Current status of gastric ESD in Korea and directions for future development

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Topics

• Brief history of gastric ESD in Korea
• Indications of ESD in Korea
• Outcomes of ESD for EGC
• How to teach and learn ESD? – including EndoGEL
  ESD hands-on with Splash M-knife
• ESD with Pentax Imagina endoscope system
• Unforgettable case
History of gastric ESD in Korea

Jun Haeng Lee. Department of Medicine
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The first report on EMR for EGC in Korea

Lee JH. Korean J Gastrointest Endosc 1996;16:928-934

Endoscopic Mucosal Resection (EMR) as a Curative Treatment of Early Gastric Cancer

Jun Haeng Lee, M.D., Jung-Hwan Yoon, M.D., Byeong Gwan Kim, M.D.
Jin Hyok Hwang, M.D., Jun Oh Jeong, M.D., Young Seok Lim, M.D.
Dae Hee Lee, M.D., Woon Tae Jeong, M.D., Kook Lae Lee, M.D.
Dong Ho Lee, M.D.,* Hyun Chae Jung, M.D., Woo Ho Kim, M.D.
In Sung Song, M.D., Kyoo Wan Choi, M.D. and Chuang Yong Kim, M.D.

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Department of Internal Medicine, Boramae Hospital**, Seoul, Korea

EMR for adenocarcinoma: 19 cases

- operation(+): 7 cases
- operation(-): 12 cases
- 4 resection margin(+): 1 incomplete resection
- 2 F/U GFS, recur

- surgical specimen
- F/U gastroscopy

<table>
<thead>
<tr>
<th>cancer(+)</th>
<th>cancer(-)</th>
<th>cancdr(+)</th>
<th>cancer(-)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>2</td>
<td>4</td>
<td>8</td>
</tr>
</tbody>
</table>

- depth of burning
- poor surgical disease free condition: for 3~13 mo

- invasion
- burning

- m: 3
- COPD, MM, effect: 2

- sm: 2
- lod age

(group A) (group B) (group C) (group D)
Early personal experience of gastric ESD (2005)
ESD for EGC in Korea
- From Nov 2011 – Dec 2014

- Number of ESD for EGC cases: 23,828
- Age: 64.9 +/- 9.9 years (median: 66)
- Male: female = 74.2% : 25.8%
- Hospital stay: 5.0 days
- Medical cost in 2014: 1,510,000 won (1,305 US dollars)
- Surgery within 3 months after ESD: 6.6%

Park CM. 24th KCHUGR Annual Scientific Meeting (2016-12-3)
Treatment of gastric cancer at SMC

- Surgery
- ESD

MERS outbreak in 2015
Indications of ESD in Korea

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Indications are different from criteria

**Indication**
- Pre-treatment
- Selection of ESD candidates

**Criteria**
- Post-treatment
- Additional surgery after ESD
## Absolute and expanded indications
- Traditional classification before 2018

<table>
<thead>
<tr>
<th>Histology</th>
<th>Depth</th>
<th>M cancer</th>
<th>SM cancer</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No ulceration</td>
<td>Ulcerated</td>
<td>SM1</td>
</tr>
<tr>
<td>Differentiated</td>
<td>≤ 20 mm</td>
<td>&gt; 20 mm</td>
<td>≤ 30 mm</td>
</tr>
<tr>
<td></td>
<td>A</td>
<td>B1</td>
<td>B2</td>
</tr>
<tr>
<td>Undifferentiated</td>
<td>C</td>
<td>D</td>
<td>D</td>
</tr>
</tbody>
</table>

- **A**  absolute indication for ER
- **B**  expanded indications for ER (B3 is for criteria only)
- **C**  expanded indications for ER
- **D**  surgery (gastrectomy + lymph node dissection)
Absolute indication EGC by pre-treatment diagnostic groups

Pre-Tx AI EGC 396

ESD 355

- LGD 1
- HGD 4
- AI EGC 229
- BAI EGC 120
- AGC 1
  - ESD 1
  - Surgery 53

Operation 41

- LGD 1
- AI EGC 29
- BAI EGC 11
  - Surgery 1

✿ Reason for surgery (multiple)
- Suspicious lymphadenopathy on CT (18)
- Multiple lesions (6)
- Patient’s wish (18)
- Difficult location (3)
- Suspicious SM invasion on EUS (2)

* BAI: beyond absolute indications

Lee JH. Surg Endosc 2016;30:3987-93
Standard indications of ESD in Korea

- ESD candidates are usually selected by the absolute indications.
- After ESD, expanded criteria is applied to determine whether the resection was curative.
- There are controversies about the safety of ESD for expanded indication cases.
Statement 1. Endoscopic resection is recommended for well or moderately differentiated tubular or papillary early gastric cancers meeting the following endoscopic findings: endoscopically estimated tumor size $\leq 2\text{cm}$, endoscopically mucosal cancer, and no ulcer in the tumor. (evidence: moderate, recommendation: strong for)
Do you think total gastrectomy was necessary for a 45 years old lady with 1 cm signet ring cell carcinoma?

- Signet ring cell carcinoma, 1cm, limited in the lamina propria layer
What would you recommend for a 40 years old woman with a small flat signet ring cell carcinoma?
SRC. 10x6mm, lamina propria, clear resection margins, no lymphatic invasion
ESD for expanded indication

• ESD for expanded indication cases can be selectively performed in the individual cases.

• Flat small signet ring cell carcinomas are frequently treated by ESD in Korea.
Statement 2. Endoscopic resection could be performed for well or moderately differentiated tubular early gastric cancer or papillary early gastric cancers with the following endoscopic findings: endoscopically estimated tumor size >2 cm, endoscopically mucosal cancer, and no ulcer in the tumor or endoscopically estimated tumor size ≤3 cm, endoscopically mucosal cancer, and ulcer in the tumor. (evidence: moderate, recommendation: weak for)
Comparison of Korean and Japanese guidelines for ESD indications (2018)

節對適應病変 absolute indication in Japan (2018)

Diff., ≤2 cm, ulcer (-)

Strongly recommended in Korea

Diff., >2 cm, ulcer (-)
Diff., ≤3, ulcer (+)
Undiff., ≤2 cm, ulcer (-)

Weakly recommended in Korea
Outcomes of ESD for EGC

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Outcome of endoscopic treatment of EGC with **differentiated-type** histology

1. **ITT analysis** (both curative and non-curative resection cases)
   - Comparison with surgery (propensity score matched cohort)

2. **PP analysis**
   1) Curative-resection cases: single-arm long-term data
   2) Non-curative resection cases: comparison between surgery group and observation group
Differentiated type EGC
(2002-2012)
(n = 3595)

Excluded
1) LNM on CT or EUS (n=6)
2) Previous gastric cancer (n=20)
3) Cancer of other origin (n=150)
4) Follow up < 2 years (n=856)

EGC meeting indication treated with curative intent
(n = 2563 )

Endoscopic resection
(n = 1290 )

Surgery
(n = 1273 )

Propensity score matching

Endoscopic resection
(n = 611 )

Surgery
(n = 611 )

ITT analysis: comparison with surgery
- Propensity score matching, differentiated type EGC

Pyo JH. Am J Gastroenterol 2016
Endoscopic resection surgery

Overall survival

Disease specific survival

Disease free survival

Recurrence free survival

Log rank P=0.827

Log rank P<0.001

Log rank P=0.891

Log rank P<0.001

Pyo JH. Am J Gastroenterol 2016
PP analysis (1): single-arm follow-up
- Differentiated, curative (n=1,306)

- EGCs treated by ESD at Samsung Medical Center
- 1,838 patients with **1,889 differentiated-type EGCs**
- November 2003 – May 2011
- Censoring date: May 2014
- Differentiated-type EGC
  - Well or moderately differentiated or papillary EGC
  - According to the quantitatively predominant histologic type
  - Differentiated-type EGC > 50%

Min BH. Endoscopy 2015
PP analysis (1): single-arm follow-up
- Differentiated, curative (n=1,306)

- Median follow-up: 61 months (range 17-122)
- **Local recurrence: 0.08% (1/1,306)**
- Metachronous recurrence: 3.6% (47/1,306)
  - Definition of metachronous recurrence: at least 12 months after ER
- **Extragastric recurrence: 0.15% (2/1,306)**
- 5-year overall survival
  - Absolute indication: 97.3%
  - Expanded indication: 96.4%

Min BH. Endoscopy 2015
Overall-survival
- 1,306 curative ESDs from December 2003 to May 2011
Two extragastric recurrences (0.15%)
Extragastric recurrence after curative endoscopic resection in Korea

<table>
<thead>
<tr>
<th></th>
<th>Rate of extragastric recurrence</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Samsung Medical Center</td>
<td>0.15% (2/1,306)</td>
<td>Min BH. Endoscopy 2015</td>
</tr>
<tr>
<td>Asan Medical Center</td>
<td>0.14% (5/3,588)</td>
<td>Lee S. Gastric Cancer 2017</td>
</tr>
<tr>
<td>Severance Hospital</td>
<td>0.15% (2/1347)</td>
<td>Hahn KY. Gastrointest Endosc 2016</td>
</tr>
<tr>
<td>Seoul National University</td>
<td>0.50% (2/404)</td>
<td>Choi KS. Radiology 2016</td>
</tr>
</tbody>
</table>
7 more extragastric recurrences after the publication
#7. M/D, 16mm, SM 400um
- Enlarged lymph node at CT, 17 months after ESD
#7. M/D, 16mm, SM 400um
- Enlarged lymph node at CT, 17 months after ESD
#7. M/D, 16mm, SM 400um
- Enlarged lymph node at CT, 17 months after ESD

• Stomach, subtotal gastrectomy: Status ESD
• Gastric location: cannot be determined (no residual tumor)
• Lymph node metastasis: metastasis to 1 out of 22 regional lymph nodes (pN1) (perinodal extension: present)
  (1/22: "LN#6" for frozen section-1, 1/1; "3,5", 0/3; "4,6", 0/6; "5", 0/0; "6", 0/3; "7", 0/2; "9", 0/2; "8a", 0/2; "11p", 0/2; "12a", 0/1; "4sb", 0/0; "1", 0/0)
Extragastric Recurrence Rate after Curative ESD for EGC in SMC (n=1306)

<table>
<thead>
<tr>
<th>Depth</th>
<th>Mucosal cancer</th>
<th>Submucosal cancer</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>UL(-)</td>
<td>UL(+)</td>
</tr>
<tr>
<td>Histology</td>
<td>≤20</td>
<td>20&lt;</td>
</tr>
<tr>
<td>Differentiated</td>
<td>0.1%</td>
<td>0%</td>
</tr>
<tr>
<td>Undifferentiated</td>
<td>0%</td>
<td></td>
</tr>
</tbody>
</table>

- Median F/U for D-EGC/UD-EGC: 47 mon/28 mon
- Outcomes after gastrectomy for SM1 EGC
  - Extragastric recurrence after surgery: 0% (0/107)
  - Surgery or GC-related mortality: 0% (F/U: 57 months)


Courtesy of prof. Min BH
<table>
<thead>
<tr>
<th>Depth</th>
<th>Mucosal cancer</th>
<th>Submucosal cancer</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>UL(-)</td>
<td>UL(+)</td>
</tr>
<tr>
<td>Histology</td>
<td>≤ 20</td>
<td>20&lt;</td>
</tr>
<tr>
<td>Differentiated</td>
<td>0.04%</td>
<td>0.21%</td>
</tr>
<tr>
<td>Undifferentiated</td>
<td>0%</td>
<td></td>
</tr>
</tbody>
</table>

**AMC, n=4105**

<table>
<thead>
<tr>
<th>Depth</th>
<th>Mucosal cancer</th>
<th>Submucosal cancer</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>UL(-)</td>
<td>UL(+)</td>
</tr>
<tr>
<td>Histology</td>
<td>≤ 20</td>
<td>20&lt;</td>
</tr>
<tr>
<td>Differentiated</td>
<td>0%</td>
<td>0.14%</td>
</tr>
<tr>
<td>Undifferentiated</td>
<td>0%</td>
<td></td>
</tr>
</tbody>
</table>

**Japanese multicenter, n=2999**

PP analysis (2): non-curative resection
- Comparison between surgery and observation group

Noncurative resection 341

Lateral margin positive
67 (19.6%)

Risk of lymph node metastasis
274 (80.4%)

Surgery
194 (70.8%)

Observation
80 (29.2%)

Lymph node 11 (5.6%)
Local residual 10 (5.2%)

- Patients’ refusal : 64
- High surgical risk : 8 (severe comorbidities)
- Concomitant advanced cancer in other organs : 8

Kim ER. Br J Surg 2015
### Predictors of LN metastasis (5.7%)

**Table 2** Comparison of clinicopathological characteristics according to the presence of lymph node metastasis among patients undergoing rescue surgery

<table>
<thead>
<tr>
<th></th>
<th>No LN metastasis (n = 183)</th>
<th>LN metastasis (n = 11)</th>
<th>P*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean(s.d.)</td>
<td>62.4 (8.4)</td>
<td>68.6 (8.7)</td>
<td>0.019†</td>
</tr>
<tr>
<td>Median (range)</td>
<td>63.0 (44–84)</td>
<td>68.1 (57–80)</td>
<td></td>
</tr>
<tr>
<td>Sex ratio (M : F)</td>
<td>142 : 41</td>
<td>8 : 3</td>
<td>0.715</td>
</tr>
<tr>
<td>Tumour site</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Antrum, angle</td>
<td>119 (65.0)</td>
<td>9 (82)</td>
<td>0.338</td>
</tr>
<tr>
<td>Body, fundus, cardia</td>
<td>64 (35.0)</td>
<td>2 (18)</td>
<td></td>
</tr>
<tr>
<td>Mean(s.d.) tumour size (cm)</td>
<td>2.1 (1.1)</td>
<td>2.6 (1.2)</td>
<td>0.113†</td>
</tr>
<tr>
<td>Tumour depth</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mucosa</td>
<td>19 (10.4)</td>
<td>0 (0)</td>
<td>0.295‡</td>
</tr>
<tr>
<td>SM1</td>
<td>30 (16.4)</td>
<td>1 (9)</td>
<td></td>
</tr>
<tr>
<td>SM invasion depth ≥ 500 µm</td>
<td>134 (73.2)</td>
<td>10 (91)</td>
<td></td>
</tr>
<tr>
<td>Differentiation</td>
<td></td>
<td></td>
<td>0.128</td>
</tr>
<tr>
<td>Well differentiated</td>
<td>37 (20.2)</td>
<td>0 (0)</td>
<td></td>
</tr>
<tr>
<td>Moderately differentiated</td>
<td>146 (79.8)</td>
<td>11 (100)</td>
<td></td>
</tr>
<tr>
<td>Lymphovascular invasion</td>
<td></td>
<td></td>
<td>1.000</td>
</tr>
<tr>
<td>No</td>
<td>76 (41.5)</td>
<td>5 (45)</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>107 (58.5)</td>
<td>6 (55)</td>
<td></td>
</tr>
</tbody>
</table>

Values in parentheses are percentages unless indicated otherwise. LN, lymph node; SM1, submucosal invasion depth less than 500 µm from muscularis mucosa layer; SM, submucosal. *χ² test, except †Student’s t test. ‡Mucosa or SM1 versus SM invasion depth of 500 µm or more.
Overall survival

- Median duration of follow-up after ER: 60.5 months (6-141)
Survival benefit of additional surgery
- Additional surgery: 127, follow-up: 67

Additional surgery group

Observation group

Eom BW. Gastrointest Endosc 2017;85:155-63
Is surgery necessary for mucosal cancer with lymphovascular invasion?

Table 3. Lymph node metastasis rate according to criteria in EGC patients with lymphovascular invasion

<table>
<thead>
<tr>
<th>Depth of invasion</th>
<th>Ulceration</th>
<th>Differentiated (%)</th>
<th>Undifferentiated (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mucosa</td>
<td>Ulcer (-)</td>
<td>≤ 2 cm</td>
<td>&gt; 2 cm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0/28 (0)</td>
<td>3/24 (12.5)</td>
</tr>
<tr>
<td></td>
<td>Ulcer (+)</td>
<td>≤ 3 cm</td>
<td>&gt; 3 cm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1/2 (50.0)</td>
<td>4/16 (25.0)</td>
</tr>
<tr>
<td>SM1</td>
<td></td>
<td>≤ 3 cm</td>
<td>&gt; 3 cm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7/61 (11.5)</td>
<td></td>
</tr>
</tbody>
</table>

*SM1* < 500 μm from the muscularis mucosae
Differentiated-dominant 14mm MM lymphatic (+)
■ 진단명

Early gastric cancer <2018 위암 ESD (이혁)>

20181002 ESD EGC 미분화 혼재암 14mm MM암 lymphatic (+) pT1acNOcMO (이혁 교수님)
- Histologic type : tubular adenocarcinoma, moderately differentiated
  >> signet ring cell carcinoma (about 5%)
  > tubular adenocarcinoma, poorly differentiated (1%)
- Lymphatic invasion : PRESENT AT ONE FOCUS

이혁 교수님 계획: 절대적응증에서의 LVI(+) : 정기적인 검사 (본원 데이터 고려함), 5년간 6mo f/u

2019-6 대장내시경: T colon 선후 하나제거 --> 2022년 재검하세요.

대전 거주

■ 진료계획

2018년 10월 2일 이혁 교수님 파트에서 위암 내시경 치료를 받으셨고 점막에 국한된 14mm 크기의 미분화 혼재암이었고 림프선 첨음이 있었습니다. 가장 좋은 경우(점막암, 분화형, 림프선 첨음 없음)이 아니지만 절대적응증에 해당하였으므로 조심스러운 경과관찰을 하기로 하셨던 것으로 파악됩니다.

금번에 위내시경과 대장내시경 등을 받으셨습니다. 금번 대장내시경에서는 작은 섭유이 있었고 제거되었습니다. 2022년 재검을 권합니다.

위암에 대해서는 6개월 후 재검을 권합니다.
How to teach and learn ESD?

Jun Haeng Lee. Department of Medicine
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Must knows before starting ESD

• Indications and skills for careful endoscopic evaluation for candidate lesions
• Advantages and disadvantages of each instrument
• Strategies for technically successful ESD
• How to manage complications

• Side by side hands-on training
병소경계 5mm
바깥에 marking
proximal 부위에 추가 marking

충분한 접막하주사 후 ① . ② . ③의 순서로 marking 5mm 바깥쪽 접막을 충분히 cutting.
Muscularis mucosae 가 완전히 cutting 되어 접막하층이 충분히 보존 되도록
Location matters.

M/D, 8x8mm, MM, RM (-), L/V (-/-)
A large loop approach
Traction ESD
Most perforations can be treated endoscopically without surgery
- Primary closure of perforation

Tubular adenocarcinoma (M/D), in lamina propria, RM (-)
When the resection is big and close to the cardia or pylorus, short-term oral steroid can be used.

8 weeks later

6 months later
The hospital stay for gastric ESD is usually 4 days.
Hands on training using an ex-vivo pig stomach model is very useful.
Artificial mucosa (EndoGEL) for gastric ESD hands-on training
EngoGEL + gastroscopy simulator
Traction type EndoGEL ESD with **Pentax** Splash-M knife
Multi-functional Splash M-knife

ACTIVE PORTION

Marker
Knife
Nozzle
Metal Plate

Insertion portion

Finger grip
Plug
Inlet
Handle
Multi-functional Splash M-knife

Multi-functional features for safer, easier and faster procedure

- Clear marking ability
- Better hemostasis ability
- Fixed knife length
- Hooking mechanism

- Metal Plate for clear marking

Retracted Position (0.5mm): For Marking and Hemostasis

Extended Position (2.0mm): For Incision, Dissection and Hemostasis
Three major advantages of Splash M-knife for gastric ESD

• Hooking mechanism is very useful for a lesion at difficult location: no need for IT-2 knife
• Metal plate (diameter: 1.8mm) at the distal end: enough contact area for the bleeding control
• The procedure time is much saved due to the water jet function.
Reducing the use of hemostatic forceps

**Table 2** Treatment outcomes of the ESD before propensity score matching

<table>
<thead>
<tr>
<th></th>
<th>Total n = 149</th>
<th>ESD-M n = 73</th>
<th>ESD-F n = 76</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Usage rate of hemostatic forceps</strong></td>
<td>75 (50.3%)</td>
<td>10 (13.7%)</td>
<td>65 (85.5%)</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>Expert</td>
<td>28/70 (40.0%)</td>
<td>9/47 (19.1%)</td>
<td>19/23 (82.6%)</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>Trainee</td>
<td>47/79 (59.5%)</td>
<td>1/26 (3.8%)</td>
<td>46/53 (86.8%)</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td><strong>Procedure time (min)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean ± SD</td>
<td>80.1 ± 51.1</td>
<td>83.8 ± 49.7</td>
<td>76.7 ± 52.4</td>
<td>0.4*</td>
</tr>
<tr>
<td>Median (range)</td>
<td>70 (7–410)</td>
<td>74.0 (7–252)</td>
<td>69.5 (18–410)</td>
<td>0.3‡</td>
</tr>
<tr>
<td>En bloc resection</td>
<td>149 (100%)</td>
<td>73 (100%)</td>
<td>76 (100%)</td>
<td>1‡</td>
</tr>
<tr>
<td>Complete resection</td>
<td>145 (97.3%)</td>
<td>70 (95.9%)</td>
<td>75 (98.7%)</td>
<td>0.36‡</td>
</tr>
<tr>
<td>Perforation</td>
<td>1 (0.7%)</td>
<td>0 (0%)</td>
<td>1 (1.3%)</td>
<td>1‡</td>
</tr>
<tr>
<td>Post-procedure bleeding</td>
<td>9 (6.0%)</td>
<td>4 (5.5%)</td>
<td>5 (6.6%)</td>
<td>1‡</td>
</tr>
</tbody>
</table>
ESD with Splash M knife

ESD: Early gastric carcinoma
1. Location: distal antrum
2. Gross type: EGC type IIc
3. Histologic type: tubular adenocarcinoma, W/D
4. Histologic type by Lauren: intestinal
5. Size of carcinoma: 20x9 mm
6. Depth of invasion: MM
7. Resection margin: free from carcinoma(N) safety margin: distal 7 mm, proximal 10 mm, anterior 8 mm, posterior 8 mm, deep 700 μm
8. Lymphatic invasion: not identified(N)
9. Venous invasion: not identified(N)
10. Perineural invasion: not identified(N)
11. Microscopic ulcer: absent
12. Histologic heterogeneity: absent
Side by side hands-on training
- Changing the role of the main operator and the first assistant
The first ESD of a young fellow endoscopist
Tele-mentoring using Facetime is a very useful tool for ESD beginners.

International mentoring is also possible. If you want some real-time comments from me, send me an e-mail (stomachlee@gmail.com).
## 1 week ESD training course at SMC

<table>
<thead>
<tr>
<th>Time</th>
<th>Schedule</th>
<th>Tutor</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday AM</td>
<td>Orientation and introductory lectures</td>
<td>LJH, MYW</td>
<td>Conference room</td>
</tr>
<tr>
<td>Monday PM</td>
<td>ESD hands-on training 1 (EndoGEL)</td>
<td>LJH</td>
<td>Simulator room</td>
</tr>
<tr>
<td>Tuesday AM</td>
<td>Observation: stomach ESD</td>
<td>MBH, LH</td>
<td>Cancer center endoscopy room</td>
</tr>
<tr>
<td>Tuesday PM</td>
<td>Observation: stomach ESD</td>
<td>LJH</td>
<td>Cancer center endoscopy room</td>
</tr>
<tr>
<td>Tuesday 17:00-18:00</td>
<td>ESD conference - previous week case review</td>
<td>MBH, LH, MYW</td>
<td>Conference room</td>
</tr>
<tr>
<td>Wednesday AM</td>
<td>Observation: stomach ESD</td>
<td>LJH</td>
<td>Main building endoscopy room</td>
</tr>
<tr>
<td>Wednesday PM</td>
<td>Observation: colon ESD</td>
<td>KER</td>
<td>Main building endoscopy room</td>
</tr>
<tr>
<td>Thursday AM</td>
<td>ESD hands-on training 2 (EndoGEL or live pig*)</td>
<td>LJH</td>
<td>Animal lab</td>
</tr>
<tr>
<td>Thursday PM</td>
<td>ESD planning session - next week cases</td>
<td>LJH, MYW</td>
<td>Conference room</td>
</tr>
<tr>
<td>Thursday 17:00-18:00</td>
<td>ESD planning session - next week cases</td>
<td>LJH, MYW</td>
<td>Conference room</td>
</tr>
<tr>
<td>Friday AM</td>
<td>Observation: EGD and ablation treatment</td>
<td>LJH</td>
<td>Main building endoscopy room</td>
</tr>
<tr>
<td>Friday PM</td>
<td>Observation: colon ESD</td>
<td>HSN</td>
<td>Main building endoscopy room</td>
</tr>
</tbody>
</table>

* Live pig ESD hands-on session will be prepared if the number of trainee is 4 or more.
* One day live pig hands-on session is open to everyone, if available.
ESD with **Pentax Imagina** endoscope system

Jun Haeng Lee. Department of Medicine
Sungkyunkwanuniversity School of Medicine, Seoul, Korea
Gastroscope Orientation Solution: **Further Angulation Range (FAR™)**

**Benefits**

**Further angulation range™**

PENTAX Medical’s gastro endoscope can be bent 33% in the downward direction and 20% in the outer right and left direction more than the conventional product, providing easier access to lesions for biopsy and treatment. In addition, the fundus area of the stomach is easy to observe.

<table>
<thead>
<tr>
<th>Specification</th>
<th>EG29-i10c</th>
<th>Conventional product</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angulation range</td>
<td>U/D: 210/120 R/L: 120/120</td>
<td>U/D: 210/90 R/L: 100/100</td>
</tr>
</tbody>
</table>
ESD – Pentax IMAGINA system
ESD: Early gastric carcinoma (x2)

1. Location: antrum, lesser curvature

2. Gross type: ① EGC type IIb+IIa ② EGC type IIc+IIb

3. Histologic type: ① tubular adenocarcinoma, well differentiated, ② tubular adenocarcinoma, moderately differentiated (WHYZ lesion)

4. Histologic type by Lauren: ①, ② intestinal

5. Size of carcinoma: ① (1) longest diameter, 16 mm (2) vertical diameter, 10 mm; ② (1) longest diameter, 8 mm (2) vertical diameter, 8 mm

6. Depth of invasion: ①, ② invades mucosa (lamina propria) (pT1a)

7. Resection margin: free from carcinoma (N), safety margin: distal 8 mm, proximal 13 mm, anterior 14 mm, posterior 10 mm, deep ①: 400 μm, deep ②: 350 μm

8. Lymphatic invasion: not identified (N)

9. Venous invasion: not identified (N)

10. Perineural invasion: not identified (N)

11. Pre-existing adenoma: none

12. Microscopic ulcer: absent

13. Histologic heterogeneity: absent
ESD for EGC
ESD: Early gastric carcinoma

1. Location : angle, lesser curvature

2. Gross type : EGC type IIc

3. Histologic type : tubular adenocarcinoma, moderately differentiated

4. Histologic type by Lauren : intestinal

5. Size of carcinoma : (1) longest diameter, 32 mm  (2) vertical diameter, 9 mm

6. Depth of invasion : invades mucosa (lamina propria) (pT1a)

7. Resection margin : free from carcinoma(N), safety margin : distal 10 mm, proximal 9 mm, anterior 2 mm, posterior 4 mm, deep 250 μm

8. Lymphatic invasion : not identified(N)

9. Venous invasion : not identified(N)

10. Perineural invasion : not identified(N)

11. Pre-existing adenoma : none

12. Microscopic ulcer : absent

13. Histologic heterogeneity: absent

14. Associated finding: Gastritis cystica superficialis
Unforgettable case

Jun Haeng Lee. Department of Medicine
Sungkyunkwanuniversity School of Medicine, Seoul, Korea
ESD for EGC in an surgical ICU
ESD for EGC in a patient on ECMO due to arrest by dilated cardiomyopathy
ESD for EGC in a patients on ECMO
- Tubular adenocarcinoma, M/D, 16x7mm, MM, L/V/N (-/-/-)
Take home message

• ESD is widely performed for EGCs in the absolute indication in Korea. Annually, its more than 7,000 cases. We are still very careful about expanded indication cases. It’s done usually for flat SRCs less than 1 cm.
• Starting the role of the first assistant is the beginning of learning ESD techniques.
• Imagina endoscopes and Splash M-knife are making the ESD procedure much easier not only for beginners but also expert doctors.