Jejunal tubes – a missed opportunity?
New methods of placement

C. Madl (Austria)
Jejunal tubes – a missed opportunity?

New methods of placement

Christian Madl, MD
Department of Gastroenterology and Endoscopy
Hospital Rudolfstiftung
Vienna, Austria
christian.madl@wienkav.at
Critical illness

- Trauma/Infection
- Acute Stress
- Iatrogenic Factors
- Immunological Response
- Neuroendocrine Response
- Metabolic Response
Nutrition in critically ill patients

- Enteral nutrition is superior to parenteral nutrition
  - Preserves gut integrity
  - Reduces infection rate
  - Less expensive
  - Improves outcome
Nutrition in critically ill patients

Early (within 24 to 48h) enteral nutrition is beneficial

→ up to 63% have intolerance of enteral nutrition:
  □ large gastric volumes
  □ vomiting
  □ abdominal distension

→ interruption of enteral nutrition

→ Guidelines: intestinal feeding via jejunal tubes
Placement of jejunal feeding tubes

- Endoscopic guided technique
  - Grasping the tube tip using a forceps
  - Placement through the endoscope

- Self-propelling tubes

- Tubes under fluoroscopic guidance

- Unguided „blinded“ jejunal tubes
Endoscopic guided technique of jejunal feeding tubes

- $n = 60$, success rate of jejunal placement: 90%
- $n = 34$, success rate of jejunal placement: 98%
- $n = 51$, success rate of jejunal placement: 90%

Schwab, Gastrointest Endosc 2002; Davies, Crit Care Med 2002; O`Keefe, JPEN 2003
Endoscopic guided technique of jejunal feeding tubes

Duration of jejunal tube placement (n=108; success rate: 97%)

- 0-10min: 10%
- 11-20min: 24%
- 21-30min: 28%
- 30-60min: 38%

Number of attempts until correct jejunal position

- 1 attempt: 57%
- 2 attempts: 14%
- 3 attempts: 10%
- 4 attempts: 19%
Endoscopic guided technique – a „new“ jejunal tube

Freka® Easy In Tube: Double lumen jejunal feeding tube for placement through the working channel of an endoskop.
**Self-propelling** tube – Bengmark naso-intestinal feeding tube

The distal end: 2.5 loops, which are straightened during insertion with a guidewire; after removal of the guidewire, the spiral allows transpyloric passage via peristalsis

- **n = 105,** success rate of jejunal placement: 49%
- **n = 30,** success rate regular peristalsis: 78%
  reduced peristalsis: 57%
- **n = 16,** success rate of jejunal placement: 75%

14 french, 155 cm long, single lumen tube with small plastic flaps; In gastric position: manually advanced 10cm/hour until the 100cm mark
Problems: single lumen "Self-propelling" tubes
Comparison of a new unguided self-advancing jejunal tube with the endoscopic guided technique: a prospective, randomized study.

<table>
<thead>
<tr>
<th></th>
<th>Endoscopic guided group</th>
<th>Unguided self-advancing group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$n = 21$</td>
<td>$n = 21$</td>
</tr>
<tr>
<td>Age (years)</td>
<td>57 ± 13</td>
<td>57 ± 16</td>
</tr>
<tr>
<td>Male/female (no.)</td>
<td>12/9</td>
<td>13/8</td>
</tr>
<tr>
<td>APACHE III score</td>
<td>93 ± 28</td>
<td>85 ± 22</td>
</tr>
<tr>
<td>SAPS II score</td>
<td>63 ± 17</td>
<td>54 ± 15</td>
</tr>
<tr>
<td>Gastric residual volume (ml)</td>
<td>636 ± 298</td>
<td>656 ± 318</td>
</tr>
</tbody>
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Holzinger; Intensive Care Med. 2009 Sep;35(9):1614-8.
Comparison of a new unguided self-advancing jejunal tube with the endoscopic guided technique: a prospective, randomized study.

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<td>$n = 21$</td>
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</tr>
<tr>
<td>Success rate, no (%)</td>
<td>21 (100)</td>
<td>14 (67)</td>
</tr>
<tr>
<td>Duration of placement (min)</td>
<td>20 ± 12</td>
<td>597 ± 260</td>
</tr>
<tr>
<td>Complication rate, no (%)</td>
<td>3 (14)</td>
<td>3 (14)</td>
</tr>
<tr>
<td>Number of attempts</td>
<td>1.76 ± 1.0</td>
<td>1.52 ± 0.6</td>
</tr>
<tr>
<td>Days in correct position</td>
<td>8.2 ± 8</td>
<td>13.1 ± 9.6</td>
</tr>
<tr>
<td>Days with high gastric residual volume</td>
<td>1.9 ± 2.1</td>
<td>2.6 ± 2.9</td>
</tr>
<tr>
<td>Length of ICU stay (days)</td>
<td>17 ± 13</td>
<td>23 ± 17</td>
</tr>
<tr>
<td>ICU mortality, no (%)</td>
<td>7 (33)</td>
<td>6 (29)</td>
</tr>
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</table>

$P = 0.008$  
$P < 0.001$

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Comparison of a new unguided self-advancing jejunal tube with the endoscopic guided technique: a prospective, randomized study.

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<th>Unguided self-advancing group: failure ($n = 7$)</th>
<th>Unguided self-advancing group: success ($n = 14$)</th>
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<tr>
<td>Age (years)</td>
<td>59 ± 20</td>
<td>56 ± 15</td>
</tr>
<tr>
<td>SAPS II score</td>
<td>59 ± 13</td>
<td>52 ± 16</td>
</tr>
<tr>
<td>Gastric residual volume (ml)</td>
<td>608 ± 246</td>
<td>676 ± 351</td>
</tr>
<tr>
<td>Norepinephrine therapy (µg/kg per min)</td>
<td>0.16 ± 0.2</td>
<td>0.12 ± 0.23</td>
</tr>
<tr>
<td>Analgetic therapy (fentanyl mg/h)</td>
<td>0.2 ± 0.17</td>
<td>0.19 ± 0.15</td>
</tr>
<tr>
<td>Sedative therapy (midazolam mg/h)</td>
<td>9.5 ± 7.14</td>
<td>10.5 ± 12.6</td>
</tr>
<tr>
<td>Patients with history of diabetes mellitus, no (%)</td>
<td>1 (14)</td>
<td>3 (21)</td>
</tr>
<tr>
<td>ICU mortality, no (%)</td>
<td>2 (29)</td>
<td>4 (29)</td>
</tr>
</tbody>
</table>

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X-ray - single lumen self-propelling “Tiger Tube®”
New jejunal feeding tube using an electromagnetic sensing technique to visualize the placement process on a bedside monitor.
Jejunal feeding tube using an electromagnetic guided system (Cortrak™)
Jejunal feeding tube using an electromagnetic guided system (Cortrak™)
Jejunal feeding tube using an electromagnetic guided system (Cortrak™)

N=250; placement by nurses; overall success rate: **85%**

Mathus-Vliegen E, DDW 2009, Abstract ID 590237
Comparison of the electromagnetic guided system with the endoscopic guided technique: a prospective, randomized study

<table>
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<tr>
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<th>Endoscopic guided technique</th>
<th>Electromagnetic guided technique</th>
<th>p-value</th>
</tr>
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<tbody>
<tr>
<td>N= (randomization 1:2)</td>
<td>22</td>
<td>44</td>
<td>0,25</td>
</tr>
<tr>
<td>SAPS II Score</td>
<td>50 ± 16</td>
<td>52 ± 20</td>
<td>0,66</td>
</tr>
<tr>
<td>Success rate (%)</td>
<td>95</td>
<td>91</td>
<td>0,65</td>
</tr>
<tr>
<td>Time until correct placement (min)</td>
<td>17 ± 9</td>
<td>15 ± 13</td>
<td>0,60</td>
</tr>
<tr>
<td>Days in correct position (d)</td>
<td>15 ± 8</td>
<td>14 ± 14</td>
<td>0,82</td>
</tr>
</tbody>
</table>

Conclusion

- Placement of jejunal feeding tubes allows continuation of enteral nutrition in more than 90% of all patients.

- The endoscopic guided technique is still the “gold standard” for jejunal feeding tube placement with a success rate of approx. 95%.

- New self propelling techniques or electromagnetic guided systems are simple alternatives.