Management of Recurrent and Refractory Esophageal Strictures

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Definitions

- **REFRACTORY**: Inability to successfully keep lumen dilated to a diameter of 14 mm over 5 sessions at 2 week intervals.

- **RECURRENT**: Inability to maintain a satisfactory luminal diameter for 4 weeks once the target diameter of 14 mm has been achieved.
Distinguish

If you see this....

VS

You’re gonna need this!!!
Malignant Dysphagia

- Intrinsic tumors
  - Esophageal adenocarcinoma
  - Esophageal SCCA
  - Junctional tumors
- Extrinsic compression
  - Lung cancer
  - Mediastinal lymphadenopathy
  - Mediastinal masses

Endoscopic Options

- Dilation
- Ablation
  - Laser, PDT, APC, cryotherapy
- Systemic therapy
- Feeding tube
- Stent
**Esophageal Stents**

- Restore luminal patency
- Relieve dysphagia
- Resume oral feeding
- Maintain nutrition
- Quality of life

**Available Stents**

*Vleggaar FP, Siersema PD. Gastrointest Endosc Clin N Amer 2011.*
**Performance: Dysphagia Scoring System**

*Esophageal Stenting for the Palliation of Malignant Dysphagia*

<table>
<thead>
<tr>
<th>DYSPHAGIA SCORE</th>
<th>SYMPTOM</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No dysphagia</td>
</tr>
<tr>
<td>1</td>
<td>Dysphagia to normal solids</td>
</tr>
<tr>
<td>2</td>
<td>Dysphagia to soft solids</td>
</tr>
<tr>
<td>3</td>
<td>Dysphagia to solids and liquids</td>
</tr>
<tr>
<td>4</td>
<td>Inability to swallow saliva</td>
</tr>
</tbody>
</table>

Mellow Arch Int Med 1985
Performance

• Relief of dysphagia

• Complications
  – Pain
  – GERD
  – Bleeding, Perforation, Aspiration, Fistulas

• Stent dysfunction
  – Re-obstruction
  – Migration

Plastic vs Metal

• RCT
• 39 pts w/locally adv esoph ca

<table>
<thead>
<tr>
<th></th>
<th>Plastic prosthesis (n = 20)</th>
<th>Metal stent (n = 19)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technical success (%)</td>
<td>18 (90)</td>
<td>18 (94.7)</td>
</tr>
<tr>
<td>Median dysphagia score</td>
<td>1</td>
<td>0.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Complications*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perforation</td>
<td>4 (22.2%)</td>
<td>0</td>
</tr>
<tr>
<td>Hemorrhage</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Seven-day mortality*</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

*P = 0.001.

Soooo.... Came the shift to metallic stents

**Stent Reobstruction**
- Uncovered Stents
  - Tumor Ingrowth
  - Tissue Overgrowth

*Llano RC. Rev Col Gastroenterol 2012.*
### PC-SEMS

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>Major Complication</th>
<th>Minor Complication</th>
<th>Recurrent Dysphagia</th>
<th>Tissue ingrowth</th>
<th>Food Impaction</th>
<th>Stent Migration</th>
</tr>
</thead>
<tbody>
<tr>
<td>van Boeckel '10</td>
<td>44</td>
<td>4 (9%)</td>
<td>Pneumonia (3)</td>
<td>GERD 11 (25%)</td>
<td>6 (14%)</td>
<td>3 (7%)</td>
<td>2 (5%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Bleeding (1)</td>
<td></td>
<td>Pain 4 (9%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>van Boeckel '10</td>
<td>37</td>
<td>3 (8%)</td>
<td>Pneumonia (1)</td>
<td>GERD 7 (19%)</td>
<td>4 (10%)</td>
<td>2 (6%)</td>
<td>2 (6%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Severe pain (2)</td>
<td></td>
<td>- Pain 10 (27%)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### FC-SEMS

- Decreased risk of stent dysfunction by tumor/tissue ingrowth/overgrowth
- Stent does not embed
  - Removable
- …Higher risk of migration
PC-SEMS vs FC-SEMS

- Retrospective, 252 pts
  - 209 PC, 112 FC

- Migration higher in FC
  - 37.5% vs 9.1% (p < 0.001)

- Tissue in/over-growth higher in PC
  - 53.4% vs 29.1% (p = 0.004)


FCSEMS in Neoadjuvant Setting

- Prospective study
- 55 pts w/locally advanced esoph ca

- Complications
  - Pain: 13/55 (24%)
  - Migration: 17/55 (31%)
    - Mean time: 44 days (6-154)
    - Only 1/17 had recurrent dysphagia

After stent placement…

- Elevate HOB, PPI
- Starts clears and slowly advance to soft foods
- Give post stent diet instructions
- Analgesics prn for pain

Benign Esophageal Obstruction

- Peptic injury
- Inflammatory (EoE)
- Anastomotic
- Radiation
- Caustic ingestion
Esophageal Strictures

**Simple**
- Short
- Focal
- Straight
- Allow passage of normal diameter endoscope

**Complex**
- Longer (>2 cm)
- Angulated
- Irregular
- Severely narrowed

Endoscopic Options

- Dilation
- Intraluminal steroid injection
- Incisional therapy
- Stent placement
Remember… it can be difficult to treat benign strictures…

- Repici et al. Gastrointest Endosc 2016
  - 1/3rd achieved clinical resolution in refractory strictures
A Prospective, Randomized, Double-Blind, Placebo-Controlled Trial of Endoscopic Steroid Injection Therapy for Recalcitrant Esophageal Peptic Strictures

Ramage et al. Am J Gastroenterol 2005

- 30 pts randomized to:
  - 0.5cc/quadrant triamcinolone and dilation
  - Sham injection and dilation
- PPI therapy in both groups
- Results: Need for redilation
  - 2 pts (13%) steroid group
  - 9 pts (60%) sham group
  - p=0.011

Endoscopic corticosteroid injections do not reduce dysphagia after endoscopic dilation therapy in patients with benign EG anastomotic strictures

Hirdes et al. Clin Gastroenterol Hepatol 2013

- BOTTOM LINE: Intralesional steroid injections to Savary dilation in patients with benign esophageal strictures did not result in clinical benefit.
Incisional Therapy

• Hordijk et al. GIE 2006
  – 20 pts with refractory strictures
    • 12 pts with <1 cm segment, 1 treatment needed
    • 8 pts with 1.5-2 cm segment, mean 3 treatments needed

• Lee et al. GIE 2009
  – 24 pts
    • 21 pts with <1 cm segment, 1 treatment needed
    • 3 pts with >1 cm segment needed repeat treatment
Temporary Stent Placement

- Potential advantages
  - Maintain patency longer
  - Decreased # interventions

- Removable

- Migration

- Tissue in/over-growth

Safety of Endoscopic Removal of SES After Treatment of Benign Esophageal Diseases

Emo et al. Gastrointest Endosc 2013

- Multicenter retrospective study
- 214 patients with 329 stent extractions
  - 170 SEMS
  - 94 PCSEMS
  - 65 SEPS
- PCSEMS was a risk factor for AE during removal ($P < 0.001$)
SEPS for Benign Strictures

<table>
<thead>
<tr>
<th></th>
<th>Technical Success N (%)</th>
<th>Early Stent Migration N (%)</th>
<th>Re-intervention N (%)</th>
<th>Clinical Success N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broto '03</td>
<td>10 (100)</td>
<td>2 (20)</td>
<td>6 (50)</td>
<td>5 (50)</td>
</tr>
<tr>
<td>Evrard '04</td>
<td>17 (100)</td>
<td>5 (29)</td>
<td>5 (29)</td>
<td>13 (76)</td>
</tr>
<tr>
<td>Repici '04</td>
<td>15 (100)</td>
<td>1 (7)</td>
<td>1 (7)</td>
<td>12 (80)</td>
</tr>
<tr>
<td>Barthel '08</td>
<td>8 (100)</td>
<td>-</td>
<td>4 (50)</td>
<td>1 (13)</td>
</tr>
<tr>
<td>Dua '08</td>
<td>38 (95)</td>
<td>-</td>
<td>1 (3)</td>
<td>12 (30)</td>
</tr>
<tr>
<td>Martin '08</td>
<td>18 (100)</td>
<td>1 (6)</td>
<td>2 (11)</td>
<td>17 (94)</td>
</tr>
<tr>
<td>Karbowksi '08</td>
<td>12 (100)</td>
<td>5 (42)</td>
<td>-</td>
<td>5 (42)</td>
</tr>
<tr>
<td>Triester '06</td>
<td>5 (100)</td>
<td>2 (40)</td>
<td>2 (40)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Garcia-Cano '08</td>
<td>4 (100)</td>
<td>3 (75)</td>
<td>4 (100)</td>
<td>2 (50)</td>
</tr>
<tr>
<td>Ott '07</td>
<td>1 (100)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>1 (100)</td>
</tr>
<tr>
<td>OVERALL</td>
<td>128 (98)</td>
<td>19 (23)</td>
<td>25 (21)</td>
<td>68 (52)</td>
</tr>
</tbody>
</table>


Temporary Stents

• Meta-analysis
  – 8 studies (6 prosp, 1 retro, 1 case-cont)
  – 2000-2010

• 199 pts w/benign strictures
  – Avg follow-up: 7.4 weeks
  – Avg length: 4.1 cm
  – Location: mid-esoph (47%)

Temporary Stents

- Outcomes
  - Technical success: 197/199 (98.9%)
  - Successful removal: 172/197 (87.3%)
  - Sustained dysphagia relief: 46.2%
    - FC-Polyester: 55.3% vs Nitinol: 36.7% (p = 0.019)

- Complications
  - Migration: 26.4%
  - Perforation: 1.5%
  - Pain: 14.4%
  - Tissue overgrowth: 11%


FCSEMS – Benign Strictures

<table>
<thead>
<tr>
<th>Study</th>
<th>N</th>
<th>Clinical Success, n (%)</th>
<th>Migration, n (%)</th>
<th>Removal, n (%)</th>
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<tbody>
<tr>
<td>Bakken ’10</td>
<td>25</td>
<td>13 (52)</td>
<td>11 (44)</td>
<td>25 (100)</td>
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<tr>
<td>Senousy ’10</td>
<td>7</td>
<td>7 (100)</td>
<td>8 (39)</td>
<td>13 (93)</td>
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<tr>
<td>Eloubedi ’11</td>
<td>19</td>
<td>19 (100)</td>
<td>7 (37)</td>
<td>19 (100)</td>
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<tr>
<td>Buscaglia ’11</td>
<td>16</td>
<td>16 (100)</td>
<td>3 (16)</td>
<td>16 (100)</td>
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<tr>
<td>Gangloff ’15</td>
<td>23</td>
<td>8 (35)</td>
<td>4 (17.4)</td>
<td>23 (100)</td>
</tr>
</tbody>
</table>
Stent Anchoring to Prevent Migration

- 7 pts
  - Anchor a migrated stent
  - Prevent migration of new stent

- Mean 2.3 stitches
  - SEPS
  - FCSEMS

- No complications
- No further migrations
- Successful removal of sutures/stents
  - 3 pts at 3 months


Over-The-Scope Clips
Be mindful in radiation strictures.....

Seo et al. Gastrointest Endosc 2006

Biodegradable Stents
## BD-Stents

<table>
<thead>
<tr>
<th>Authors</th>
<th>Year</th>
<th>Design</th>
<th>Stent type</th>
<th>No of pts</th>
<th>Tech Success</th>
<th>Early migration</th>
<th>Tissue hyperpl</th>
<th>Clinical success</th>
</tr>
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<tbody>
<tr>
<td>Tanaka</td>
<td>2006</td>
<td>Retrosp</td>
<td>PLLA</td>
<td>2</td>
<td>(100)</td>
<td>2 (0)</td>
<td>0 (0)</td>
<td>2 (100)</td>
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<tr>
<td>Saito</td>
<td>2007</td>
<td>Prospec</td>
<td>PLLA</td>
<td>13</td>
<td>(100)</td>
<td>10 (77)</td>
<td>0 (0)</td>
<td>13 (100)</td>
</tr>
<tr>
<td>Saito</td>
<td>2008</td>
<td>PLLA</td>
<td>PLLA</td>
<td>2</td>
<td>(100)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>2 (100)</td>
</tr>
<tr>
<td>Repici</td>
<td>2010</td>
<td>Retrosp</td>
<td>ELLA</td>
<td>21</td>
<td>(100)</td>
<td>2 (10)</td>
<td>1 (5)</td>
<td>9 (43)</td>
</tr>
<tr>
<td>van Boeckel</td>
<td>2011</td>
<td>Retrosp</td>
<td>ELLA</td>
<td>18</td>
<td>(85)</td>
<td>4 (22)</td>
<td>2 (11)</td>
<td>6 (33)</td>
</tr>
<tr>
<td>van Hooft</td>
<td>2011</td>
<td>Prospec</td>
<td>ELLA</td>
<td>10</td>
<td>(100)</td>
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<td>2 (20)</td>
<td>6 (60)</td>
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<tr>
<td>Canena</td>
<td>2012</td>
<td>Retrosp</td>
<td>ELLA</td>
<td>10</td>
<td>(100)</td>
<td>2 (20)</td>
<td>3 (30)</td>
<td>3 (30)</td>
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<td>Hirdes</td>
<td>2012</td>
<td>Retrosp</td>
<td>ELLA</td>
<td>28</td>
<td>(93)</td>
<td>3 (11)</td>
<td>-</td>
<td>7 (25)</td>
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<td>Karakan</td>
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<td>Retrosp</td>
<td>ELLA</td>
<td>7</td>
<td>(100)</td>
<td>0 (0)</td>
<td>3 (43)</td>
<td>4 (57)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td>111</td>
<td>107 (96)</td>
<td>23 (21)</td>
<td>11 (13)</td>
<td>52 (47)</td>
</tr>
</tbody>
</table>


## Issues with Stenting for Benign Strictures

- No comparative trials vs dilation
- Migration risk is high
- Cost of re-intervention
- Cost of adjunctive interventions
  - Suturing (~ $1000)
  - Over-the-scope clip (~ $450)
- Long-term dysphagia relief is poor
In Summary

- Malignant strictures
  - Esophageal stents

- Benign strictures
  - Intraluminal steroid injection
  - Needle knife therapy
  - Esophageal stents