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Title: Surgical Robot-Assisted Transanal Specimen Extraction Radical Sigmoidectomy Without an Auxiliary Abdominal Incision

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Author Questionnaire

1. We have marked your project as author-provided footage, meaning you film the video yourself and provide JoVE with the footage to edit. JoVE will not send the videographer. Please confirm that this is correct.

✓ Correct

2. Microscopy: Does your protocol require the use of a dissecting or stereomicroscope for performing a complex dissection, microinjection technique, or something similar? **No**

3. Software: Does the part of your protocol being filmed include step-by-step descriptions of software usage? **No**

4. Proposed filming date: To help JoVE process and publish your video in a timely manner, please indicate the proposed date that your group will film here: **MM/DD/YYYY**

When you are ready to submit your video files, please contact our China Location Producer, [Yuan Yue](#).

Current Protocol Length

Number of Steps: 21

Number of Shots: 41

Introduction

1.1. **Guiyu Wang:** This clinical study presents a robot-assisted radical sigmoid resection with transanal specimen extraction, without an auxiliary abdominal incision.

1.1.1. INTERVIEW: Named talent says the statement above in an interview-style shot, looking slightly off-camera. *Suggested B.roll:2.10*

What are the most recent developments in your field of research?

1.2. **Guiyu Wang:** The proposal and refinement of the NOSES concept represent a major technological innovation in the field of minimally invasive surgery.

1.2.1. INTERVIEW: Named talent says the statement above in an interview-style shot, looking slightly off-camera.

What advantage does your protocol offer compared to other techniques?

1.3. **Hanging Hu:** Robot-assisted NOSES integrates the advantages of the robotic surgery with natural orifice specimen extraction, ensuring radical resection efficacy while significantly enhancing both the surgeon's experience and patient recovery.

1.3.1. INTERVIEW: Named talent says the statement above in an interview-style shot, looking slightly off-camera.

Ethics Title Card

This research has been approved by the Institutional Review Board (IRB) at The Second Affiliated Hospital of Harbin Medical University

Protocol

2. Robot-Assisted Transanal Specimen Extraction for Radical Sigmoidectomy

Demonstrator: Guiyu Wang

NOTE: Protocol scripted from Available Footage

2.1. To begin, use nanocarbon to mark the site of the primary tumor during preoperative colonoscopy [1].

2.1.1. LAB MEDIA: (4).MP4 05:14-05:17

Video Editor: Please slow down or freeze frame here if necessary

2.2. After tilting the patient to displace the small intestines away from the surgical site, use small gauze to prevent the intestines or mesentery from sliding and interfering with the surgical field [1].

2.2.1. LAB MEDIA: (2).MP4 07:03 – 07:22 and
LAB MEDIA: (3).MP4 00:10 – 00:20

2.3. Grasp and lift the rectum and inferior mesenteric vessels ventrally with two forceps to expose the surgical area [1]. Use bipolar coagulation forceps to open Toldt's space at the sacral promontory [2]. Push along Toldt's space and dissect to the right iliac vessel bifurcation [3].

2.3.1. LAB MEDIA: (4).MP4 05:42 – 05:57, 06:27 – 06:29

2.3.2. LAB MEDIA: (4).MP4 06:36 – 06:52

2.3.3. LAB MEDIA: (5).MP4 00:21 – 00:27, 01:25 – 01:33

2.4. Dissect the presacral space from proximal to distal using sharp and blunt techniques. Increase the grasping force for the mesentery and use sharp and blunt dissection to gradually expose and widen the space [1].

2.4.1. LAB MEDIA: (5).MP4 05:50 – 05:55, 06:16 – 06:24, 07:42 – 07:53

2.5. Gently draw the mesentery pedicle to the left ventral side using grasping forceps and expand the peritoneal window using bipolar coagulation forceps [1]. Expose the root of the inferior mesenteric artery and separate it distally along its direction [2]. Then,

progressively isolate the left colic artery, the sigmoid artery, and the superior rectal artery [3].

- 2.5.1. LAB MEDIA: (6).MP4 01:58 – 02:16, 05:11 – 05:25, 05:38 – 05:54
- 2.5.2. LAB MEDIA: (7).MP4 02:08 – 02:10, 02:16 – 02:26, 02:37 – 02:47
- 2.5.3. LAB MEDIA: (7).MP4 05:54 – 06:00, 06:25 – 06:40, 07:02 – 07:12

2.6. Dissect the lymph nodes at the root of the inferior mesenteric artery [1]. Expose and ligate the sigmoid artery, superior rectal artery, and inferior mesenteric vein in sequence [2]. Place gauze on the posterior aspect of the mesosigmoid to protect the ureter and vessels [3].

- 2.6.1. LAB MEDIA: (9).MP4. 01:33 – 01:43
- 2.6.2. LAB MEDIA: (8).MP4 01:43 – 01:56, 04:35 – 04:44, 06:30 – 06:37
- 2.6.3. LAB MEDIA: (9).MP4. 03:10 – 03:26

2.7. Pull the sigmoid mesentery to the right to expose the mesentery-peritoneum junction [1]. Dissect the lateral attachments of the sigmoid colon free. Completely mobilize the sigmoid colon using sharp and blunt dissection [2-TXT].

- 2.7.1. LAB MEDIA: (9).MP4 03:51 -04:00, 05:12-05:22
- 2.7.2. LAB MEDIA: (9).MP4 05:27 – 05:33, 05:47 – 05:51, 06:23 – 06:33, 07:10 – 07:26 And LAB MEDIA: (10).MP4 05:55 – 05:59, 06:03 – 06:06, 07:32 – 07:43
TXT: Identify gauze protecting the ureter through the mesosigmoid

2.8. Incise the sigmoid mesocolon to the bowel edge and ligate the sigmoid vessels along the dissection line [1]. Clear perisigmoid fat and epiploica for 2 to 3 centimeters along the bowel [2].

- 2.8.1. LAB MEDIA: (14).MP4 01:02 – 01:08, 02:47 – 02:55, 05:10 – 05:16, 05:30 – 05:45
- 2.8.2. LAB MEDIA: (14).MP4 07:29 – 07:40
and (15).MP4 06:17-06:27

2.9. Ensure the distal resection margin is 5 centimeters from the tumor. Dissociate the mesentery along the same horizontal line from right to left. Connect the resection lines posteriorly [1].

- 2.9.1. LAB MEDIA: (17).MP4 00:36 – 00:45, 01:09 – 01:20, 07:28 – 07:39, 07:46 – 07:52

2.10. Select a protective sleeve appropriate to specimen size, then insert it through trocar hole A1, placing it in the abdominal cavity for later use [1]. Transect the rectum at the lower resection line using an endoscopic linear cutter [2]. Then, sterilize the cut ends of the intestine with povidone gauze [3].

2.10.1. LAB MEDIA: (18).MP4 06:44 – 06:48, 06:55 – 07:03

2.10.2. LAB MEDIA: (19).MP4 00:44 – 00:54

2.10.3. LAB MEDIA: (19).MP4 01:10 – 01:20

2.11. Use bipolar forceps to carefully expose the rectal stump and disinfect with iodophor gauze [1]. Ask the assistant to press an iodophor gauze against the stump using an oval clamp to generate tension [2].

2.11.1. LAB MEDIA: (19).MP4 02:55 – 03:03, 03:24 – 03:30,

2.11.2. LAB MEDIA: (19).MP4 03:58 – 04:14

2.12. Hold the oval clamp and carefully draw the transparent protective sleeve through the anus to create a sterile passage [1]. Then insert the anvil through the protective sleeve into the abdomen [2].

2.12.1. LAB MEDIA: (19).MP4 06:12 – 06:30

2.12.2. LAB MEDIA: (20).MP4 02:09 – 02:13, 02:21 – 02:32

2.13. Make a longitudinal incision on the exposed sigmoid colon above the tumor [1].

2.13.1. LAB MEDIA: (20).MP4 04:54 – 05:11

2.14. After disinfecting the lumen, insert the anvil into the lumen of the proximal sigmoid colon [1]. Then use the linear cutter to close the incision while leaving the anvil in place [2]. Disinfect the stump with povidone gauze [3]. Protrude the center rod of the anvil head through one side of the suture line [4].

2.14.1. LAB MEDIA: (20).MP4 07:20 – 07:28, 07:34 – 07:37

2.14.2. LAB MEDIA: (21).MP4 02:24 – 02:42

2.14.3. LAB MEDIA: (21).MP4 03:07- 03: 13

2.14.4. LAB MEDIA: (21).MP4 05:54 – 06:01, 06:25 – 06:32

2.15. Place the resected specimen and any used gauze into the sterile plastic sleeve before

extracting them through the anus [1]. Then carefully tighten the protective sleeve to secure the contents [2].

2.15.1. LAB MEDIA: (22).MP4 04:25 – 04:31, 04:53 – 05:09

2.15.2. LAB MEDIA: (22).MP4 07:09 – 07:25

2.16. Insert an oval clamp into the pelvic cavity through the anus and grasp one end of the specimen [1]. Gently extract it through the rectum and anus [2]. Confirm that the protective sleeve remains intact [3].

2.16.1. LAB MEDIA: 2.体外取标本视频.MP4 00:15-00:21

2.16.2. LAB MEDIA: 2.体外取标本视频.MP4 00:40 – 00:53,

2.16.3. LAB MEDIA: 2.体外取标本视频.MP4 02:42 – 02:48

2.17. Close the open rectal stump using a linear cutter [1]. Then place the closed stump in a specimen bag and remove it through Trocar A1 [2].

2.17.1. LAB MEDIA: (23).MP4 02:14 – 02:20, 02:44 – 02:50

2.17.2. LAB MEDIA: (23).MP4 04:02 - 04:14

2.18. Introduce the circular stapler through the gently dilated anus. Protrude the spike of the stapler from one side of the suture line [1].

2.18.1. LAB MEDIA: (23).MP4 07:23 – 07:40

2.19. Connect the center rod of the anvil to the distal part of the circular stapler [1]. Check for twisting of colon and mesentery and ensure surrounding organs are away from the stapling path [2-TXT].

2.19.1. LAB MEDIA: (24).MP4 00:06 – 00:16

2.19.2. LAB MEDIA: (24).MP4 00:41 – 00:56, 01:21 – 01:23 **TXT: Fire the stapler and withdraw after twisting it open**

2.20. Perform a reinforced suture at the intra-abdominal 'risk triangle' [1].

2.20.1. LAB MEDIA: (25).MP4 03:24 – 03:30

2.21. Check the anastomosis for leaks by verifying the proximal and distal ring integrity and performing an air test [1]. Place two drainage tubes routinely on either side of the pelvic cavity at the anastomosis site [2].

2.21.1. LAB MEDIA: (28).MP4	04:06 – 04:11, 04:15 – 04:21
2.21.2. LAB MEDIA: (34).MP4	00:08 – 00:15

Results

3. Results

- 3.1. The sigmoid colon specimen was surgically resected, with no signs of perforation or fragmentation [1].
 - 3.1.1. LAB MEDIA: Figure 4.
- 3.2. Histopathology following surgery showed no residual cancer in the sigmoid colon [1], with reactive lymphadenopathy observed in all 12 retrieved lymph nodes [2].
 - 3.2.1. LAB MEDIA: Figure 5A.
 - 3.2.2. LAB MEDIA: Figure 5B.
- 3.3. The patient underwent blood index examinations on the 1st, 3rd, and 5th postoperative days, as well as in the 4th week after surgery, to monitor changes in hemoglobin levels, inflammation markers, and liver function [1].
 - 3.3.1. LAB MEDIA: Figure 6. *Video editor: Sequentially highlight each graph*
- 3.4. The surgeon-rated intraoperative workload was minimal, with all NASA-TLX dimension scores at or near the lowest rating of 1 to 2 [1].
 - 3.4.1. LAB MEDIA: Table 1. *Video editor: Highlight all cells in the table showing values of 1 or 2 across the row labeled "Indicator".*

1. nanocarbon

- Pronunciation link: No Merriam-Webster page found. Wiktionary defines it but lacks audio ([YouTube](#), [Merriam-Webster](#))
 - IPA: /'nænɒs,kɑrbən/
 - Phonetic Spelling: nan-oh-kar-buhn
-

2. mesentery

- Pronunciation link: <https://www.merriam-webster.com/dictionary/mesentery> ([findwords.info](#), [Merriam-Webster](#))
 - IPA: /'mez.ən,teri/
 - Phonetic Spelling: mez-en-teh-ree
-

3. peritoneal

- Pronunciation link: <https://www.merriam-webster.com/dictionary/peritoneal> ([Merriam-Webster](#), [Forvo.com](#)) (assumed from dictionary)
 - IPA: /,per.ə'toʊ.niəl/
 - Phonetic Spelling: per-uh-toh-nee-uhl
-

4. promontory

- Pronunciation link: <https://www.merriam-webster.com/dictionary/promontory> ([Wiktionary](#), [pronouncekiwi.com](#)) (assumed from dictionary)
 - IPA: /'prɒ:.mən,tɔ:r.i/
 - Phonetic Spelling: proh-mon-tor-ee
-

5. epiploica (as in epiploicae)

- Pronunciation link: No confirmed Merriam-Webster page—likely absent. [[Oxford?]] No link found.
 - IPA: /,ɛp.i'plɒʊ.i.ki/
 - Phonetic Spelling: ep-ih-ploh-ih-kee
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6. anastomosis

- Pronunciation link: <https://www.merriam-webster.com/dictionary/anastomosis> ([pronouncekiwi.com](#), [Forvo.com](#), [Merriam-Webster](#))
 - IPA: /ə,næs.tə'moʊ.sɪs/
 - Phonetic Spelling: uh-nas-tuh-moh-sis
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7. iodophor

- Pronunciation link: <https://www.merriam-webster.com/dictionary/iodophor> (assumed)
- IPA: /,aɪ.ə'doʊ.fɔr/
- Phonetic Spelling: eye-uh-doh-for