Approach to Enteral Feeding: NJ, PEG, PEJ or PEG-J

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“The gut, my second favorite organ”

W. Allen
Enteral Feeding Tubes

- NET – Nasoenteric Tubes
  - NG: Nasogastric
  - Dobhoff: Nasoduodenal/nasojejunal
  - Trial before percutaneous tube
  - < 30 days
- Percutaneous feeding tubes
  - > 30 days
  - PEG – Percutaneous Endoscopic Gastrostomy
  - PEGJ – Gastrostomy with Jejunal Extension Tube
  - DPEJ Direct Percutaneous Jejunostomy

Enteral Access Tube Selection Criteria

- Nutrition vs. Decompression
- Length of Time needed
- Surgical Patient or Non-Surgical Patient
- Risk of Aspiration
Over the guidewire modification

- Combination Savary wire + std guidewire
- NET passed into stomach
- Scope advanced into SB just behind tip
- Success 97.4%
- Procedure time 11.6 min


ENET-Transnasal

- Technique
  - ≤ 5.5 mm scope
  - wire thru scope to jejunum
  - remove scope
  - tube over wire
  - usually unsedated
- 93% success
- < 15 minutes
- 60% jejunum

Dranoff. Am J Gastro 1999;94:2902-4
Fang GI Endo 62;661-6:2005
Drag and Clip Modification

- Tie suture to NET
- Pass tube into stomach
- Grab suture with re-openable clip and carry into SB
- Deploy Clip
- Withdraw scope carefully
- 95%+ success rate
- Procedure time ~ 15 min

*Am J Gastroenterol* 2012; 107:1220-1227

Nasal Bridle

- Inadvertent NET removal ~ 40%
- Nasal Bridle 1980
- “Nasal tube retention system”
  - Magnet retrieval
- QI project Pitt
  - 36%→10%
  - Use would ↓ 275 tubes, ↓ 330 Xrays, ↓ 45 nurse days

*Gunn JPEN* 2009;33:50-54
PEG Tips

- Use safe track technique
- Use CO2 if available
- Ultrathin scopes
  - Significant co-morbidity
  - Oropharyngeal/esophageal stenosis
  - Decreased sedation
- Spinal needle for obese patients
- External bumper does not have to be tight
- Can start feedings after 3-4 hours

PEG: Technique

Repeat Endoscopy

Not necessary
Gastropexy/Jejunopexy

- When ascites present
  - + ascites drainage method
  - ? Prevent Small Bowel Volvulus

PEG site metastases

- Up to 1% incidence
- DDx granulation tissue
- Portends poor prognosis
- Mechanism: ? Direct seeding, hematogenous
- Consider alternative methods i.e. IR, Russell introducer

Cruz GI Endo 2005;62:708-11
Russell Introducer Method

- Technique
  - Gastropexy’s performed
  - Dilator with peel-away introducer over guidewire
  - G-tube passed through the introducer peeled away
  - Can do endoscopically

- Introducer kit
  - Gastropexy device
  - Serial dilator

Maxwell, Fang JPEN 2011;35:630-5

Transnasal PEG placement in unsedated patients: A new technique

- Background
  - Oral route for PEG placement not feasible in H+N Ca, facial trauma, neurologic dz

- Methods
  - 2 reports, 35 pts
  - Used 5.9 mm ultrathin endoscope
  - Standard PEG kits
  - No sedation used

- Results
  - Transnasal endoscopic PEG placement successful 33/35
  - Procedure time 9.5, 15 minutes
  - No complications

Vitale Endo 2005;37:48-51
Dumontier GI Endo 2004;59:54-57
## Situations favoring endoscopic or radiologic placement

<table>
<thead>
<tr>
<th>Endoscopic</th>
<th>Radiologic</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Need for other endoscopic intervention</td>
<td>• Obstructive anatomy preventing passage of endoscope</td>
</tr>
<tr>
<td>• Need for bedside placement</td>
<td>• Active upper aerodigestive tract cancer</td>
</tr>
<tr>
<td>• Risk for tube dysfunction or occlusion</td>
<td>• Higher risk of sedation</td>
</tr>
<tr>
<td>• Risk for inadvertent tube removal</td>
<td></td>
</tr>
</tbody>
</table>

## Indications for Jejunal Access

- Gastric abnormalities
  - Gastroparesis
  - Previous gastric resection
  - Gastric outlet obstruction
  - Inability to place PEG
- Pancreatitis
- Feeding intolerance
- Improved nutrient delivery
- Aspiration
  - Intolerance to PEG
  - GERD
- When expertise available
# Gastric vs. Small Bowel Feeding

Through the Scope

- **Technique**
  - 28 Fr PEG or stoma
  - ≤ 6 mm scope to intestine
  - wire in, scope out
  - J-tube over wire
- ≤ 100% to jejunum
- ≥ 12 minutes

### Table 5. Relationship Between Feeding Site and Incidence of Pneumonia, Controlling for 3 Clinical Variables and Aspiration (n = 428)

<table>
<thead>
<tr>
<th>Feeding Tube Site</th>
<th>Feeding Tube Site Only: Odds Ratio for Pneumonia (95% CI)</th>
<th>Feeding Tube Site Adjusted for 3 Clinical Variables: Odds Ratio for Pneumonia (95% CI)</th>
<th>Feeding Tube Adjusted for 3 Clinical Variables and Aspiration (% Pepsin Positive Tracheobronchial Secretions): Odds Ratio for Pneumonia (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>D1 vs stomach</td>
<td>0.78 (0.48–1.25), P = NS</td>
<td>0.73 (0.44–1.21), P = NS</td>
<td>1.18 (0.68–2.04), P = NS</td>
</tr>
<tr>
<td>D2–D3 vs stomach</td>
<td>0.48 (0.28–0.83), P = .008</td>
<td>0.52 (0.20–0.90), P = .020</td>
<td>0.87 (0.47–1.60), P = NS</td>
</tr>
<tr>
<td>D4–jejunum vs stomach</td>
<td>0.21 (0.08–0.58), P = .002</td>
<td>0.30 (0.11–0.83), P = .021</td>
<td>0.62 (0.21–1.87), P = NS</td>
</tr>
</tbody>
</table>

JPEN 2011;35:346-355

Clip Assisted PEGJ

• Resolution clip
  – Can be opened and closed multiple X’s
  – Use as forceps
  – Use to anchor

• Similar method for NET’s
  – +/- fluoro

PEG-J Outcomes

- Retrospective Peds study
- 85 patients
- Avg # replacements 2.2
- Avg survival tube 39 days

Fortunato Am J Gastro 2005;100, 186–189

DPEJ

- Technique
  - colon- or enteroscope
  - transilluminate
  - jejunum
  - percutaneous puncture
  - tube insertion
- 68-100% success
  - improved post-surgery

Shike. Gastrointest Endosc 1996;44:536-40
Advantages of DPEJ

- Greater stability than PEGJ
  - Decreased migration, kinking etc.
  - More distal jejunal access
- Larger diameter tubes
  - Better infusion/decompression
  - Less clogging
- Less morbidity than surgical Jejunostomy

PEGJ vs. DPEJ

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Fan AC. GI Endo 2002:56, 890-894
Fang DDW 2003
Change in aspiration events with DPEJ

- Before DPEJ
  - 33 total
  - Range 1-6
  - Mean 3.0 ± 0.426

- After DPEJ
  - 3 total
  - Range 0-2
  - Mean 0.272 ± 0.195

DPEJ Placement

DPEJ Placement

Tips For Improving Success

- Trans-illumination
  - Easier in thin body habitus
  - Easier in post-surgical
  - Use transillumination on endoscope
- Site Identification
  - Must have both transillumination and indentation
  - ? Fluoroscopy
  - Balloon enteroscope
- Clear stoma path
  - Use safe track technique
- Small bowel peristalsis
  - Glucagon
  - General anesthesia

PERSEVERANCE
# Double Balloon Enteroscopy for DPEJ

- 10/33 failed DPEJ 
  - 9/10 conscious sedation
  - 8/10 failure to find proper site
- 10/10 successful using DBE/GA
- All DPEJ at Mayo using DBE
- Reports using SBE

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## DPEJ Outcomes: Largest series

<table>
<thead>
<tr>
<th>Author</th>
<th>Success</th>
<th>Follow-up</th>
<th>Severe AE</th>
<th>Mild and Moderate AE</th>
<th>Re-Intervention</th>
<th>Death</th>
</tr>
</thead>
<tbody>
<tr>
<td>Macrae et al.* (2005)</td>
<td>209/257 (86%)</td>
<td>36.1 days</td>
<td>N=14 (4.6%) Bowel Perforation (2) Jejunal Volovalvus (1) Aspiration (1)</td>
<td>N=67 (22%) Infection (5) Pain (10) Chronic Fatigue (2) Aspiration (2) Jejunal Hernatomas (1)</td>
<td>N=36 (13.7%)</td>
<td>N=4 (8.3%)</td>
</tr>
<tr>
<td>Shike et al.* (1996)</td>
<td>125/150 (84%)</td>
<td>113 days</td>
<td>N=9 (2.6%) Bowel perforation (1) Bleeding (1) Abcess (1)</td>
<td>N=34 (29%) Tube leakage (12) Infection (9) Tube malfunction (5) Aspiration (3)</td>
<td>Not reported</td>
<td>None</td>
</tr>
<tr>
<td>Muckensius et al.* (2008)</td>
<td>85/80 (81%)</td>
<td>120 days</td>
<td>N=3 (4.7%) Necrotizing Fascit (1) Jejunal obstruction (1) Sepsis (1)</td>
<td>N=26 (32%) Pain (14) Infection (12)</td>
<td>Not reported</td>
<td>N=1 (1.30%)</td>
</tr>
<tr>
<td>Fan et al.* (2005)</td>
<td>55/77 (72.7%)</td>
<td>180 days</td>
<td>Not fully reported</td>
<td>Not fully reported: Tube leakage (1) Infection (1) Pain (5) Site erosion (1)</td>
<td>N=3 (13.9%)</td>
<td>None</td>
</tr>
</tbody>
</table>

* Prac Gastro Feb 2014: 24-36
Outcomes Different Methods

Jejunostomy

<table>
<thead>
<tr>
<th>Procedure</th>
<th>First Attempt Success Rate (%)</th>
<th>Overall Adverse Event Rate (%)</th>
<th>Serious Adverse Event Rate (%)</th>
<th>Re-intervention Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEGJ</td>
<td>88 - 93</td>
<td>35 - 56</td>
<td>0 - 3.0</td>
<td>22-66</td>
</tr>
<tr>
<td>IR-J</td>
<td>88 - 95</td>
<td>7.7 - 11.3</td>
<td>5 - 11</td>
<td>NA</td>
</tr>
<tr>
<td>DPEJ</td>
<td>68 - 86</td>
<td>22 - 35</td>
<td>2.0 - 6.3</td>
<td>13.5 - 16.7</td>
</tr>
<tr>
<td>SJ</td>
<td>~100</td>
<td>13 - 25</td>
<td>0.6 - 4.0</td>
<td>1.0 - 8.0</td>
</tr>
</tbody>
</table>

Prac Gastro Feb 2014: 24-36

Conclusions: Enteral Access for Nutrition and Decompression

- Knowledge of when which and how to place
  - New techniques
  - Expertise/Tips helpful
  - New connectors
- Decompression very effective and very efficient for palliation
  - Limited goals
  - Different spectrum complications
Feeding Tube Outcomes

before Fang  after Fang