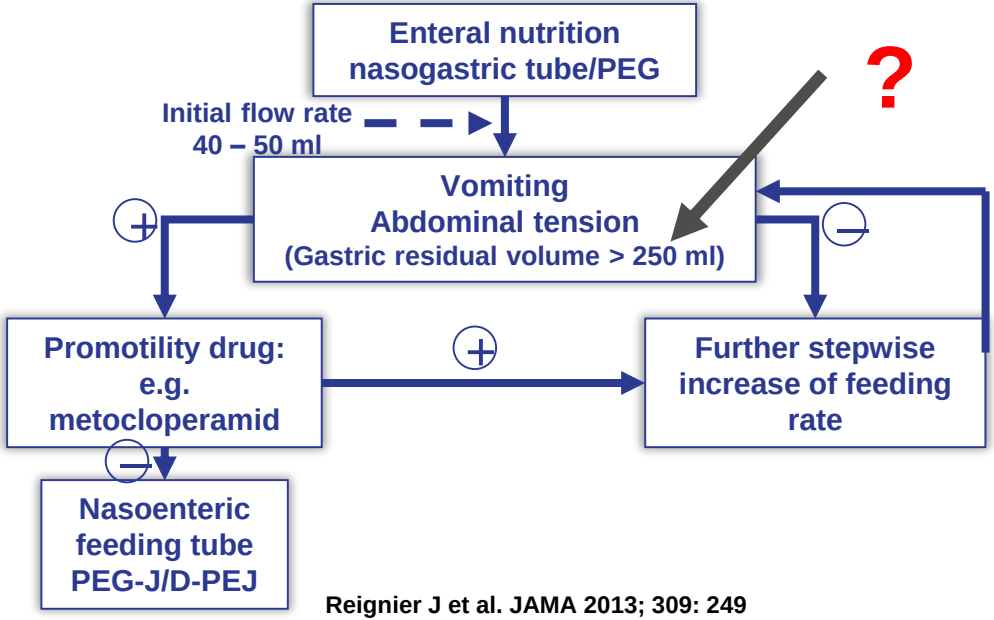
Education and Culture DG
Lifelong Learning Programme

Management and delivery of nutrients

Bolus versus continous feeding

- **Bolus feeding (200-300 ml, 6-8 x per day)** may be appropriate in patients with low aspiration risk
- **Continous feeding** should be tempered in patients with high aspiration risk (ventilated) and symptoms of gastrointestinal intolerance on bolus feeding

Algorithm for gastric reflux



Reignier J et al. JAMA 2013; 309: 249

ESPEN

THE EUROPEAN SOCIETY FOR CLINICAL NUTRITION AND METABOLISM

Education and Culture DG
Lifelong Learning Programme

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 dysrrhythmias

ESPEN

THE EUROPEAN SOCIETY FOR CLINICAL NUTRITION AND METABOLISM

Education and Culture DG
Lifelong Learning Programme

Hygienic aspects

Although normal food is not sterile, enteral feeding solutions should be protected and contamination must be avoided to prevent possible infections.

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 (LOS)

Mathus-Vliegen et al. Crit Care Med. 2000 Jan;28(1):67-73

ESPEN

THE EUROPEAN SOCIETY FOR CLINICAL NUTRITION AND METABOLISM

Education and Culture DG
Lifelong Learning Programme

Key messages I

- **Correct placement of the feeding tube in the stomach or upper jejunum has to be monitored to avoid dislocation and aspiration**
- **Jejunal placement of a feeding tube is a special challenge in daily practice**
- **Enteral feeding via tube can be delivered by boluses or continuously, depending on the clinical situation**

ESPEN

THE EUROPEAN SOCIETY FOR CLINICAL NUTRITION AND METABOLISM

Education and Culture DG
Lifelong Learning Programme

Key messages II

- **After the start of feeding clinical monitoring is necessary and a treatment algorithm for feeding intolerance (high gastral reflux) should be employed**
- **Bacterial contamination of the enteral feeding system has to be avoided**

„Dave having lunch“