Clinical Outcome of Endoscopic Resection for Nonampullary Duodenal Tumors

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National Cancer Center Hospital, Tokyo
Duodenal endoscopic resection (ER) is most difficult

- Narrow lumen
- Poor stability of the endoscope
- Brunner glands in submucosal layer
- Thin muscle layer
- Higher risk of complications
- Difficult access for emergency surgery
Duodenal Wall

1mm

1.5-2.0mm

0.5mm
Duodenal EMR: Injection & Cut

SDA, sporadic adenoma, 12mm
Duodenal EMR: Injection & Cut
Duodenal EMR: Injection & Cut

0-IIa, 12mm, tubular adenoma, pHMX, pVM0
0-IIa, 25mm, 2\textsuperscript{nd} part, opposite side of papilla

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Duodenal EMR: Strip Biopsy
0-IIa, 25mm, Well differentiated adenocarcinoma M, ly(-), v(-), pHMX, pVM0

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Duodenal ESD Case

Duodenal Cancer, 0-IIa, 25mm, 2\textsuperscript{nd} Part
0-IIa, 25mm, Well differentiated adenocarcinoma, low grade atypia, M, ly(-), v(-), pHM0, pVM0
Duodenal ESD case

2nd part, 0-IIa, M, 24mm, tub1, ly(-), v(-), pHM0, pVM0

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Duodenal EMR: 3 piece resection

2nd part, 0-IIa, M, 20mm, tub1, ly(-), v(-), pHMX, pVM0

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Prophylactic Clipping Case

Duodenal Cancer, 24×22mm, M, ly(-), v(-), pHM0, pVM0
Closure by loop snare with endo-clip

2nd part, 0-IIa, 38mm, tub1, M, ly(-), v(-), pHMX, pVM0

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Closure by loop snare with endo-clip
Perforation during ESD

→ Subsequent Surgery
Delayed Perforation Case

→ Emergency Surgery
EMR for Duodenal Adenoma of FAP Patient
Treatment Strategy in NCCH

**Adenocarcinoma (HGIN)**
- cSM: Depth
  - Surgery
- cM: Size
  - >10mm

**Adenoma (LGIN)**
- Depth: ER
- Size: ≤10mm
- ER or follow up

HGIN; High-grade intraepithelial neoplasia
LGIN; Low-grade intraepithelial neoplasia
Our current position is to refrain from aggressively performing duodenal ESD.

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>Case (no.)</th>
<th>Tx</th>
<th>Size (mm)</th>
<th>Delayed bleeding (%)</th>
<th>Perforation (%)</th>
<th>Recurrence (%)</th>
<th>Period (M)</th>
</tr>
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<tbody>
<tr>
<td>Oka</td>
<td>2003</td>
<td>15</td>
<td>EMR</td>
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<td>Alexander</td>
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<td>3</td>
<td>0</td>
<td>37</td>
<td>26</td>
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<td>Fanning</td>
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<td>9</td>
<td>7</td>
<td>17</td>
<td>12</td>
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<td>Maruoka</td>
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<tr>
<td>Matsumoto</td>
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<td>13</td>
<td>ESD</td>
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<td>8</td>
<td>23</td>
<td>0</td>
<td>---</td>
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<tr>
<td>Jung</td>
<td>2013</td>
<td>14</td>
<td>ESD</td>
<td>17</td>
<td>7</td>
<td>36</td>
<td>0</td>
<td>29</td>
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<tr>
<td>Inoue</td>
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<td>63</td>
<td>ER</td>
<td>10</td>
<td>8</td>
<td>10</td>
<td>---</td>
<td>---</td>
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<tr>
<td>Hoteya</td>
<td>2014</td>
<td>41</td>
<td>ESD</td>
<td>26</td>
<td>18</td>
<td>34</td>
<td>0</td>
<td>48</td>
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<tr>
<td>Nonaka</td>
<td>2015</td>
<td>113</td>
<td>ER</td>
<td>12</td>
<td>12</td>
<td>2</td>
<td>0</td>
<td>51</td>
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</tbody>
</table>

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Patients and Methods

<2000.1 – 2015.3>

Duodenal ERs
176 Patients 229 Lesions

Excluded as follows:
✓ NET
✓ FAP
✓ Ampullary duodenal tumors

Duodenal adenoma/carcinoma
127 Patients 134 Lesions

EMR: 118 Patients 125 Lesions
ESD: 9 Patients 9 Lesions

EMR including Strip Biopsy & Polypectomy
ESD including circumferential incision with snaring

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Nonampullary Duodenal Tumors
127 Patients 134 Lesions

EMR
125 (Ca:72, Ad:53)
- Piecemeal
  42 (Ca:31, Ad:11)
  - Local recurrence
    1 (Re-EMR)
  - Non-R0
    37 (Ca:19, Ad:18)
    - Local recurrence
      1 (Surgery)
  - En-bloc
    83 (Ca:41, Ad:42)
  - Piecemeal
    1 (Ca:1)
  - En-bloc
    7 (Ca:5, Ad:2)
  - Intraoperative perforation
    1 (Discontinuation of ESD)
  - R0
    46 (Ca:22, Ad:24)

ESD
9 (Ca:6, Ad:2)
- Piecemeal
  1 (Ca:1)
  - Non-R0
    3 (Ca:2, Ad:1)
  - R0
    4 (Ca:3, Ad:1)
  - Delayed perforation
    1 (Emergency surgery)
# Complications

<table>
<thead>
<tr>
<th>Perforation, no.</th>
<th>3 (3%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intraoperative*</td>
<td>2 (2%)</td>
</tr>
<tr>
<td>Delayed**</td>
<td>1 (1%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Delayed Bleeding, no.</th>
<th>11 (9%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1&lt;sup&gt;st&lt;/sup&gt; part</td>
<td>0/24 (0%)</td>
</tr>
<tr>
<td>2&lt;sup&gt;nd&lt;/sup&gt; part</td>
<td>9/97 (9%)</td>
</tr>
<tr>
<td>3&lt;sup&gt;rd&lt;/sup&gt; part</td>
<td>2/10 (20%)</td>
</tr>
<tr>
<td>Anastomosis</td>
<td>0/3 (0%)</td>
</tr>
</tbody>
</table>

| with Prophylactic Closure | 7/117 (6%) |
| without Prophylactic Closure | 5/17 (29%) |

| Blood Transfusion | 1 (1%) |

*One patient underwent subsequent surgery  **Emergency surgery

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## Long-Term Outcomes

96 patients followed up more than one year

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Local Recurrence</td>
<td>2 (2%)</td>
</tr>
<tr>
<td>Death by Duodenal Tumor</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Death by Other causes</td>
<td>4 (4%)</td>
</tr>
<tr>
<td>Follow-up Periods, months,</td>
<td>38</td>
</tr>
<tr>
<td>median (range)</td>
<td>(12-181)</td>
</tr>
</tbody>
</table>

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## Technical Results of EMR/ESD

<table>
<thead>
<tr>
<th>Location, no.</th>
<th>EMR (125)</th>
<th>ESD (9)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1(^{st}) part</td>
<td>18 (15%)</td>
<td>6 (67%)</td>
</tr>
<tr>
<td>2(^{nd}) part</td>
<td>94 (75%)</td>
<td>3 (33%)</td>
</tr>
<tr>
<td>3(^{rd}) part</td>
<td>10 (8%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Anastomosis</td>
<td>3 (2%)</td>
<td>0 (0%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tumor Size*, mm (range)</th>
<th>EMR (125)</th>
<th>ESD (9)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(\leq 20) mm</td>
<td>109 (87%)</td>
<td>5 (56%)</td>
</tr>
<tr>
<td>&gt;20 mm</td>
<td>16 (13%)</td>
<td>4 (44%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Procedure time*, min (range)</th>
<th>EMR (125)</th>
<th>ESD (9)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>20 (5-190)</td>
<td>78 (20-246)</td>
</tr>
</tbody>
</table>

*median
## Technical Results of EMR/ESD

<table>
<thead>
<tr>
<th></th>
<th>EMR (125)</th>
<th>ESD (9)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Resection, no.</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>En-bloc</td>
<td>83 (66%)</td>
<td>7 (78%)</td>
</tr>
<tr>
<td>≤20mm</td>
<td>78/109 (72%)</td>
<td>4/5 (80%)</td>
</tr>
<tr>
<td>&gt;20mm</td>
<td>5/16 (31%)</td>
<td>3/4 (75%)</td>
</tr>
<tr>
<td>R0</td>
<td>46 (37%)</td>
<td>4 (44%)</td>
</tr>
<tr>
<td>Discontinuation</td>
<td>0 (0%)</td>
<td>1 (11%)</td>
</tr>
<tr>
<td><strong>Complications, no.</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perforation</td>
<td>1 (1%)</td>
<td>2 (22%)</td>
</tr>
<tr>
<td>Delayed Bleeding</td>
<td>11 (9%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td><em><em>Histology</em>, no.</em>*</td>
<td></td>
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</tr>
<tr>
<td>Adenoma</td>
<td>52 (42%)</td>
<td>2 (22%)</td>
</tr>
<tr>
<td>Intramucosal ca</td>
<td>70 (56%)</td>
<td>5 (56%)</td>
</tr>
<tr>
<td>Submucosal ca</td>
<td>3 (2%)</td>
<td>1 (11%)</td>
</tr>
</tbody>
</table>
Discussion

- Balance of ESD

**Benefits**
- En-bloc resection
- Accurate diagnosis
- Recurrence ↓

**Risks**
- Perforation, Bleeding,
  Longer procedure
Discussion

<Injection Solutions>

Saline

Glyceol®

MucoUp®

Softer

Intermediate

Stiffer

EMR

EMR & ESD

ESD
Discussion

➢ CO$_2$ insufflation

Safety of carbon dioxide insufflation for upper gastrointestinal tract endoscopic treatment of patients under deep sedation

Satoru Nonaka · Yutaka Saito · Hajime Takisawa · Yongmin Kim · Tsuyoshi Kikuchi · Ichiro Oda

Received: 29 April 2009 / Accepted: 21 November 2009
© Springer Science+Business Media, LLC 2010
Is prophylactic clipping effective?

Effective for protection from exposure of bile & pancreatic juice
En-bloc resection by ESD is ideal, but there is a big challenge on the technical difficulty and safety of ESD.

Curability and safety of EMR is maintained and small lesion ≤20mm is controllable by EMR.

Endoscopists must be particularly concerned about perforations including the possibility of delayed perforations.

Duodenal ER is feasible as a therapeutic procedure, but it should only be performed by highly skilled endoscopists.
The risks of performing an en-bloc resection by ESD are greater than the benefits of ESD in some cases.

It is acceptable to perform a piecemeal resection by EMR for small lesions based on the excellent prognosis.
Thank you for your kind attention