Nutritional Access

TUBES AND OSTOMIES FOR ENTERAL ACCESS

K. Boeykens (BE)
TUBES AND OSTOMIES FOR ENTERAL ACCESS

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Content

SELECTION!

• Short time enteral access
  • NG-tube and complications
  • Postpyloric enteral access

• Long-term enteral access
  • PEG and some complications
Disclosures

- Invited lectures:
  - BAXTER
  - FRESENIUS
  - NUTRICIA
  - HALYARD (AVANOS)
  - NESTLE
Learning objectives

• Know the elements, including **duration** and risk of aspiration, behind the choice of enteral access
• Know the **most common** methods of enteral access insertion
• Know the **most important** complications of enteral access placement
Examples of Enteral Access

Feeding Routes Through The Nose
(Or alternatively may be oral)

1. Nasogastric
2. Nasoduodenal
3. Nasojejunal

Gastrostomy Options*
- Percutaneous Endoscopic Gastrostomy (PEG)
- Percutaneous Radiologic Gastrostomy (PRG)
- Percutaneous Endoscopic Jejunostomy (PEJ)
- Percutaneous Radiologic Jejunostomy (PRJ)
- Percutaneous Endoscopic Gastrojejunostomy (PEG/J)
- Button
- Surgically placed Gastrostomy

Jejunostomy

*Gastrostomy and jejunostomy tubes may be placed endoscopically, radiologically, or surgically.
NG-tube

1. Placement method
   • Insertion length

2. Complications
   • Misplacement/position check
   • Aspiration risk
   • (Dislocation)
   • (Blockage)
Four studies found that NEX was most likely to result in a tube that is positioned incorrectly, either ending in the esophagus, in the stomach but too close to the esophagus, or too far into the stomach or duodenum.
Hanson study 1979

- 99 cadavers
- 5 volunteers
- **NEX**: 72 % correct
- **NEX + Formulas**: 91,3% till 92,3% correct

### Table III

*Alternative formulas for predicting the length of nasogastric tube insertion for tube feeding*

<table>
<thead>
<tr>
<th>Formula</th>
<th>Percent properly placed*</th>
<th>Percent in the esophagus</th>
<th>Percent more than 10 cm. into the stomach</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Nose to ear to xiphoid − 50</td>
<td>91.35%</td>
<td>2.88%</td>
<td>5.77%</td>
</tr>
<tr>
<td></td>
<td>( \frac{\text{Nose to ear to xiphoid}}{2} + 50 )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>II. (Nose to ear to xiphoid × .38696) + 30.37</td>
<td>92.30%</td>
<td>3.85%</td>
<td>3.85%</td>
</tr>
<tr>
<td>III. (Body length × .20239) + 17.07</td>
<td>96.15%</td>
<td>2.88%</td>
<td>0.97%</td>
</tr>
<tr>
<td>IV. Nose to ear to xiphoid</td>
<td>72.12%</td>
<td>1.92%</td>
<td>25.96%</td>
</tr>
</tbody>
</table>

*a Properly placed defined as in the stomach but no more than 10 cm.*
Table 2. Localization of Nasogastric Tubes in Both Groups and Obtainment of Gastric Aspirate (N = 183).

<table>
<thead>
<tr>
<th>Tip positioning</th>
<th>Control Group (n = 99)</th>
<th>Intervention Group (n = 84)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 3 cm under LES, no. (%)</td>
<td>20 (20.2)</td>
<td>19 (22.6)</td>
<td></td>
</tr>
<tr>
<td>3–10 cm under LES, no. (%)</td>
<td>62 (62.6)</td>
<td>61 (72.6)</td>
<td></td>
</tr>
<tr>
<td>&gt; 10 cm under LES, no. (%)</td>
<td>17 (17.2)</td>
<td>4 (4.8)</td>
<td></td>
</tr>
<tr>
<td>Obtaining gastric aspirate, a no. (%)</td>
<td>55 (55.6)</td>
<td>47 (56.0)</td>
<td></td>
</tr>
</tbody>
</table>

LES, lower esophageal sphincter; no., number.

aAfter placement of the tube.
### Tip positioning

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</table>
Table 3: Localization of nasogastric tubes and obtainment of gastric aspirate.

<table>
<thead>
<tr>
<th>Tip positioning</th>
<th>CoNEX method (n = 199)</th>
<th>Obtaining gastric aspirate&lt;sup&gt;a&lt;/sup&gt; (n = 199)</th>
<th>Tubes looping upwards&lt;sup&gt;b&lt;/sup&gt; (n = 199)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 3 cm under LES, no. (%)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>3 – 5 cm under LES, no. (%)</td>
<td>12 (6.6)</td>
<td>10 (5.0)</td>
<td>1 (0.5)</td>
</tr>
<tr>
<td>6 – 10 cm under LES, no. (%)</td>
<td>63 (31.7)</td>
<td>46 (23.1)</td>
<td>2 (1.0)</td>
</tr>
<tr>
<td>&gt; 10 cm under LES, no. (%)</td>
<td>124 (62.3)</td>
<td>99 (49.8)</td>
<td>14 (7.0)</td>
</tr>
<tr>
<td>No aspirate, no. (%)</td>
<td></td>
<td>44 (22.1)</td>
<td></td>
</tr>
<tr>
<td>Not bent upwards, no. (%)</td>
<td></td>
<td></td>
<td>182 (91.5)</td>
</tr>
</tbody>
</table>

CoNEX, Correction of the NEX; LES, lower esophageal sphincter.

<sup>a</sup>Within 2h after placement/reposition

<sup>b</sup>Looping upwards inside the stomach

Submitted for publication
STEP 1: NEX

STEP 2: CONEX

CoNEX
NG-tube

1. Placement method
   • Insertion length

2. Complications
   • Misplacement/position check
   • Aspiration risk
   • (Dislocation)
   • (Blockage)
Enteral feeding tube misplacements

- Pennsylvania (US)
- Report (2011-2016)
- 166 NGT misplacements
  - 60-89 years: 68.7%
  - 0-11 years: 6.6%
- 56% serious harm (2 deaths)
- 81 X-rays: 16 misread
A review of published case reports of inadvertent pulmonary placement of nasogastric tubes in children.

Metheny NA¹, Meert K².

- 15 published case reports
- 4 children died
- The auscultatory method failed to detect malpositioned tubes in all seven cases where it was used.
Do not rely on the auscultatory method alone to differentiate between gastric and respiratory placement or between gastric and small bowel placement.
Iceberg means a small indication of a bigger problem.
pH-method
• At 5.5, the pH test lacks sensitivity towards oesophageal placements, a major risk identified by feeding experts

• Under cut-off 5, respiratory feeding was excluded; oesophageal feeding was kept to a minimum
NG-tube

1. Placement method
   • Insertion length

2. Complications
   • Misplacement/position check
   • Aspiration risk
   • (Dislocation)
   • (Blockage)
• Prospective-multicentre
• Pepsin-positive tracheal secretions (a proxy for the aspiration of gastric content)
• \( N = 6000 \) tracheal secretions
• 31.3 % positive
• Pneumonia on day 4 vs NOT:
  • 42.2% vs 21.1% \((P < 0.001)\) pepsine-pos!
<table>
<thead>
<tr>
<th><strong>RISK ASPIRATION</strong></th>
<th><strong>RISK PNEUMONIA</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Low backrest elevation ((p = .024))</td>
<td>Low backrest elevation ((p = .018)).</td>
</tr>
<tr>
<td>Vomiting ((p = .007))</td>
<td>Aspiration ((p &lt; .001))</td>
</tr>
<tr>
<td>Gastric feedings ((p = .009))</td>
<td>Use of paralytic agents ((p = .002)).</td>
</tr>
<tr>
<td>Glasgow Coma Scale score &lt;9 ((p = .021))</td>
<td>High sedation level ((p = .039)).</td>
</tr>
<tr>
<td>Gastroesophageal reflux disease ((p = .033)).</td>
<td></td>
</tr>
</tbody>
</table>
• 14 trials
• Gastric vs post-pyloric
• N = 1109
• Moderate-quality evidence of a 30% lower rate of pneumonia
• No sufficient evidence to show that other clinically important outcomes such as duration of mechanical ventilation, mortality and length of stay are influenced
• Aspiration as compared with the stomach:
  • First portion duodenum: 11.6% lower
  • Second/third part: 13.2% lower
  • Fourth part and beyond: 18.0% lower
• Pneumonia occurred less often when feedings were introduced at or beyond the second portion of the duodenum
Nasojejunal (duodenal)

- Blind
- During open surgery
- Endoscopically
  - 1,2-3 lumens
- Electromagnetic-guidance
  - (Cortrak®)
Nasojejunal (duodenal)

- Blind
- Endoscopically
- During open surgery
- Electromagnetic-guidance
  - (Cortrak®)
• Bedside EM-guided placement of naso-enteral feeding tubes appears to be as safe and effective as fluoroscopic or endoscopic placement.

• Placed by nurses

Electromagnetic-Guided Bedside Placement of Nasoenteral Feeding Tubes by Nurses Is Non-Inferior to Endoscopic Placement by Gastroenterologists: A Multicenter Randomized Controlled Trial.

Gerritsen A, de Rooij T, Dijkstra MG, Busch OR, Bergman JJ, Ubbink DT, van Duijvendijk P, Erkelens GW, Klos M, Kruit PM, Bac DJ, Rosman C, Tan AC, Molenar IQ, Monkelbaan JF, Mathus-Vliegent EM, Besselink MG.
Case reports of misplacement (FDA)

- Right lung (n = 13)
- Left lung (n = 6)
- Unspecified lung (n = 4)
- Bronchus (n = 2)
- A pneumothorax occurred in 17 of the 25 misplacements
- Feedings were administered in 6 cases
2006-2016: 54 adverse events
Lung placement: 98% (LL 46%)
Pneumonitis: 21%
Death in of 17% lung placements
89% of clinicians failed to detect malpositioned insertion tracings reviewed

EXPERIENCE-COMPETENCY!!
Long Time EN Access

Gastrostomy Options:
- Percutaneous Endoscopic Gastrostomy (PEG)
- Percutaneous Radiologic Gastrostomy (PRG)
- Percutaneous Endoscopic Jejunostomy (PEJ)
- Percutaneous Radiologic Jejunostomy (PRJ)
- Percutaneous Endoscopic Gastrojejunoscopy (PEG/J)
- Button
- Surgically placed Gastrostomy

Jejunostomy

*Gastrostomy and jejunostomy tubes may be placed endoscopically, radiologically, or surgically.
• A PEG should be preferred over a surgical gastrostomy mainly due a lower complication rate, cost-effectiveness and operating time.

Grade of recommendation B

• If a PEG if not suitable a percutaneous laparoscopic assisted gastrostomy (PLAG) may be a safe alternative.

Grade of recommendation 0
Percutaneous endoscopic gastrostomy versus nasogastric tube feeding for adults with swallowing disturbances.

Gomes CA Jr, Andriolo RB, Bennett C, Lustosa SA, Matos D, Waisberg DR, Waisberg J.

- N = 735 (11 RCT)
- PEG: less intervention failure
- No other significant differences in important outcomes
- But scarce detailed patient characteristics in studies (underlying disease, placement technique,...)
1) Early enteral feeding after intubation via percutaneous gastrostomy has no effect on mortality in critically ill patients.

2) Early enteral feeding after intubation via percutaneous gastrostomy is associated with a significant decrease in ventilator-associated pneumonia in critically ill patients.
QOL (NG vs PEG)

- Inconvenience,
- Discomfort
- Altered body image
- Social activities
• **Pro**
  - Weight loss ▼
  - Therapy interruptions ▼
  - Dehydration ▼
  - Hospitalisation ▼
  - QoL ▲

• **Contra**
  - Procedural complications
  - QoL ▼
    - Body image
    - Social isolation
  - Longer dependency of TF
  - Swallowing motivation ▼
Rapid Response Report NPSA/2010/RRR010: Early detection of complications after gastrostomy

March 2010

Supporting Information

22 serious incidents:
- 11 patients died
Incidents reported

- 9 cases of leakage of feed into the peritoneal cavity and/or peritonitis
- 2 of colonic puncture
- 1 related to haemorrhage
- 1 involving both haemorrhage and colonic puncture;
- 1 septic shock secondary to aspiration
- 1 of leakage of feed into thoracic cavity
- 1 of surgical emphysema
- 6 of unclear mechanism
Reduced 30-day gastrostomy placement mortality following the introduction of a multidisciplinary nutrition support team: a cohort study

Assessment by a Multidisciplinary Clinical Nutrition Team Before Percutaneous Endoscopic Gastrostomy Placement Reduces Early Postprocedure Mortality
PEG/PEG-J

• Aftercare/complications
• ESPEN HEN guidelines 2019

- Stoma care
- Burried Bumper
- Leakage
- Hypergranulation
- Infection
- Inadvertent removal
- .....
Overgranulation

- Prolonged stimulation of fibrous tissue and new blood vessels (angiogenesis)
- Excess friction/movement a/o moisture
- Infection
• Pain and bleeding
• Treatment: silver nitrate application
Treatment

- Dermal corticosteroid cream, ointment
  - (With antibiotics)
- (Antimicrobial) aliginate, foam (+ silver) dressing to keep modest pressure on the skin around the stoma and minimize movement.
Hypergranulation = oedematous tissue
N = 8 (paediatric patients)
Daily 1/3 of 5 ml teaspoon salt ‘sprinkled’ over the tissue
Treatment period: 3 days-2 months
Positive result in all patients but 5/8 recurrence but successfully repeated treatment afterwards
1 skin erosion: salt irrigated 10 minutes after application
Buried bumper

- Tube blockage
- Pain with flushing
- Persisting leakage
- Chronic site infection
- Possible evolution to an abscess and fistulisation
- Even erodation onto the abdominal wall
- Sometimes rotation possible:
  - Gastro mucosa ‘pocket’ round the bumper
Burried bumper

- Serious but preventable complication
- Normally a long-term complication
- Aftercare!
  - Release external bumper
  - Clean PEG-site
  - Advance PEG into abdomen minimum 2-3 cm but ideally 5 to even 10 cm (at least once a week!)
Treatment

• Needle-knife
• Laparoscopy
• Laparatomy
• Jejunal extension through the PEG (if PEG facilitates that) leaving tip in the stomach
• If too high risk: leave it in situ and new PEG beside the existing one
The Flamingo Set
A New Therapy for the Buried Bumper Syndrome (BBS)

Figs. 6-8: By slowly closing the grip in position 2 a safe incision is made towards the central catheter on the surface of the internal bumper.

Figs. 9-11: Exposure of the internal bumper by PPT and replacement with a new PEG tube; in the two pictures below it is possible to see the depth of incision.
TO CLOSE
THANK YOU!

AZ Nikolaas