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Title: The Role of Anatomical Dissection in Defining Colic and Small Bowel Artery Lymphovascular Bundles in the D3 Volume of Small and Large Bowel Mesentery

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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: Filming done

Current Protocol Length

Number of Steps: 15
Number of Shots: 30

NOTE: No interviews

Ethics Title Card

The protocol of the study follows the guidelines of the body donor program of the Unit of Anatomy, Faculty of Medicine, University of Geneva

Protocol

1. Dissecting the Peritoneum and Clearing the Lymph Nodes

Demonstrator: Bojan Stimec

1.1. To begin, use a scalpel to make a wide and deep incision on the anterolateral wall of the abdomen, cutting through all layers including the parietal peritoneum while avoiding the intraperitoneal organs **[1]**. Ensure the incision begins at the midpoint of the inguinal fold, crosses posteriorly toward the midaxillary line, and extends upward to reach the costal arch **[2]**.

1.1.1. Project_1, sequence_0010000. 00:38-00:45

1.1.2. Project_1, sequence_0010000. 00:46-00:54

1.2. Using blunt forceps, divide the falciform and round ligaments of the liver **[1]**, then gently recline the entire abdominal wall flap in a caudal direction **[2]**.

1.2.1. Project_1, sequence_0020000. 00:00-00:15

1.2.2. Project_1, sequence_0020000. 00:21-00:35

1.3. Pull the small bowel loops caudally and toward the left side **[1]** and the cecum toward the right to expose the ileocecal fold **[2]**.

1.3.1. Project_1, sequence_0040000. 00:08-00:15

1.3.2. Project_1, sequence_0040000. 00:30-00:37

1.4. Using anatomical boundaries, delineate the D3 volume with a margin of approximately 3 centimeters on all sides **[1]**. Using a scalpel, make a shallow incision, approximately 1 to 2 millimeters deep, in the visceral peritoneum over the delineated area to avoid damaging subperitoneal structures **[2]**.

1.4.1. Project_1, sequence_0050000. 00:00-00:17

1.4.2. Project_1, sequence_0050000. 01:30-01:40

1.5. Using forceps, scissors, or tweezers, carefully detach the peritoneal leaf from the underlying fat and connective tissue **[1]**. Pay close attention to the area of the transverse mesocolon where the serosal leaflet is especially thin **[2]**.

1.5.1. Project_1, sequence_0060000. 00:00-00:10

1.5.2. Project_1, sequence_0060000. 00:11-00:16

1.6. Pull the cecum again in a caudal direction to tighten and accentuate the ileocecal vessels **[1]**.

1.6.1. Project_1, sequence_0070000. 00:08-00:15

1.7. Begin dissecting the lymphovascular bundles accompanying the ileocecal vessels using fine curved dissection forceps, tweezers, dissection needles, small spatulas, and micro-surgical sharp-sharp scissors **[1]**.

1.7.1. Project_1, sequence_0080000 . 00:10-00:30

1.8. Continue the dissection by following the course of the lymphatic vessels, using gentle scraping motions to separate fat lobules instead of sharp cutting **[1]**. Identify the lymph vessels by their longer, more elastic structure and their connection to lymph nodes **[2-TXT]**.

1.8.1. Project_1, sequence_0100000. 00:10-00:30

1.8.2. Project_1, sequence_0110000. 00:30-00:45

1.9. Using a fine instrument, clear each lymph node by scraping away surrounding fat and connective tissue in a radial, centrifugal direction **[1]**. Follow the afferent and efferent lymph vessels extending from each node in both directions **[2]**.

1.9.1. Project_5, sequence_0010000. 00:25-00:35

1.9.2. Project_5, sequence_0020000. 00:00-00:20

2. Dissecting and Separating Blood Vessels

2.1. Dissect the underlying blood vessels, such as the ileocecal artery and vein, within their connective tissue sheaths, or vaginae vasorum, without disturbing the overlying lymphatic network **[1]**. Use natural gaps in the vascular network and apply minimal tension on the lymphatic vessels **[2]**. In appropriate regions, gently force apart the blades of a pair of sharp-sharp scissors in the direction parallel to the ileocecal blood vessels **[3]**.

2.1.1. Project_1, sequence_0130000. 00:01-00:16

2.1.2. Project_1, sequence_0130000. 00:17-00:25

2.1.3. Project_1, sequence_0130000. 00:26-00:38

2.2. After spraying the dissection field with a phenol solution, use an aspirator to remove excess fluid collected in the peritoneal crevices and fossae **[1]**.

2.2.1. Project_5, sequence_0000000. 00:00-00:20

2.3. Once the ileocolic blood and lymphatic vessels are fully freed from the surrounding fat and connective tissue, use a finely calibrated caliper to measure the lymphatic clearan **[1]**. Take measurements at the point where the artery crosses the right-hand side of the superior mesenteric vein and again at a point 1 centimeter distal to it **[2]**.

2.3.1. Project_5, sequence_0030000. 01:20-01:30

2.3.2. Project_5, sequence_0050000. 01:02-01:55

3. Dissecting Superior Mesenteric Vessels and Small Bowel Vessels

3.1. Follow the ileocolic vessels in a proximal direction to identify their origins from the superior mesenteric vessels **[1]**. Before proceeding with dissection, use a finely curved forceps and a probe to trace the lymphatic vessels and expose their network at the root of the D3 volume **[2]**.

3.1.1. Project_5, sequence_0070000. 00:00-00:20

3.1.2. Project_5, sequence_0070000. 00:21-00:35

3.2. Locate the collector lymphatic channel that runs longitudinally along the left-hand side of the superior mesenteric artery **[1]**. Preserve this main vessel and, moving outward from it in a centrifugal direction, dissect and separate its afferent lymphatic branches on both sides **[2]**.

3.2.1. Project_5, sequence_0080000. 00:00-00:10

3.2.2. Project_5, sequence_0080000. 00:12-00:26

3.3. Observe whether the ileocolic artery crosses anteriorly or posteriorly to the superior mesenteric vein to understand its anatomical syntopy **[1]**. Continue dissecting along the superior mesenteric artery caudally **[2]**.

3.3.1. Project_5, sequence_0110000 . 00:00-00:10

3.3.2. Project_5, sequence_0110000. 00:11-00:18

3.4. Measure the lymphatic clearance around the colic vessels in the same way as demonstrated previously **[1]**. Follow the middle colic artery and its accompanying lymphatic plexuses upward into the transverse mesocolon **[2]**.

3.4.1. Project_5, sequence_0090000. 00:00-00:18

3.4.2. Project_7, sequence_0060000. 00:50-01:00

Results

4. Results

4.1. A total of three Jores-embalmed bodies from the body donor program were included in the study **[1]**.

4.1.1. LAB MEDIA: Table 1

4.2. The mean lymphatic clearances for the ileocolic artery were greater in subjects A **[1]** and B **[2]** compared to subject C **[3]**.

4.2.1. LAB MEDIA: Table 1. *Video editor: Highlight the value 4.9 mm in the row "Ileocolic artery" under column A*.

4.2.2. LAB MEDIA: Table 1. *Video editor: Highlight the value 5.3 mm in the row "Ileocolic artery" under column B.*

4.2.3. LAB MEDIA: Table 1. *Video editor: Highlight the value 3.7 mm in the row "Ileocolic artery" under column C*.

4.3. The lymphatic clearance for the middle colic artery was greater in subject C **[1]**, as compared to subjects A and B **[2]**.

4.3.1. LAB MEDIA: Table 1. *Video editor: Emphasize the 7.1 mm value in column C in the "Middle colic" row.*

4.3.2. LAB MEDIA: Table 1. *Video editor: Highlight the values 5.4 mm, 6.6 mm in the row "Middle colic" across columns A and B,.*

4.4. The lymphatic clearances of the ileal arteries and the jejunal artery clearances were similar among subjects A, B, and C **[1]**.

4.4.1. LAB MEDIA: Table 1. *Video editor: Highlight rows "Ileal arteries" and "Jejunal arteries"*

4.5. Overall, the colic artery clearances were significantly greater than those of the jejunoileal arteries **[1]**.

4.5.1. LAB MEDIA: Table 1. *Video editor: Highlight the four values in the top two rows ("Ileocolic artery" and "Middle colic")*

Pronunciation guides:

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1. anterolateral

Pronunciation link: https://www.merriam-webster.com/medical/anterolateral (How To Pronounce)
IPA: /ˌæn.təˈroʊ.læ.tə˞.əl/
Phonetic spelling: an-tuh-ROH-lat-uh-rul

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2. parietal

Pronunciation link: https://www.merriam-webster.com/dictionary/parietal
IPA: /pəˈraɪ.ɪ.təl/
Phonetic spelling: puh-RY-ih-tuhl

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3. peritoneum

Pronunciation link: https://www.merriam-webster.com/dictionary/peritoneum
IPA: /ˌpɛr.əˈtoʊ.ni.əm/
Phonetic spelling: per-uh-TOH-nee-um

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4. intraperitoneal

Pronunciation link: https://www.merriam-webster.com/dictionary/intraperitoneal
IPA: /ˌɪn.trəˌper.əˈtoʊ.ni.əl/
Phonetic spelling: in-truh-per-uh-TOH-nee-uhl

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5. inguinal

Pronunciation link: https://www.merriam-webster.com/dictionary/inguinal
IPA: /ˈɪŋ.gwɪ.nəl/
Phonetic spelling: ING-gwin-uhl

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6. midaxillary

Pronunciation link: No confirmed link found
IPA: /ˌmɪd.ˈæk.sə.lɛr.i/
Phonetic spelling: mid-AK-suh-ler-ee

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7. falciform

Pronunciation link: https://www.merriam-webster.com/dictionary/falciform
IPA: /ˈfæl.səˌfɔr( )m/
Phonetic spelling: FAL-suh-form

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8. cecum

Pronunciation link: https://www.merriam-webster.com/dictionary/cecum
IPA: /ˈsiː.kəm/
Phonetic spelling: SEE-kum

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9. ileocecal

Pronunciation link: https://www.merriam-webster.com/dictionary/ileocecal
IPA: /ˌaɪ.li.oʊˈsɛk.əl/
Phonetic spelling: eye-lee-oh-SEK-uhl

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10. mesocolon

Pronunciation link: https://www.merriam-webster.com/dictionary/mesocolon
IPA: /ˌmɛz.əˈkoʊ.lɑn/
Phonetic spelling: mez-uh-KOH-lon

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11. serosal

Pronunciation link: https://www.merriam-webster.com/dictionary/serosal
IPA: /səˈroʊ.səl/
Phonetic spelling: suh-ROH-suhl

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12. afferent

Pronunciation link: https://www.merriam-webster.com/dictionary/afferent
IPA: /ˈæf.ə.rənt/
Phonetic spelling: AF-uh-rent

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13. efferent

Pronunciation link: https://www.merriam-webster.com/dictionary/efferent
IPA: /ˈɛf.ə.rənt/
Phonetic spelling: EF-uh-rent

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14. vaginae vasorum

Pronunciation link: https://www.howtopronounce.com/vasa-vasorum
IPA: /ˈveɪ.sə ˈveɪ.səˌrɔrəm/
Phonetic spelling: VAY-suh VAY-suh-ROR-um

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15. mesenteric

Pronunciation link: https://www.merriam-webster.com/dictionary/mesenteric
IPA: /ˌmɛz.ənˈtɛr.ɪk/
Phonetic spelling: mez-en-TER-ik

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16. syntopy

Pronunciation link: No confirmed link found
IPA: /sɪnˈtoʊ.pi/
Phonetic spelling: sin-TOH-pee

17. jejunoileal

Pronunciation link: No confirmed link found
IPA: /ˌdʒɛdʒ.u.noʊ.aɪˈli.əl/
Phonetic spelling: jeh-joo-noh-eye-LEE-ul