Endoscopic Resection for Barrett’s Esophagus and Early Cancer

2014 Masters of Minimally Invasive Surgery

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Case Presentation: Patient ER

51 y/o man with schizophrenia and polysubstance abuse

- Several year history of dysplastic Barrett’s Esophagus
- Previously underwent EMR of a nodular lesion at OSH
- EMR followed by repeated RFA with Halo 360
- Recent EGD demonstrated nodularity with BE with biopsies showing “BE with severe dysplasia”
Endomucosal Resection (EMR and ESD)

What is it?

- Excision of neoplastic epithelium via endoscopic approach
- Variety of techniques exist
- Only as good as your endoscopist, staging, and pathology
- Can be used for enhanced diagnostics as well as for curative intent
Endomucosal Resection (EMR and ESD)

Here’s what we know: Barrett’s Esophagus with HGD or early cancer

- More commonly identified as surveillance EGD increases
- BE with HGD frequently harbors invasive cancer on surgical pathology (≈30%)
- Esophagectomy is associated with mortality (2-7% in experienced centers) and morbidity (nearly 50%)
- Patients and providers are looking for other options
Endomucosal Resection (EMR and ESD)

<table>
<thead>
<tr>
<th>Table 1</th>
<th>T category definitions for esophageal cancer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tx</td>
<td>Primary tumor cannot be assessed</td>
</tr>
<tr>
<td>T0</td>
<td>No evidence of primary tumor</td>
</tr>
<tr>
<td>Tis, m1</td>
<td>High-grade dysplasia, limited to mucosal layer</td>
</tr>
<tr>
<td>T1</td>
<td>Tumor invades lamina propria, muscularis mucosa or submucosa</td>
</tr>
<tr>
<td>T1, m2</td>
<td>Tumor invades the lamina propria</td>
</tr>
<tr>
<td>T1, m3</td>
<td>Tumor invades into but not through the muscularis mucosa</td>
</tr>
<tr>
<td>T1, sm1</td>
<td>Tumor invades into the shallowest one-third of the submucosa</td>
</tr>
<tr>
<td>T1, sm2</td>
<td>Tumor invades into the intermediate one-third of the submucosa</td>
</tr>
<tr>
<td>T1, sm3</td>
<td>Tumor penetrates the deepest one-third of the submucosa</td>
</tr>
<tr>
<td>T2</td>
<td>Tumor invades the muscularis propria</td>
</tr>
<tr>
<td>T3</td>
<td>Tumor invades adventitia</td>
</tr>
<tr>
<td>T4</td>
<td>Tumor invades adjacent structures</td>
</tr>
<tr>
<td>T4a</td>
<td>Resectable tumor that invades pleura, pericardium, or diaphragm</td>
</tr>
<tr>
<td>T4b</td>
<td>Unresectable tumor invading aorta, vertebra, tracea, or other adjacent structures</td>
</tr>
</tbody>
</table>

Endomucosal Resection (EMR and ESD)

<table>
<thead>
<tr>
<th>Depth of lesion</th>
<th>HGD m1</th>
<th>T1a m2</th>
<th>T1a m3</th>
<th>T1b sm1</th>
<th>T1b sm2</th>
<th>T1b sm3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk of lymph node metastasis*</td>
<td>0%</td>
<td>0–6%</td>
<td>0–12%</td>
<td>8–32%</td>
<td>12–28%</td>
<td>20–67%</td>
</tr>
</tbody>
</table>

*Based on pearson fg, cooper jd, deslauriers j, et al [eds]: esophageal surgery, 2nd ed. new york: churchill livingstone; 2002. p. 687; with permission.)
Endomucosal Resection (EMR and ESD)

Here’s what we know: Barrett’s Esophagus with HGD or early cancer

- Standard biopsy difficult to distinguish histologic invasion
- EUS best T staging method, but poor at distinguishing T1a from T1b
- Some have proposed EUS plays no role and that all patients with superficial esophageal cancer should undergo ER

Case Presentation: Patient ER

51 y/o man with schizophrenia and polysubstance abuse

- Taken to OR for EGD, EUS, possible EMR
- Long-segment Barrett’s stage C11-M11 per Prague Critieria
- Z-line at 27cm from incisors
- 1.5 x 3 cm nodularity from 30-33 cm within Barrett’s
Case Presentation: Patient ER

51 y/o man with schizophrenia and polysubstance abuse

- EUS showed mass from 30-33cm corresponding to nodularity
- 3mm thick, not involving muscularis propria
- But cannot discern T1a m2, T1a m3 or T1b sm1
- Normal appearing LN’s
- EMR performed
Endomucosal Resection (EMR)

Two major kinds of EMR:

- Endoscopic resection-cap assisted technique
  - Requires elevation of lesion with submucosal injection
  - Suction cap on end of endoscope

- Endoscopic ligation assisted technique
  - “suck-band-and-ligate” technique
  - Does not require submucosal injection
  - Multiband mucosectomy possible
Endomucosal Resection (EMR)
Cap Assisted Technique

1) saline or dilute epi (1:10,000) with methylene blue
2) Suction into cap
3) Preloaded resection snare
4) Release suction and resect
Endomucosal Resection (EMR)

Ligation Assisted Technique

1) saline or dilute epi (1:10,000) with methylene blue optional
2) Suction into cap
3) Deploy band creating a neopolyp
4) Electrocautery snare to resect
Endomucosal Resection (EMR)

Ligation Assisted vs Cap Assisted EMR

- RCT comparing Ligation asst vs Cap asst
- 100 consecutive resections, 50 each
- Size of resection (about 16 x 11 mm) similar
- No difference in complication rate
**Endomucosal Resection (EMR)**

**Multiband Mucosectomy EMR**

- A form of ligation assisted EMR
- Multiple specimens can be removed without exchanging scope and instruments
- Commercial device now available for this (Duette; Cook Medical, Limerick, Ireland).
- RCT comparing Cap asst to Multiband EMR showed decreased OR time and costs with Multiband EMR
Endoscopy Submucosal Dissection (ESD)

- En-bloc dissection of larger lesions using specially designed electric needle-knives
- Mainly in use in Japan, not widely available in U.S.
- Highly technical with steep learning curve
- Increased cure rates compared to EMR for early SCC (71% vs 97%) but no difference for tumors < 1.5 cm.
Endomucosal Resection (ESD)

Endoscopic Submucosal Dissection (ESD)

Fig. 4. Examples of knives for endoscopic submucosal dissection. (A) Needle knife, (B) HookKnife, (C) TT knife, (D) FlexKnife, (E) IT knife. (Images courtesy of Olympus.)
Endomucosal Resection (ESD)
Case Presentation: Patient ER EMR Procedure Video
Case Presentation: Patient ER

- Discharged same day without complications
- Pathology shows well differentiated adeno in BE with HGD
- But suspicious for submucosal invasion T1a m3 or T1b sm1
Endomucosal Resection (EMR and ESD)

Periprocedural Complications

- **Bleeding**
  - Most common reported complication (0% - 46%)
  - 3% in a case series of 1000 procedures

- **Perforation**
  - Seems to be about same regardless of technique
  - Up to 5% in the RCT (4 of 84 patients)
Endomucosal Resection (EMR and ESD)

**Late Complications**

- **Stenosis**
  - 2% - 88%
  - Depends on size of resection, BE, post-RFA, etc.\(^1\)

- **Recurrence**
  - Depends on stage, but > 90% if m1, m2 have complete remission
  - Recurrence or metachronous lesions in up to 30%\(^2\)

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Endomucosal Resection

Optimal Candidate for EMR?

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Favorable Outcome</th>
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<tbody>
<tr>
<td>Size</td>
<td>&lt;2 cm</td>
</tr>
<tr>
<td>Depth of penetration</td>
<td>Muscularis mucosae is preserved</td>
</tr>
<tr>
<td>Grade of cancer</td>
<td>Well-differentiated cancer</td>
</tr>
<tr>
<td>Appearance</td>
<td>Elevated, polypoid, or flat</td>
</tr>
</tbody>
</table>

Endomucosal Resection (EMR and ESD)

Conclusions

- Endomucosal resection serves diagnostic and staging utility
- Endomucosal resection provides possible definitive therapy
  - HGD, T1a m2 optimal EMR
  - T1a m3 somewhat controversial
  - $\geq$ T1b surgical resection if operative candidate
- Can be combined with RFA for treatment of BE
- Those treated with EMR require very close surveillance