Pediatric Tubes and Lines

Pediatric ER Half-day Rounds
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Objectives

- to identify various enteral and vascular access lines
  - what do they look like?
  - indications & contraindications
  - proper placement
  - complications
Feeding tubes:

• Indications?
• Types?
• Method of insertion?
• Complications?
Salem Sump

Naso-Gastric Tube

Pigtail
Enteral access: Surgical

- types of G-tubes
  - Percutaneous endoscopic gastrostomy (PEG)
  - Mic-Key (button)
  - pezzer / malecot
  - Foley
  - GJ-tube
  - J-tube
  - Cecostomy tube
Enteral access: Surgical

- Methods of insertion
  - Percutaneous Endoscopic
    - (PEG/PEJ/PEGJ)
  - Open
  - Laparoscopic/assisted
  - Radiologic
PEG
PEG
PEG
PEG
PEG
PEG

PEG tube

crossbar
Enteral access: Mic-Keys and Buttons

- skin level device more attractive
- requires mature gastro-cutaneous or jejuno-cutaneous fistula
- 3 months after PEG or jejunostomy
Mic-Key
Complications

- At the time of insertion:
  - Endoscopic, radiologic –
  - Infection

- Longterm:
  - Blockage
  - Granulation tissue
Complications - 70% complication rate

- 88% of these minor (wound infection, stomal leak) in first 3 months
- wound infection decreased with pre-op dose of cefazolin
- case reports of necrotizing fasciitis and colocutaneous fistulas
- pneumoperitoneum and peritonitis
- early dislodgement
crossbar

PEG tube

cellulitis
• What do I do if it falls out??

• Ok, I’ve replaced it, but the child returned vomiting, now what?

• Now she doesn’t need it anymore, how do you close the hole?
Issues for discussion

- Replacement of G-tubes that ‘fall out’
  - By parents – foley / Mickey
  - By residents in ER - foley
  - By Lida in Clinic - Mickey
- When to do a contrast study?
- What to teach the parents?
- Ongoing costs of Mickeys?
- Alternative tubes?
- Other?
Enteral access: GJ or J-tube

❤ Advantages
❤ Beneficial for patients with
❤ tracheal aspiration
❤ reflux esophagitis
❤ gastroparesis
❤ stomach resection

🚫 Disadvantages
🚫 ? elemental diets
🚫 tube obstruction
🚫 diarrhea
🚫 volvulus
🚫 requires pump for slow feeds
Transgastric jejunal tube passed into jejunum
Central lines

- Indications?
- Types?
- Method of insertion?
- Complications?
Central Venous Access

IV Nurse or Radiology
- PICC - peripherally inserted central catheters
- temporary central venous line

Surgical
- Hickmann
- Broviac
- Port-o-cath
**PICC**

- **Peripherally Inserted Central Catheter**
- made of radiopaque polymeric silicone (Silastic) or polyurethane
- long term, long IV access device
- inserted in peripheral vein (basilic or cephalic veins) and advanced to distal third of SVC
- **Why SVC?** Allows catheter to float freely in lumen to decrease risk of thrombus and infection
PICC

- Advantages
  - can be inserted by IV nurse
  - do not require surgical insertion
  - increased caloric allowance (compared to PIV)
  - last up to 2-3 years
    - 7.9-25.4 days in neonates
  - cheap!!! 35-100$
PICC

Complications

- infection (0.8-12.5%)
- phlebitis (hypertonic or corrosive fluids)
- thrombus (3.9-29%)
- blockage
- pleural or pericardial effusions,
  pneumothorax, arrhythmia, endocarditis
Tunneled Central Venous Lines

- long term use
- surgically placed
- subclavian vein or internal jugular vein into SVC
- Dacron cuff - supports ingrowth of tissue to prevent dislodgement and provides barrier to infection
- single or multiple lumens
Implantable port

- long term vascular access
- totally implantable beneath skin
- infusion of medications, TPN, blood products, and IV fluids
- blood sampling
- dual or single lumen
Implantable port

Non-coring Huber needle

Self-sealing septum
Implantable port
Implantable port
Broviac / Central Line Tip Placement in Neonates - A Survey of Pediatric Surgeons on the Web

![Bar graph showing the distribution of responses for different placements.]

- **SVC**: 2 responses
- **SVC/Atrial**: 6 responses
- **High/Mid Atrial**: 12 responses
- **Low Atrial**: 1 response
- **Other**: 2 responses

*Number of Respondants*
CVL - complications

- insertion related
  - catheter malposition
  - pneumothorax, hemothorax, chylothorax
  - arterial puncture
  - hematoma
  - pericardial tamponade
  - air embolization
  - AV fistula
  - nerve transection
  - acute vascular occlusion
  - dysrhythmiias
Tunnel infection: erythema and tenderness extending along tunnel
CVL

Pneumothorax

Weighted NG

ETT
CVL in jugular vein

approx. skin puncture
Broviac tip

Chylothorax
CVL - complications

- long term
  - thrombus formation
  - line sepsis
  - broken or sheared-off catheters
  - clotting
  - catheter tip migration
  - tract infection
  - vessel perforation
  - fluid extravasation
  - skin erosion

Immunosuppressed children
Thrombus in subclavian vein with back flow of blood into collaterals
Preferred Vein Selection

- Axillary Vein
- Cephalic Vein
- Accessory Cephalic Vein
- Median Cubital Vein
- Basilic Vein

Diagram indicates superficial vein passing deep.
THE END
Nasoenteric tubes

- Therapeutic
  - Salem sump
  - Levin
  - Replogle

- Feeding
  - Regular
  - Weighted
  - Dobbhoff
  - Rusch
Nasogastric tubes

- Therapeutic (suctioning) - Sump, Levin, Replogle
  - large caliber tubes
  - decompression
  - monitor gastric pH
  - medications or short-term feeding
- Feeding - short term (<30 days)
  - small caliber tubes (weighted or unweighted)
Nasogastric tubes

- Levin tubes
  - 1867 Kussmaul first to use tube for decompression
  - 1921 Levin introduced supple rubber tube of uniform diameter with well-designed suction holes
  - suction
Nasogastric tubes

- **Sump tubes**
  - suction via multiple holes in distal tube
  - gentle suction \(\downarrow\) risk of inducing GI bleed
  - continuous movement of air through vent
    \(\therefore\) prevents plugging of holes by mucosa
  - continuous low-level wall suction allows efficient aspiration and minimizes tissue damage
Nasogastric tubes

- Replogle
  - used in TEF for continuous suctioning
  - multiple holes at very distal end of tube
ETT

UVC

NG

Temperature sensor
Nasoduodenal and nasojejunal tubes

- Tubes placed distal to ligament of Treitz associated with decreased risk of aspiration
- Longer term feeding
- Use of smaller caliber tubes - clogging of tubes
- Can be placed at bedside
  - RLD positioning, unweighted tubes, pro-motility agent, pH monitor
  - Fluoroscopic or endoscopic assistance
Nasoenteric tubes

- Mean tube life span: 10 days
- Clogging: 2-9%
- "Accidental" tube dislodgment: 60% of tube removals
- Feeding intolerance and residual volumes
- Continuous, intermittent, bolus feeds
Tip of NG in esophagus
NG in left hemithorax