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Scriptwriter Name: Praveen Kumar

Project Page Link: <https://review.jove.com/account/file-uploader?src=21146613>

Title: Self-Made Internal Traction Method for Endoscopic Submucosal Dissection of Early Gastric Cancer

Authors and Affiliations:

Takaaki Yoshikawa, Masaya Hiura, Yuji Ueyama, Yuya Miyake, Takeshi Mori, Keiichiro Toyohara, Kumi Itami, Tarou Kosaka, Momoko Iketani, Sonoka Katsuyama, Kazuki Osawa, Kosuke Iwano, Shigeharu Nakano, Toshihiro Morita, Kenshiro Hirohashi, Tadayuki Kou, Shujiro Yazumi

Department of Gastroenterology and Hepatology, Kitano Hospital, Tazuke Kofukai Medical Research Institute

Corresponding Authors:

Takaaki Yoshikawa (anctan180@gmail.com)

Email Addresses for All Authors:

anctan180@gmail.com
m-hiura@kitano-hp.or.jp
yuuzi-ueyama@kitano-hp.or.jp
myuya0410@gmail.com
t-mori@kitano-hp.or.jp
toyokei.074@gmail.com
k-itami@kitano-hp.or.jp
tarou-kosaka@kitano-hp.or.jp
m-iketani@kitano-hp.or.jp
s-katuyama@kitano-hp.or.jp
k-oosawa@kitano-hp.or.jp
k-iwano@kitano-hp.or.jp
shigeharu-nakano@kitano-hp.or.jp
toshihiro-morita@kitano-hp.or.jp
k-hirohashi@kitano-hp.or.jp
t-kou@kitano-hp.or.jp
s-yazumi@kitano-hp.or.jp

Author Questionnaire

- 1. Microscopy:** Does your protocol require the use of a dissecting or stereomicroscope for performing a complex dissection, microinjection technique, or something similar? **No**
- 2. Software:** Does the part of your protocol being filmed include step-by-step descriptions of software usage? **No**
- 3. Filming location:** Will the filming need to take place in multiple locations? **No**
- 4. Testimonials (optional):** Would you be open to filming two short testimonial statements **live during your JoVE shoot**? These will **not appear in your JoVE video** but may be used in JoVE's promotional materials. **No**

Current Protocol Length

Number of Steps: 10

Number of Shots: 29

Interviews

Videographer: Obtain headshots for all authors available at the filming location.

INTRODUCTION:

~~REQUIRED: Summarize your research focus and the main questions it aims to answer.~~

- 1.1. **Takaaki Yoshikawa:** Our research evaluates the effectiveness of a self-developed traction method during gastric endoscopic submucosal dissection and determines whether it improves procedural outcomes.
 - 1.1.1. INTERVIEW: Named talent says the statement above in an interview-style shot, looking slightly off-camera. *Suggested B-roll: 3.5.1*

NOTE: Use Take 3

~~Describe the research gap or limitation in existing methods and how this protocol addresses them.~~

- 1.2. **Takaaki Yoshikawa:** Existing traction methods face theoretical, procedural, and cost limitations; this protocol overcomes these challenges by providing a practical, streamlined, and economical approach.
 - 1.2.1. INTERVIEW: Named talent says the statement above in an interview-style shot, looking slightly off-camera

NOTE: Use Take 1

CONCLUSION:

~~What does this protocol allow researchers to study or measure?~~

- 1.3. **Takaaki Yoshikawa:** This protocol enables researchers to evaluate a simple, equipment-free traction method that facilitates gastric ESD, improving procedural ease, accessibility, and broader clinical applicability.
 - 1.3.1. INTERVIEW: Named talent says the statement above in an interview-style shot, looking slightly off-camera

NOTE: Use Take 1

~~Describe the most important consideration or challenge when performing this protocol.~~

1.4. **Takaaki Yoshikawa:** The main challenge while performing this protocol is achieving proficiency in basic ESD techniques, as success depends on foundational endoscopic skills.

1.4.1. INTERVIEW: Named talent says the statement above in an interview-style shot, looking slightly off-camera *Suggested B roll: 3.3.1*

NOTE: Use Take 2

Videographer: Obtain headshots for all authors available at the filming location.

Ethics Title Card

This research has been approved by the Ethics Committee of Kitano Hospital

Protocol

***Videographer:** Please always record an audio slate while filming each shot mentioned in the shotlist.*

2. Preparation of Multiring Thread

Demonstrator: Takaaki Yoshikawa

2.1. To begin, obtain a 2.5 milliliter plastic disposable syringe with an outer diameter of 10 to 12 millimeters [1]. Cut approximately 40 centimeters of 4-0 (*Four-O*)-nylon thread for rings based on lesion characteristics [2].

2.1.1. WIDE: Talent placing a 2.5 mL plastic disposable syringe on the working surface.

2.1.2. Talent measuring 40 cm and cut approximately.

2.2. Tie three tight overhand knots around the syringe to form the first ring [1]. Rotate the first ring by one-eighty degrees along its longitudinal axis [2]. Then, repeat the knotting process to form an additional ring connected to the first ring [3]. Prepare three rings for typical gastric lesions [4] and store prepared threads in a sterile container at room temperature [5].

2.2.1. CU: three tight overhand knots are being tied to form the first ring.

NOTE: Take 2 CU, Take 3 wider

2.2.2. Talent rotating the first ring by 180°.

2.2.3. CU: a second ring is being formed connected to the first one.

2.2.4. Shot of completed three-ring thread

2.2.5. Talent keeping three multiring threads in a sterile container.

3. Gastric Endoscopic Submucosal Dissection (ESD)

Demonstrator: Takaaki Yoshikawa

3.1. Use a standard therapeutic endoscope with a working channel of approximately 2.8 millimeters [1]. Once the patient is anesthetized, monitor heart rate, blood pressure, oxygen saturation, and respiratory status throughout the procedure [2].

3.1.1. WIDE: Shot of endoscopy suite setup.

3.1.2. CU shot of patient vitals readings on the monitor.

- 3.2. Use an endoscopic submucosal dissection or ESD (*E-S-D*) knife to create circumferential markings approximately three millimeters from the lesion border [1]. Increase the distance to five to ten millimeters for lesions with suspected lateral spread [2].
 - 3.2.1. SCOPE: 3.2.1.mp4
 - 3.2.2. SCOPE: 3.2.2.mp4
- 3.3. Make a circumferential mucosal incision and dissect the deep submucosal layer [1] while injecting a 1-2 cubic centimeter of submucosal fluid per injection for cushioning [2]. Continue dissection until the white muscular layer and blue-stained submucosal fibers are clearly exposed [3].
 - 3.3.1. SCOPE: 3.3.1.mp4: 00:07-end
 - 3.3.2. SCOPE: 3.3.2.mp4: 00:03-00:15
 - 3.3.3. SCOPE: 3.3.3.mp4
- 3.4. Dissect the front side of the submucosa [1] to form a large mucosal flap for clip attachment [2]. Place two or three marking points on the mucosa to indicate the intended traction site [3].
 - 3.4.1. SCOPE: 3.4.1.mp4: 00:05-end
 - 3.4.2. SCOPE: 3.4.2.mp4
 - 3.4.3. SCOPE: 3.4.3.mp4: 00:05-end
- 3.5. Inject 2–3 milliliters of submucosal lifting solution of saline, glycerol solution, or hyaluronic acid under the mucosal flap before the traction device [1]. Use a reopenable endoscopic clip compatible with the working channel to grasp the end ring of the multiring thread [2]. Advance it through the endoscope working channel [3].
 - 3.5.1. SCOPE: 3.5.1.mp4
 - 3.5.2. Talent grasping the end ring of the multiring thread with reopenable endoscopic clip.
 - 3.5.3. Talent advancing the clip-thread assembly through the endoscope working channel.
- 3.6. Next, attach the clip to the mucosal flap [1]. Advance a second, reopenable clip through the working channel [2] and use it to grasp the ring opposite the attached end of the multiring thread [3]. Attach the clip to the normal mucosa opposite the lesion to expose the submucosal layer [4].
 - 3.6.1. SCOPE: 3.6.1.mp4: 00:11-00:14
 - 3.6.2. Talent advancing second clip through working channel.
 - 3.6.3. SCOPE: 3.6.3.mp4

3.6.4. SCOPE: 3.6.4.mp4: 00:04-end

- 3.7. Dissect the exposed submucosal layer from the front side while maintaining traction [1]. Continue until the lesion is completely separated from the surrounding tissue [2].

3.7.1. SCOPE: 3.7.1.mp4: 00:06-00:13

3.7.2. SCOPE: 3.7.2.mp4: 00:03-00:05, 00:13-end

- 3.8. After the resection, use grasping forceps to remove the second clip from the mucosa, followed by removal of the resected lesion [1]. **NOTE: The VO is edited for the deleted shots**

3.8.1. CU: forceps is being advanced through the endoscopic working channel.

3.8.2. ~~CU: Second clip is being removed~~ **NOTE: this is filmed within the SCOPE but not provided by authors**

~~3.8.3. CU: resected lesion with the traction device is coming out if working~~ **NOTE: Not filmed**

Results

4. Results

- 4.1. In the present study, 13 cases involving 14 procedures were included [1]. Four patients underwent gastric ESD of the remnant stomach, and all lesions were located on the staple line [2].
 - 4.1.1. LAB MEDIA: Table 1 *Video Editor: Please emphasize the first column "CASE" and second column "PROCEDURE"*.
 - 4.1.2. LAB MEDIA: Table 1 *Video Editor: Please emphasize rows for cases 4, 7, 8, and 11 and emphasize "Remnant" in the Area column in them.*
- 4.2. The median lesion diameter was 11 millimeters, and the median specimen size was 35 millimeters [1]. The median attachment time of the device was 166 seconds [2]. The median resection speed was 8.4 square millimeters per minute [3].
 - 4.2.1. LAB MEDIA: Table 2 *Video editor: Highlight the rows for "Median lesion diameter" and "Median specimen diameter"*.
 - 4.2.2. LAB MEDIA: Table 2 *Video editor: Highlight the rows for Median attachment time"*
 - 4.2.3. LAB MEDIA: Table 2 *Video editor: Highlight the rows for Median resection speed"*
- 4.3. En bloc resection could not be achieved in Case 8 due to the presence of a staple line after gastrectomy [1]. Case 8 also demonstrated the lowest resection speed, reflecting increased procedural difficulty [2]. Adverse events were not observed in any cases [3].
 - 4.3.1. LAB MEDIA: Table 1 *Video editor: Highlight the Case 8 row and the En bloc resection cell showing "2 pieces"*.
 - 4.3.2. LAB MEDIA: Table 1 *Video editor: Highlight the Case 8 row and cell showing "1.4" in the Resection speed column for it.*
 - 4.3.3. LAB MEDIA: Table 1 *Video editor: Highlight the column "Adverse events"*

1. Endoscopic
Pronunciation link: <https://www.merriam-webster.com/dictionary/endoscopic>
IPA: /,en.də'skɑ:.pɪk/
Phonetic Spelling: en·duh·skop·ik
2. Submucosal
Pronunciation link: <https://www.merriam-webster.com/dictionary/submucosal>
IPA: /,sʌb.mju:'koʊ.səl/
Phonetic Spelling: sub·myoo·koh·suhl
3. Dissection
Pronunciation link: <https://www.merriam-webster.com/dictionary/dissection>
IPA: /dɪ'sekʃən/
Phonetic Spelling: dye·sek·shuhn
4. Longitudinal
Pronunciation link: <https://www.merriam-webster.com/dictionary/longitudinal>
IPA: /lɒ:n.dʒə'tu:.dən.əl/
Phonetic Spelling: lon·juh·too·duh·nuhl
5. Therapeutic
Pronunciation link: <https://www.merriam-webster.com/dictionary/therapeutic>
IPA: /,θer.ə'pjʊ:.tɪk/
Phonetic Spelling: thair·uh·pyoo·tik
6. Circumferential
Pronunciation link: <https://www.merriam-webster.com/dictionary/circumferential>
IPA: /,sɜ:.kəm.fə'renʃəl/
Phonetic Spelling: sir·kum·fuh·ren·shuhl
7. Mucosal
Pronunciation link: <https://www.merriam-webster.com/dictionary/mucosal>
IPA: /mju:'koʊ.səl/
Phonetic Spelling: myoo·koh·suhl
8. Muscular
Pronunciation link: <https://www.merriam-webster.com/dictionary/muscular>
IPA: /'mʌs.kjə.lə/
Phonetic Spelling: mus·kyuh·ler
9. Glycerol
Pronunciation link: <https://www.merriam-webster.com/dictionary/glycerol>
IPA: /'glɪs.ə,rɔ:l/
Phonetic Spelling: glis·uh·rawl
10. Hyaluronic
Pronunciation link: <https://www.merriam-webster.com/dictionary/hyaluronic%20acid>
IPA: /,haɪ.ə.ljʊ'rɑ:.nɪk/
Phonetic Spelling: hy·uh·loor·on·ik
11. Reopenable
Pronunciation link: No confirmed link found
IPA: No verified IPA available
Phonetic Spelling: ree·oh·puh·nuh·buhl

12. Traction
Pronunciation link: <https://www.merriam-webster.com/dictionary/traction>
IPA: /'træk.ʃən/
Phonetic Spelling: trak·shuhn
13. Gastrectomy
Pronunciation link: <https://www.merriam-webster.com/dictionary/gastrectomy>
IPA: /gæ'strek.tə.mi/
Phonetic Spelling: gas·trek·tuh·mee
14. Resection
Pronunciation link: <https://www.merriam-webster.com/dictionary/resection>
IPA: /rɪ'sek.ʃən/
Phonetic Spelling: ree·sek·shuhn
15. Specimen
Pronunciation link: <https://www.merriam-webster.com/dictionary/specimen>
IPA: /'spes.ə.mən/
Phonetic Spelling: spes·uh·muhn
16. Lesion
Pronunciation link: <https://www.merriam-webster.com/dictionary/lesion>
IPA: /'li:.ʒən/
Phonetic Spelling: lee·zhuhn
17. Staple line
Pronunciation link: <https://www.merriam-webster.com/dictionary/staple>
IPA: /'steɪ.pəl laɪn/
Phonetic Spelling: stay·puhl line
18. Hemostasis
Pronunciation link: <https://www.merriam-webster.com/dictionary/hemostasis>
IPA: /'hi:.moʊ'steɪ.sɪs/
Phonetic Spelling: hee·moh·stay·sis
19. Saturation
Pronunciation link: <https://www.merriam-webster.com/dictionary/saturation>
IPA: /,sætʃ.ə'reɪ.ʃən/
Phonetic Spelling: sach·uh·ray·shuhn
20. Adverse
Pronunciation link: <https://www.merriam-webster.com/dictionary/adverse>
IPA: /æd'vɜ:s/
Phonetic Spelling: ad·vurs