Learning Journey

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3. Meet Your Patient
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5. Differential Diagnosis
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15. Simulators for Practice
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Introduction

AMPATH Surgical App

Introduction to the Program

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COSECSA Surgery Program Director
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Overview

This program is designed to enable medical doctors who are expected to perform essential surgical procedures to become confident and competent in the skills necessary to perform an open appendectomy.

Learning Objectives

Upon completion of this program, you will be able to:

- Describe the features of acute appendicitis.
- Discuss a differential diagnosis for right lower quadrant pain.
- Describe the steps of an open appendectomy.
- Demonstrate the psychomotor skills necessary to complete an open appendectomy.
- Recognize the importance and apply mental imagery to the performance of open appendectomy.

Disclaimer

The patient in this case is not real. All patient information is strictly hypothetical. Any resemblances to real patients are completely coincidental. The content available in this case is for informational and educational purposes only and is not an alternative to physical examination or a substitute for the professional judgement of a clinician in diagnosing and treating patients on an individual basis. The ideas expressed in this case are solely the opinions of the author(s) and do not necessarily represent the opinions of Indiana University and Moi University.

Appendix Anatomy Review

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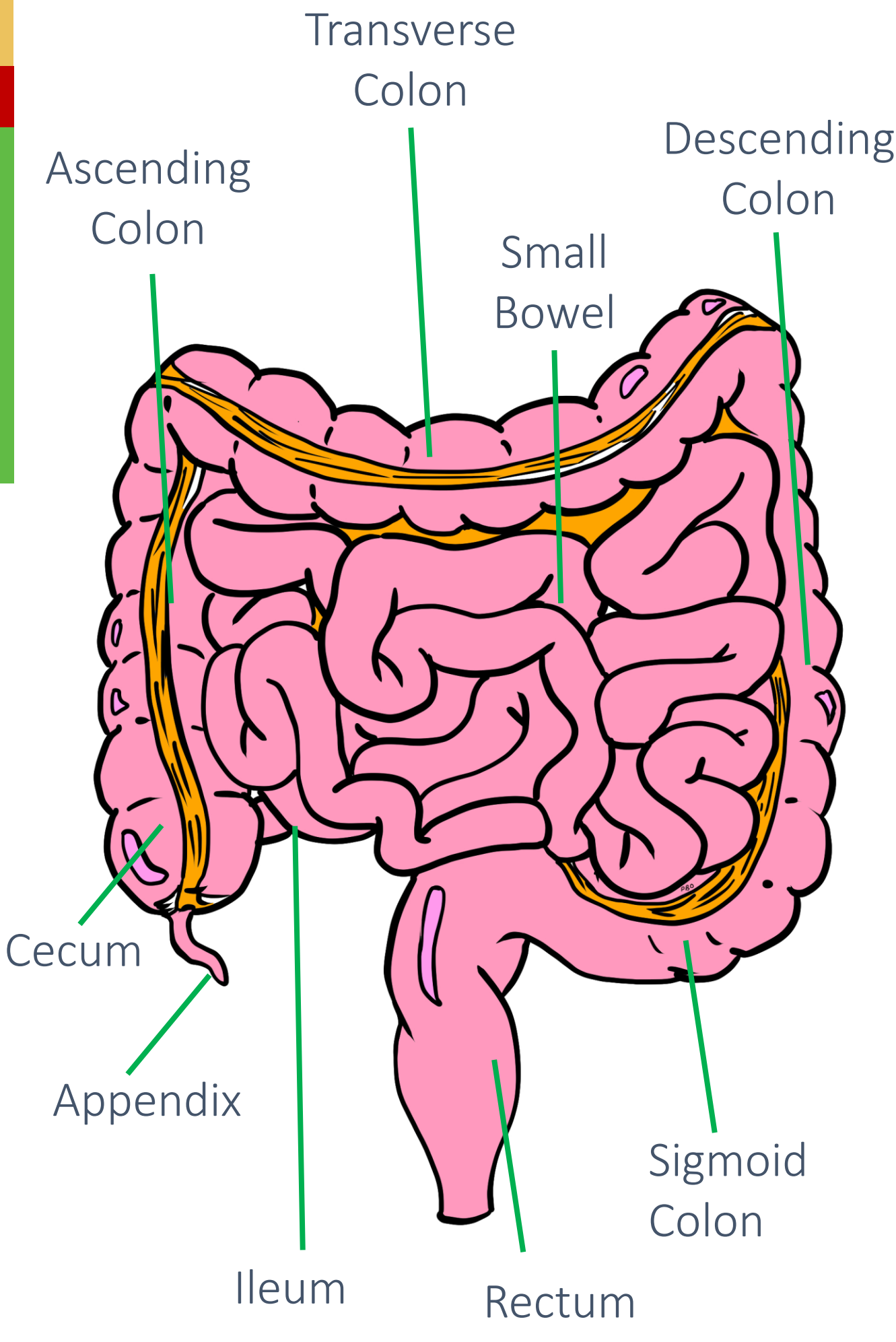
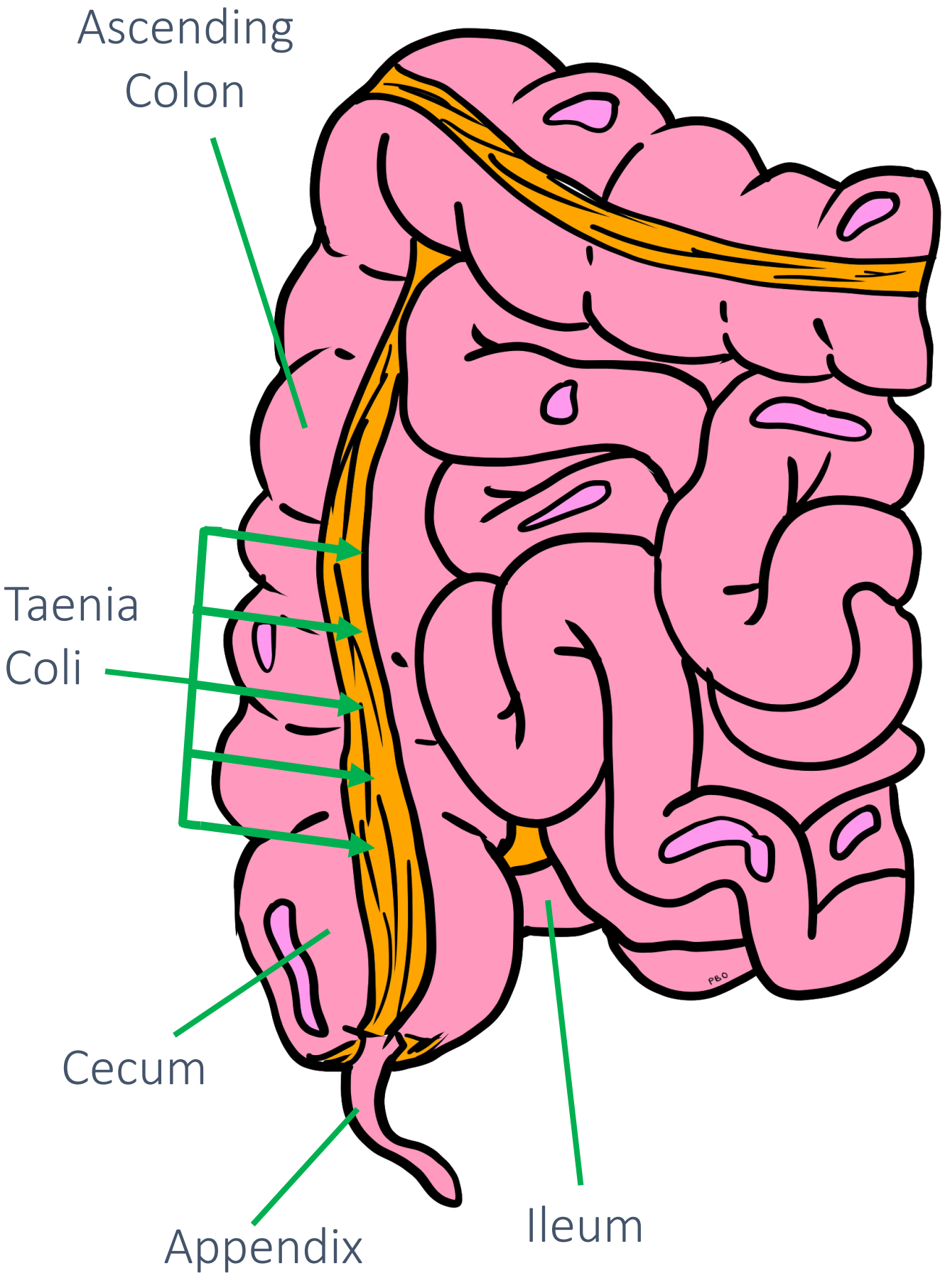
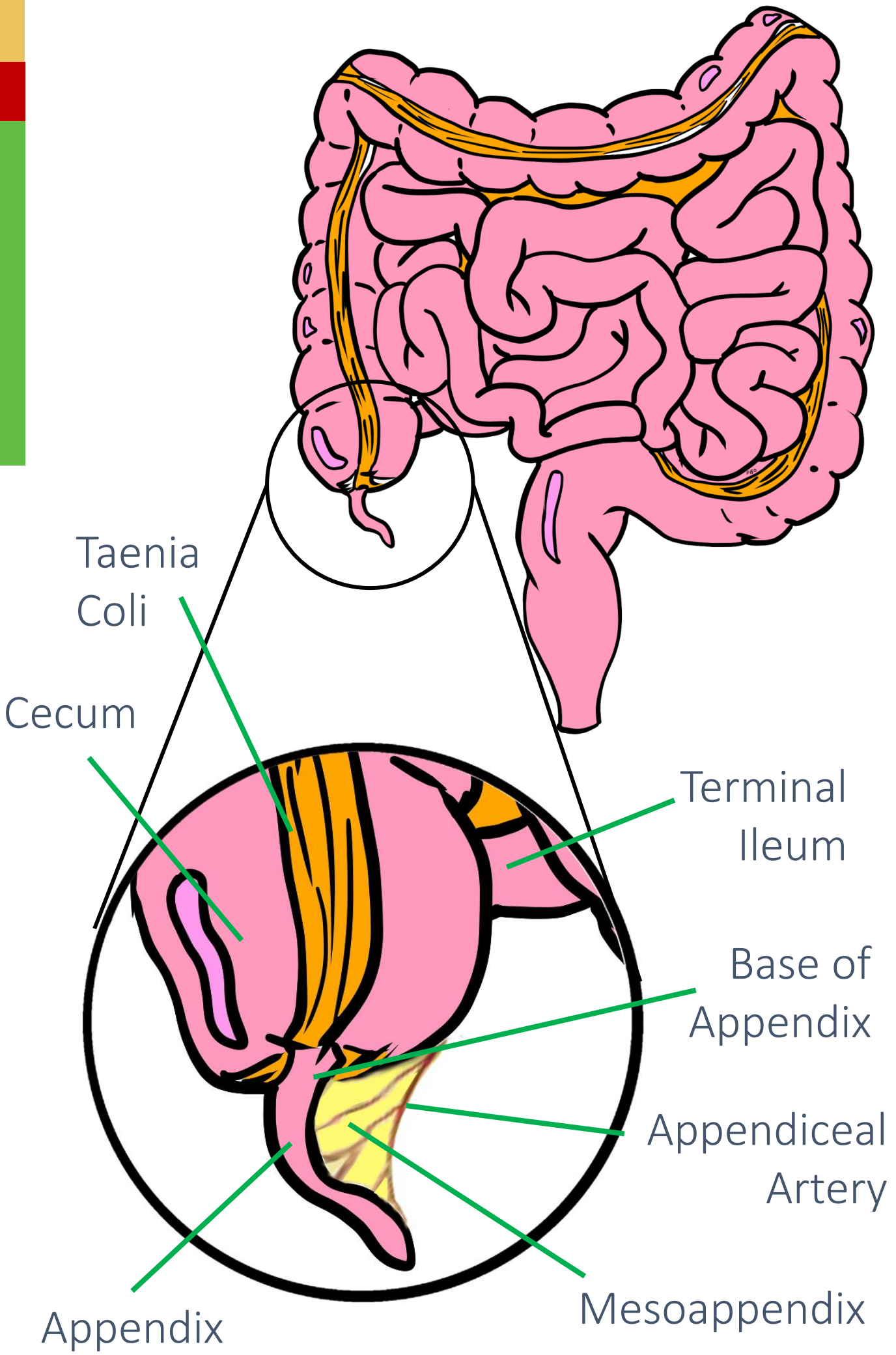
Bowel Anatomy



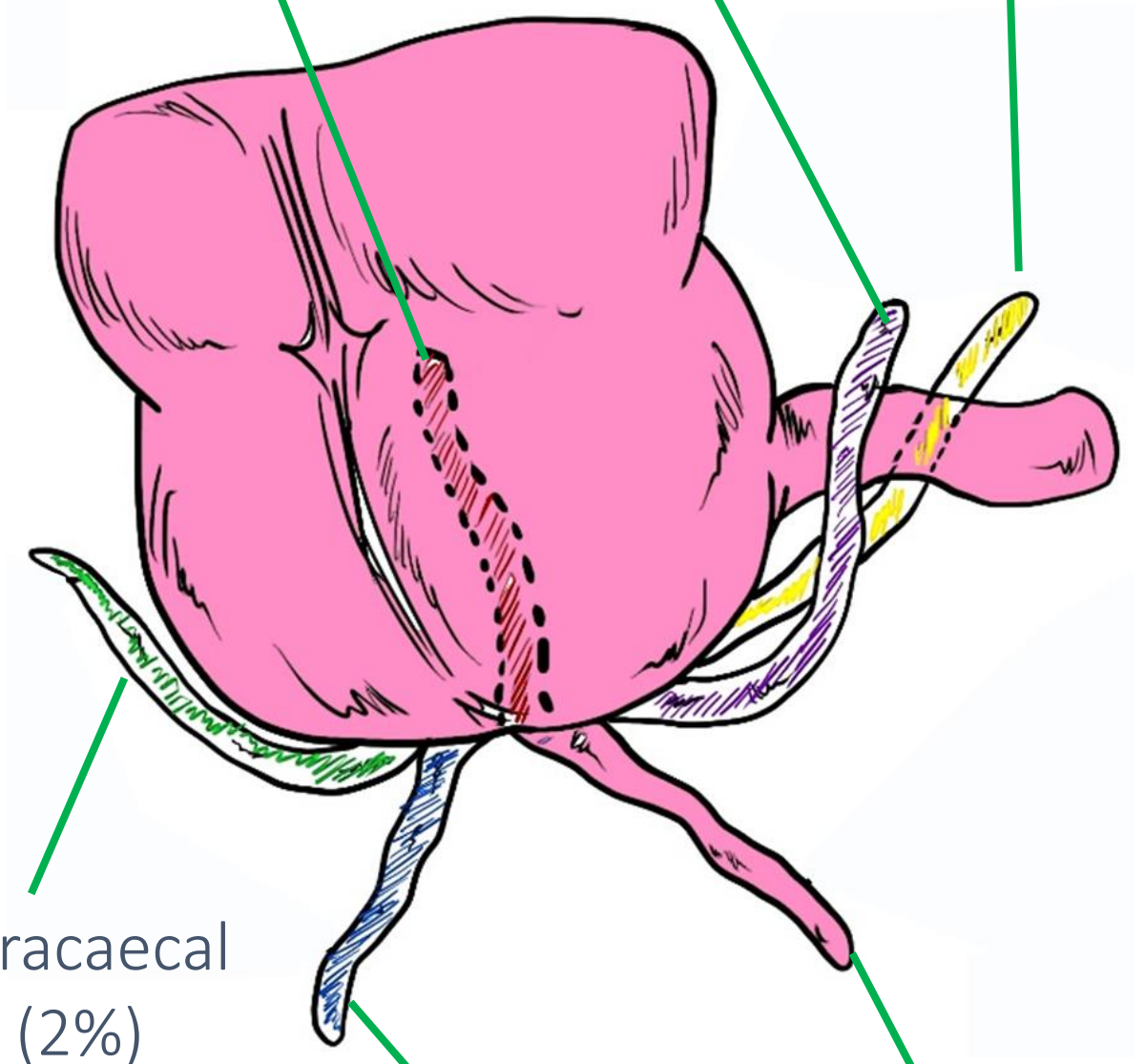
Bowel Anatomy



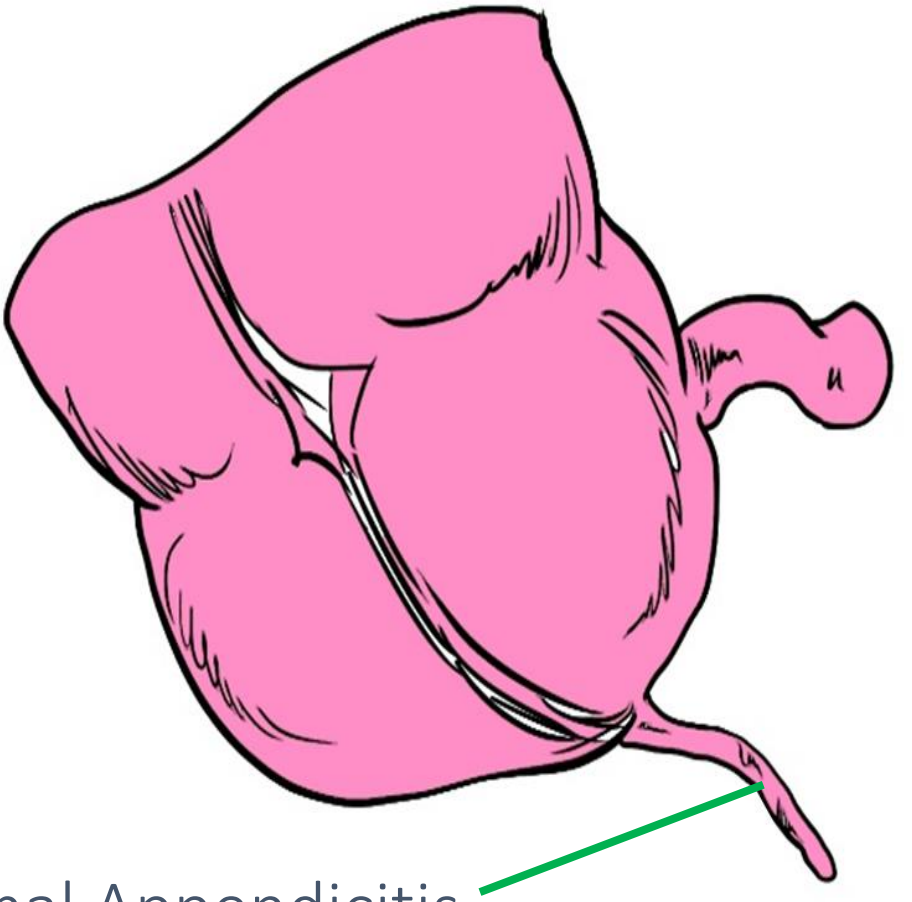
Appendix Anatomy



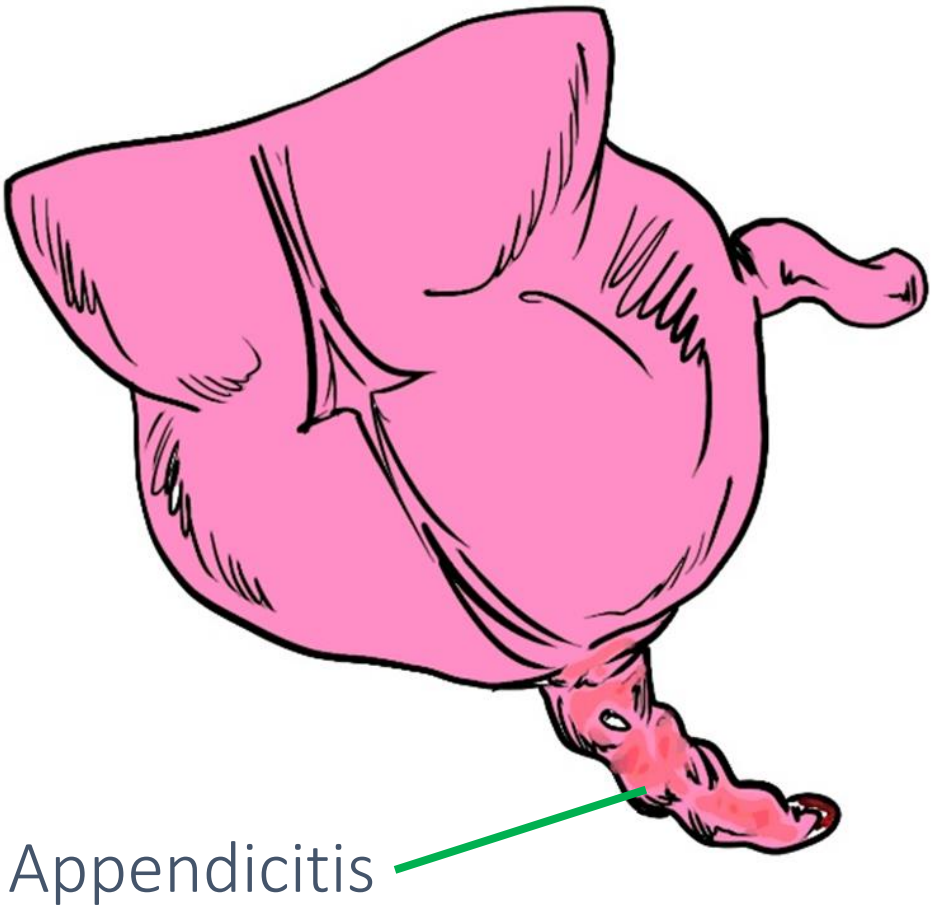
Positions of the Appendix



Appendicitis



Normal Appendicitis



Appendicitis

Microscopic Appearance of an Appendicitis

- Neutrophilic infiltrates in the wall of the appendix
- Congested serosa
- Hyperemia of mucosa

Image from Wikimedia Commons

Meet Your Patient

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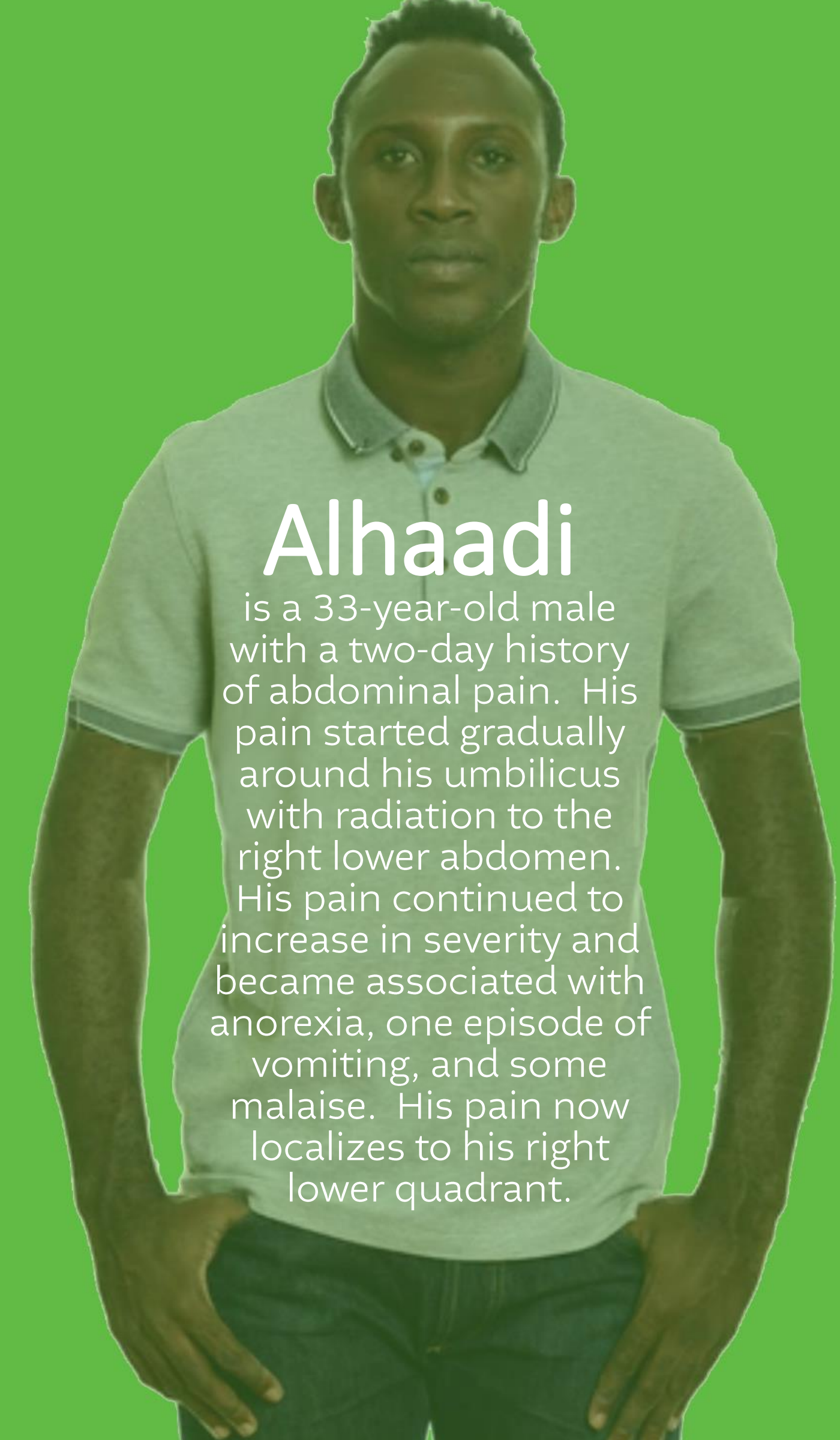


Alhaadi

is a 33-year-old male with a two-day history of abdominal pain. His pain started gradually around his umbilicus with radiation to the right lower abdomen. His pain continued to increase in severity and became associated with anorexia, one episode of vomiting, and some malaise. His pain now localizes to his right lower quadrant.

Past History

Alhaadi denies any previous medical or surgical histories or any drug allergies and is otherwise healthy. He leads a relatively healthy lifestyle. He does not smoke or drink alcohol. He has not travelled outside the country recently and has not had any recent change in diet. He denies any sick contacts and has no family history of cancer or inflammatory bowel disease.

Other Questions You Want to Ask

Select the most important other questions you would like to ask this patient.

- Have you had a fever?
- When did you last eat or drink anything?
- When was your last bowel movement?
- Have you had any diarrhea?
- Have you had any other flu-like symptoms (headache, muscle aches, or sore throat)?
- Have you had any nausea or vomiting?

In the feedback you receive, your answers will be rated 1-5 with 5 being the best choice.

Have you had a fever?

Patient Answer

I felt like I had a little fever over the last couple of days, but I have not had any chills.

When did you last eat or drink anything?

Patient Answer

Not for a couple of days. I haven't felt like eating anything.

When was your last bowel movement?

Patient Answer

I think it was 2-3 days ago.

Have you had any diarrhea?

Patient Answer

No, I have not had any diarrhea.

Have you had any other flu-like symptoms (headache, muscle aches, or sore throat)?

Patient Answer

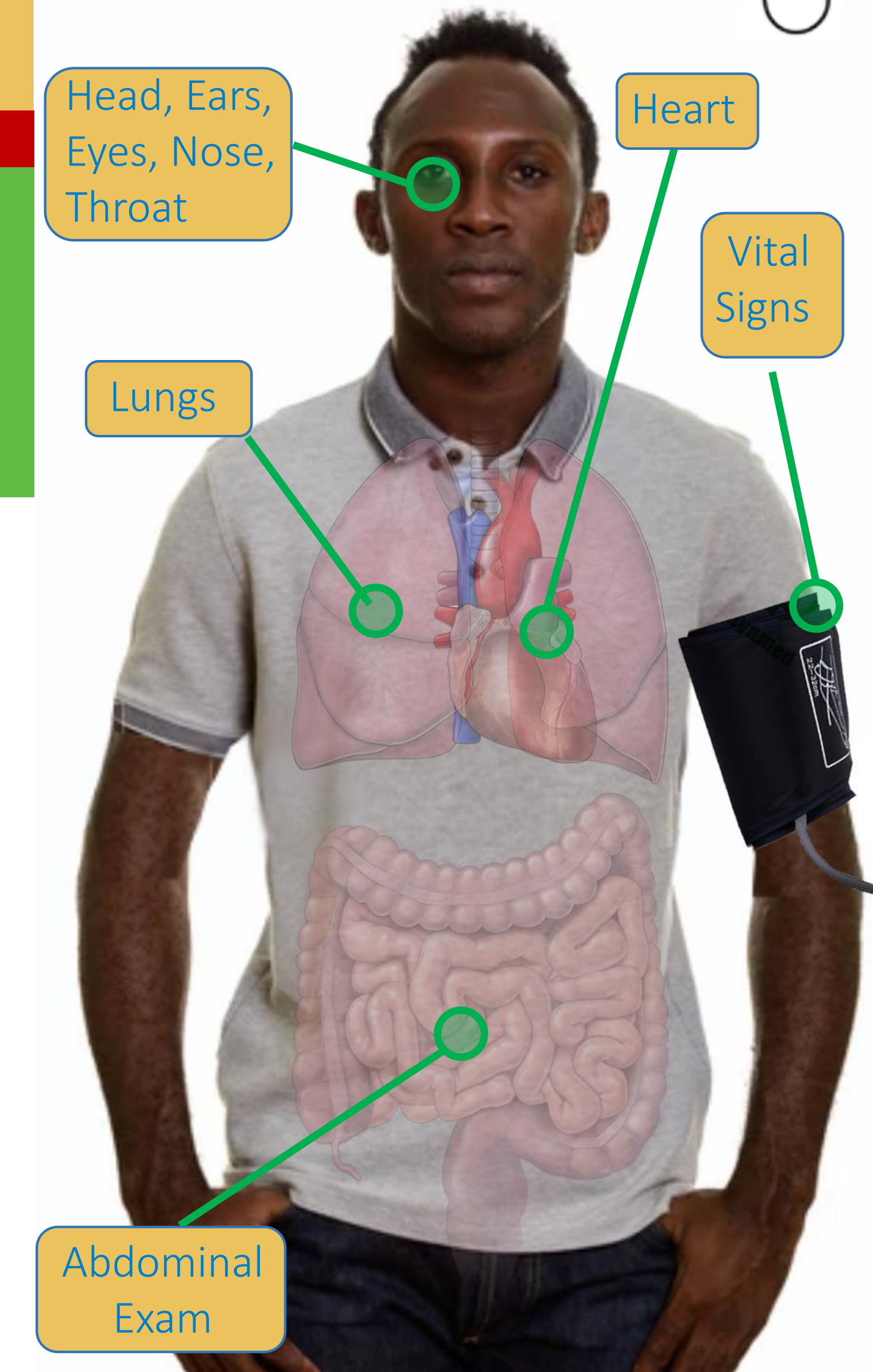
I am not having any symptoms like that. I have not been sick for over a year.

Have you had any nausea or vomiting?

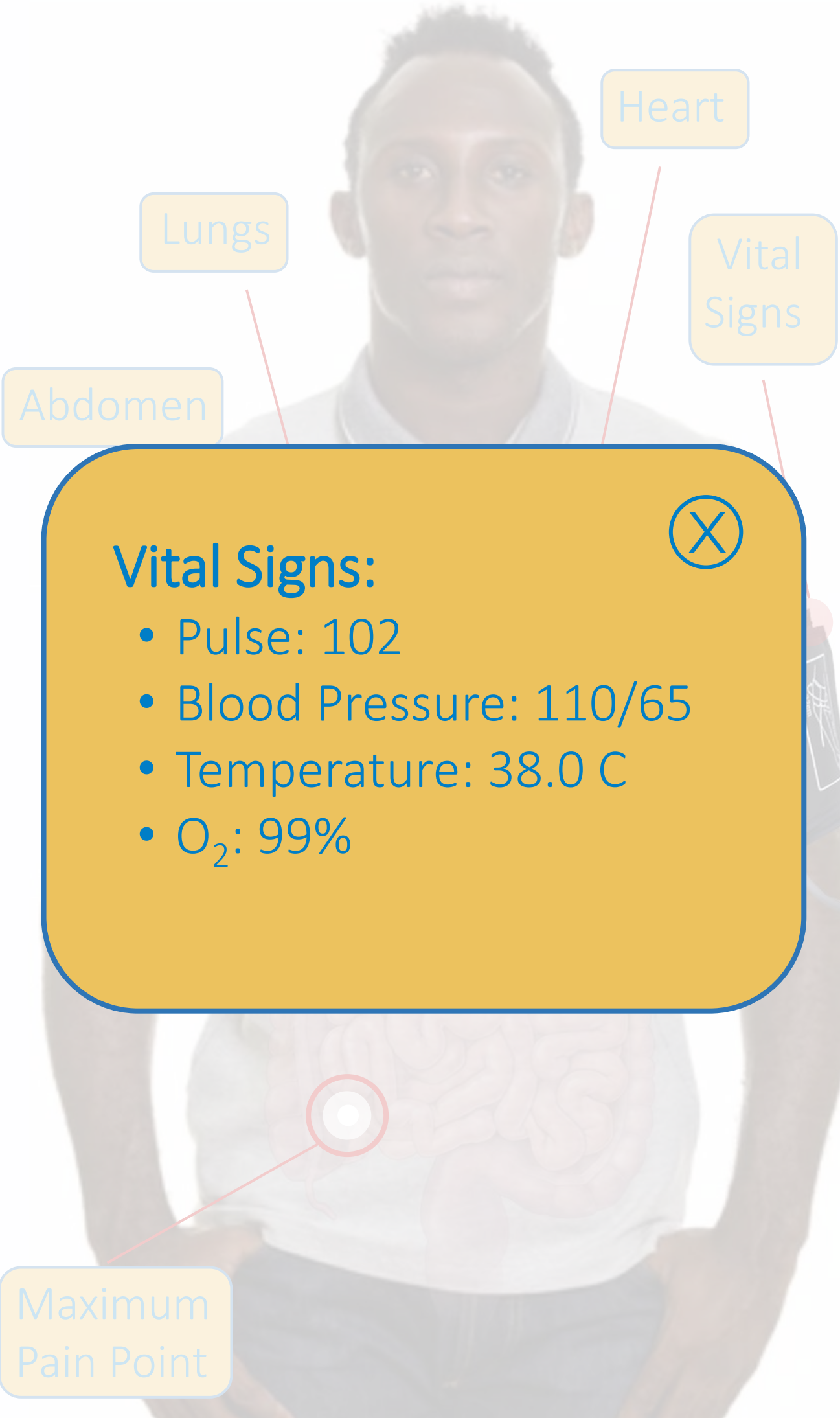
Patient Answer

I have mild nausea and vomited once today.

Physical Exam



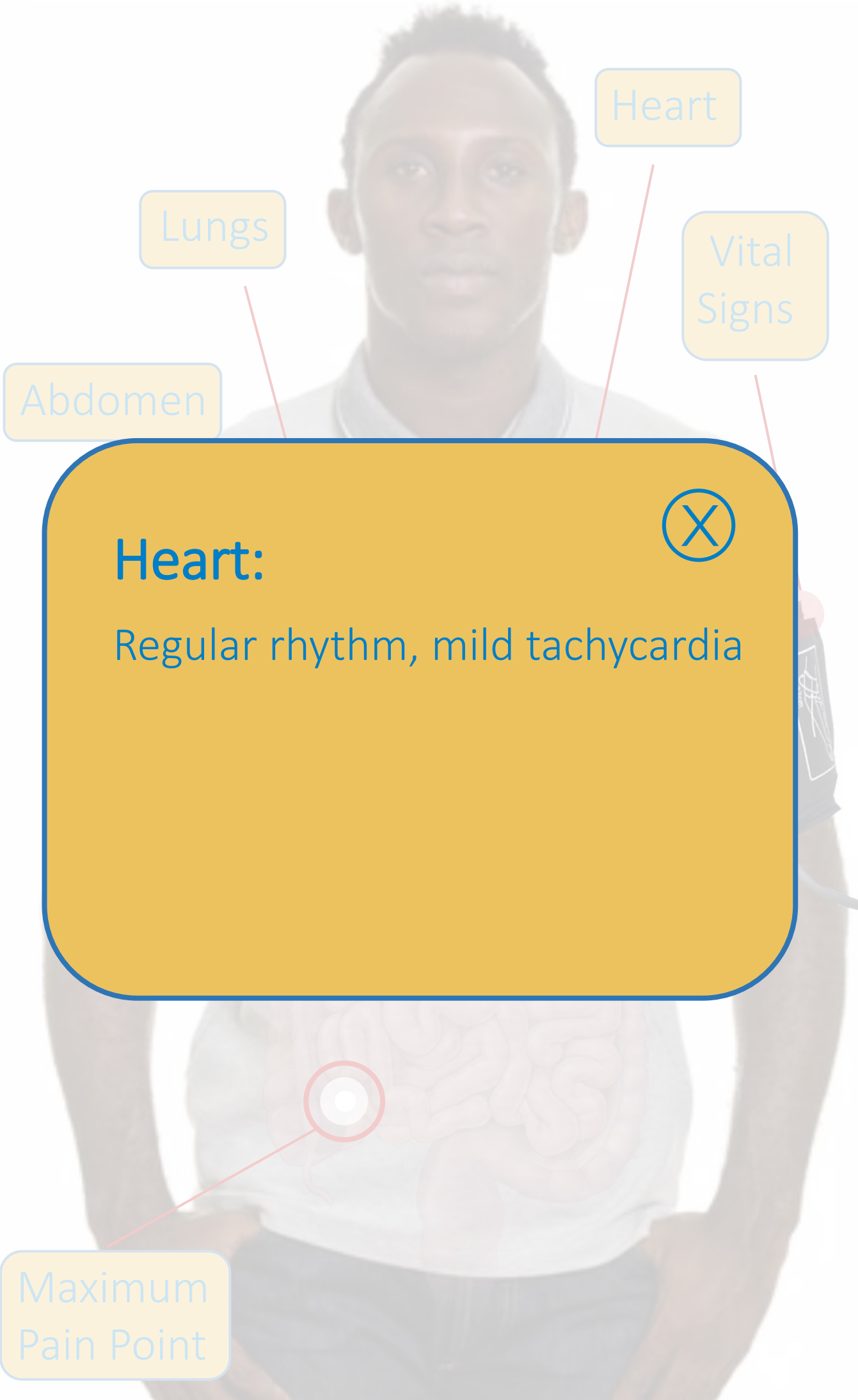
Physical Exam



Vital Signs:

- Pulse: 102
- Blood Pressure: 110/65
- Temperature: 38.0 C
- O_2: 99%

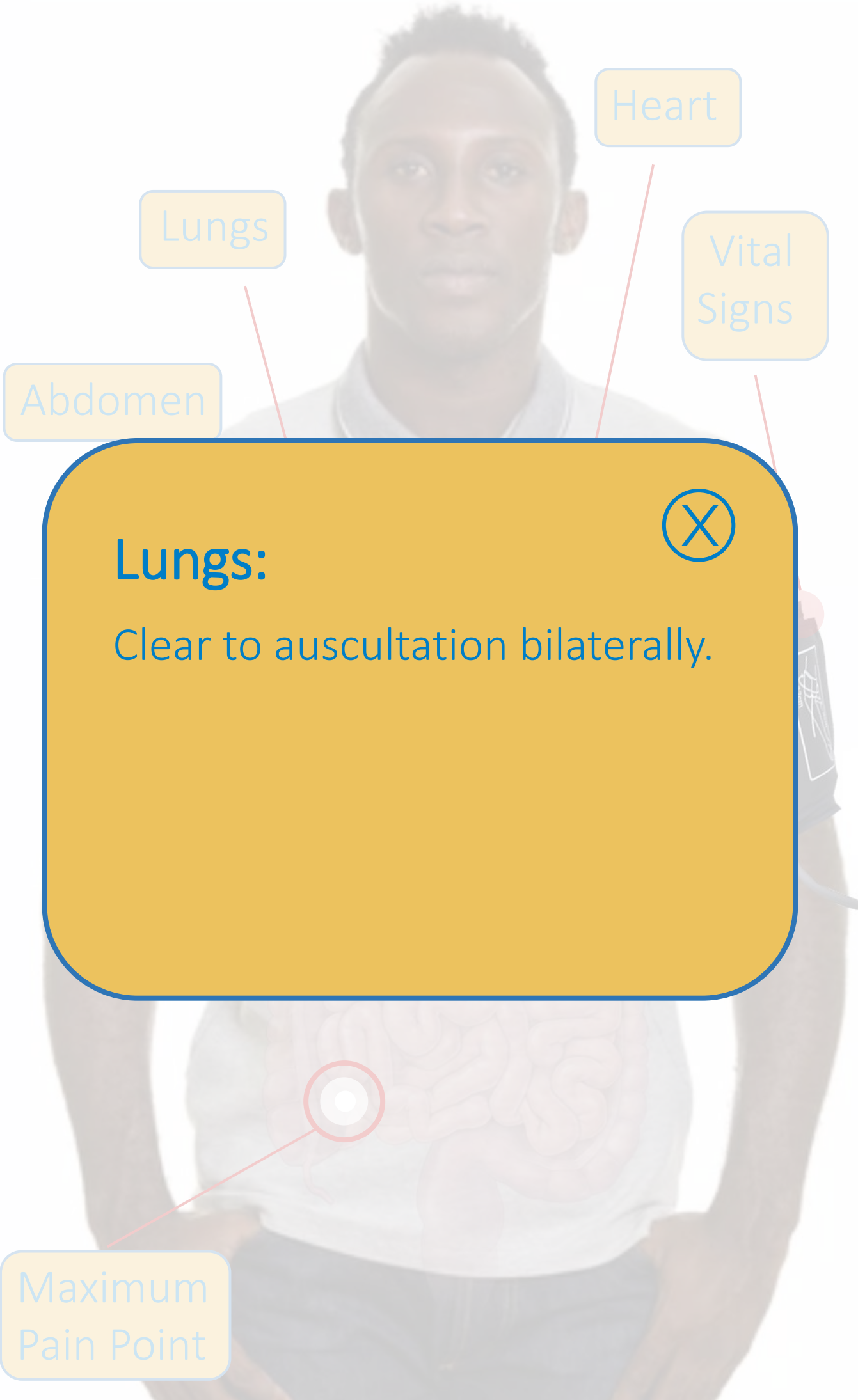
Physical Exam



Heart:

Regular rhythm, mild tachycardia

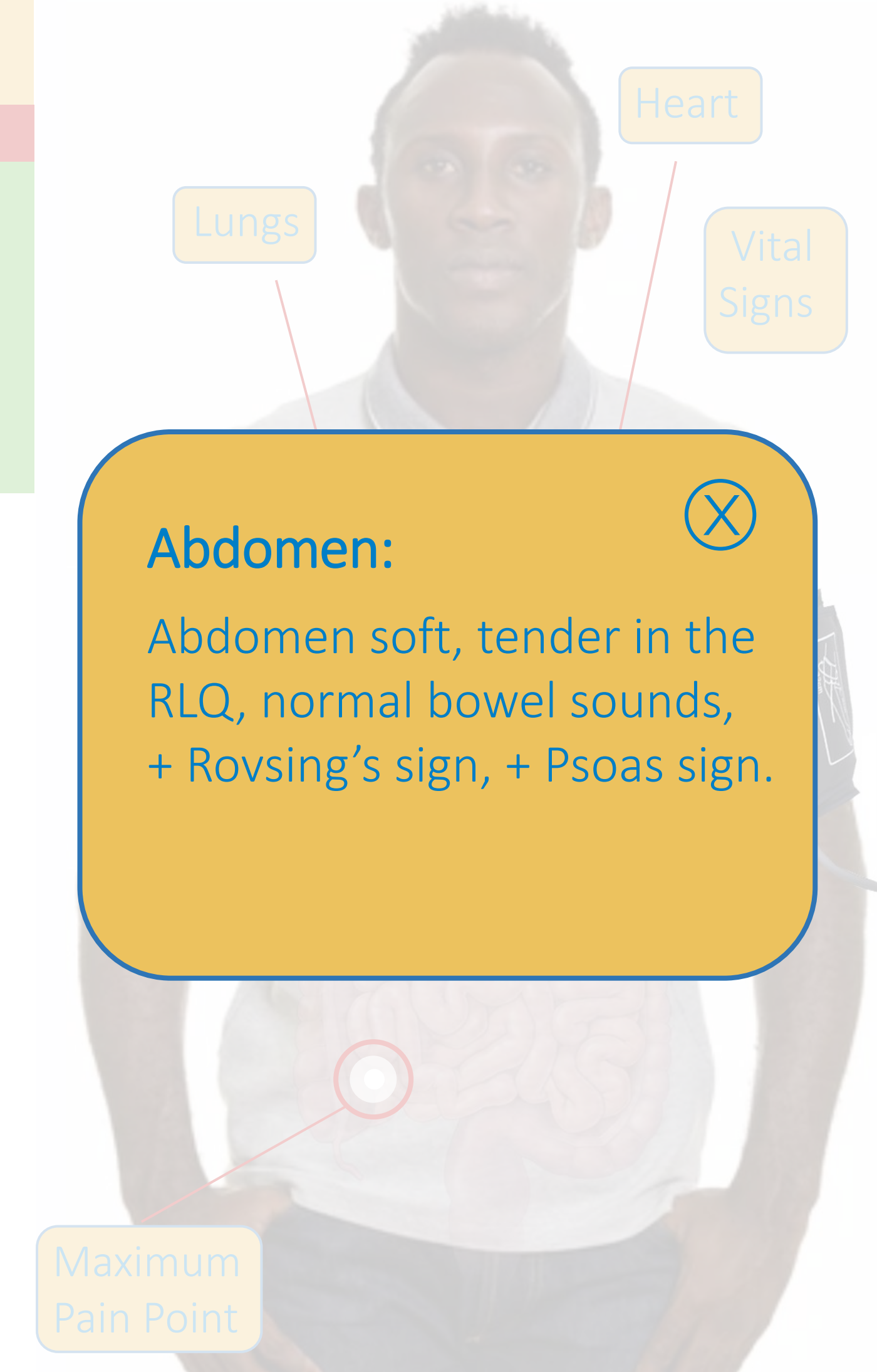
Physical Exam



Lungs:

Clear to auscultation bilaterally.

Physical Exam



Abdomen:

Abdomen soft, tender in the RLQ, normal bowel sounds, + Rovsing's sign, + Psoas sign.

Physical Examination Maneuvers

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Physical Maneuvers

There are several physical examination maneuvers that are helpful in diagnosing an appendicitis. Please review the videos of each maneuver by clicking on the arrows below.

Blumberg's Sign

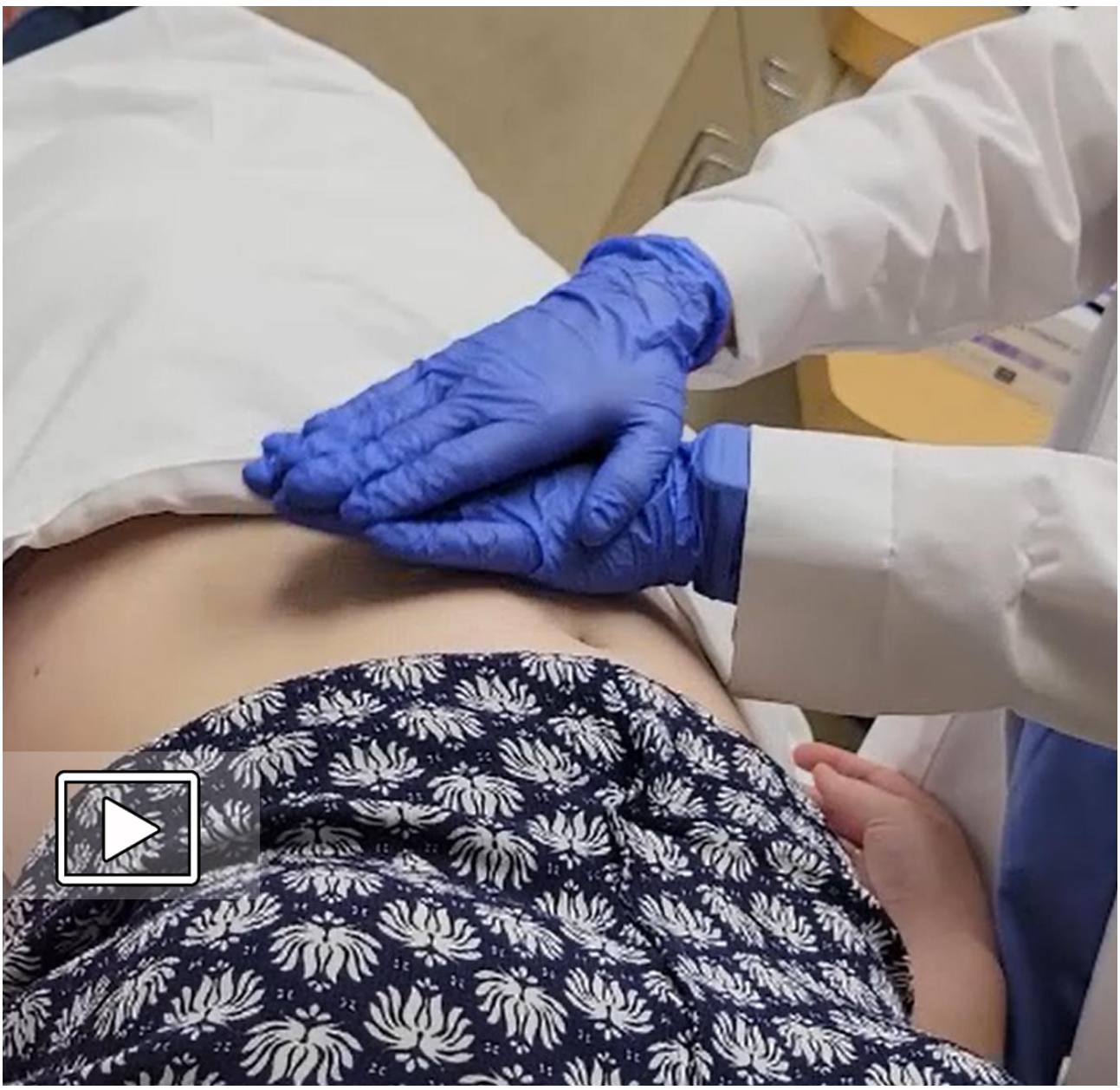
Rovsing's Sign

Obturator Sign

Psoas Sign

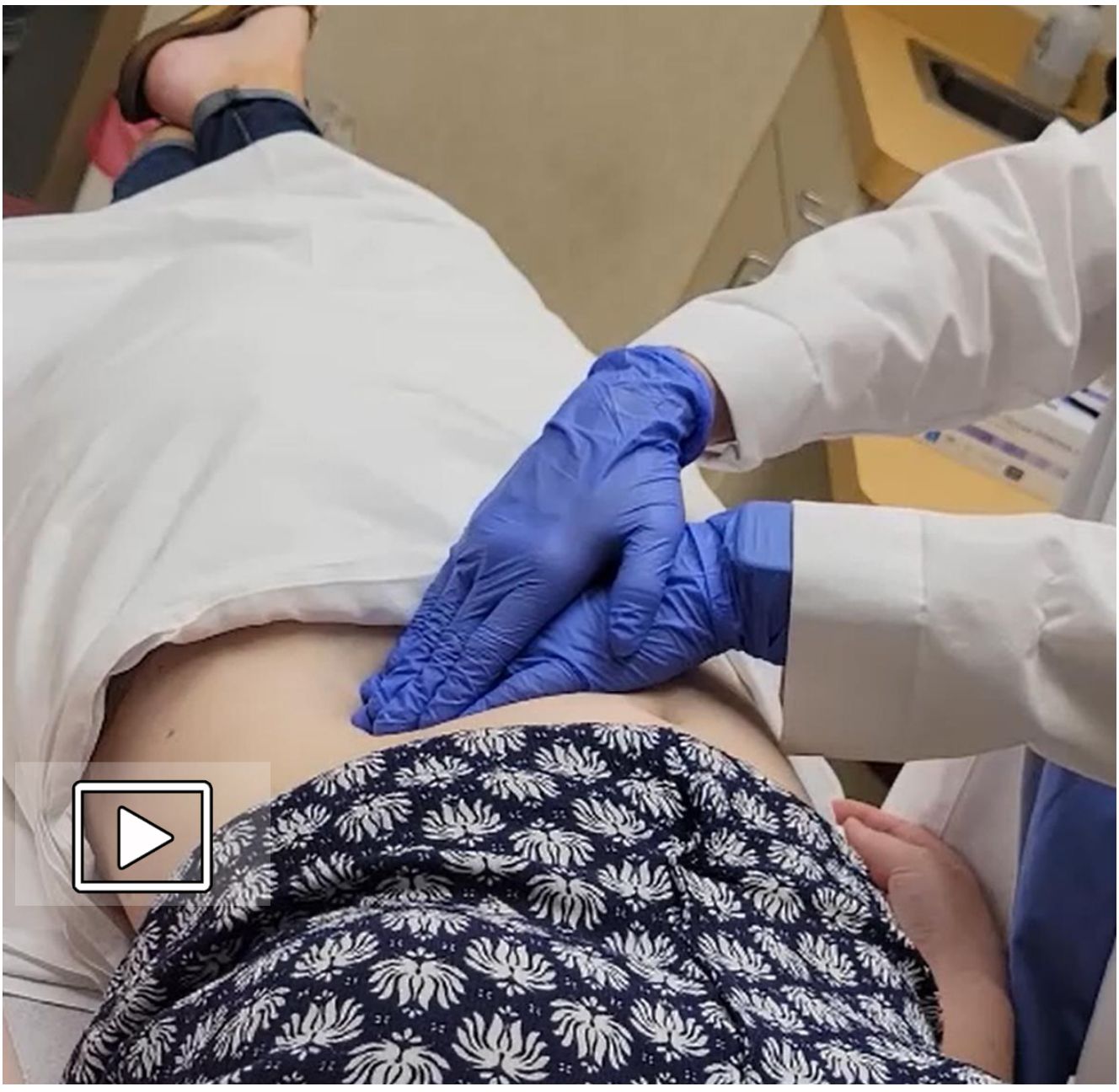
Blumberg's Sign

Deep abdominal palpation followed by sudden release of pressure causes severe pain indicating peritonitis.



Rovsing's Sign

Pain in the right lower quadrant when pressure is applied in the left lower quadrant



Obturator Sign

Pain with passive rotation of the flexed right hip, which commonly presents in patients with a pelvic appendicitis

Psoas Sign

Pain on extension of the right hip (commonly presents in patients with retrocecal appendix)

Differential Diagnosis

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Differential Diagnosis

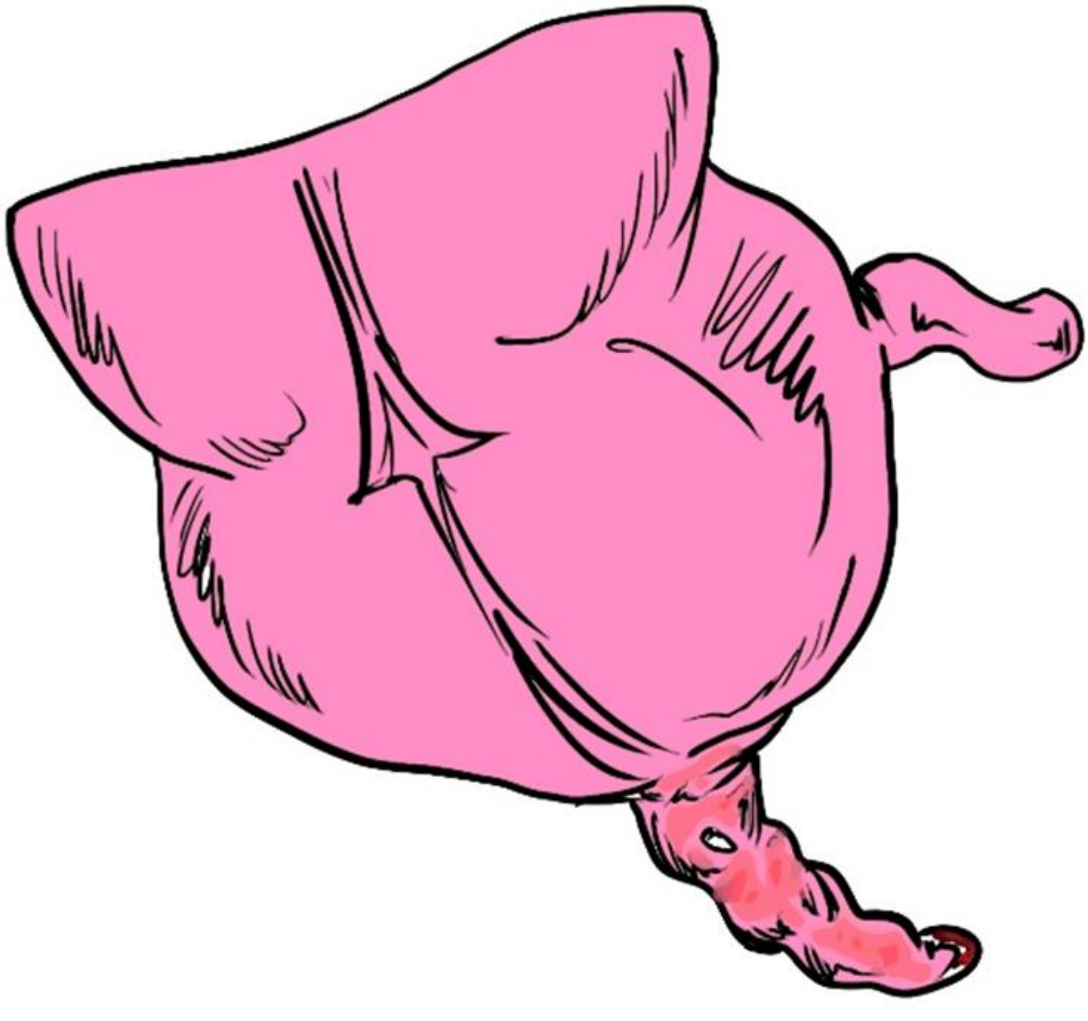
Select the **most likely** differential diagnosis for this patient first and then explore other options.

- Appendicitis
- Pyelonephritis
- Diverticulitis
- Gastroenteritis
- Gastrointestinal Tuberculosis
- Inflammatory Bowel Disease
- Typhoid Ulcers

Your answers will be rated 1-5 with 5 being the best choice.

Appendicitis (5)

This is the most likely diagnosis since his pain started gradually around his umbilicus, the pain continued to increase in severity, and is now localizes to his right lower quadrant.



VIRTUAL EXPERT

Appendicitis (5)

This is the most likely diagnosis since his pain started gradually around his umbilicus, the pain continued to increase in severity, and is now localizes to his right lower quadrant.

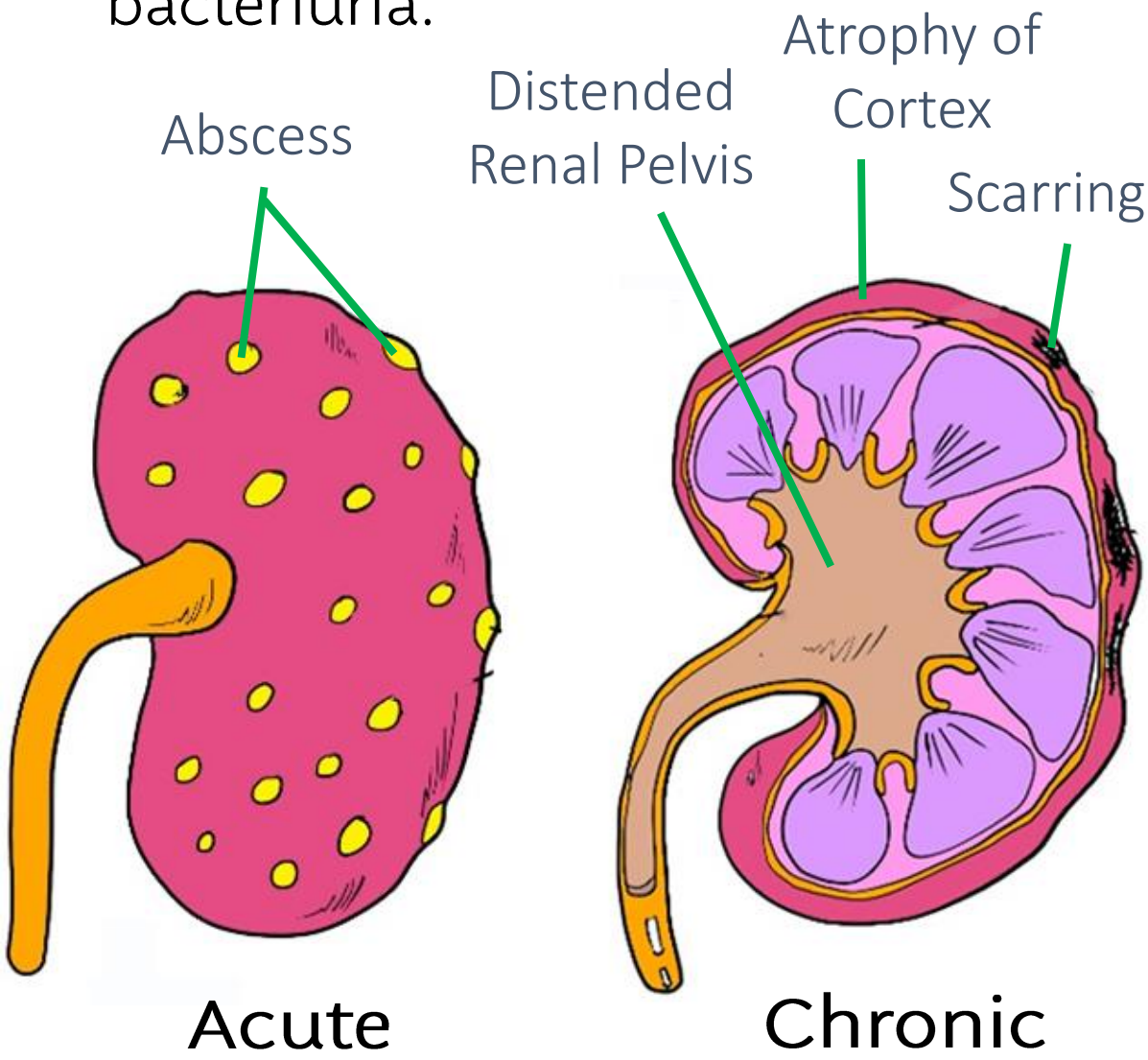
Appendicitis develops after the opening of the appendix is obstructed with mucus, swelling, inflammation or fecalith. The pain is initially poorly localized but then localizes to the RLQ when the inflammation directly involves the parietal peritoneum.

VIRTUAL EXPERT

Pyelonephritis (3)

(Ascending Urinary Tract Infection)

Patients often have generalized abdominal pain with persistent fever and chills. Unlike appendicitis, pyelonephritis presents more commonly in woman due to the shorter urethra and the urine analysis would demonstrate pyuria and bacteriuria.



Pyelonephritis (3)

(Ascending Urinary Tract Infection)

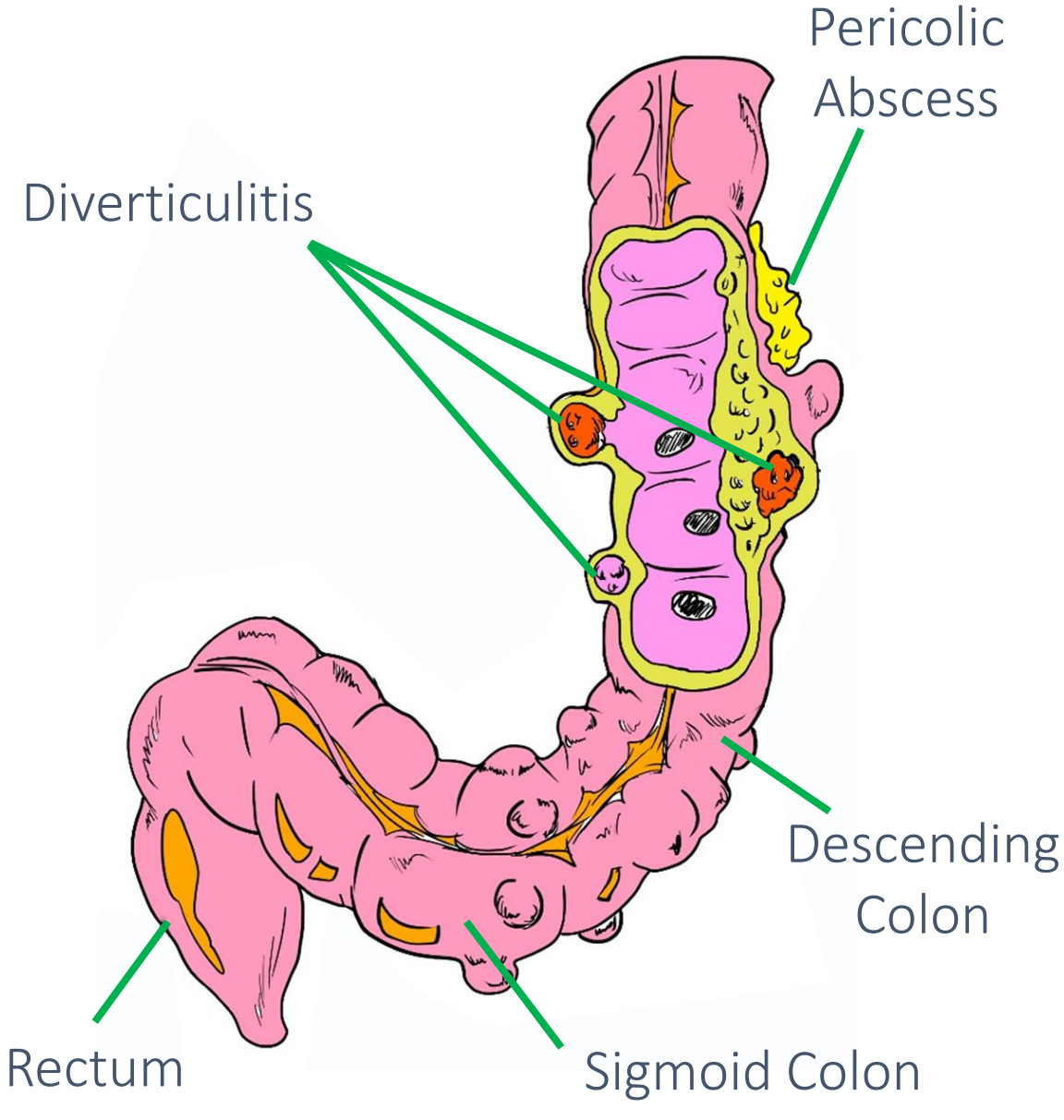
Patients often have generalized abdominal pain with persistent fever and chills.

Pyelonephritis in an ascending infection of the upper urinary tract, specifically the renal parenchyma and renal pelvis. Pyelonephritis can be acute or chronic. If not treated it can lead to sepsis and renal abscesses and may cause secondary hypertension and renal failure.

VIRTUAL EXPERT

Diverticulitis (4)

Similar to appendicitis, the labs are nonspecific and patients may have rebound and guarding. However, diverticulitis occurs most off in the sigmoid colon and as such presents with left sided abdominal pain.



VIRTUAL EXPERT

Diverticulitis (4)

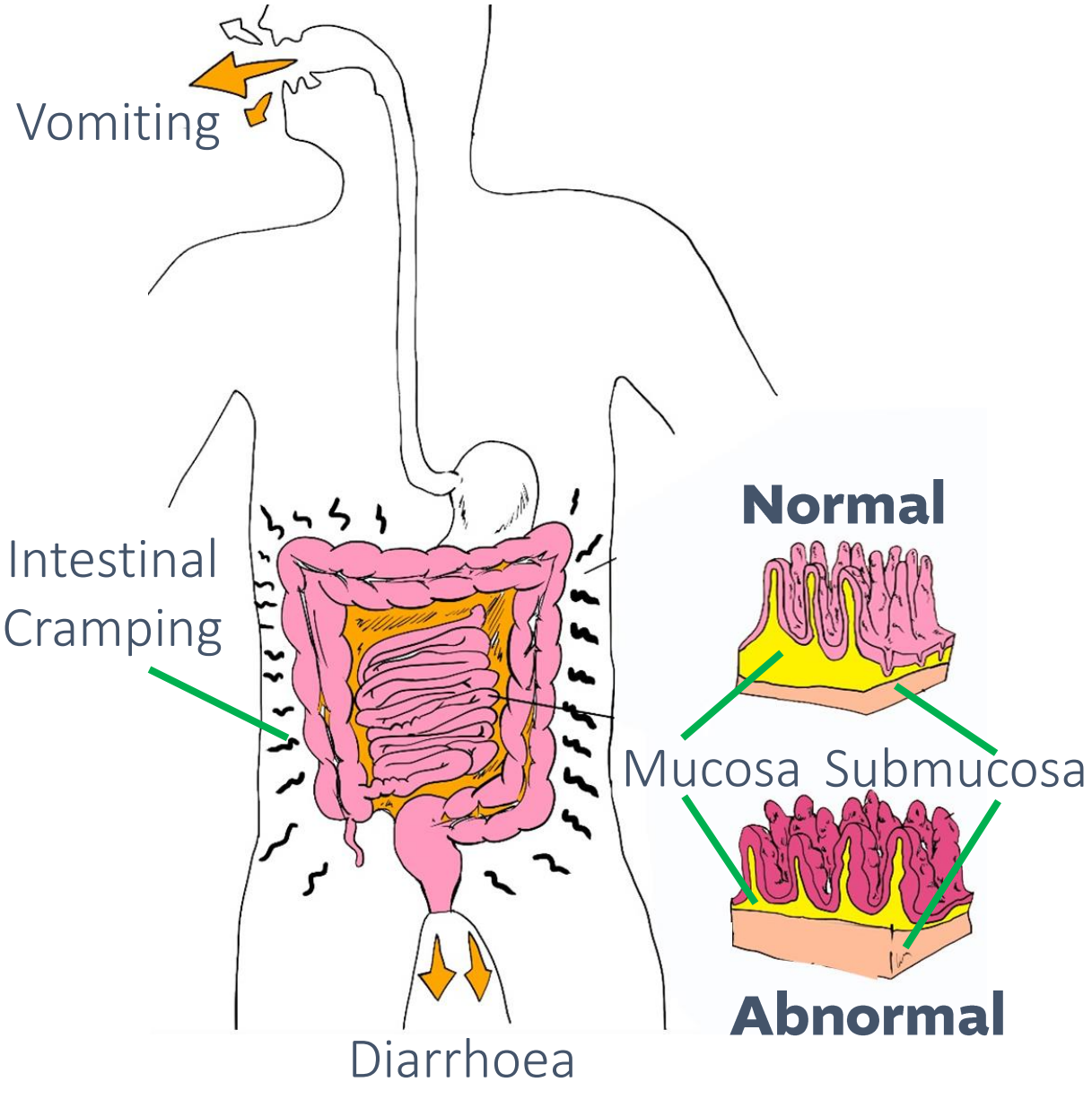
Similar to appendicitis, the labs are non-specific and patient may have rebound and guarding.

Diverticulitis is an inflammation of an outpouching of the sigmoid colon that often presents with left lower quadrant pain and fever. However, people of Asian and African descent have redundant sigmoid colons and may present with right lower quadrant pain.

VIRTUAL EXPERT

Gastroenteritis (4)

This patient presented with abdominal pain, vomiting and anorexia, which is consistent with gastroenteritis. With gastroenteritis, however, the patient's contacts and diet become important. Patients typically are exposed to a sick contact prior to developing symptoms.



VIRTUAL EXPERT

Gastroenteritis (4)

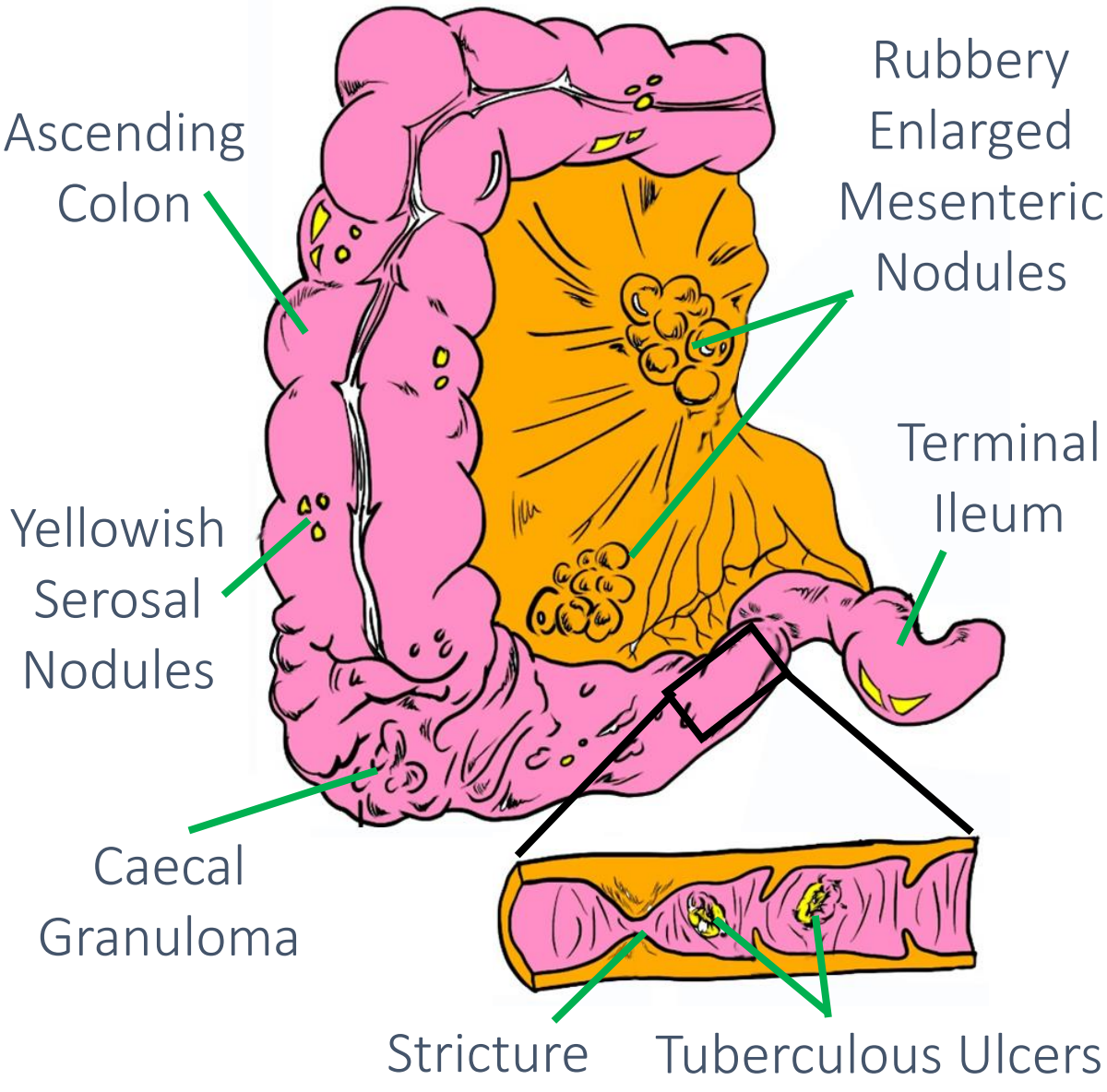
This patient presented with abdominal pain, vomiting and anorexia, which is consistent with gastroenteritis. Unlike appendicitis, the patient's contacts and diet become important. Patients typically are exposed to a sick contact prior to

Gastroenteritis, also known as infectious diarrhea is inflammation of the gastrointestinal tract caused most commonly by viruses, but can also be due to bacteria, parasites and fungus. Patients typically present with generalized cramping, abdominal pain, diarrhoea, vomiting and anorexia.

VIRTUAL EXPERT

Gastrointestinal Tuberculosis (2)

Patients with gastrointestinal tuberculosis may have a subacute presentation with generalized abdominal pain, which at times can mimic acute appendicitis. This patient did not have hepatosplenomegaly, weight loss, or lymphadenopathy making it less likely.



Gastrointestinal Tuberculosis (2)

Patients with gastrointestinal tuberculosis may have a subacute

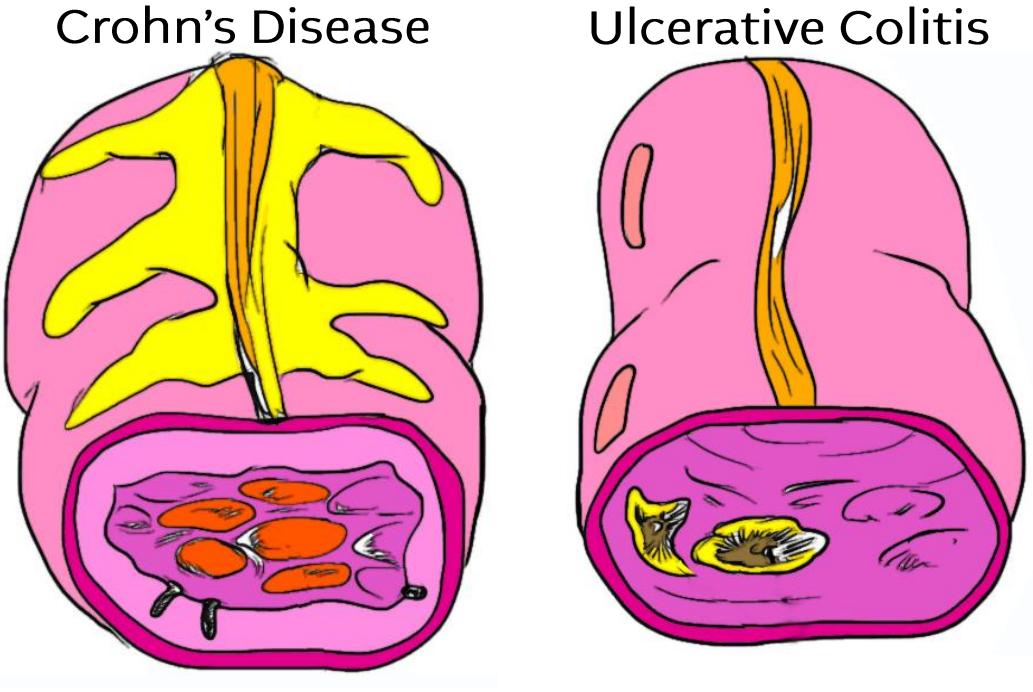
Gastrointestinal Tuberculosis is a type of extrapulmonary tuberculosis that will often have pulmonary symptoms, but rarely may only have abdominal symptoms. It accounts for 1-3% of the tuberculosis cases worldwide. Patients present with gastroenteritis symptoms with weight loss, hepatosplenomegaly, or lymphadenopathy. If surgical intervention is necessary, a right lower quadrant incision is NOT recommended.

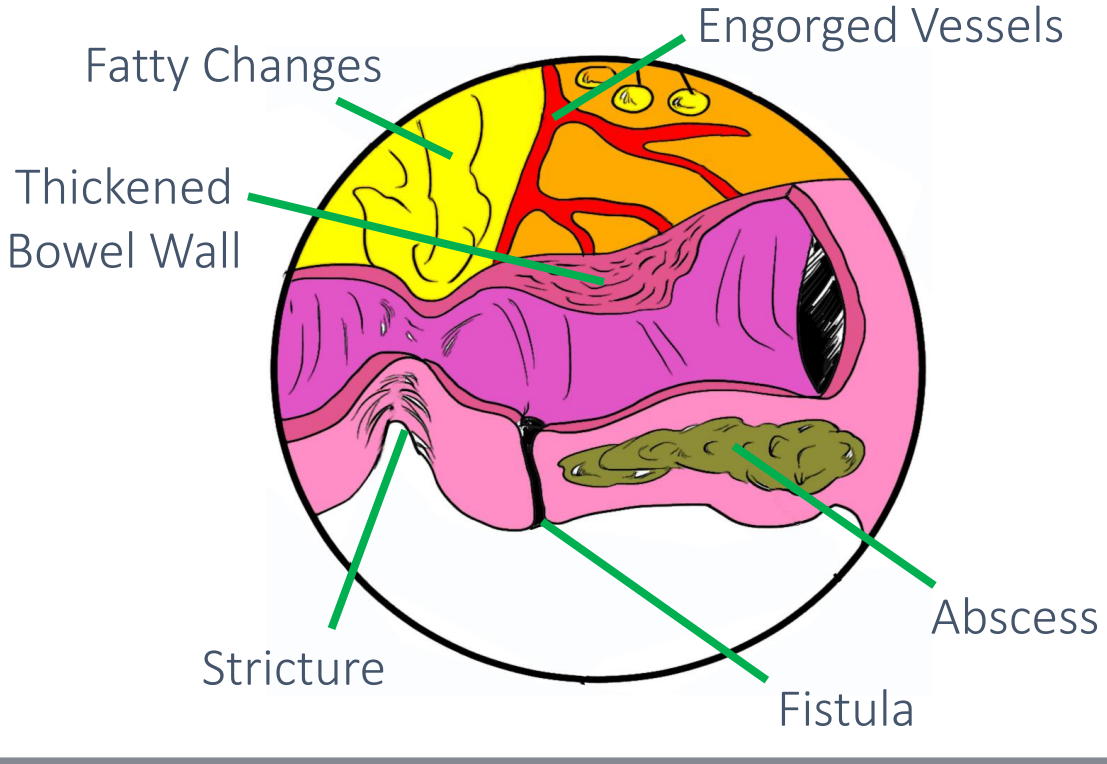
Stricture Tub culous Ulcers

VIRTUAL EXPERT

Inflammatory Bowel Disease (3)

This patient had abdominal pain, but did not have any other common features of inflammatory bowel disease including, diarrhoea, rectal bleeding, and weight loss.





VIRTUAL EXPERT

Inflammatory Bowel Disease (3)

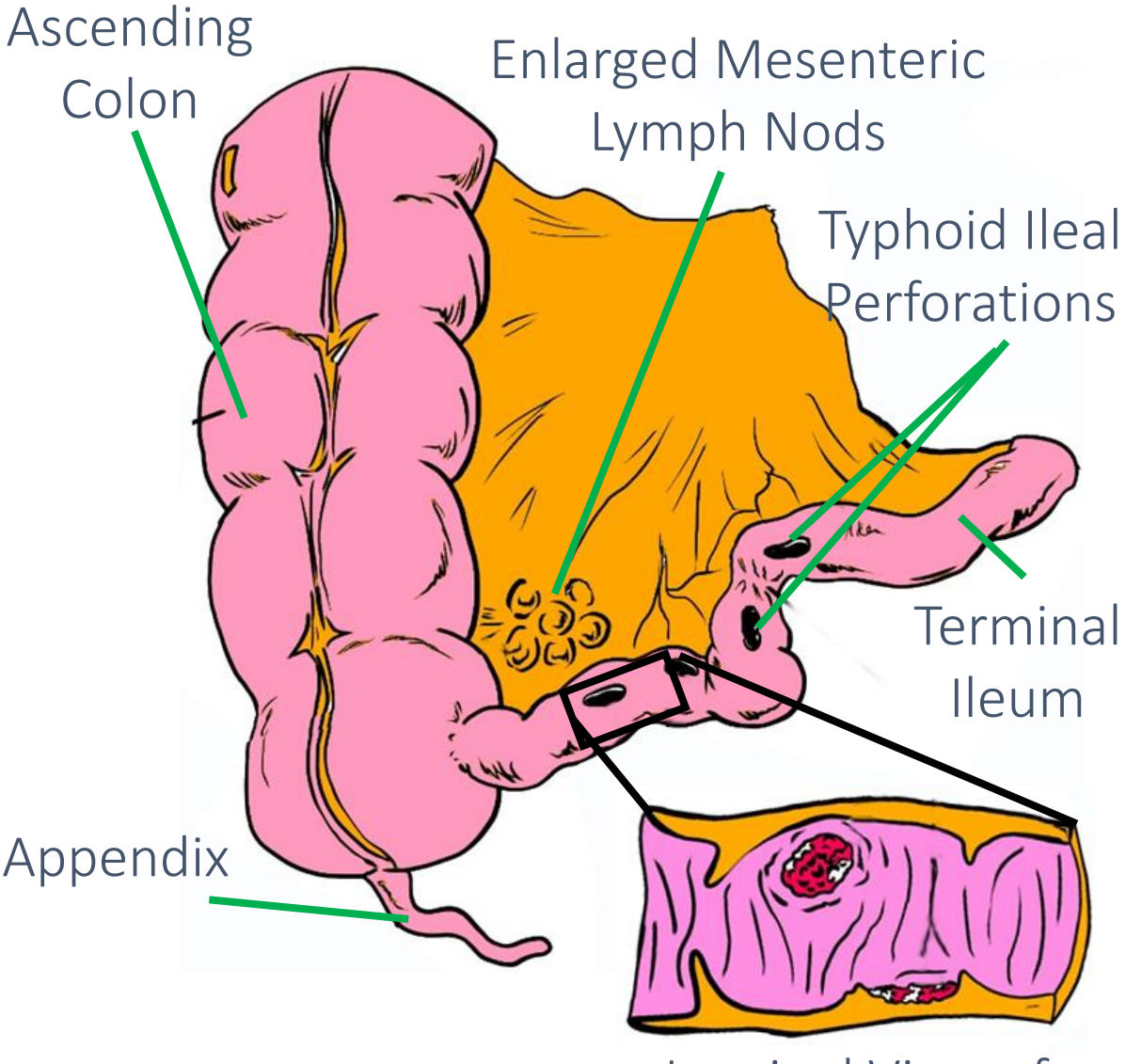
This patient had abdominal

The principal types of inflammatory bowel disease are Crohn's disease (affecting the small intestine and large intestine, as well as the mouth, esophagus, stomach and the anus) and ulcerative colitis (primarily affecting the colon and rectum). Symptoms of Inflammatory bowel disease include, abdominal pain, diarrhea, rectal bleeding, severe abdominal cramps and weight loss.

VIRTUAL EXPERT

Typhoid Ulcers (2)

Typhoid ulcers can cause abdominal pain, high fevers, diarrhoea, and vomiting. Unlike appendicitis, patients present with a delayed peritoneal response. Be mindful when you approach a patient with possible perforation because they may have more than one.



Luminal View of Typhoid Ulcers

VIRTUAL EXPERT

Typhoid Ulcers (2)

Typhoid ulcers can cause abdominal pain, high fevers, diarrhoea, and vomiting. Unlike appendicitis,

Typhoid is a bacterial infection caused by the *Salmonella* serotype Typhi bacteria. It is spread by eating food or drinking water contaminated with the feces from an infected person. Symptoms include high fever, diarrhoea and vomiting. One in ten patients may have an urgent complication including perforation of intestinal ulcers. If surgical intervention is necessary, a right lower quadrant incision is NOT recommended.

Typhoid Ulcers

VIRTUAL EXPERT

Differential Diagnosis for Female Patient

Several additional diagnoses should be considered in the differential diagnosis for lower abdominal pain in the female patient, including:

- Ectopic Pregnancy
- Ovarian Cyst (Haemorrhagic)
- Ovarian Torsion
- Pelvic Inflammatory Disease

Click on the green button below to explore the additional diagnoses in the female patient.

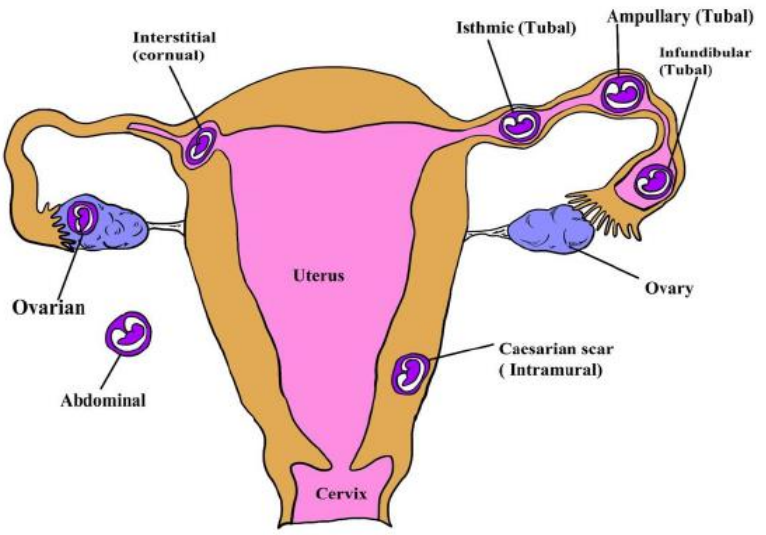
Differential for Female Patients

This will be a scrolling PDF in the app - only part of it is shown here.

Additional Diagnoses in the Differential for Females with Right Lower Abdominal Pain

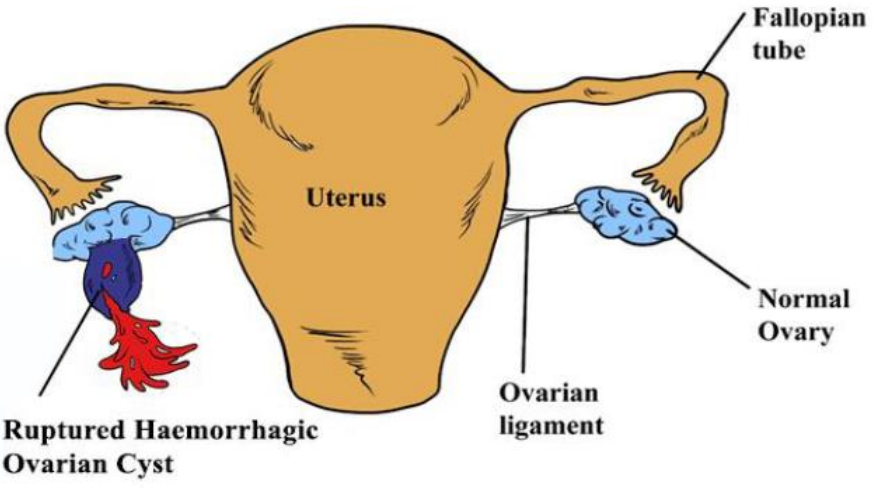
Ectopic Pregnancy

- When a fertilized egg grows outside of the uterus. With 9 out of 10 times, the fertilized egg is within the fallopian tube.
- This can be challenging to differentiate from appendicitis. In all female patients of child-bearing age, obtain a pregnancy test. If the patient has a positive pregnancy test, obtain a right lower quadrant ultrasound.



Ovarian Cyst (Haemorrhagic)

Patients with a haemorrhagic ovarian cyst will present with abrupt lower abdominal or pelvic pain. Menstrual history is essential to understand the timeline. Unlike appendicitis, the treatment for rupture haemorrhagic ovarian cyst is supportive.



Ovarian Torsion

Ovarian torsion results from twisting of the ovary on the supporting ligaments. Patient typically present

Labs and Diagnostic Tests

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Labs & Diagnostic Tests

Select the most appropriate labs and diagnostic tests for this patient first and then explore other options.

- Alvarado Score (Calculate)
- Chemistry
- Hemogram
- Urine Analysis
- Ultrasound Imaging (If Available)
- CT Imaging (If Available)

In the feedback you receive, your answers will be rated 1-5 with 5 being the best choice.

Alvarado Score (5)

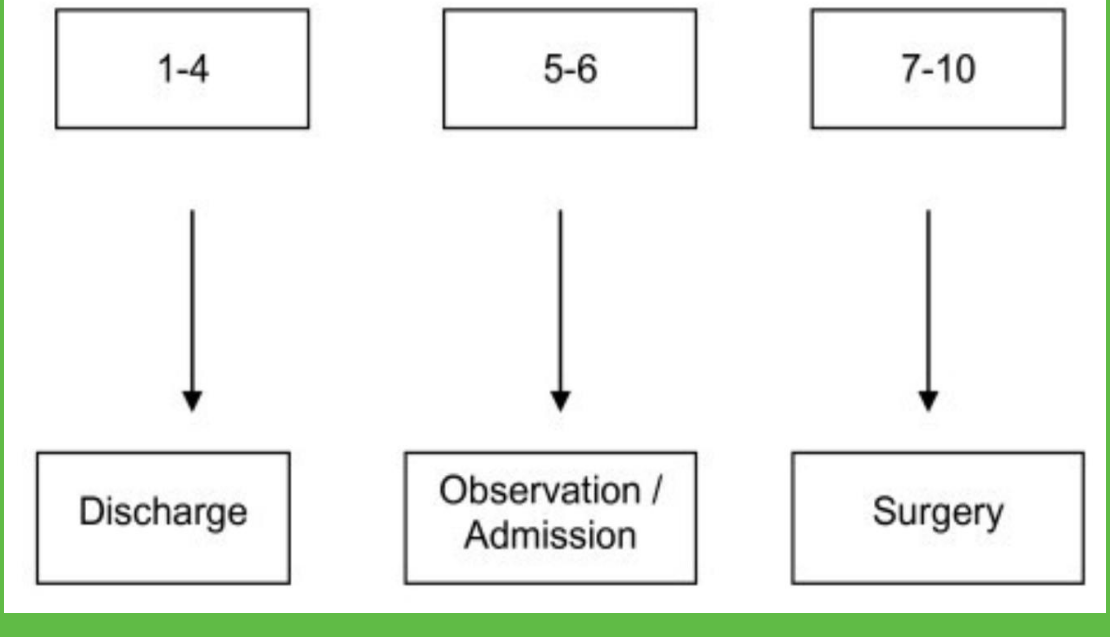
Test Results

Alvarado score	
Feature	**Score**
Migration of pain	1
Anorexia	1
Nausea	1
Tenderness in right lower quadrant	2
Rebound pain	1
Elevated temperature	1
Leucocytosis	2
Shift of white blood cell count to the left	1
Total	**10**

The Alvarado score has high sensitivities (>93%) in adult men with scores >7; however low sensitivities (67%) and high false positives in female populations. A modified score has been developed for resource limited settings.

Predicted number of patients with appendicitis:

- Alvarado score 1-4 = 30%
- Alvarado score 5-6 = 66%
- Alvarado score 7-10 = 93%



VIRTUAL EXPERT

Chemistry (5)

Test Results

A basic metabolic panel will guide your preoperative therapies on your patient. The patient must be adequately hydrated with normal electrolytes to tolerate anaesthesia.

Test	Result	Normal
Sodium	145	136 – 146 mmol/L
Potassium	3.6	3.5 – 5.0 mmol/L
Chloride	102	98 – 106 mmol/L
Bicarbonate	26	24-31 mmol/L
Blood Urea Nitrogen (BUN)	12	6 – 20 mg/dL
Creatinine	1.3	0.70-1.20 mg/dL
Glucose	102	70-99 mg/dL

Chemistry (5)

Test Results

A basic metabolic panel will guide your preoperative therapies on

Most general anaesthetics cause vasodilation so the patient must be well-hydrated to prevent cardiac collapse. Likewise, many general anaesthetics force the extracellular potassium intracellular so the patient must have appropriate electrolytes to prevent cardiac collapse.

VIRTUAL EXPERT

Hemogram (5)

Test Results

The hemogram is an essential lab test for a patient with appendicitis.

Test	Result	Normal
WBC	12,000	3,300-8,700 uL
Haemoglobin	14.0	12.6-16.1 g/dL
Haematocrit	42.1	38-47.7%
Platelets	400,000	147,000-347,000 uL

VIRTUAL EXPERT

Hemogram (5)

Test Results

The hemogram is an essential

The white blood cell (WBC) could be elevated as a sign of infection, but typically does not go above 20,000 with an appendicitis. The platelet count should be elevated as an acute phase reactant. The haemoglobin and haematocrit may be elevated as a sign that the patient may be dehydrated.

VIRTUAL EXPERT

Urine Analysis (5)

Test Results

Because of the localization of pain on physical exam, analysing the patient's urine is important.

Test	Result	Normal
Colour	Amber	Yellow
Specific Gravity	1.05	1.005-1.030
pH	5.5	5.0 – 8.0
Blood	Negative	Negative
Protein	Negative	Negative
Glucose	Negative	Negative
Leukocyte esterase	Negative	Negative
Nitrite	Negative	Negative

Urine Analysis (5)

You should be weary of your diagnosis of appendicitis if you see:

- positive leukocyte esterase or nitrites which would be concerning for an ascending urinary tract infection
- positive blood which would be concerning for kidney stones

In this patient's urine analysis, it appears his specific gravity is high which correlates to the dehydration seen in the chemistry.

VIRTUAL EXPERT

Ultrasound Imaging (5)

Test Results

If you are concerned the patient may not have typical appendicitis, then consider ordering imaging. In some facilities ultrasound and radiologic imaging are more accessible.

Ultrasound Scan: Acute appendicitis.

VIRTUAL EXPERT

Ultrasound Imaging (5)

Test Results

On ultrasound, direct signs of acute appendicitis include:

- Non-compressiblity of the appendix
- Appendix diameter > 6 mm
- Single wall thickness ≥ 3 mm
- Target Sign – hypoechoic fluid-filled lumen with hyperechoic mucosa/submucosa and hypoechoic muscularis layer
- Appendicolith – hyperechoic with posterior shadowing

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4805616/

VIRTUAL EXPERT

CT Imaging (3)

Test Results

If the patient's body habitus is not amenable to ultrasound, consider a computed tomography scan.

CT Scan: Enlarged, inflamed appendix of 1.5 cm (blue arrows) and surrounding fat stranding and edema (red arrow).

CT Imaging (3)

Test Results

If the patient's body habitus is not amenable to ultrasound, consider a computed tomography scan.

On CT, signs of acute appendicitis include:

- Appendix diameter > 6 mm
- Wall thickening > 2 mm
- Visualizing appendicolith, fat stranding, mesenteric lymph nodes or peri-appendiceal fluid

VIRTUAL EXPERT

Appendectomy Overview

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Procedure Introduction

Preop Patient Preparation

Safe Entry Into the Abdomen

Identify the Appendix

Appendectomy

Abdominal Closure

Overview of the Procedure

Take a few minutes to review the steps of the open appendectomy procedure. Each step will be explored in more details in this section.

Open Appendectomy Procedure Steps

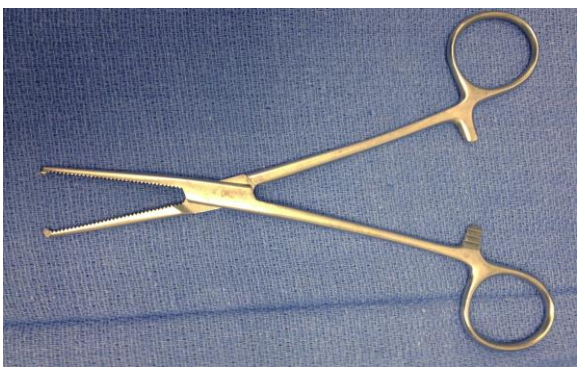
Instruments Needed

Scalpel

Babcock Clamp

Hemostat

Needle Holder

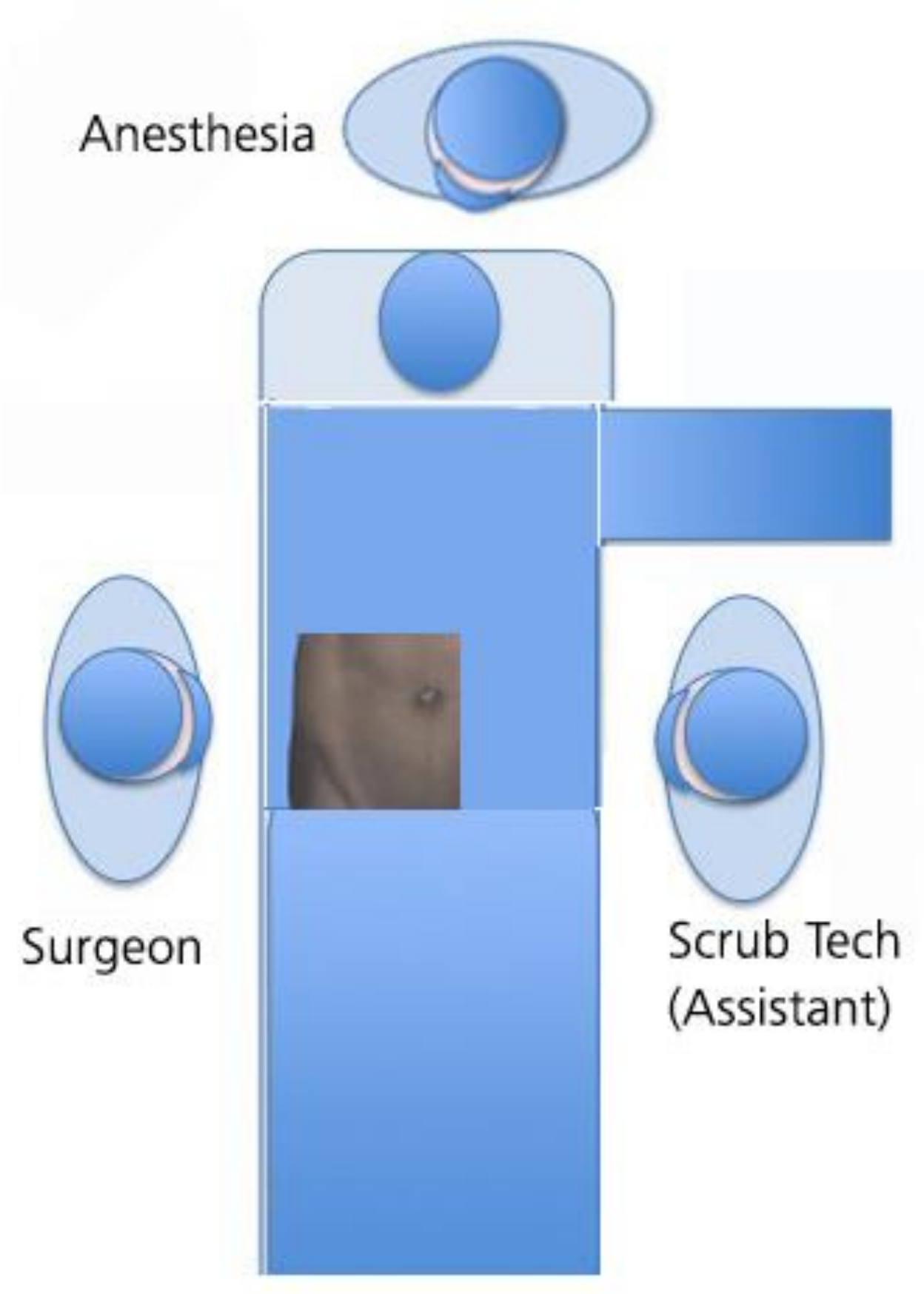


Kocher Clamp

Scissors

Sutures

Room Setup



Preoperative Patient Preparation

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1 | Informed Consent

All patients must give consent for the procedure and declare that they understand it. It should at a minimum include:

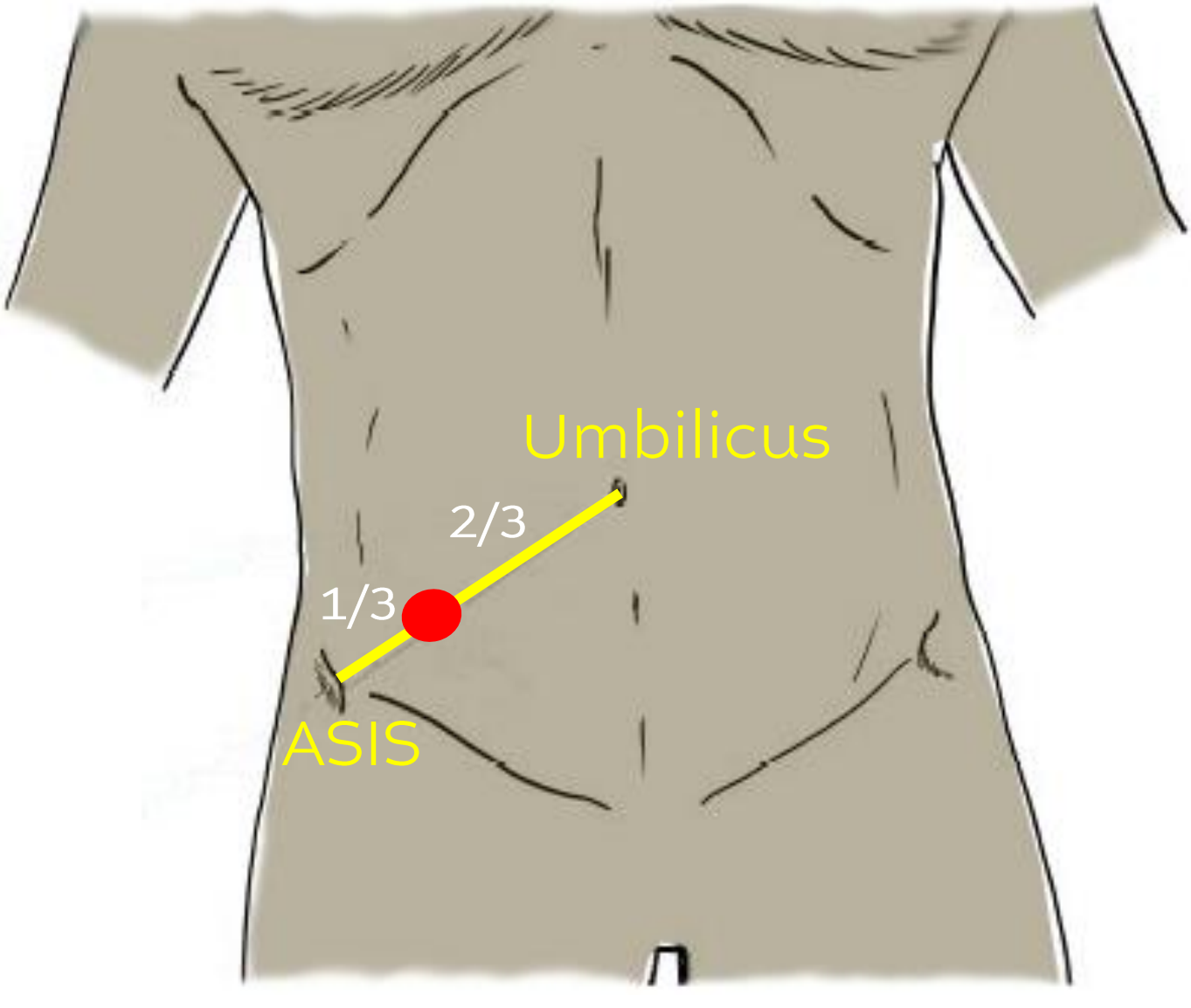
- Name of the surgeon
- Date of the procedure
- Type of procedure
- Risks of the procedure including bleeding, infection, and even death.
- Risks of anaesthesia being administered
- Specimens may be collected and submitted for evaluation
- The patient has the right to consent to or refuse any proposed operation or procedure
- All questions that have been asked by the patient have been answered to his/her satisfaction

2 | Mark Point of Maximum Tenderness

McBurney's point (in red)

- The point that is 1/3rd the distance from the anterior superior iliac spine (ASIS) to the umbilicus

This point roughly corresponds to the most common location of the base of the appendix. Severe tenderness at McBurney's point suggests later stages of an acute appendicitis and increased likelihood of rupture.



WHO Checklist

AMPATH Surgical App

3 WHO Checklist Prior to Anesthesia

The tool is designed to improve surgical safety; it requires that all operating room team members engage and complete safety checks as a group.

Before induction of anaesthesia

(with at least nurse and anaesthetist)

Has the patient confirmed his/her identity, site, procedure, and consent?

- ☐ Yes

Is the site marked?

- ☐ Yes
- ☐ Not applicable

Is the anaesthesia machine and medication check complete?

- ☐ Yes

Is the pulse oximeter on the patient and functioning?

- ☐ Yes

Does the patient have a:

Known allergy?

- ☐ No
- ☐ Yes

Difficult airway or aspiration risk?

- ☐ No
- ☐ Yes, and equipment/assistance available

Risk of >500ml blood loss (7ml/kg in children)?

- ☐ No
- ☐ Yes, and two IVs/central access and fluids planned

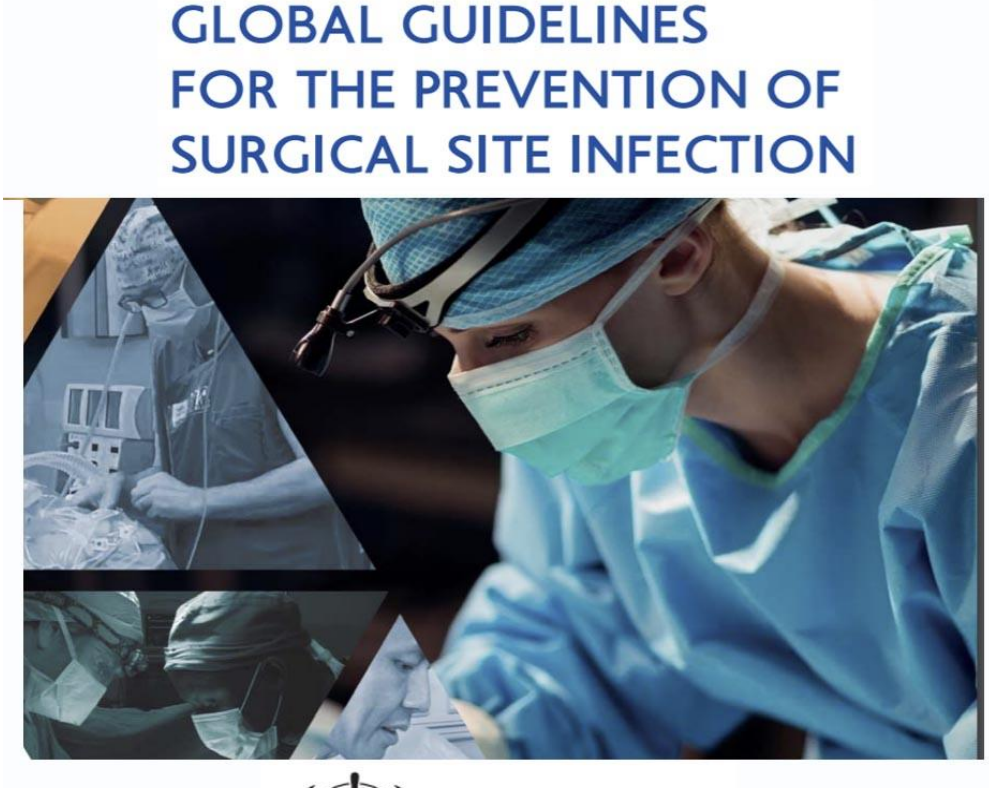
Link to the WHO Checklist

4 Anaesthesia

- General anaesthesia is preferred to promote complete muscle relaxation.
  - If general anaesthesia is not available or the anaesthesia provider is uncomfortable with general anaesthesia, spinal anaesthesia may be used.
  - Consider transferring the patient if you believe the anaesthesia available is not adequate for the procedure.

5 Antibiotics

Before an appendectomy, antibiotics should be dosed within 60 minutes before surgical incision, while considering the half-life of the antibiotic.

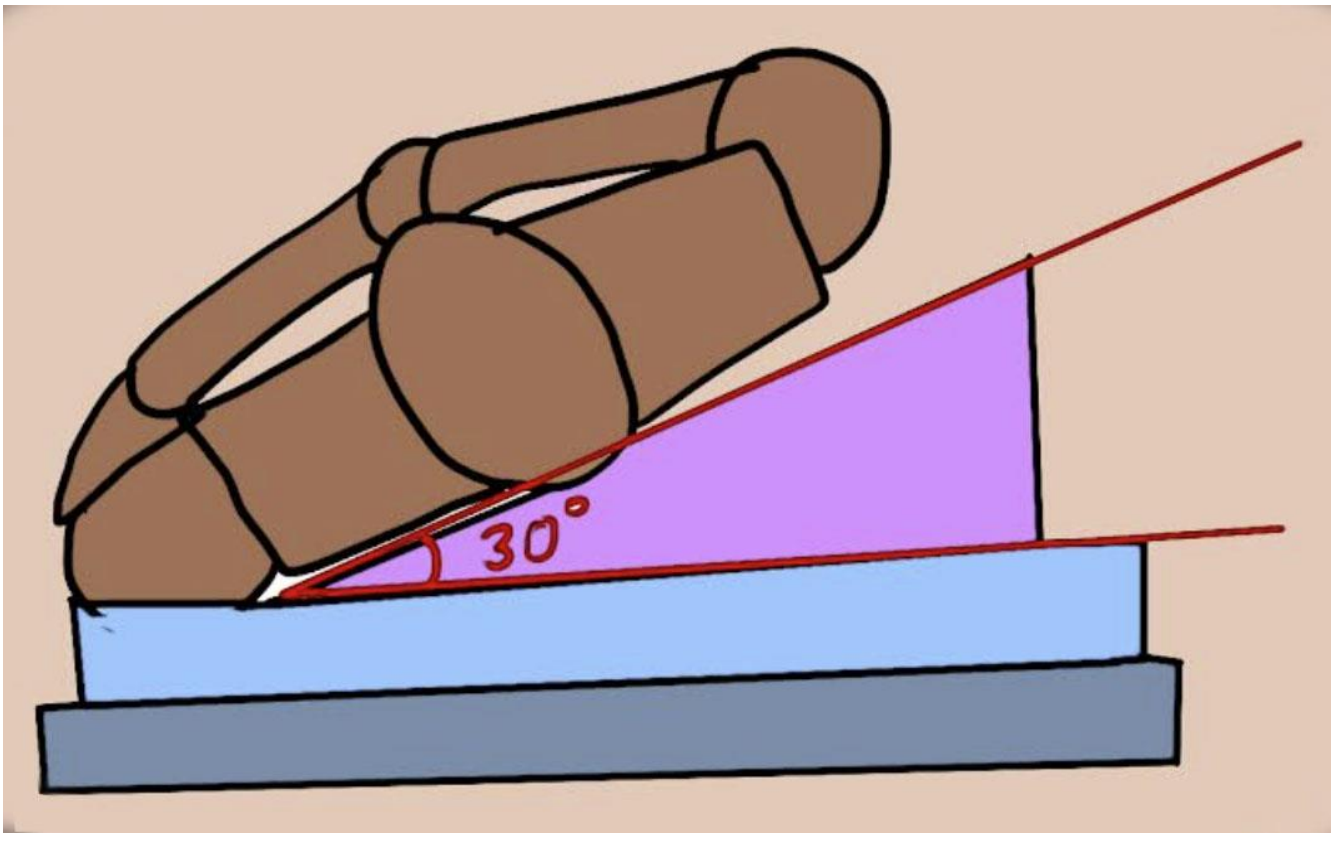


WHO Guidelines for Antibiotics PDF

- Consider 2nd generation cephalosporin (cefotetan, cefoxitin, cefuroxime) OR 3rd generation cephalosporin (ceftriaxone, cefotaxime, ceftazidime) if available.

6 Patient Positioning

Place patient supine on the operative table and tilt bed 30 degrees to the left with the right side up. This will move the small bowel to the left of the abdomen. This can also be accomplished with a wedge or towels under the right side of the patient.



7 Prepare the Adbomen

Prepare the abdomen from the center to the periphery with sanitizing solution from the xiphoid process to 2 cm below the pubic symphysis and from the right to the left of the ASIS

- Solution options – 70% alcohol, chlorohexidine, betadine

8 Drape the Abdomen

Ensure the umbilicus, pubic symphysis and right anterior superior iliac spine are exposed

WHO Checklist

AMPATH Surgical App

9 WHO Checklist Before Skin Incision

- The tool is designed to improve surgical safety by incorporating all operating room team members to complete safety checks as a group.

Before skin incision

(with nurse, anaesthetist and surgeon)

- ☐ **Confirm all team members have introduced themselves by name and role.**
- ☐ **Confirm the patient's name, procedure, and where the incision will be made.**

Has antibiotic prophylaxis been given within the last 60 minutes?

- ☐ Yes
- ☐ Not applicable

Anticipated Critical Events

To Surgeon:

- ☐ What are the critical or non-routine steps?
- ☐ How long will the case take?
- ☐ What is the anticipated blood loss?

To Anaesthetist:

- ☐ Are there any patient-specific concerns?

To Nursing Team:

- ☐ Has sterility (including indicator results) been confirmed?
- ☐ Are there equipment issues or any concerns?

Is essential imaging displayed?

- ☐ Yes
- ☐ Not applicable

Link to the WHO Checklist

Mental Rehearsal

Preoperative/Preincision Steps

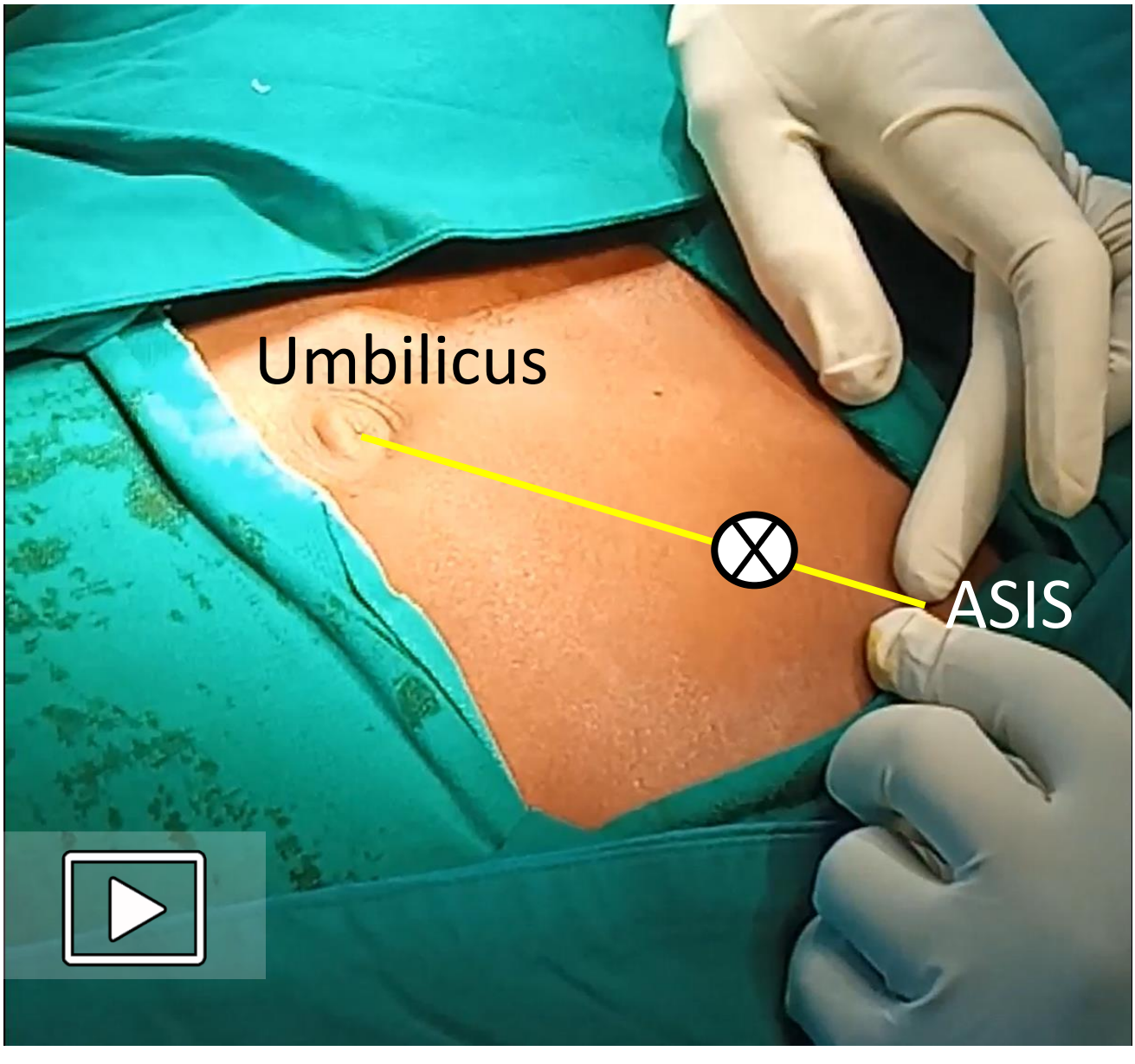
- Informed Consent
- Mark Point of Maximum Tenderness
- WHO Checklist – Prior to Anesthesia
- Anesthesia
- Antibiotics
- Patient Positioning
- Prepare the Abdomen
- Drape the Abdomen
- WHO Checklist – Prior to Skin Incision

Safe Abdominal Entry

AMPATH Surgical App

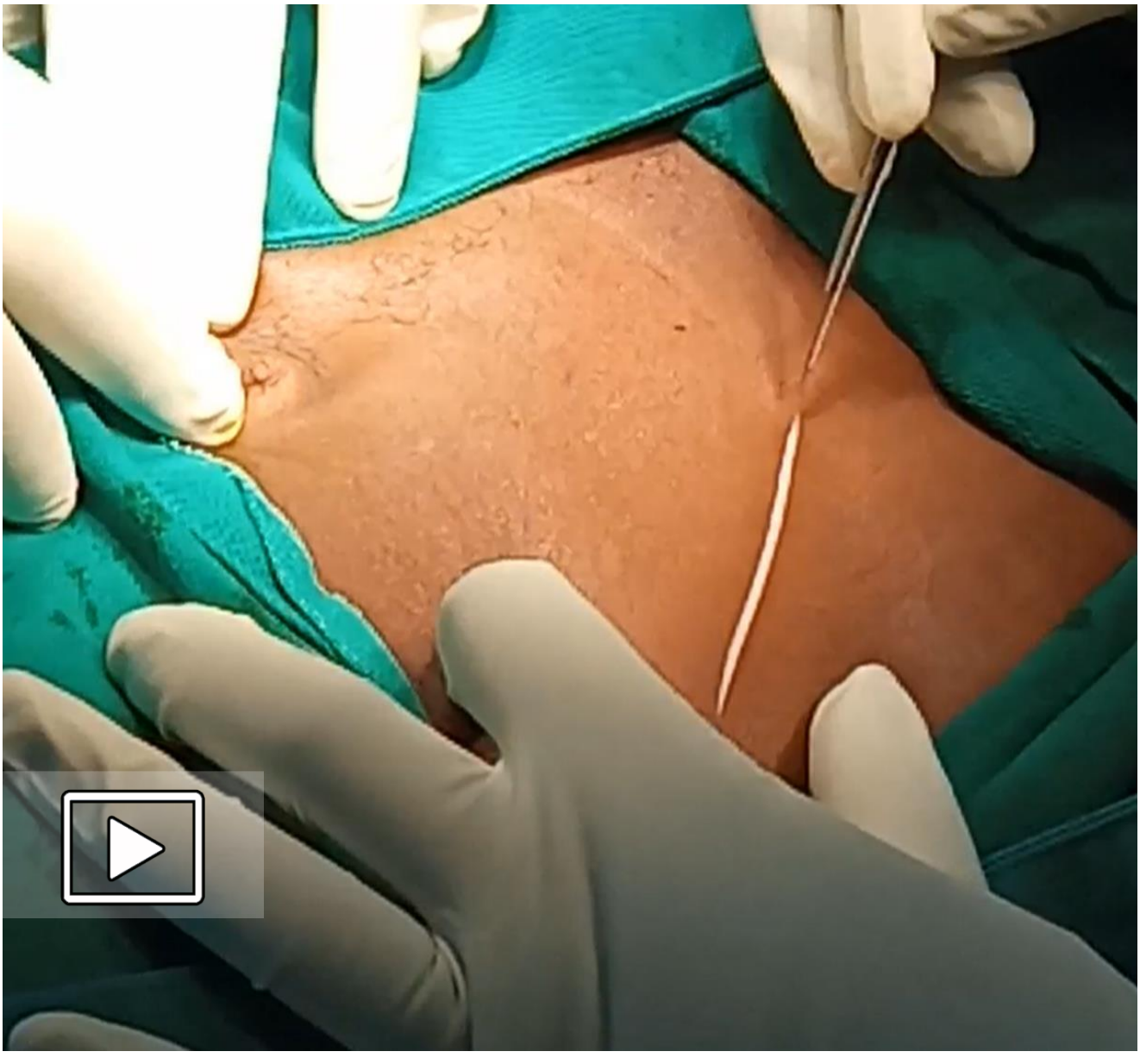
2 | Identify McBurney's Point

A. Draw the line from the right anterior superior iliac spine (ASIS) to the umbilicus.
B. Identify the point of maximum tenderness and determine its relationship to McBurney's point.



1 | Skin Incision

Using a scalpel make a 4-6 cm incision along the lines of Langer.

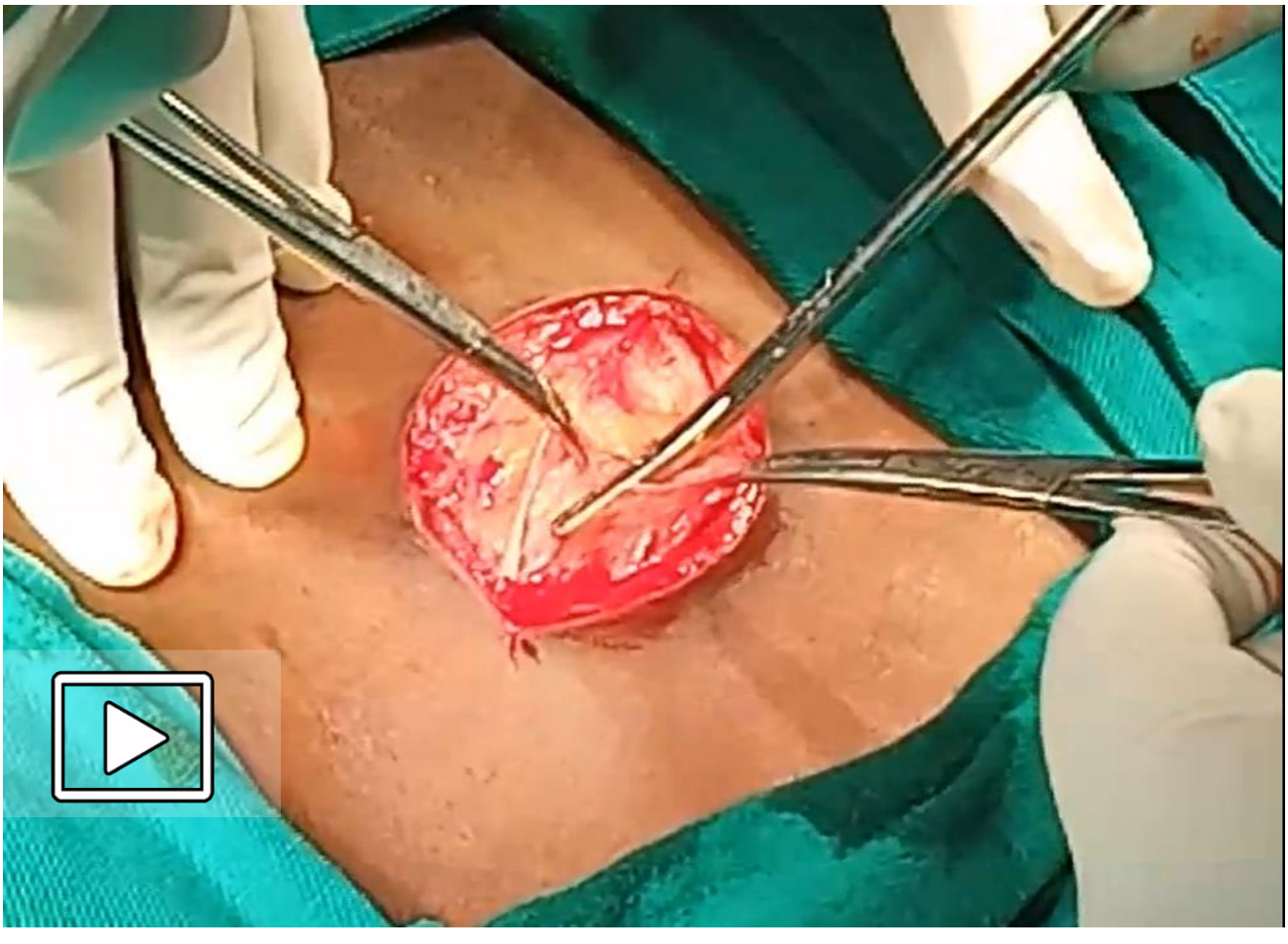


3 Soft Tissue Dissection

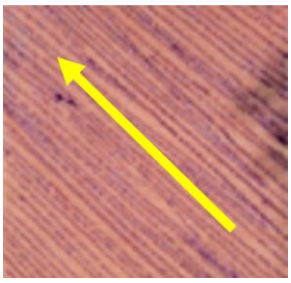
Use sharp dissection with diathermy. There will be two layers including a fatty layer and then a membranous layer (Scarpa's). There may also be a small layer of fat below the membranous layer.

4 Aponeurosis Layer

Grasp the external oblique aponeurosis with a haemostat and incise with Metzenbaum scissors. The fibers point medially to inferiorly.

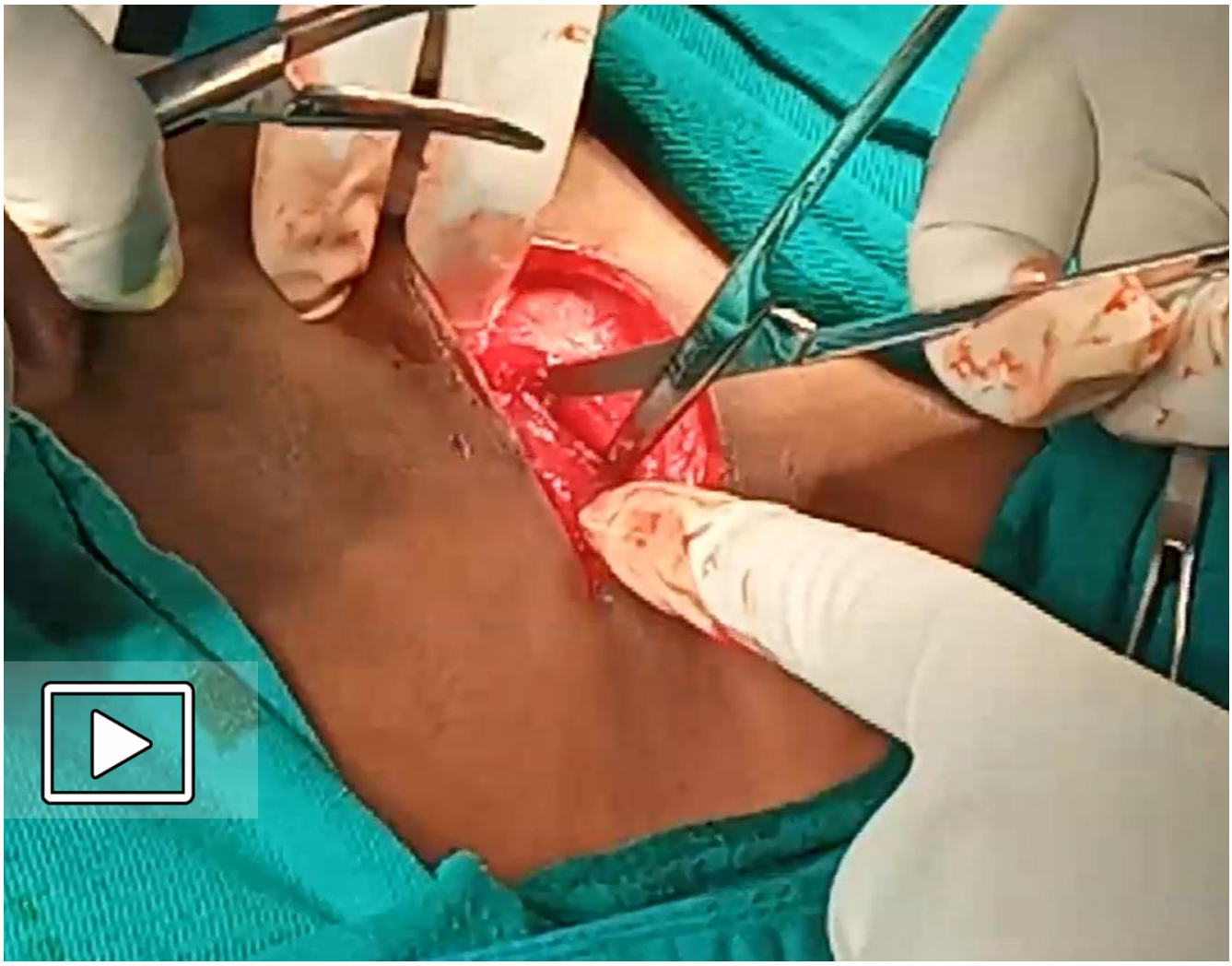


5 Muscle Dissection

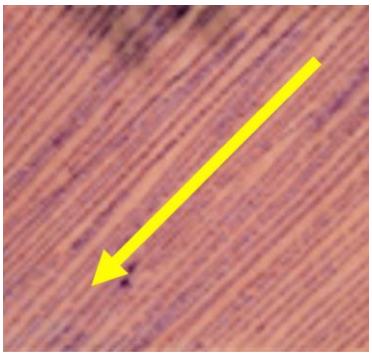


The first layer of the muscle to be dissected is the **external oblique**. Its fibers run parallel to the incision.

To dissect through the muscle, you will put a haemostat into the muscle and bluntly spread it along the pattern of the muscle fibers to create an opening wide enough to fit two army-navy retractors. You will then place the retractors into the opening and pull to continue to spread the opening along the length of the muscle.

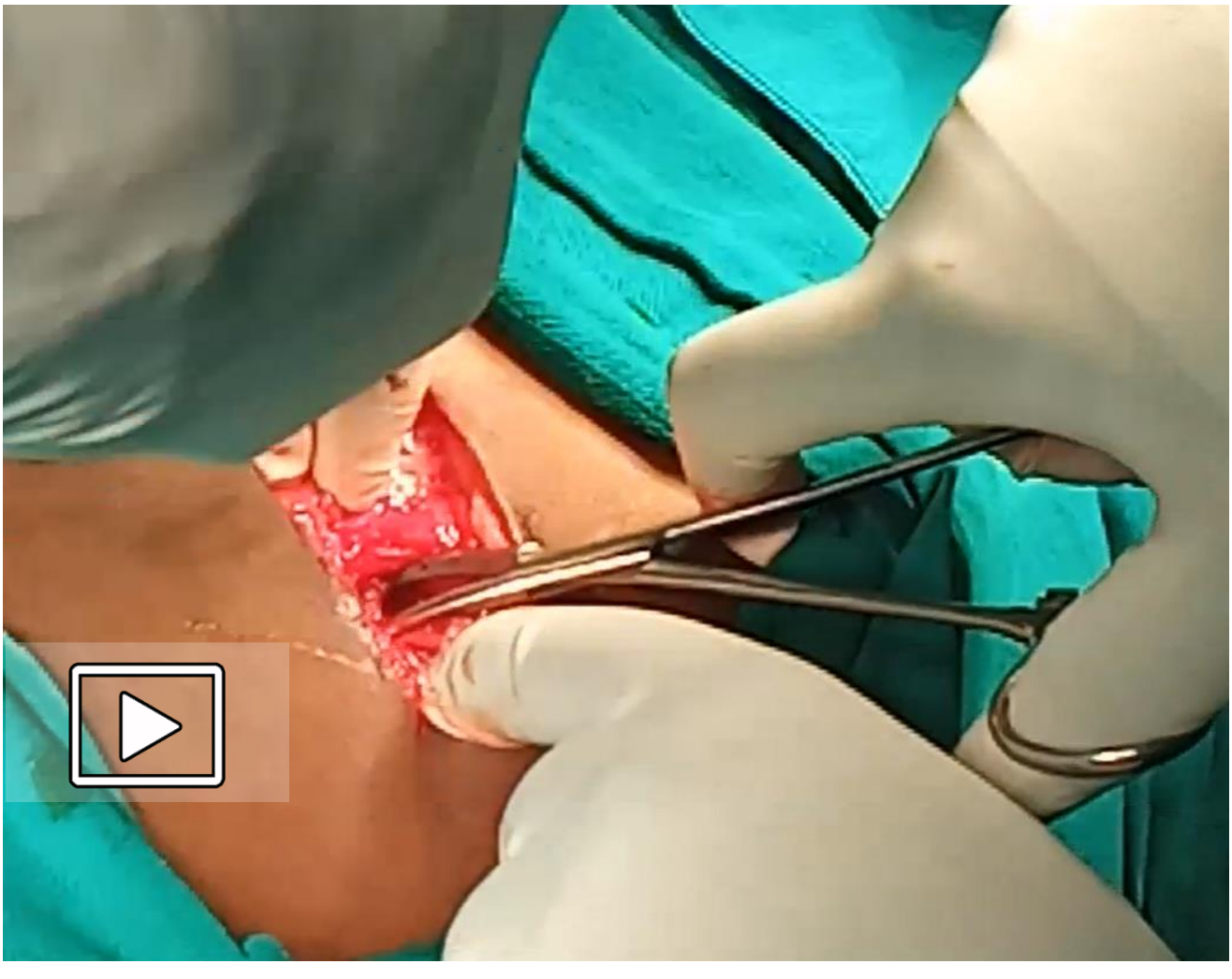


6 Muscle Dissection Continued



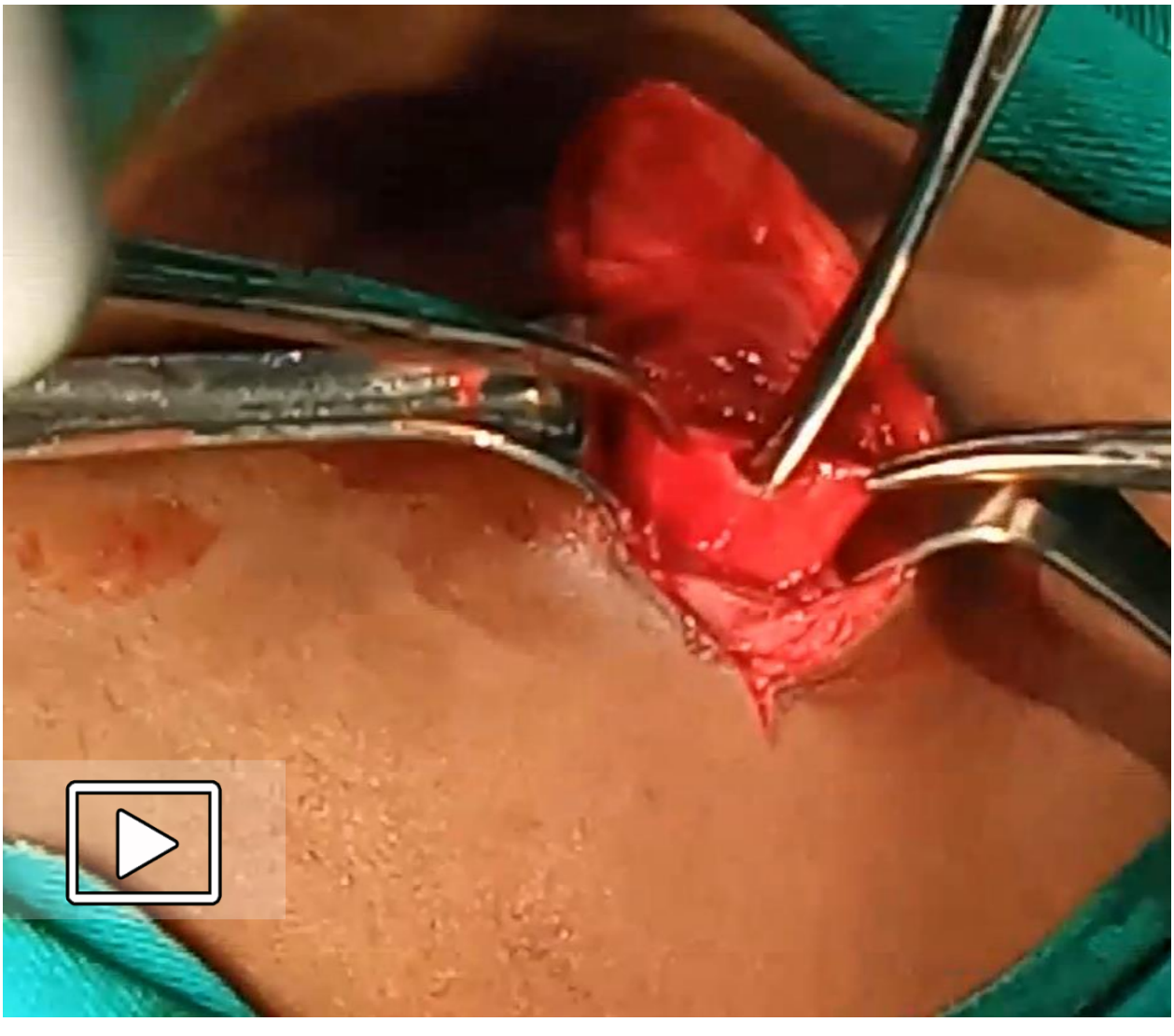
The second layer of the muscle to be dissected is the **internal oblique**. Its fibers point medially and superiorly, or perpendicular to the incision toward the left shoulder.

Put a haemostat into the muscle and bluntly spread it along the pattern of the muscle fibers to create an opening wide enough to fit two army-navy retractors. You will then place the retractors into the opening and pull to continue to spread the opening along the length of the muscle.



7 | Peritoneum

The last layer you will encounter before entering the abdominal cavity is the peritoneum. You will grasp the edge of the peritoneum with a haemostat and elevate it and place a second haemostat 5 mm away from the original. Then palpate the elevated peritoneum to ensure there is no bowel or omentum within the contents and then sharply incise it.



Test Your Knowledge

What do you do if you encounter some purulent fluid upon entering the abdomen?

A. You don't need to do anything
B. Suction the fluid only
C. Aspirate the fluid and send it for culture
D. Remove the ascending colon and omentum

Cognitive Task

W
e
u

for culture

D. Dissect out any tissues touching the fluid.

The Correct answer is C, aspirate the fluid and send for culture.

- Serous fluid - suction
- Murky fluid – obtain culture
- Purulent fluid – obtain culture
- Abscess – gently attempt to bluntly dissect away from the anterior and lateral abdominal walls, obtain culture if purulent

Identification of the Appendix

AMPATH Surgical App

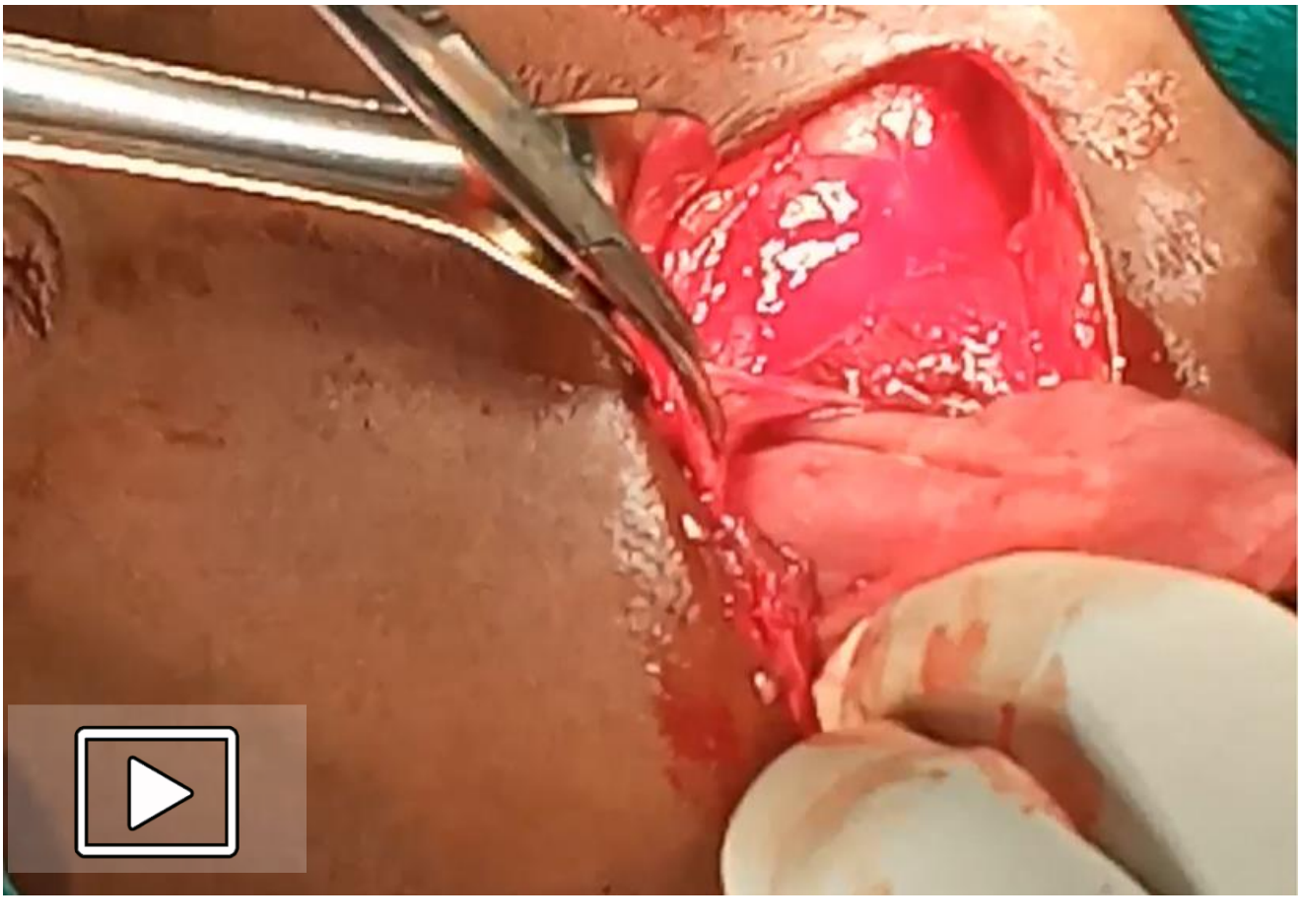
1 Obtaining Proper Visualization

Ensure the light is appropriately positioned to visualize the cecum.
Retract the muscles with two army-navy retractors by tucking in the retractor under the peritoneum and elevating the muscle
Use a sponge stick to tuck the small bowel to the left of the abdominal cavity

- If the small bowel does not stay out of the field, place a wet abdominal mop to tuck away the bowel

2 Identify the Cecum

Visualize the anterior taenia coli. Follow the taenia coli inferiorly to the base of the appendix. The cecum has a lighter pink appearance compared with the redder small bowel.

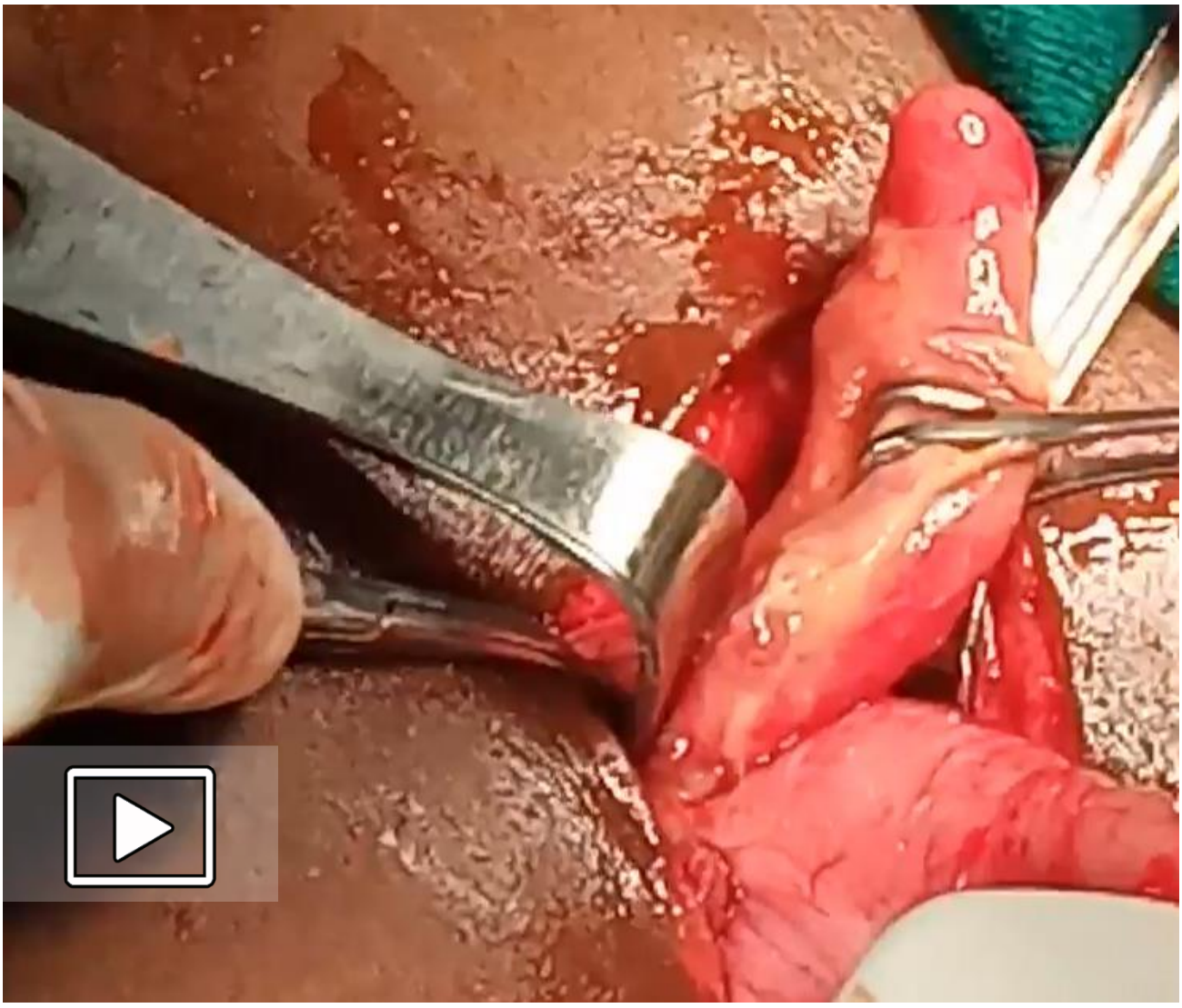


3 Deliver the Cecum

Grasp the cecum with a Babcock and using the Babcock in the left hand and the thumb and index in the right hand deliver the superior aspect first by retracting inferiorly and then the inferior portion by retracting superiorly.

4 Identify the Appendix

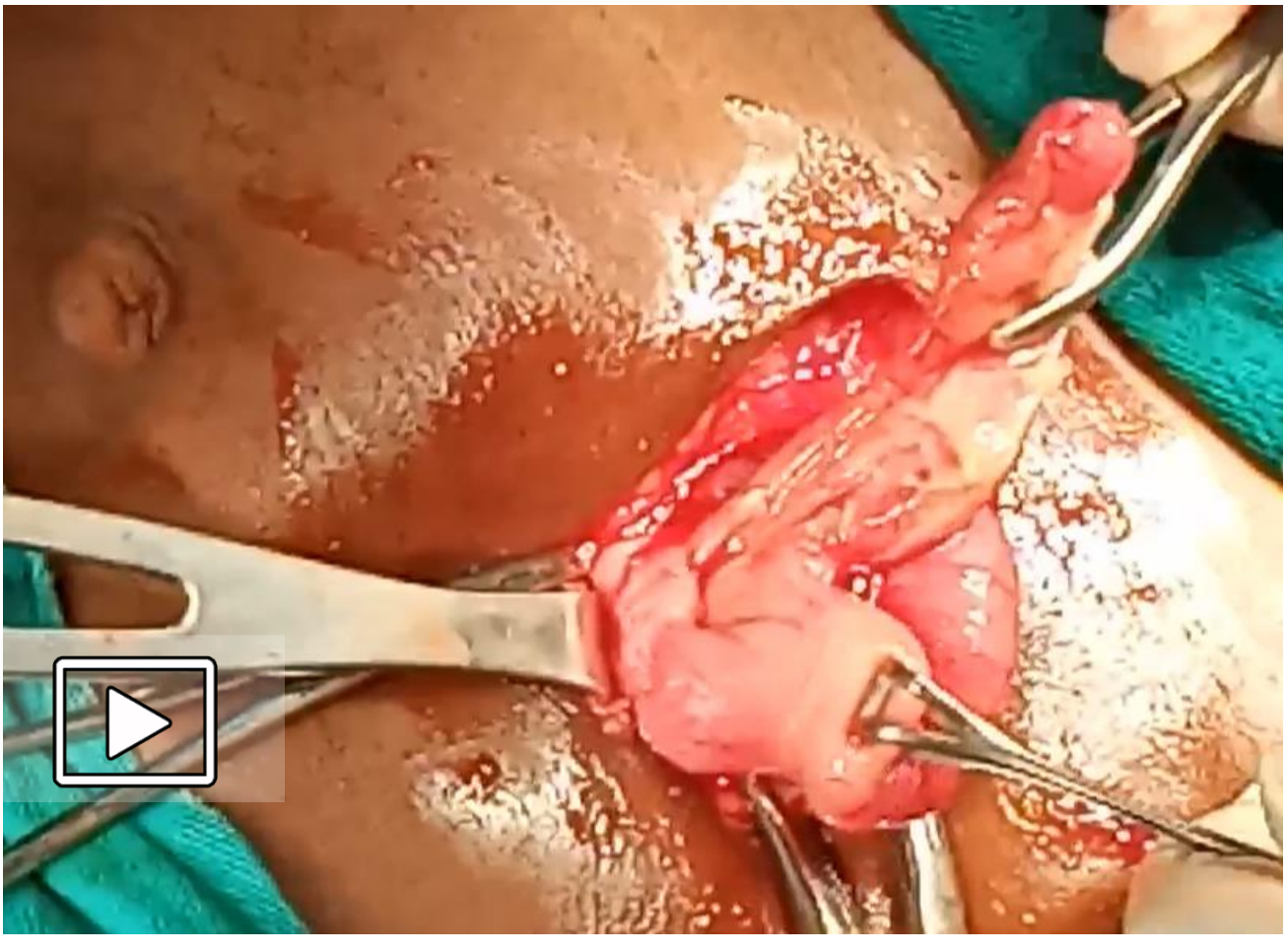
Follow the taenia coli where all 3 converge at the base of the appendix and atraumatically grasp the appendix within the Babcock such that it encases the appendix. Confirm the identity of the appendix by identifying attachment to the cecum and identification of the terminal ileum.



5 Assess the Appendix

Determine the extent of pathology of the appendix to determine next steps of the procedure.

- Inflamed Appendix: Complete the appendectomy
- Gangrenous Base: Assess if there is enough healthy cecum. If not, consider transferring patient to the referral centre.
- Caecal tumour: Close the patient and write your operative note. Send the patient and the operative note to the referral centre for oncologic resection.

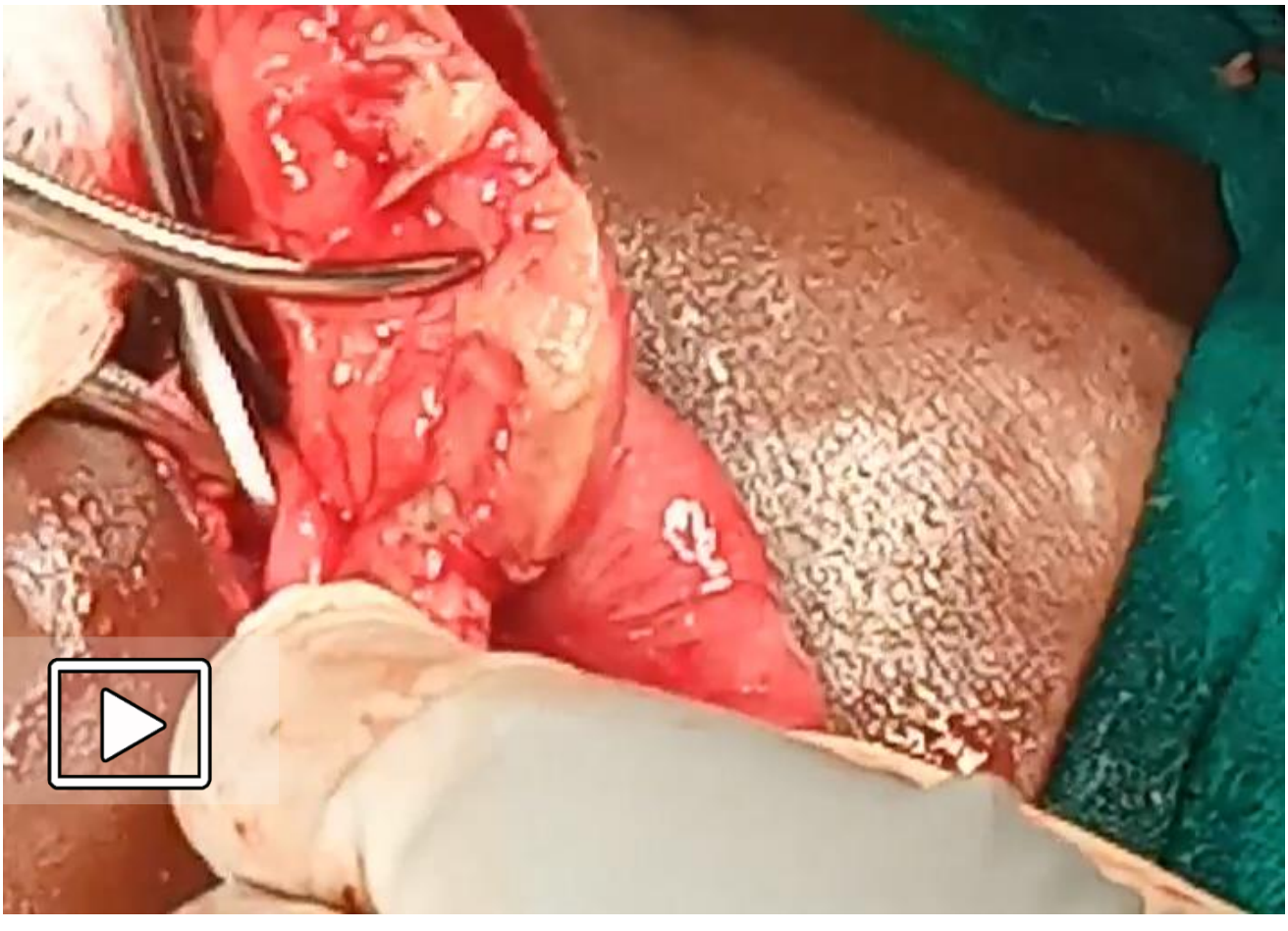


Appendectomy

AMPATH Surgical App

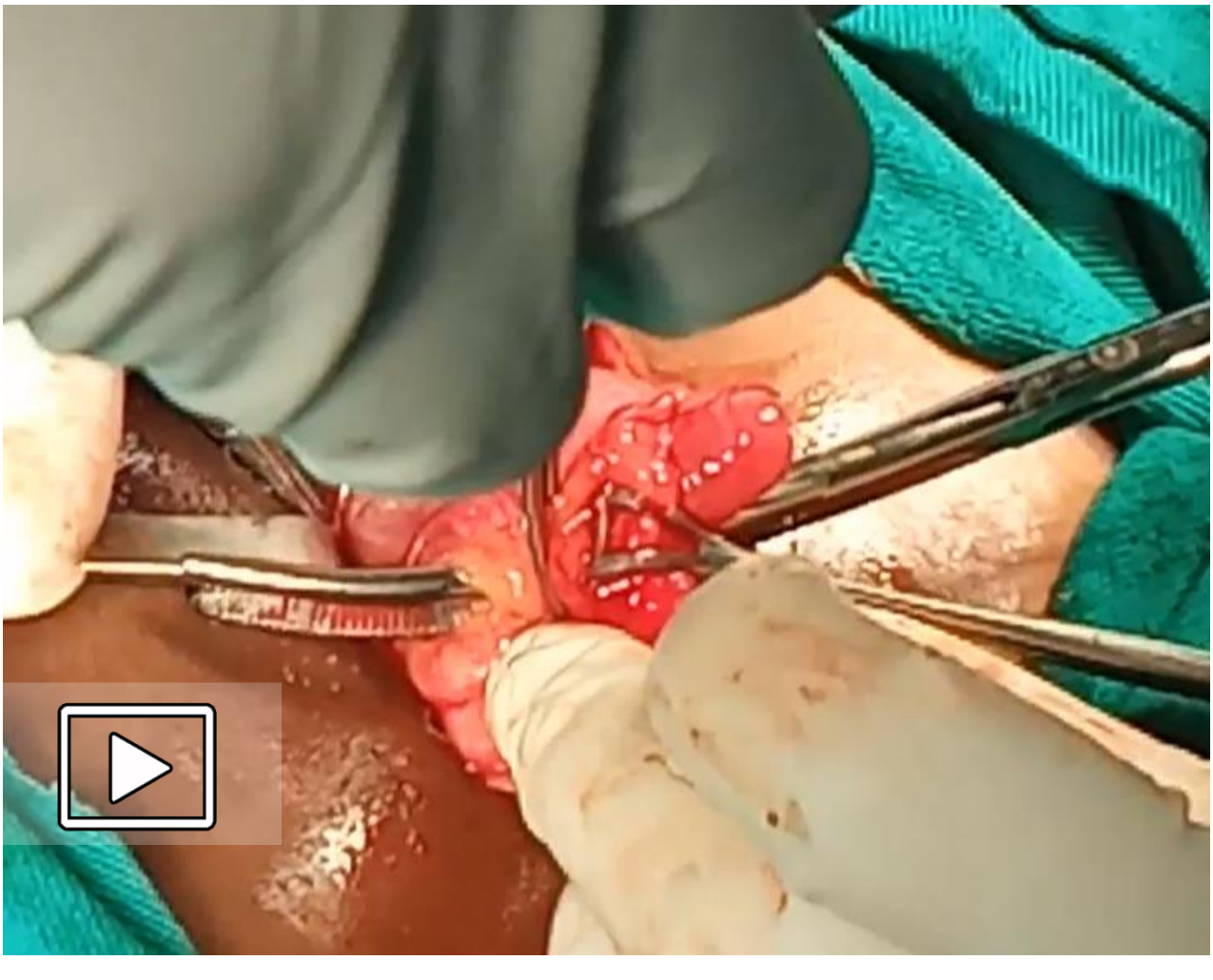
1 Identify the Mesoappendix

Identify the mesoappendix. The mesoappendix contains the appendiceal artery.



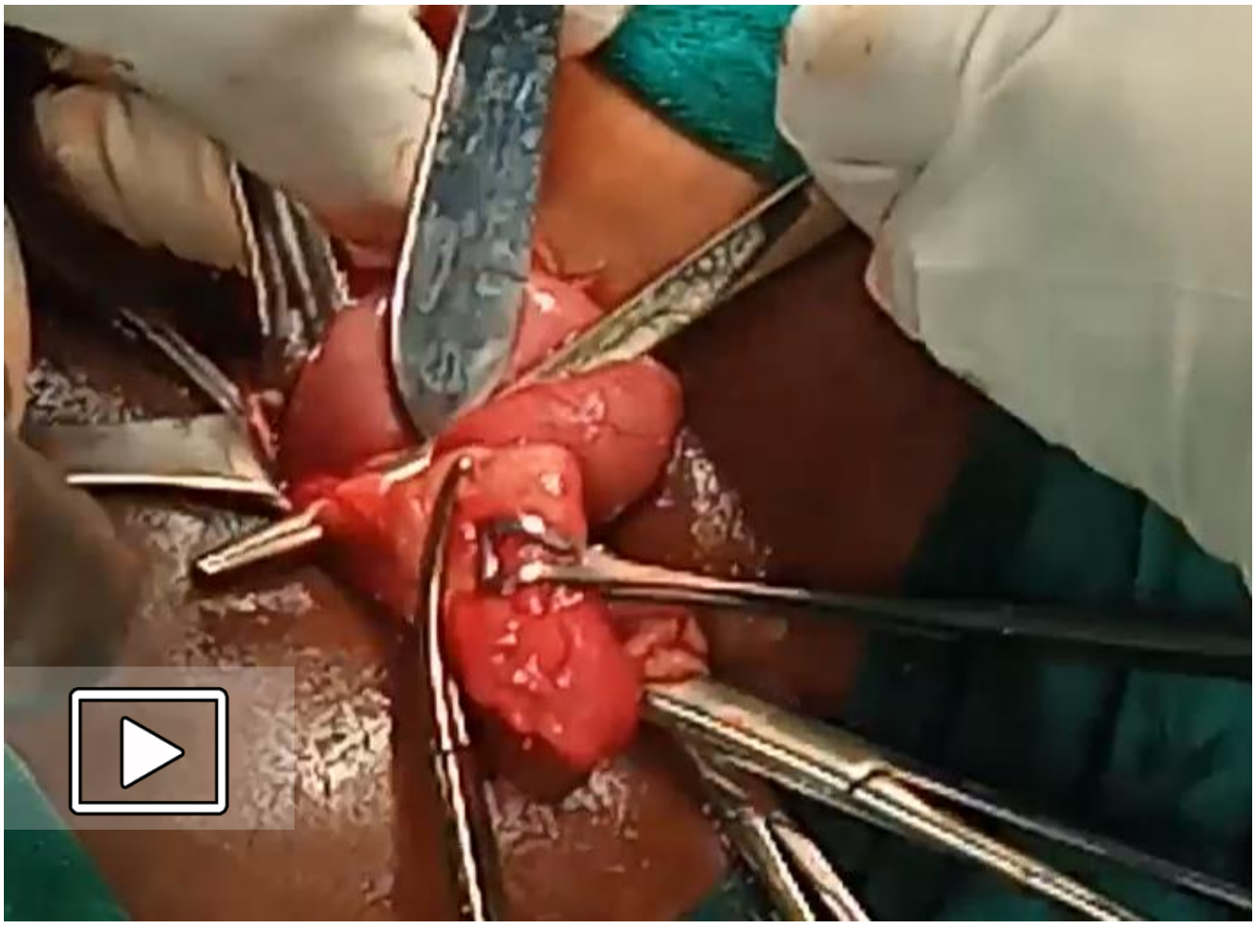
2 | Create a Window

Create a small window within the mesoappendix near the base of the appendix by using a haemostat with the curve of the haemostat follows the curve of the appendix. Gently insert the haemostat tips into the mesoappendix near the base of the appendix and slowly spread, remove the haemostats while they are still open and repeat until you have created a window within the mesoappendix.



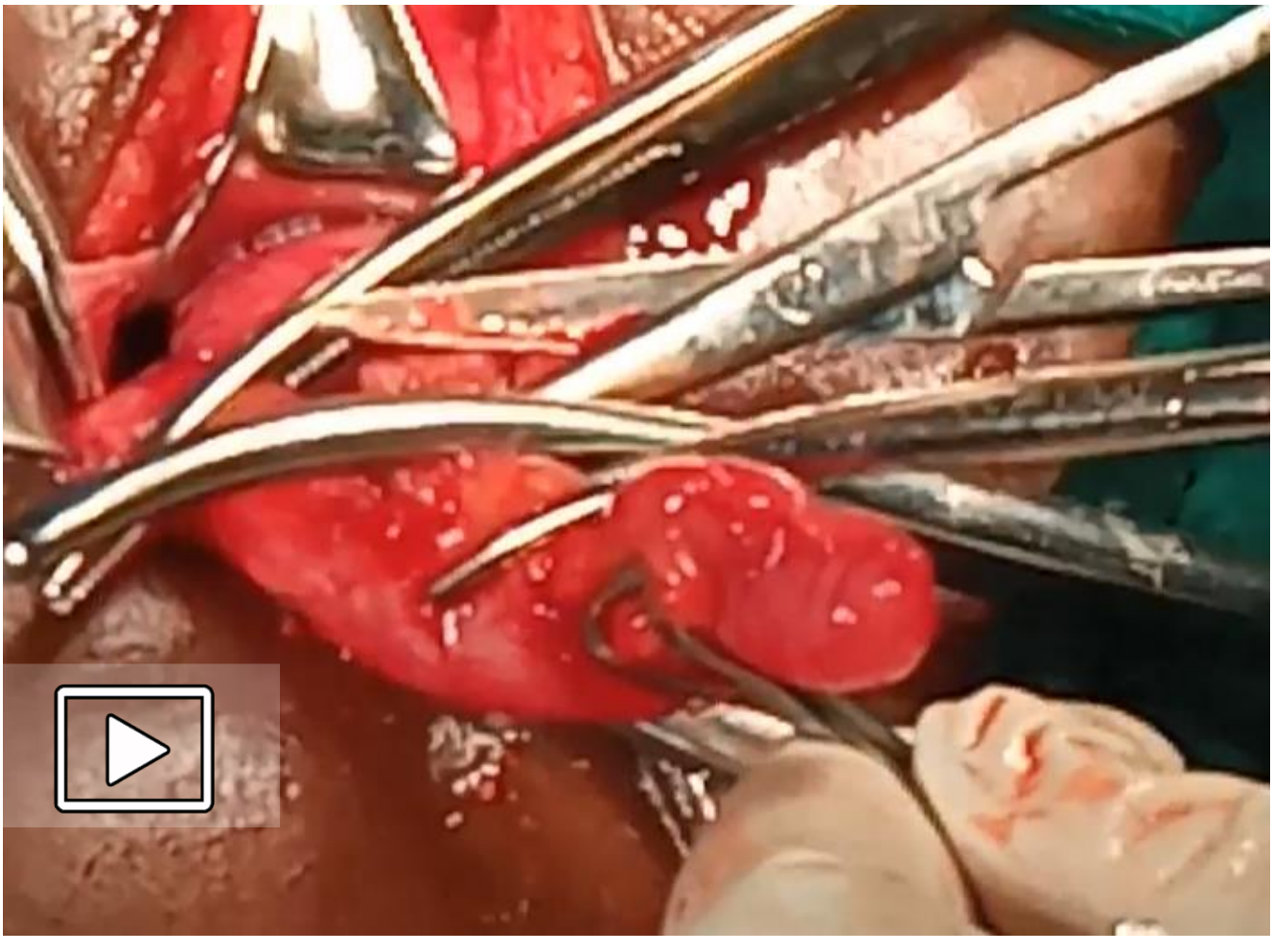
3 Clamp the Mesoappendix

Clamp the portion of the mesoappendix (that is now detached from the appendix) proximally near the base of the appendix with a haemostat. Clamp the portion of the mesoappendix (that is now detached from the appendix) distally near the end of the window with another haemostat.



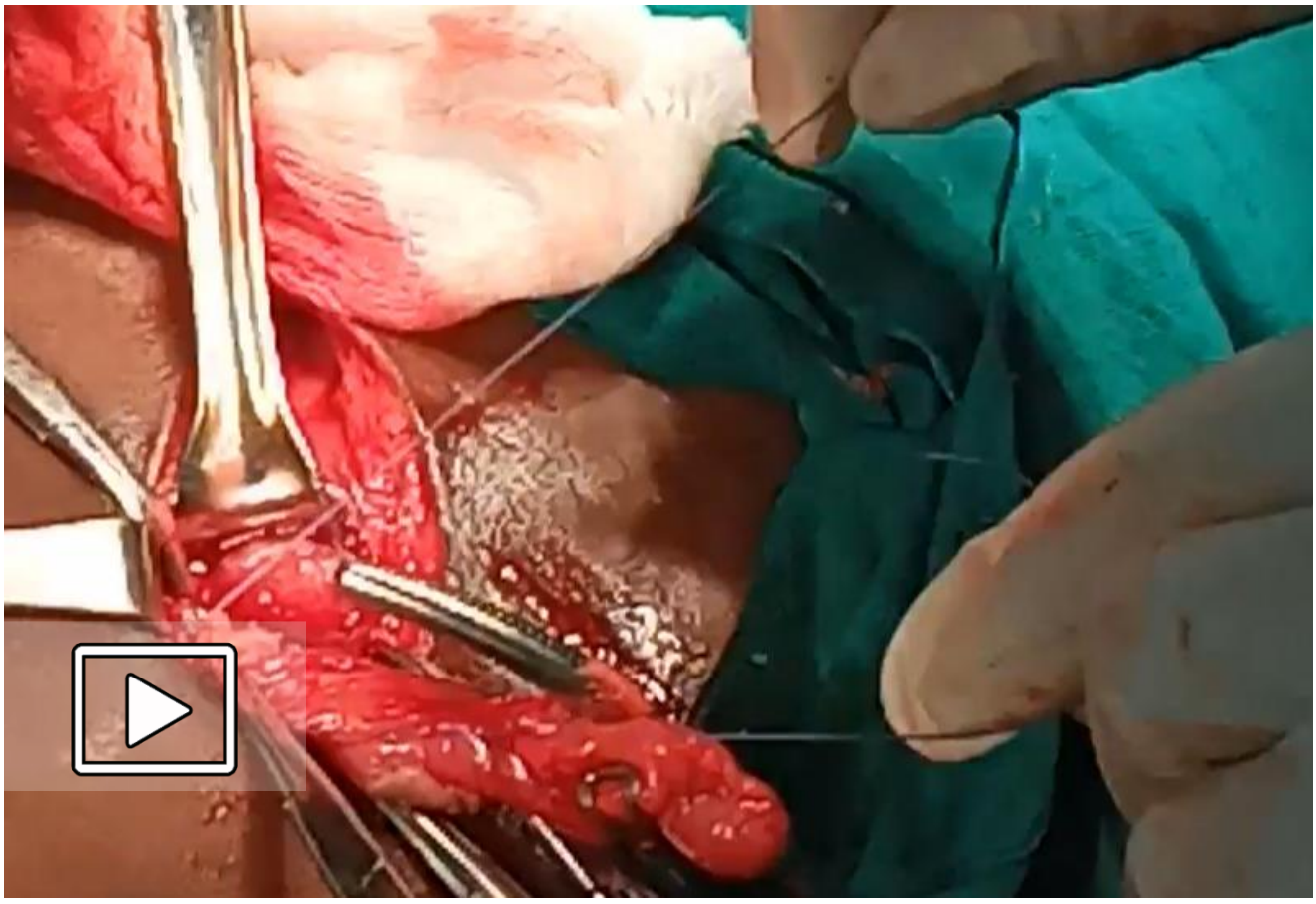
4 Cut the Mesoappendix

Using Metzenbaum scissors, divide the mesoappendix between the haemostats but leave the haemostats in place.



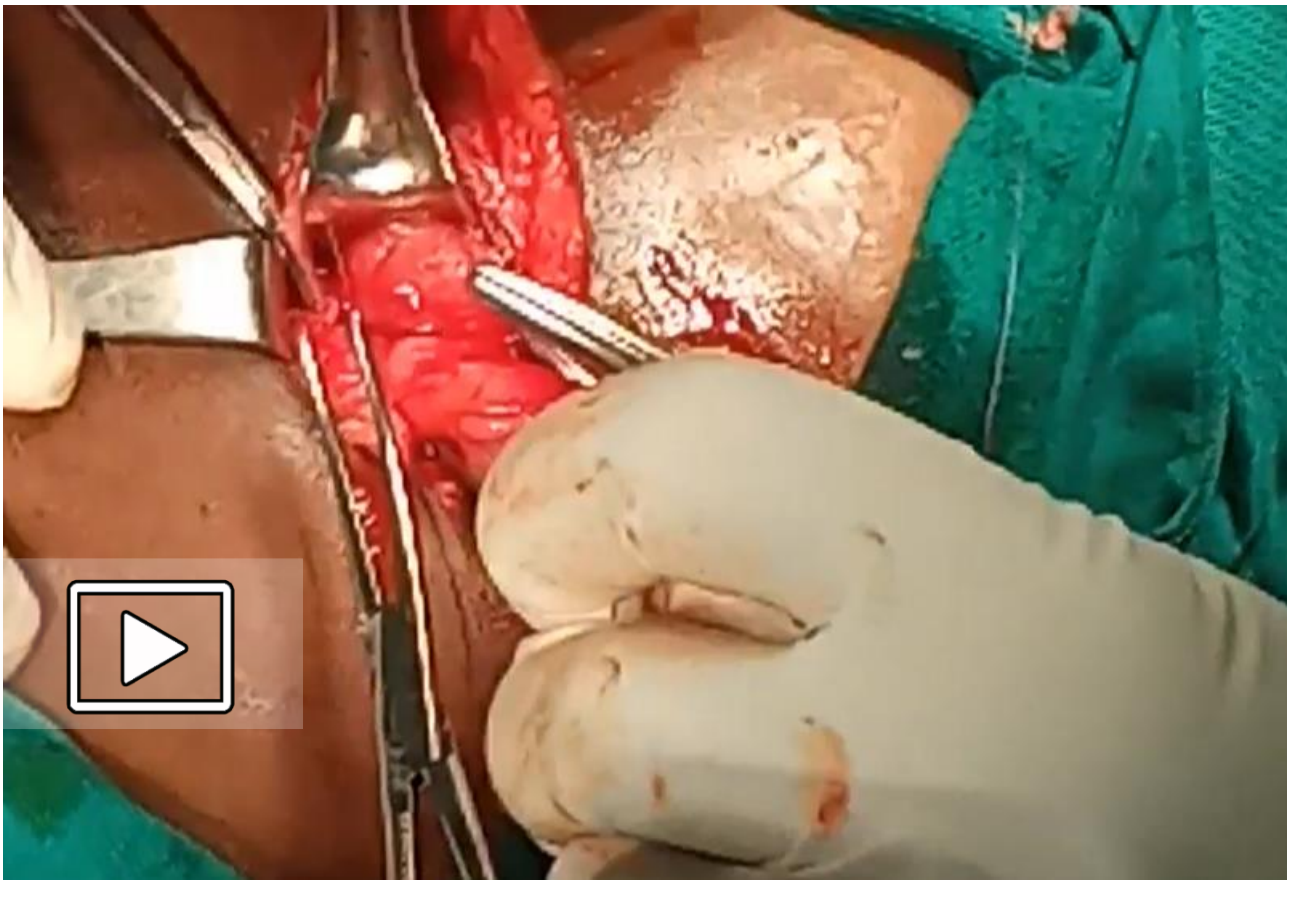
5 Ligate the Mesoappendix

Using the end of your 2-0 vircyl, pass the suture around the haemostat, bring the suture down to the clamp in a tip-to-tip fashion which will allow the suture to be hooked under the clamp and throw your first knot.



6 Remove Proximal Clamp

After your knot has been tightened, ask your assistant to slowly remove the haemostat from the vessel to ensure haemostasis; complete a total of 3 knots for vicryl.



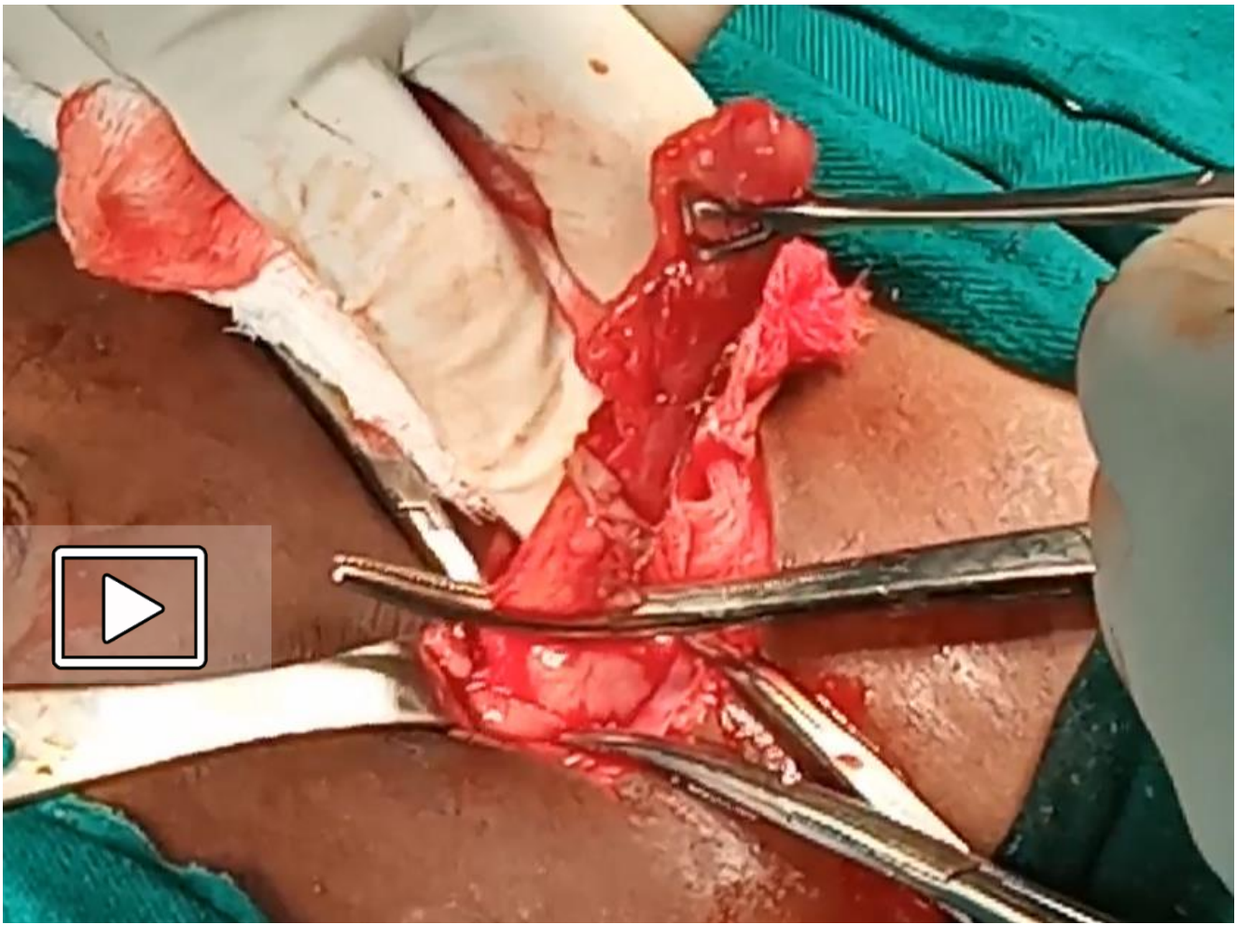
7 | Skeletonize Base of Appendix

Skeletonize the base of the appendix using blunt dissection.

8 Place a Distal Clamp on the Appendix

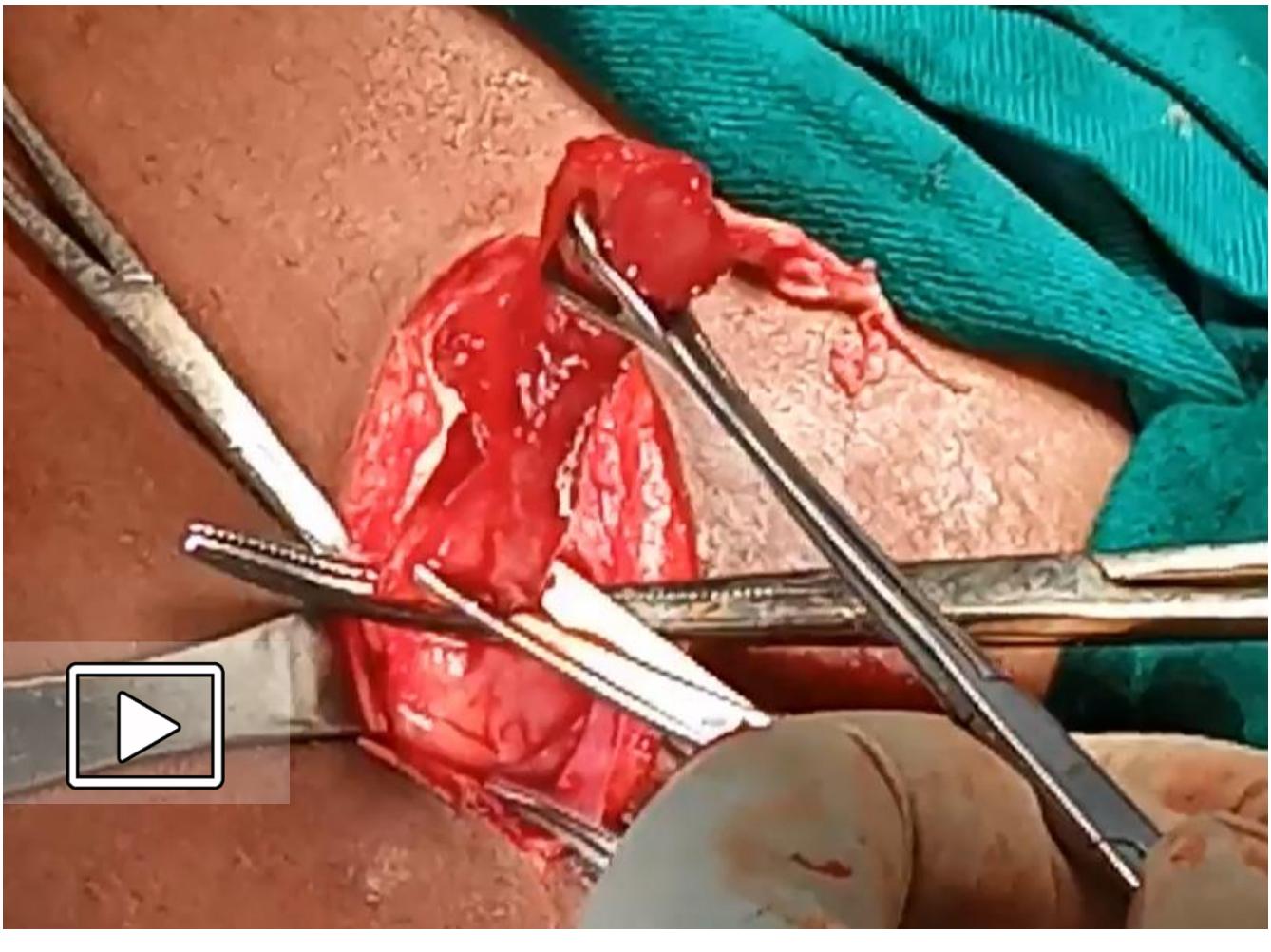
Once clearly visualized, clamp the appendix 5 mm from the base with a Kelly clamp (or haemostat if that's what you have available)

Now, place another Kelly clamp 3-5 mm distally along the appendix with enough space to fit a scalpel in between the two clamps



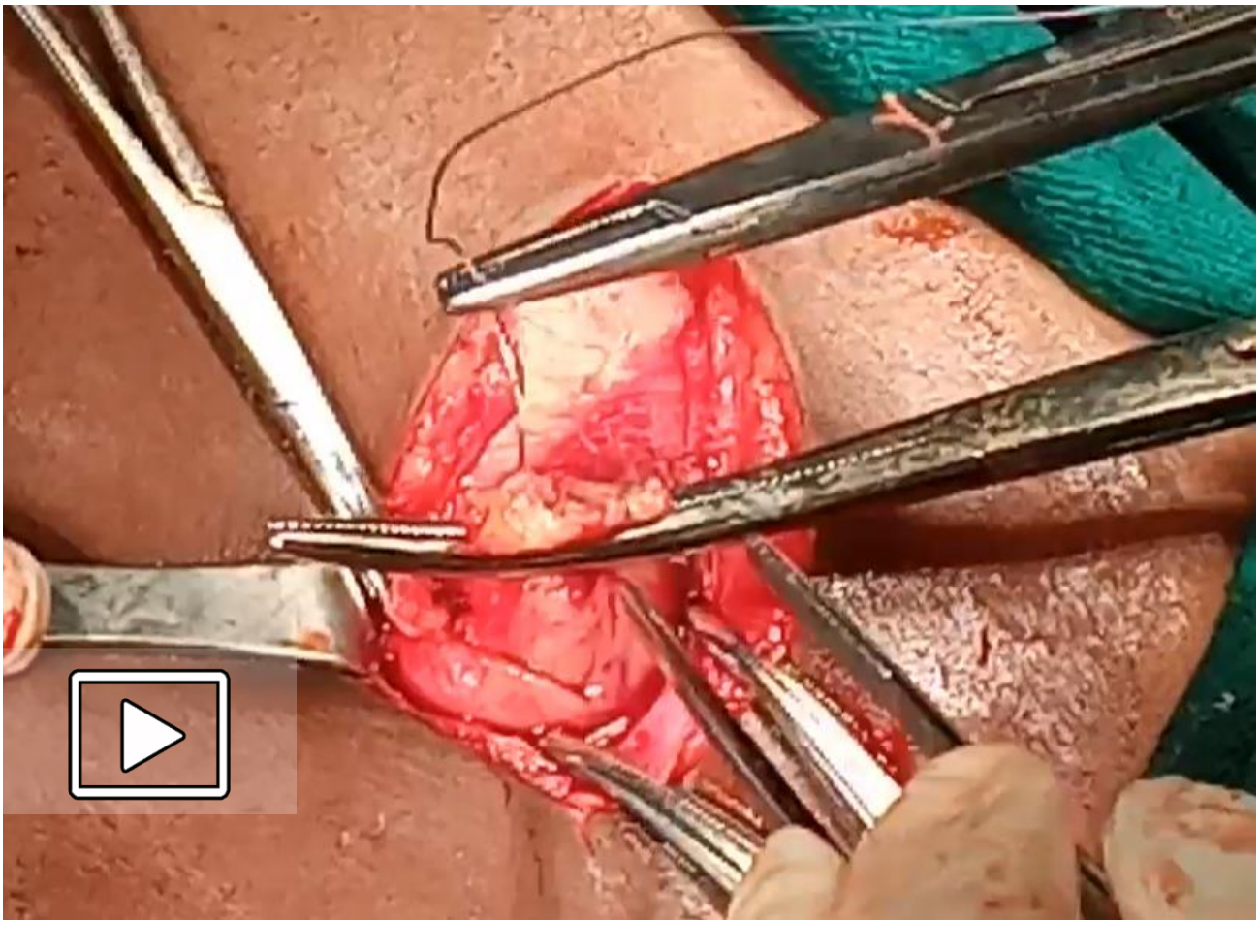
9 Excise the Appendix

Excise the appendix in between the clamps with a scalpel or scissors. Remove the specimen from the abdomen.



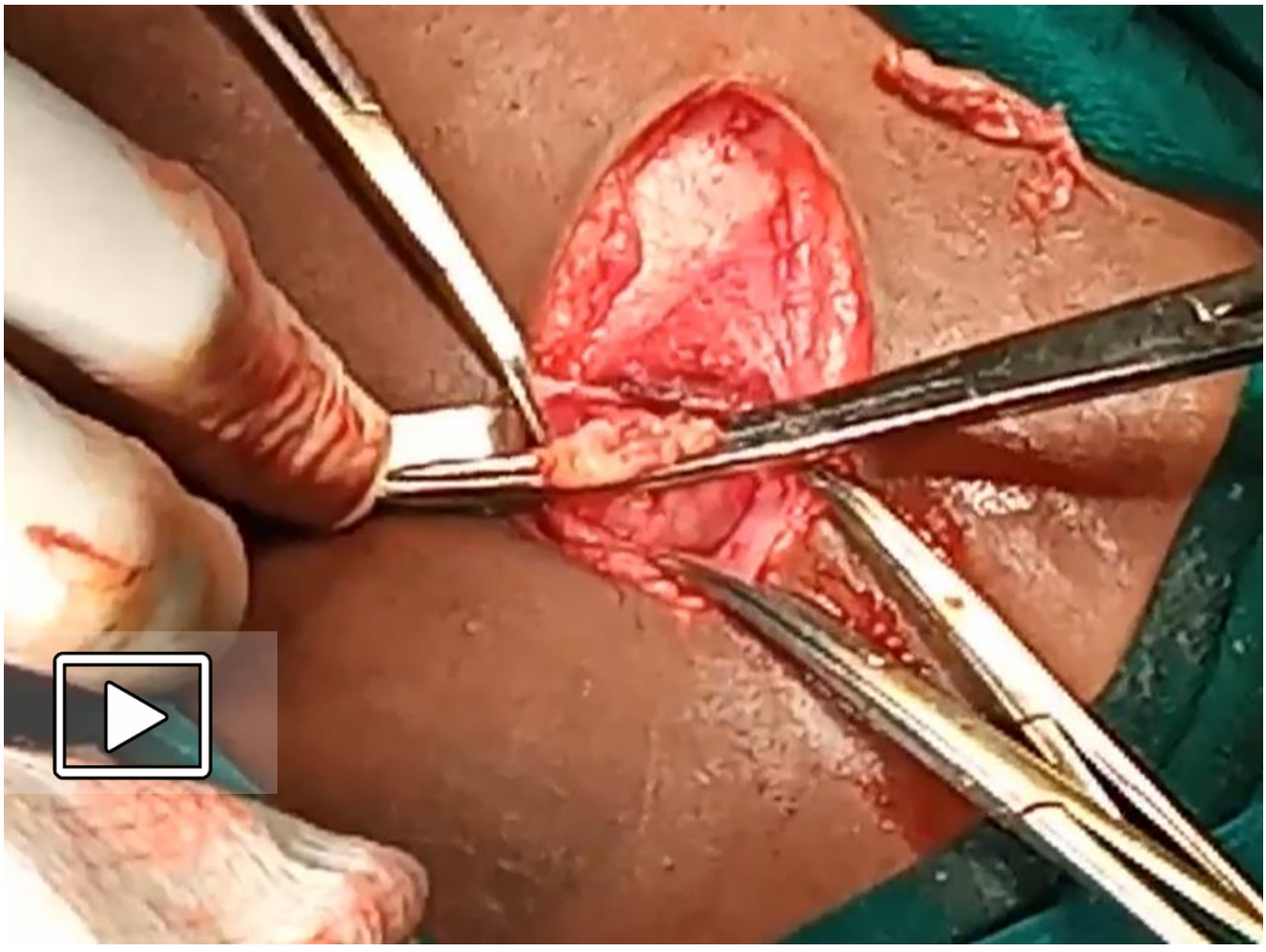
10 Suture Ligate Base of the Appendix

Suture ligate the base of the appendix. If cecum appears to be friable, you may have to run a suture through healthy cecum to prevent fistula formation.



11 Inspect the Appendiceal Stump

Inspect the appendiceal stump. If stump appears intact, no further steps are necessary. If the base of the appendix is very indurated: Bury the stump using the remaining 2-0 vicryl, place a purse string around the base of the appendix.

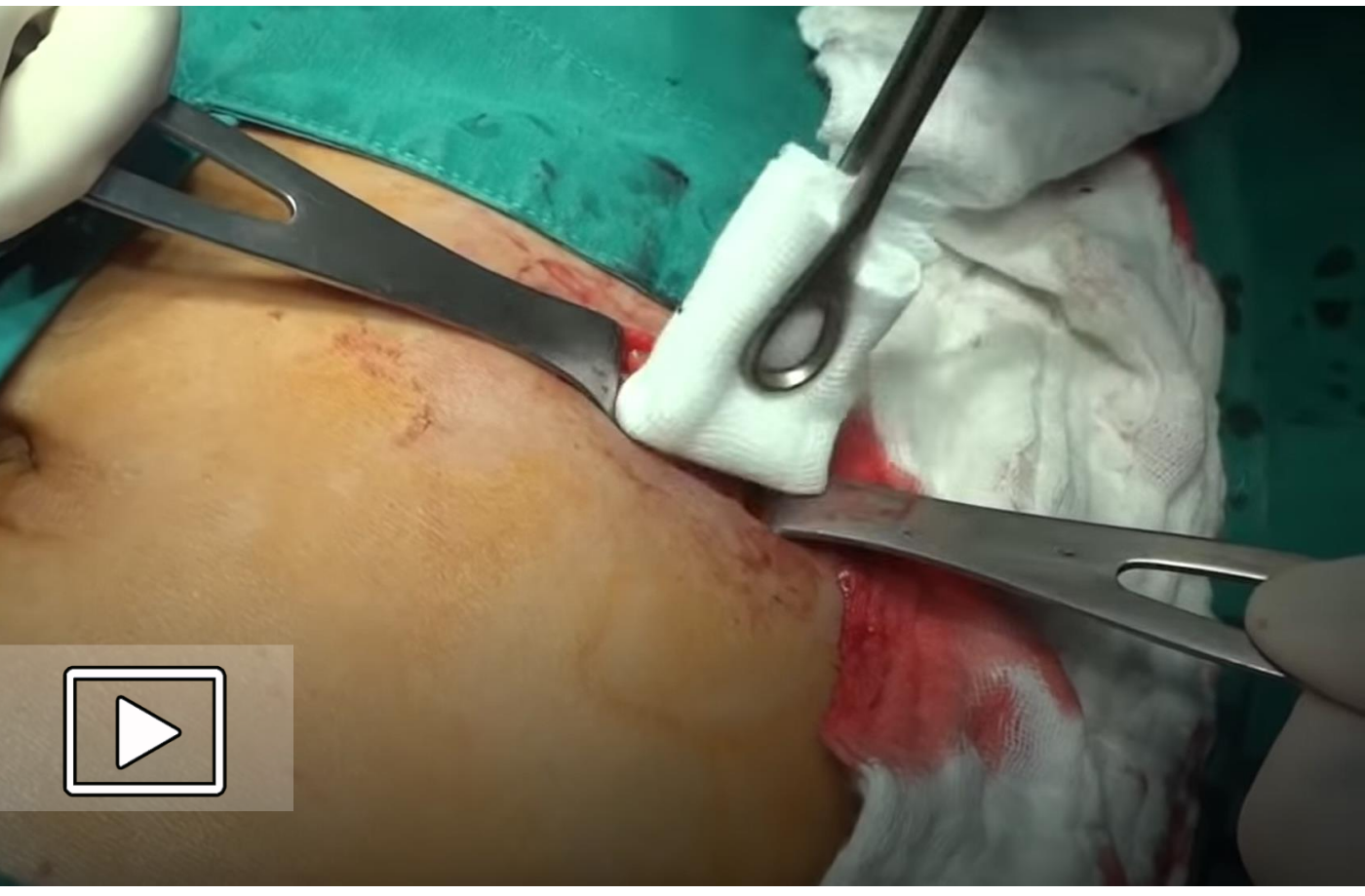


Abdominal Closure

AMPATH Surgical App

2 Final Abdominal Inspection

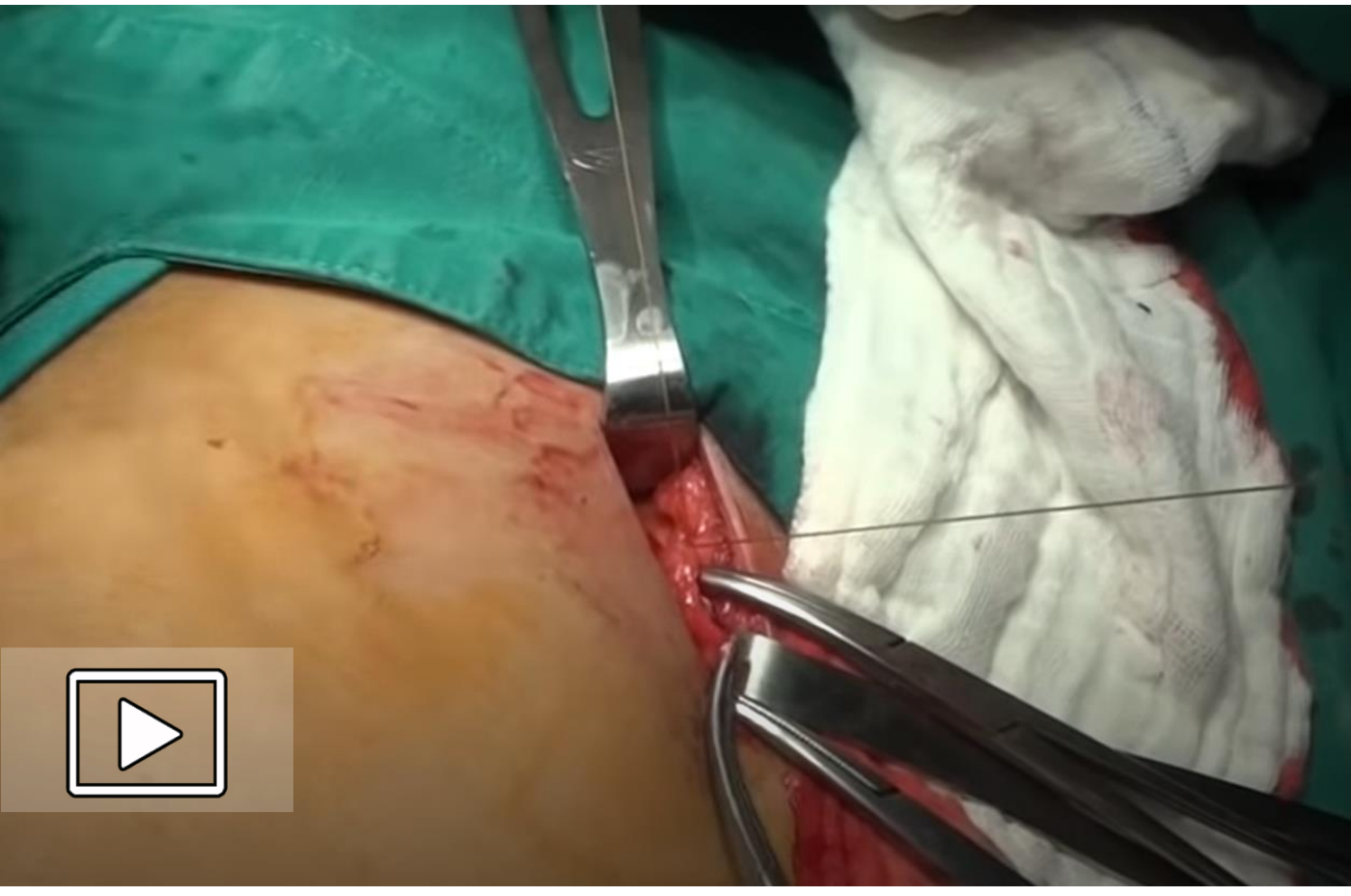
Ensure haemostasis of the mesoappendix prior to placing the cecum and ileum back into the abdomen. Inspect the pelvis by placing a suction into the pelvis to ensure no purulence.



3 Closure of External Oblique Aponeurosis

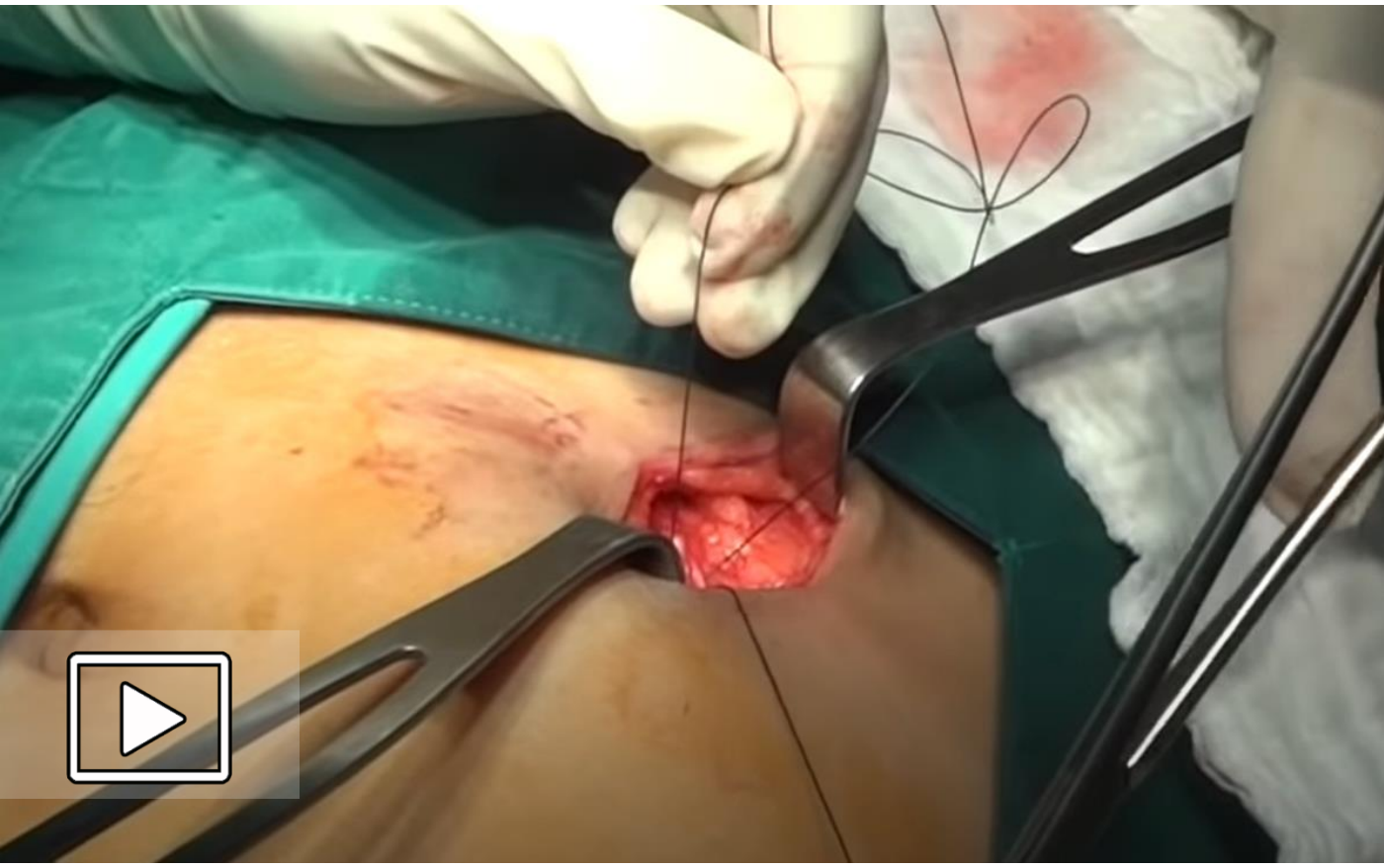
Remove retractors slowly, inspecting for haemostasis within the muscles. If there is bleeding, temporize with diathermy.

Close the external oblique aponeurosis with a 0-vicry running suture.



3 Close Scarpa's Layer

Close the membranous layer (Scarpa's) with the remaining 0-Vicryl suture.



4 Close Skin Incision

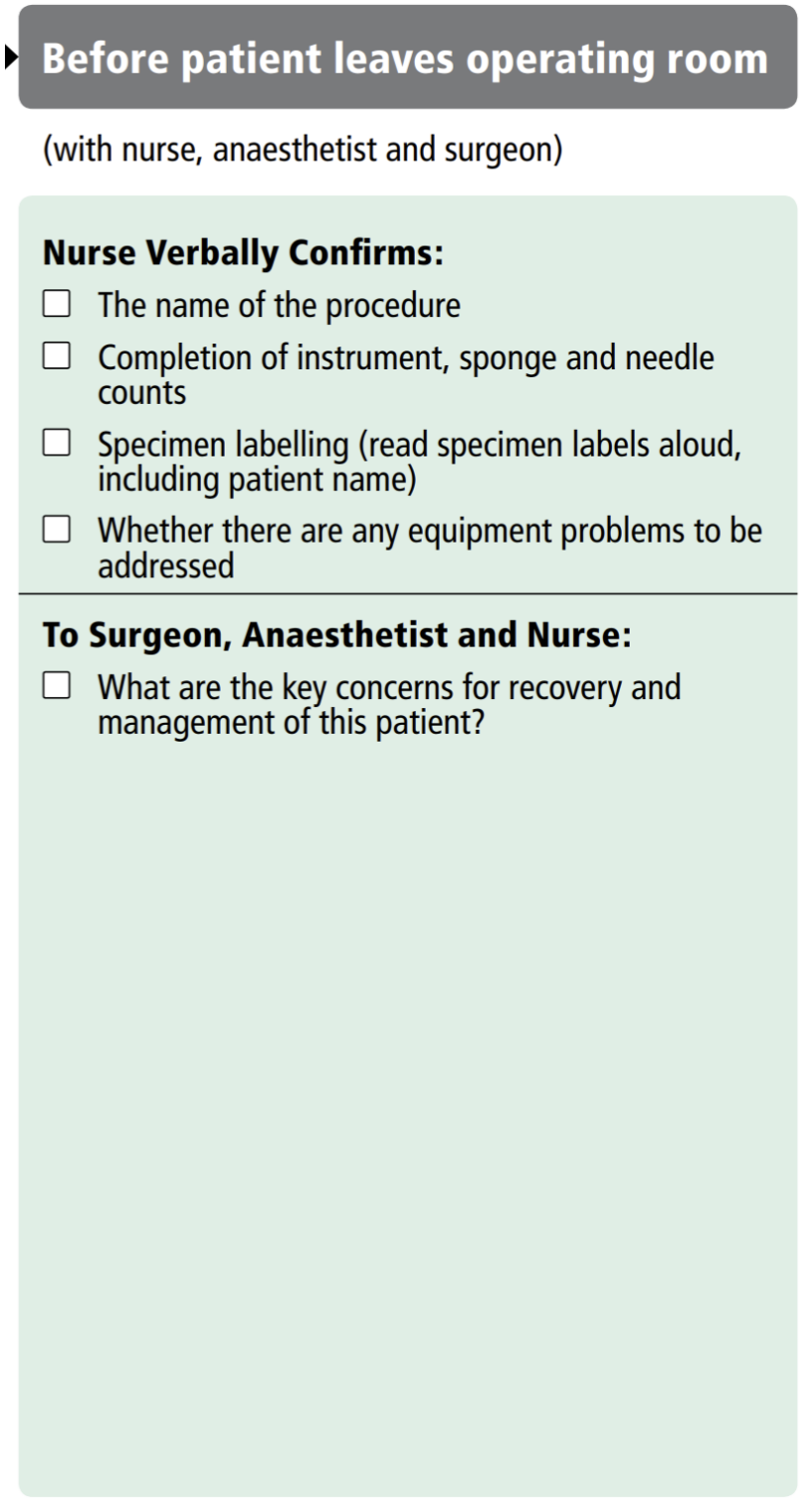
Use interrupted sutures if the appendix was grossly purulent. Space sutures approximately 1 cm apart.

WHO Checklist

AMPATH Surgical App

1 | WHO Checklist Before Leaving OR

- The tool is designed to improve surgical safety by incorporating all operating room team members to complete safety checks as a group.



Before patient leaves operating room

(with nurse, anaesthetist and surgeon)

Nurse Verbally Confirms:

- ☐ The name of the procedure
- ☐ Completion of instrument, sponge and needle counts
- ☐ Specimen labelling (read specimen labels aloud, including patient name)
- ☐ Whether there are any equipment problems to be addressed

To Surgeon, Anaesthetist and Nurse:

- ☐ What are the key concerns for recovery and management of this patient?

Link to the WHO Checklist

Mental Rehearsal

Safe Entry Into Abdomen

- Skin incision
- Soft tissue dissection
- Muscle dissection
- Open peritoneum

Appendectomy

- Visualize intra-abdominal contents
- Identify and deliver cecum
- Identify and assess appendix
- Identify, create window, clamp mesoappendix with vascular ligation
- Skeletonize appendix
- Crush and tie the appendix base
- Excise and remove appendix
- Suture ligate base of appendix

Closure

- Do a final abdominal inspection
- Close peritoneum
- Close muscle layers
- Close subcutaneous tissue
- Close skin

Operative Procedure Dictation

AMPATH Surgical App

Operative Note Dictation

Describe all the steps of the appendectomy procedure in detail as you would in an operative note and dictate it on your phone.

Click on the audio icon above to submit your audio of your operative note dictation

Postoperative Care

AMPATH Surgical App

1 | Post-operative Care

- A simple appendicitis will require <24 hours of antibiotics.
- Once anaesthesia medications have metabolized, the patient may ambulate and eat a regular diet
- On daily rounds, assess the wound for signs of infection
- The inpatient stay will depend on the patient's clinical condition.

2 | Post-Operative Note

It is essential to keep meticulous notes from procedures and provide a postoperative note for the patient's records. If the patient requires an additional surgery, the post-operative note will provide insight for the future operating surgeon.

Incision and Approach

Findings

Closure

Postoperative Instructions

Cognitive Test

AMPATH Surgical App

Cognitive Test

AMPATH Surgical App

Cognitive Test Question

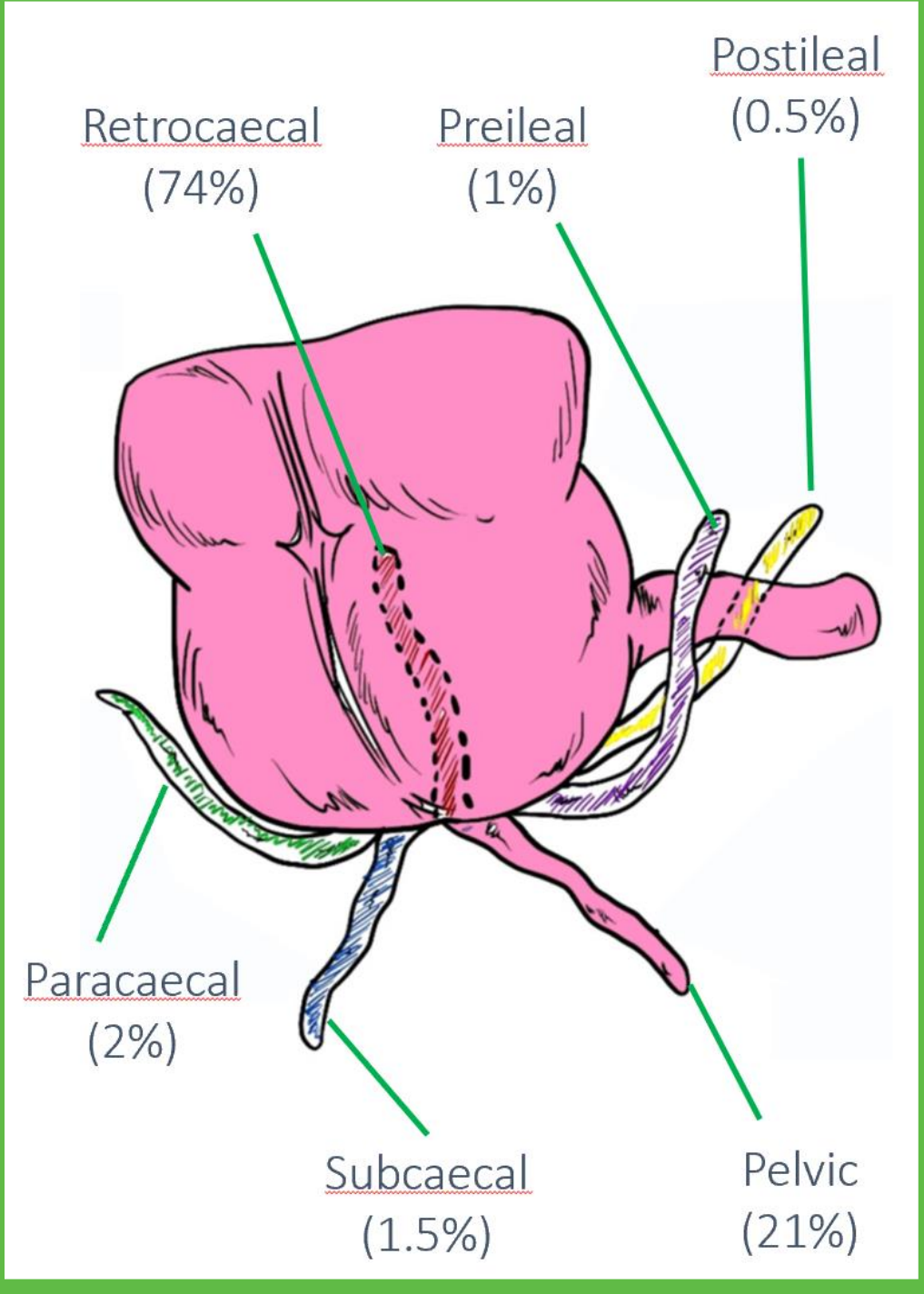
The most common position of the appendix is:

A. Paracaecal
B. Pelvic
C. Preileal
D. Retrocaecal
E. Subcaecal

Example Question

The most common position of

The correct answer is D, Retrocaecal (74%).



Cognitive Test Question

Which of the following is not part of the Alvarado score?

A. Migration of pain
B. Anorexia
C. Elevated temperature
D. Leucocytosis
E. Diarrhoea

Cognitive Test Question

What would you look for on ultrasound images for a patient with appendicitis?

A. Appendix diameter = 4 mm
B. Wall thickness = 1 mm
C. Compressible appendix
D. Hypoechoic fluid-filled lumen with hyperechoic mucosa/submucosa and hypoechoic muscularis layer

Cognitive Test Question

Where is McBurney's point?

A. The lateral third between the anterior superior iliac spine and the umbilicus
B. The umbilicus
C. The point of maximal tenderness
D. The pubic symphysis

Cognitive Test Question

Which way do the right external oblique muscle fibres point?

A. Transversely
B. Angled upward to the left
C. Angled downward to the left
D. Longitudinally

Cognitive Test Question

How long should a patient be on antibiotics for simple appendicitis?

A. 120 minutes
B. <24 hours
C. 3 days
D. 7 days

Cognitive Test Question

Which of the following is not a way to confirm the identity of the appendix?

A. Tubular structure with a blind end
B. Convergence of the taenia coli
C. Identifying another tubular structure attached to the cecum
D. Attached to the uterus

Cognitive Test Question

What will you find in the mesoappendix?

A. Ureter
B. Appendiceal artery
C. Fallopian tube
D. Ileocecal artery

Cognitive Test Question

Which physical exam manoeuvre indicates a retroperitoneal appendix?

A. Blumberg's Sign
B. Rovsing's Sign
C. Psoas Sign
D. Obturator Sign

Cognitive Test Question

How should you suture close the skin?

A. Simple running suture
B. Subcuticular suture
C. Interrupted horizontal mattress sutures
D. Deep dermal sutures

Cognitive Test Question

What are typical post-operative orders for patients with simple appendicitis?

A. 5 days of antibiotics
B. Immobilization until abdominal pain resolves
C. Regular diet once anaesthesia is metabolized
D. Keep wound in operative dressing until patient returns for post-op appointment

Cognitive Test Question

While working up a patient with simple appendicitis, which lab values are most important to assess?

A. WBC, Potassium, Creatinine
B. Platelets, sodium, chloride
C. Haemoglobin, Sodium, Chloride
D. Haematocrit, urea, haemoglobin

Cognitive Test Question

If a 33-year-old man with simple appendicitis has a potassium of 3.2 and a creatinine of 1.4 preoperatively, what should you do prior to operating?

A. Order maintenance fluids
B. Order oral rehydration salts
C. Order a pregnancy test
D. Order resuscitation fluids and potassium

Simulation Model Setup

AMPATH Surgical App

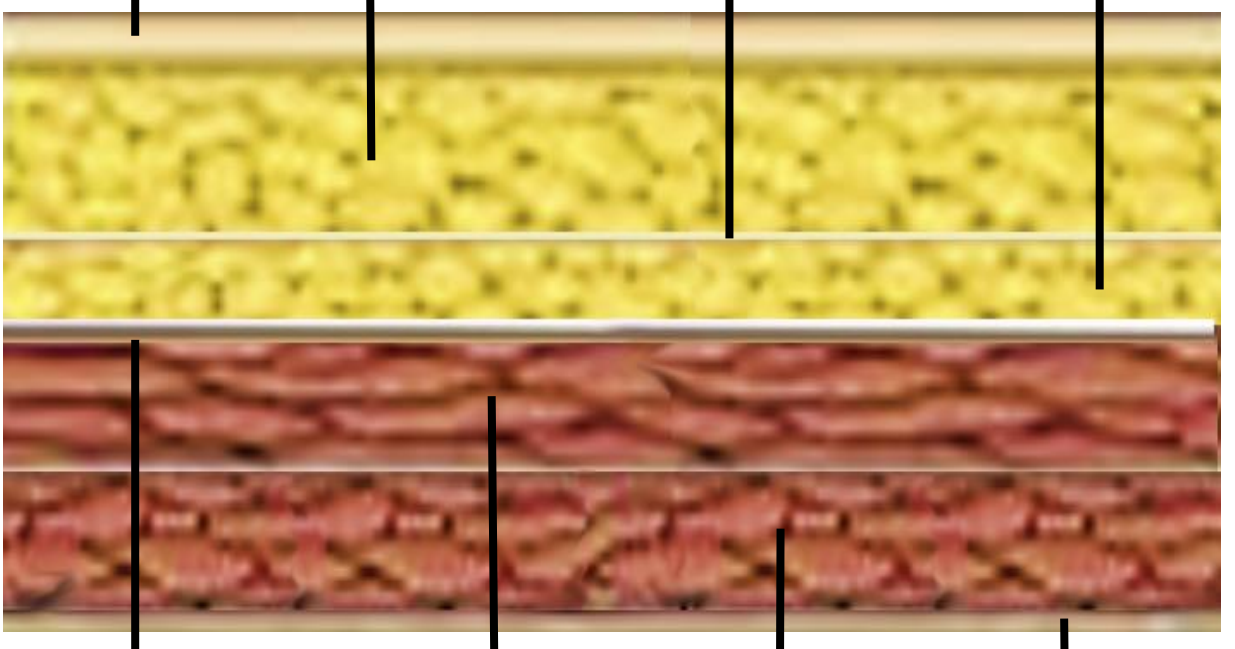
Building Your Simulation Model

The following components are part of building your simulation model.

- Camera stand
- Anterior Abdominal Wall
- Appendix-Cecum Complex
- Any tools that need to be created or substitutions

Anatomy Review

The model will contain 8 anterior abdominal wall layers that are reviewed below.



Anterior Abdominal Wall

The materials for the model will be described when you click on a layer.

- Skin
- Subcutaneous Fat
- Scarpa's Layer
- Additional Fatty Tissue
- External Oblique Aponeurosis
- External Oblique Muscle
- Internal Oblique Muscle
- Peritoneum

Anterior Abdominal Wall

The model will contain 8 anterior abdominal wall layers.

Skin

Skin

Made up of vinyl material

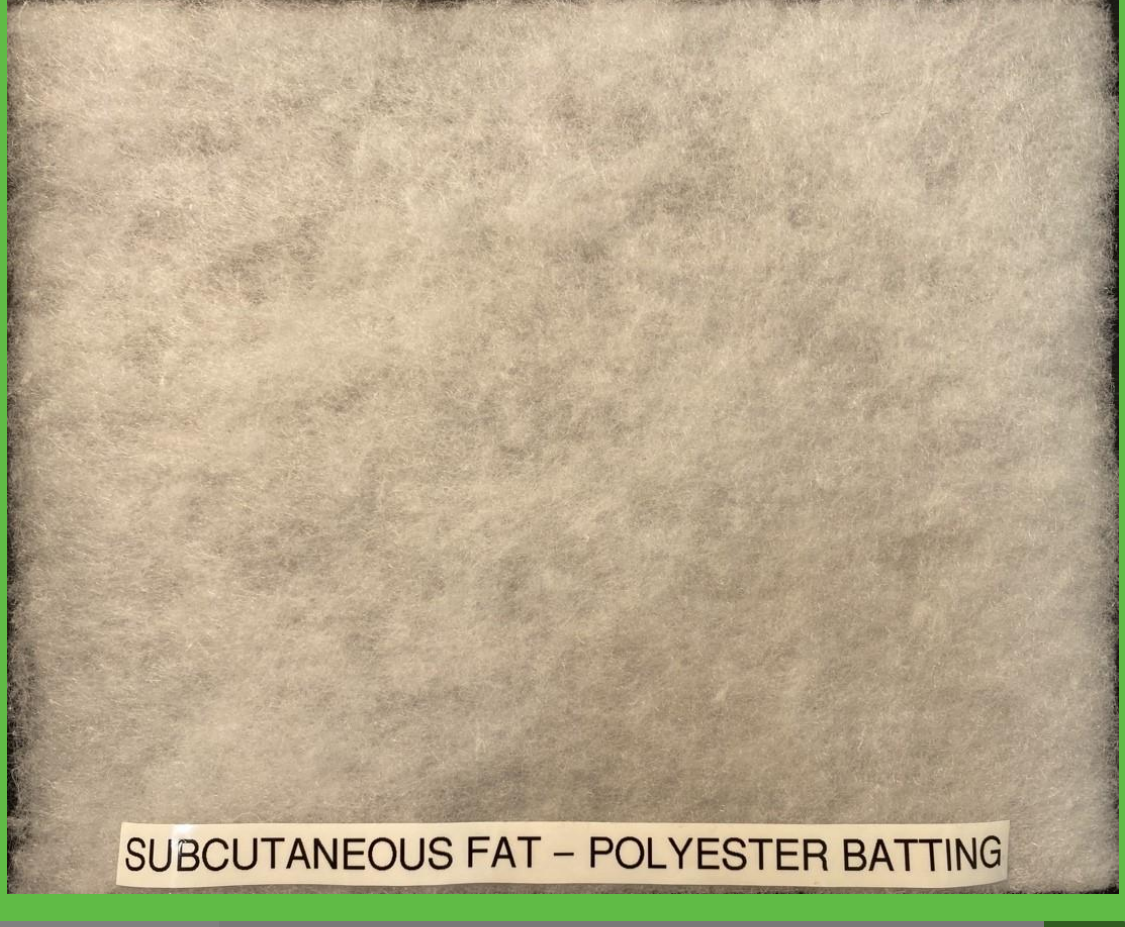
Anterior Abdominal Wall

The model will contain 8 anterior abdominal wall layers.

Skin

Subcutaneous Fat

Made up of Polyester batting
~ 1 cm thick



Anterior Abdominal Wall

The model will contain 8 anterior abdominal wall layers.

Skin

Subcutaneous Fat

Scarpa's Layer

Plastic wrap – 1 sheet

Anterior Abdominal Wall

The model will contain 8 anterior abdominal wall layers.

Skin

Additional Fatty Tissue

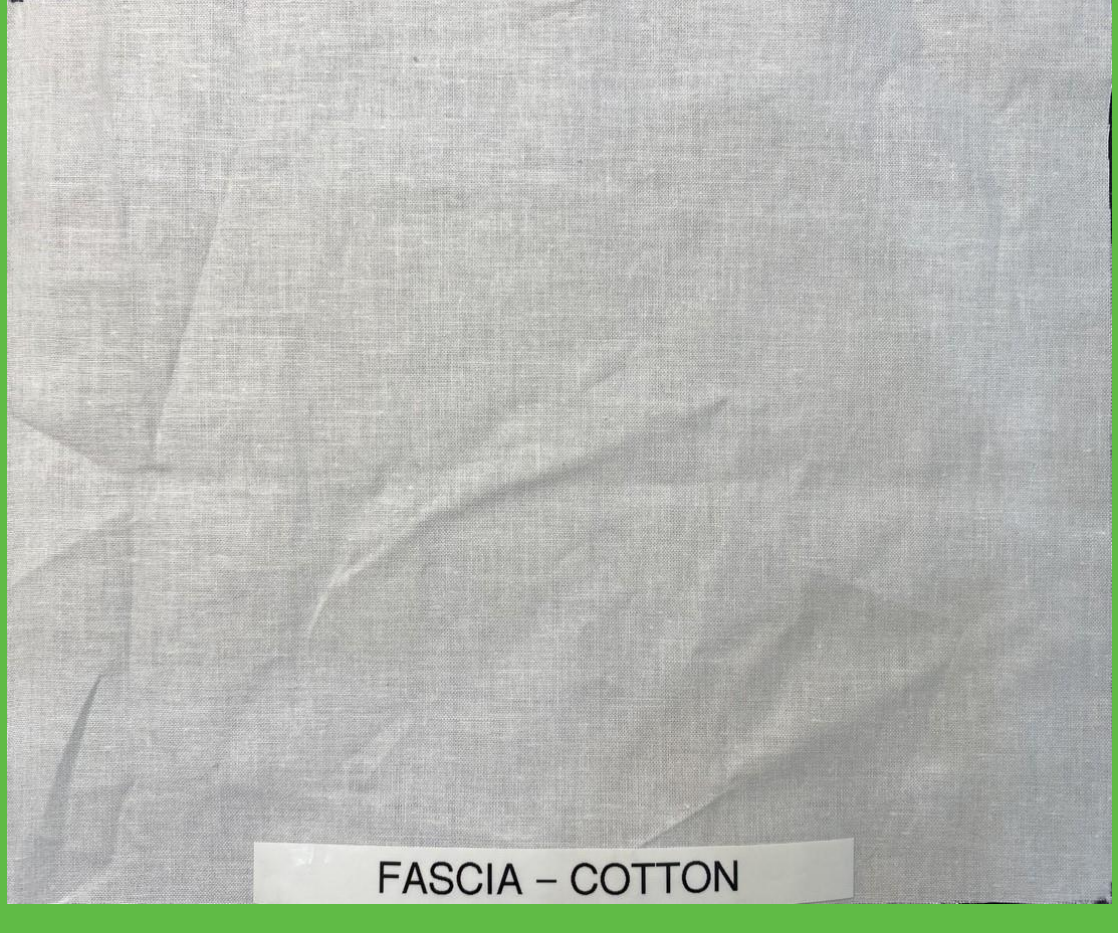
Thinner Polyester batting ~ 5 cm thick

Anterior Abdominal Wall

The model will contain 8 anterior abdominal wall layers.

External Oblique Aponeurosis

Facia made of cotton material like a pillow case

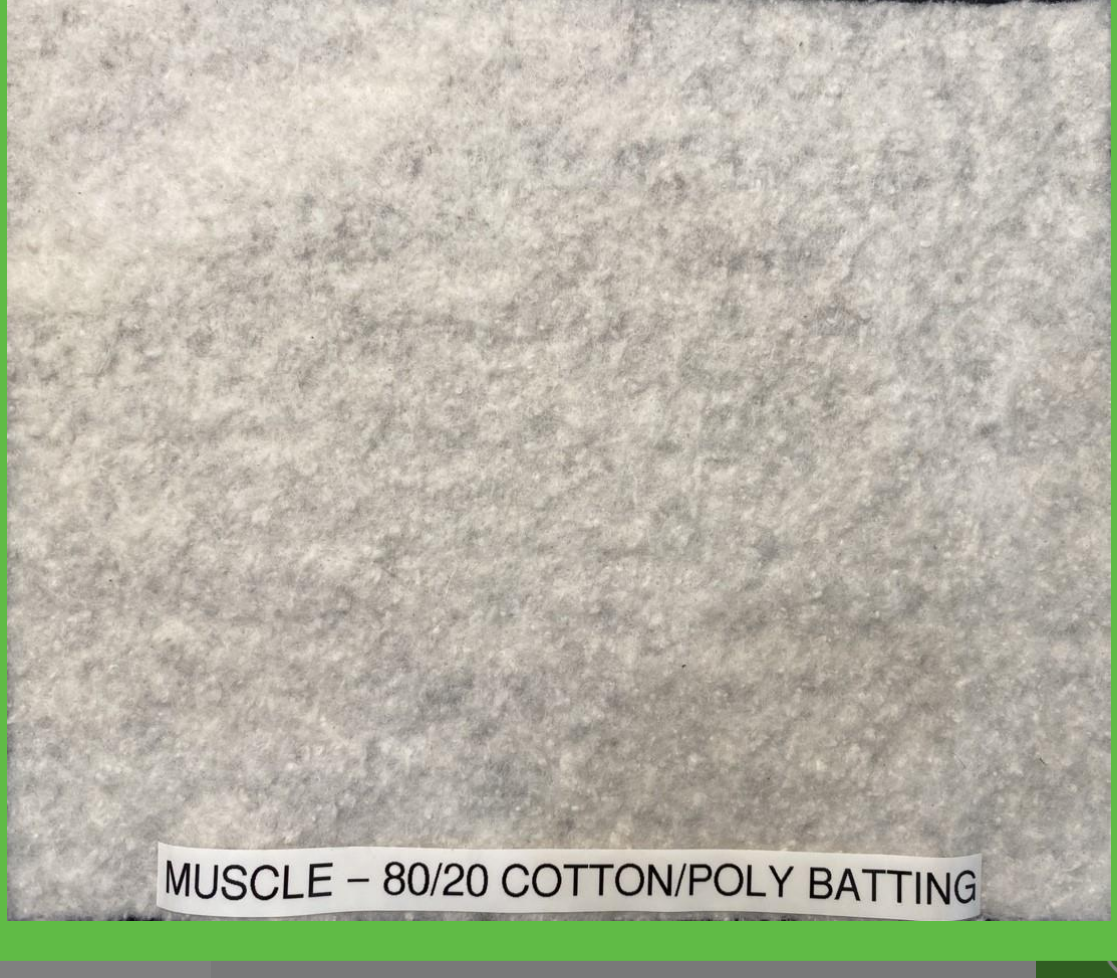


Anterior Abdominal Wall

The model will contain 8 anterior abdominal wall layers.

External Oblique Muscle

80% cotton/20% polyester batting

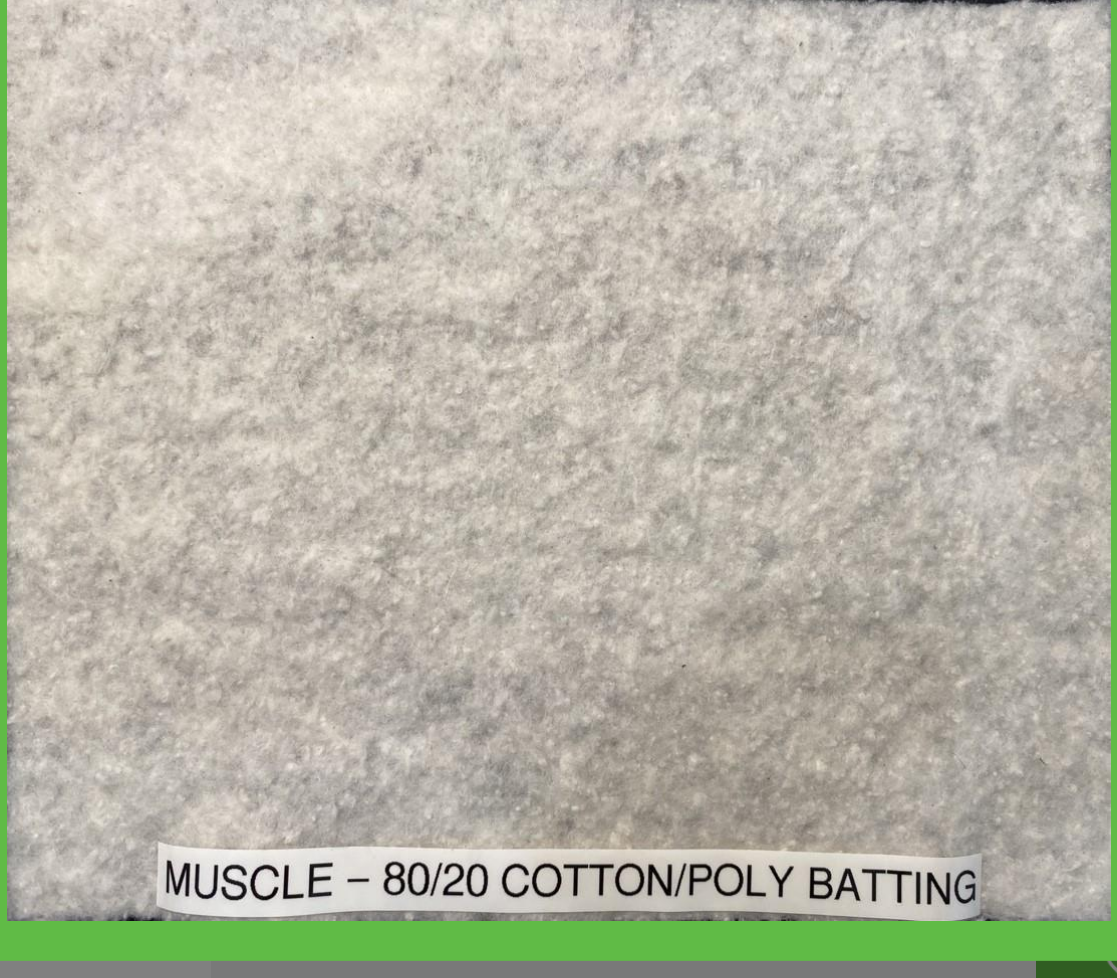


Anterior Abdominal Wall

The model will contain 8 anterior abdominal wall layers.

Internal Oblique Muscle

80% cotton/20% polyester batting



Anterior Abdominal Wall

The model will contain 8 anterior abdominal wall layers.

Skin

Peritoneum

Made up of plastic wrap – 2 layers thick

Equipment Needed

The equipment is needed for this simulation:

A. Skin layer materials
B. Plastic container
C. Scissors
D. Marker
E. Suture
F. Needle driver

Creating the Simulator

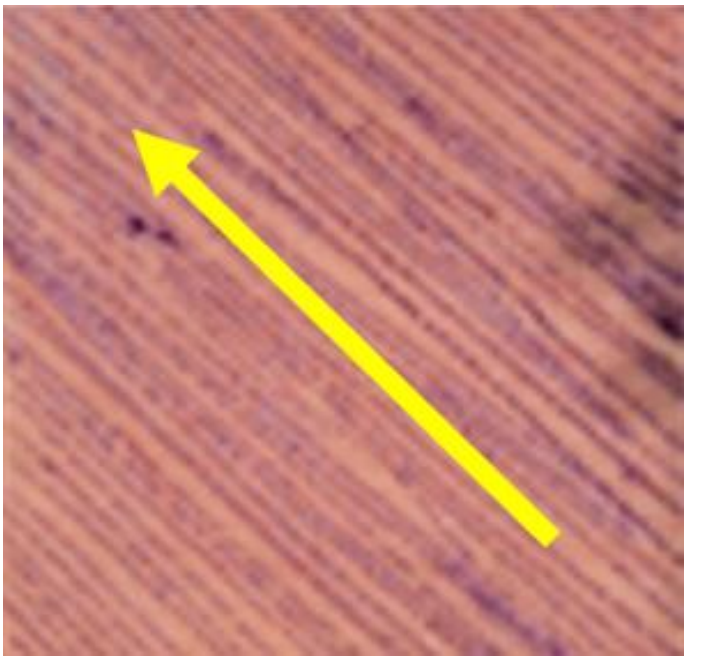
First get a plastic container that is 20 cm long, 10 cm wide and 10 cm high.

Now cut the materials for each skin layer so that it is 1 cm larger than the lid of your plastic container on all four sides

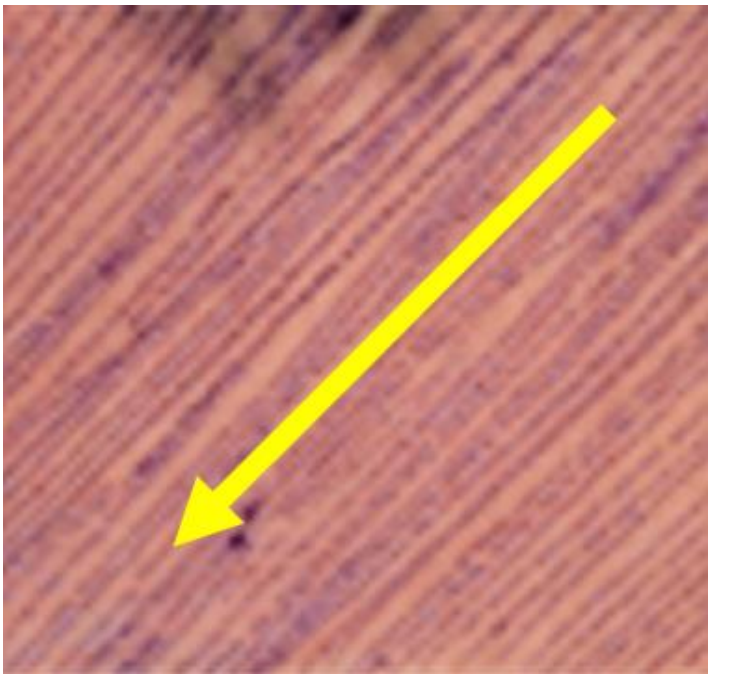
Muscle Striations

Now, you will draw on the striations your 2 muscle layers:

1. External Oblique Muscle: Mark the first layer with lines diagonally towards the upward left corner.



2. Internal Oblique Muscle: Mark the second layer with lines diagonally towards the lower left corner.



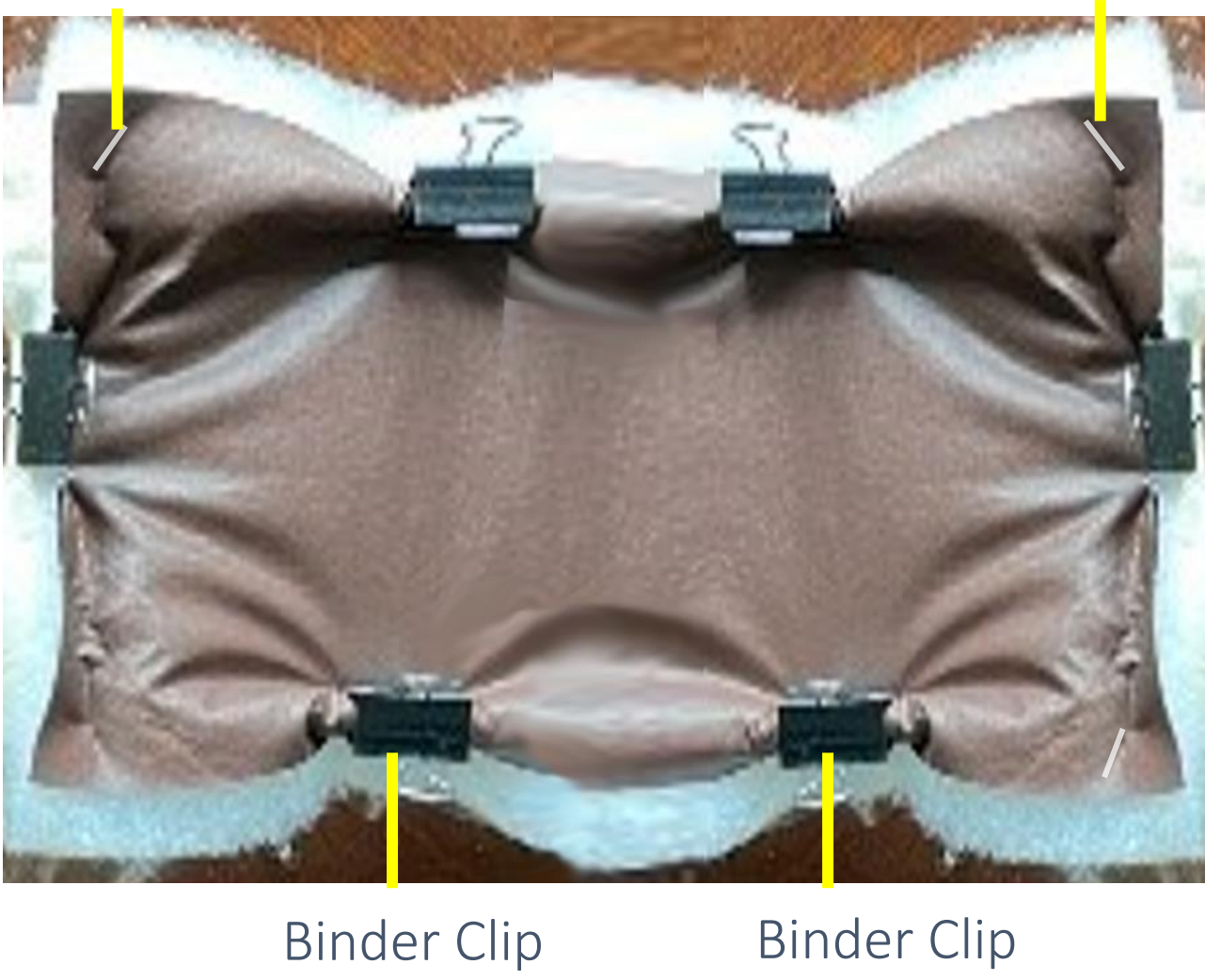
Assemble Abdominal Wall

Now it is time to assemble the layers of your abdominal wall model in the correct order.

1. Skin: Vinyl with the colored side down
2. Subcutaneous Fat: Polyester batting ~ 1 cm thick
3. Scarpa's Layer: Plastic wrap (1 layer)
4. Additional Fatty Tissue: Thinner polyester batting ~ .5 cm thick
5. External Oblique Aponeurosis: Cotton material like a pillowcase
6. External Oblique Muscle: 80%cotton/20% polyester batting with marked side facing down
7. Internal Oblique Muscle: 80%cotton/20% polyester batting with marked side facing down
8. Peritoneum: Plastic wrap (2 layers)

Assemble Abdominal Wall

1. After assembling the abdominal wall layers, place binder clips as described on each side to hold layers in place.
2. In each corner, place one simple interrupted stitch using any suture material.



Practice Suture Ties

Camera Use

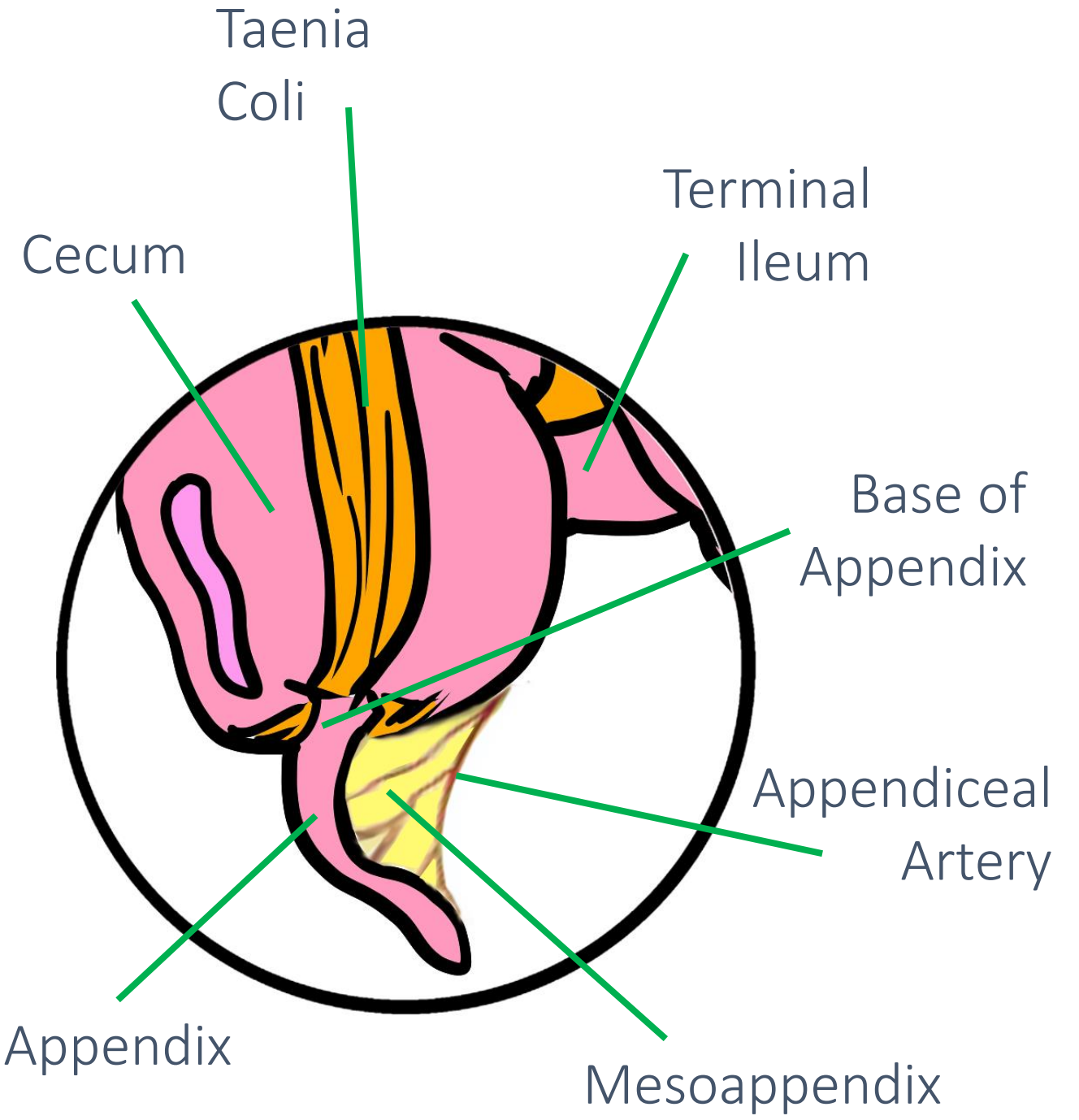
Using the camera stand and your phone, record your simple interrupted sutures and instrument knot tying.

Assemble Abdominal Wall

- Trim the excess plastic wrap from all the layers
- Now, you will attach the anterior abdominal to your plastic container by taking a binder clip and clipping the wall to the plastic container.
- Attach the anterior wall beneath the skin (vinyl) such that the first layer being clipped is the subcutaneous tissue (polyester batting)
- Attach the anterior abdominal wall twice on each long edge and once on each short edge
- Attach the skin (vinyl) twice – once on each short end
- Remove the binder clip arms on the surface of your model.

Anatomy Review

The intestinal portion of the model will contain the appendix, mesoappendix, cecum and terminal ileum.



Assemble Appendix Portions of the Model

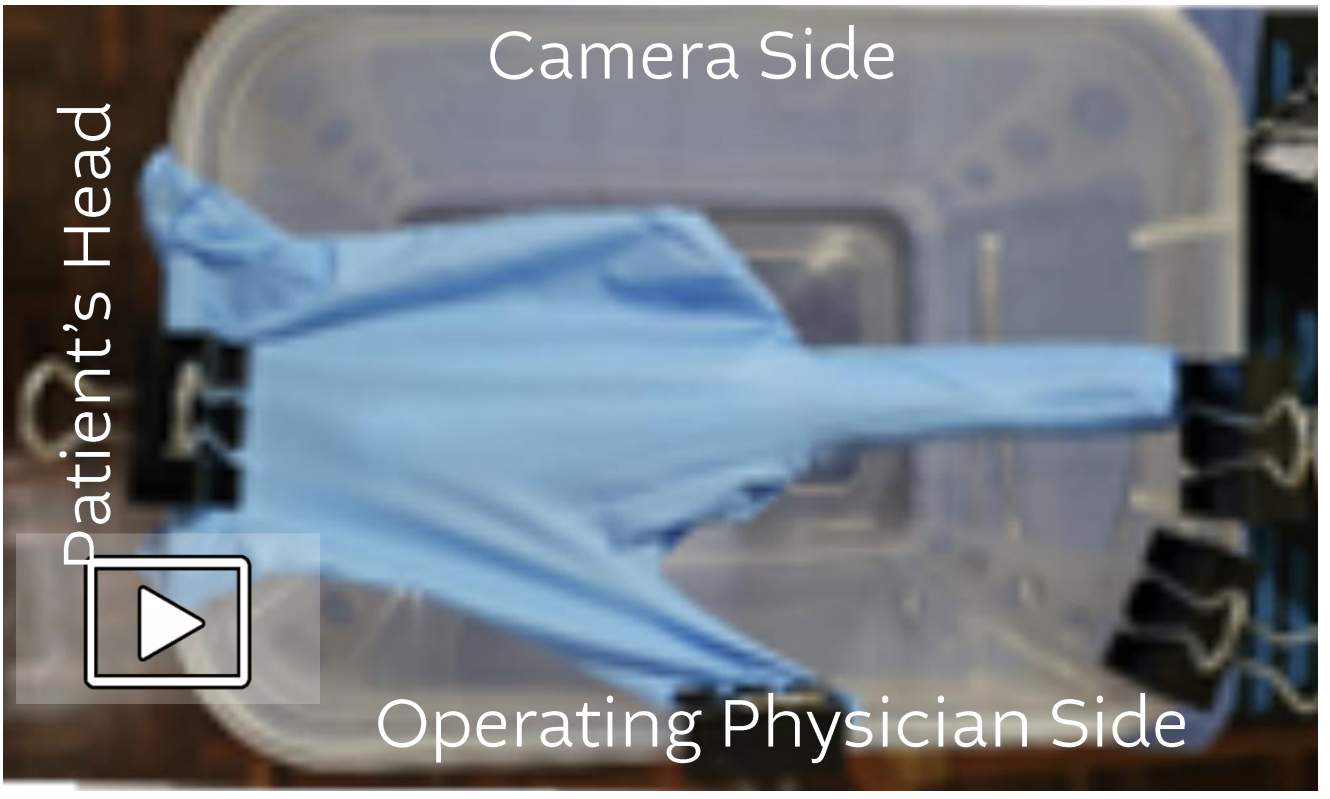
Supplies and Equipment Needed

- Procedural glove
- Suture material
- Needle Driver
- Haemostat
- Scissors
- Stocking
- Yarn
- Cotton
- Umbilical tape vs. mask edge

Assemble Appendix Model

Now begin assembly of the intestinal portion of your model.

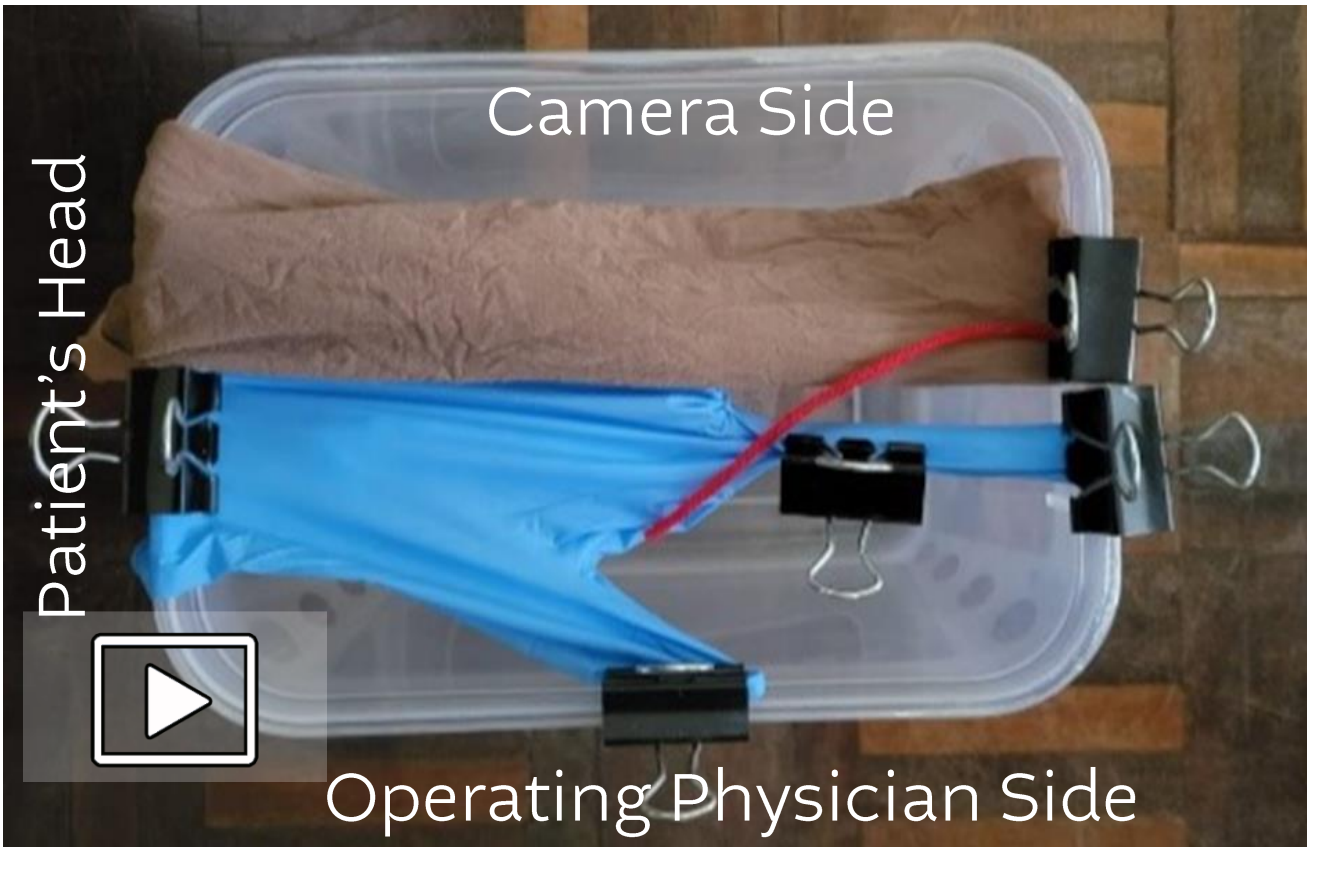
1. Suture ligate the fourth and fifth finger of the glove
2. Now, tie off the index finger of the glove with a simple instrument tie
3. Invert the glove such that all of your tied off fingers are on the inside
4. Take a piece of cotton and thin it out to be approximately 1 cm thick and the length of the glove's middle finger Using a haemostat, place the cotton inside the middle finger of the glove



Assemble Appendix Model

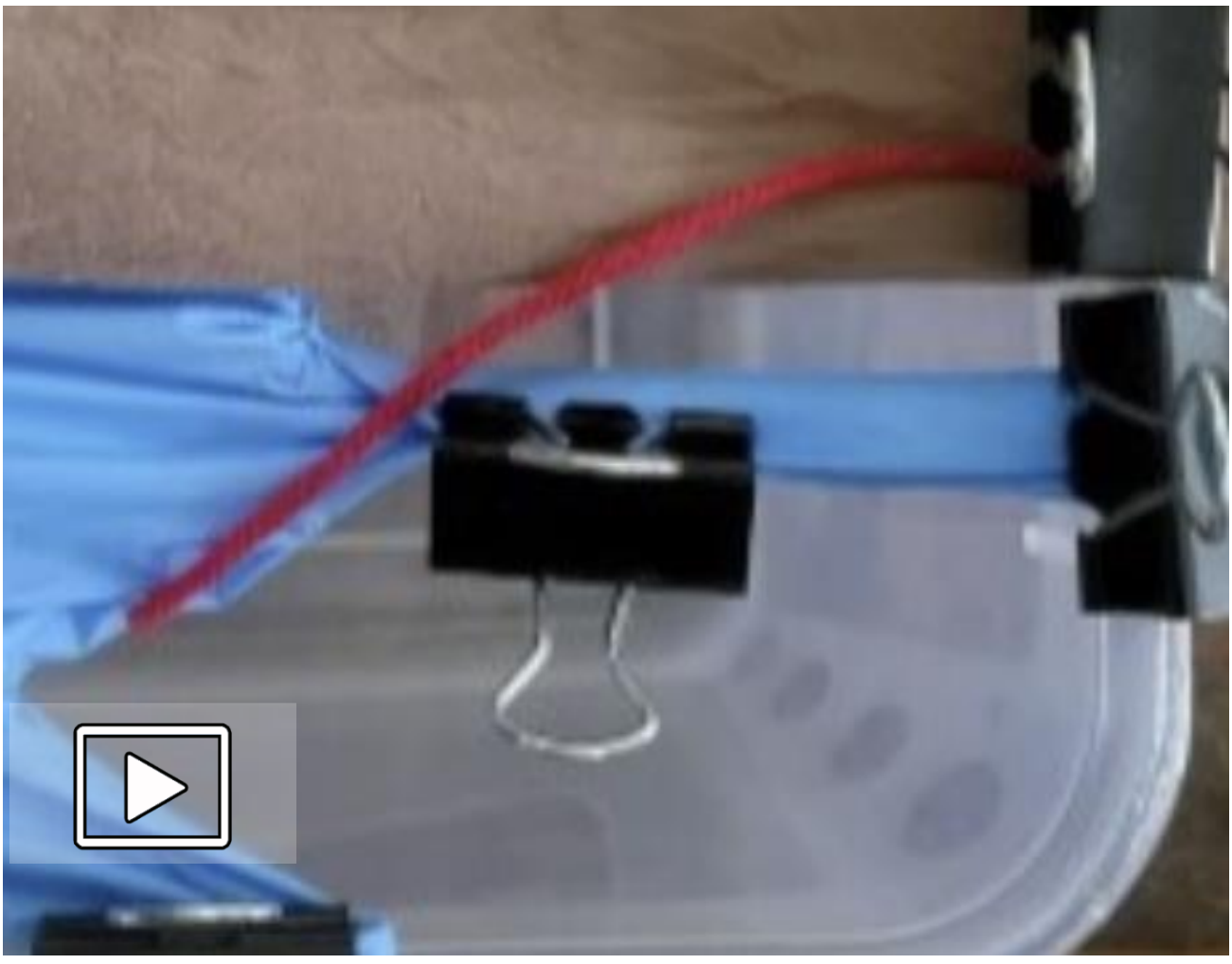
Continue the assembly of the intestinal portion of your model.

5. Using your plastic container, place the glove such that the wrist is attached to the short edge with a binder clip, the thumb is on the left side of the plastic container attached with a binder clip.
6. Measure and cut the stocking and yarn such that it is 2 cm longer than the middle finger of the glove.



Assemble Appendix Model

7. Place the yarn inside of the stocking and place a single, interrupted suture at one end to suture the yarn in place.
8. Fold the middle finger into thirds such that you can clip the superior surface ends with a binder clip .
9. At the distal tip of the finger, place one interrupted suture to tie the edges of the finger together.



Assemble Appendix Model

10. Do not cut the suture but use it to attach the stocking into the finger.
    a. Ensure that the yarn is on the opposite side of your suturing.
    b. Throw your stitches at the most 0.5 cm apart.
    c. As you continue stitching the stocking, tie a knot near the base of the finger where the finger meets the palm.
    d. Do not cut the suture after you tie and just continue suturing the stocking onto the glove until there is no more stocking left.
    e. Use an instrument tie the suture.

Assemble Appendix Model

11. Take the loose end of the stocking on the palm side, and place a single interrupted suture attaching the stocking close to the junction of the thumb and palm
12. On the other end of the stocking, place a stitch through the end of the stocking with the vessel and then one through the glove and instrument tie
    a. The mesoappendix is sinched to a nice round end

Assemble Appendix Model

13. Stuff the glove with cotton balls.
14. The last step will be to attach the anterior tenia coli.
    a. Cut the tie of the mask and cut it the length of the base of the middle finger to the proximal end of the glove.
    b. Affix the tie to the glove longitudinally with simple interrupted stitches.

Camera Placement

- After creating your model, you will set up the simulation.
- Change settings on camera.
- Place your camera onto the camera stand and a box or books such the lens is 39 cm high from the table and the lens is 24 cm from the base of the plastic container. You can use boxes or books to elevate the camera to the correct height.

Instrument and Material Substitution

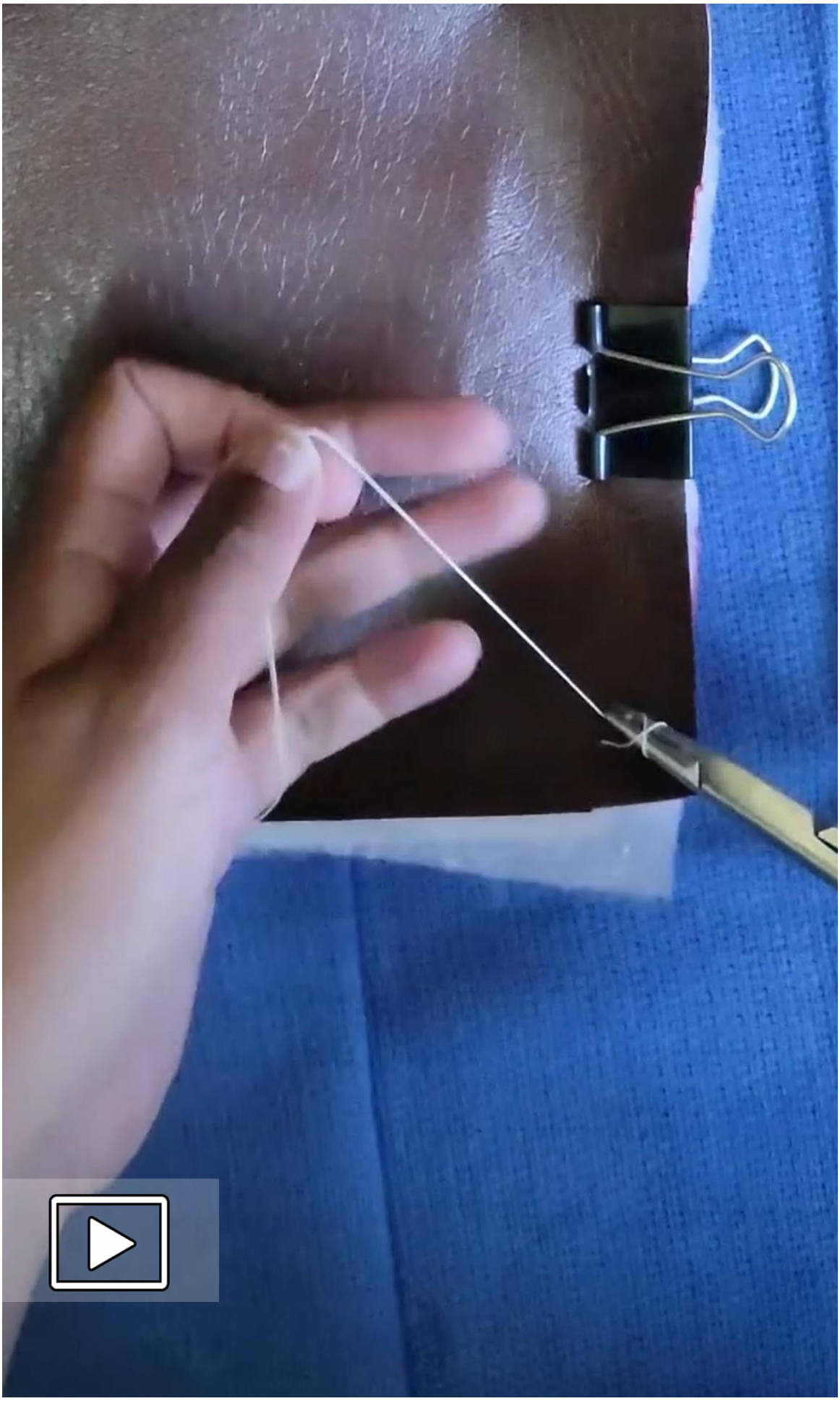
Although most of the instruments necessary to perform this simulation will be readily available at your hospital, some instrument and material substitutions are provided.

Substitutions PDF

Basic Skills Training

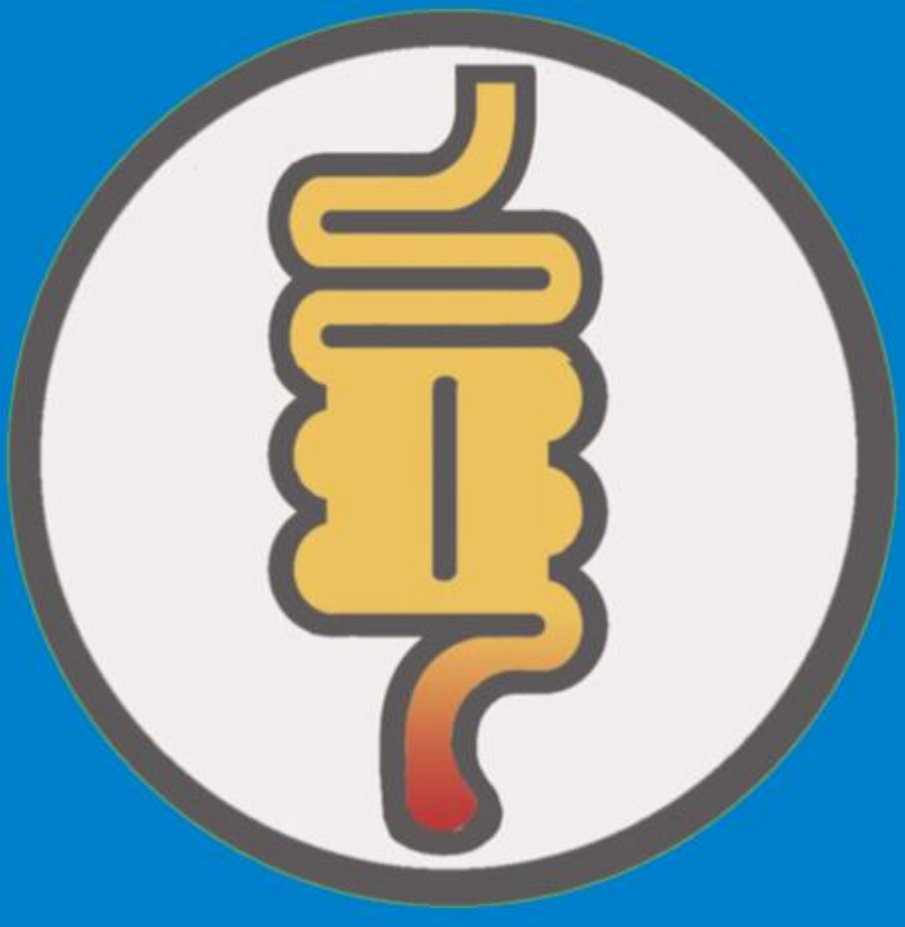
AMPATH Surgical App

1 Instrument Tying



2 Suture Ligation

3 | Tying Around Clam



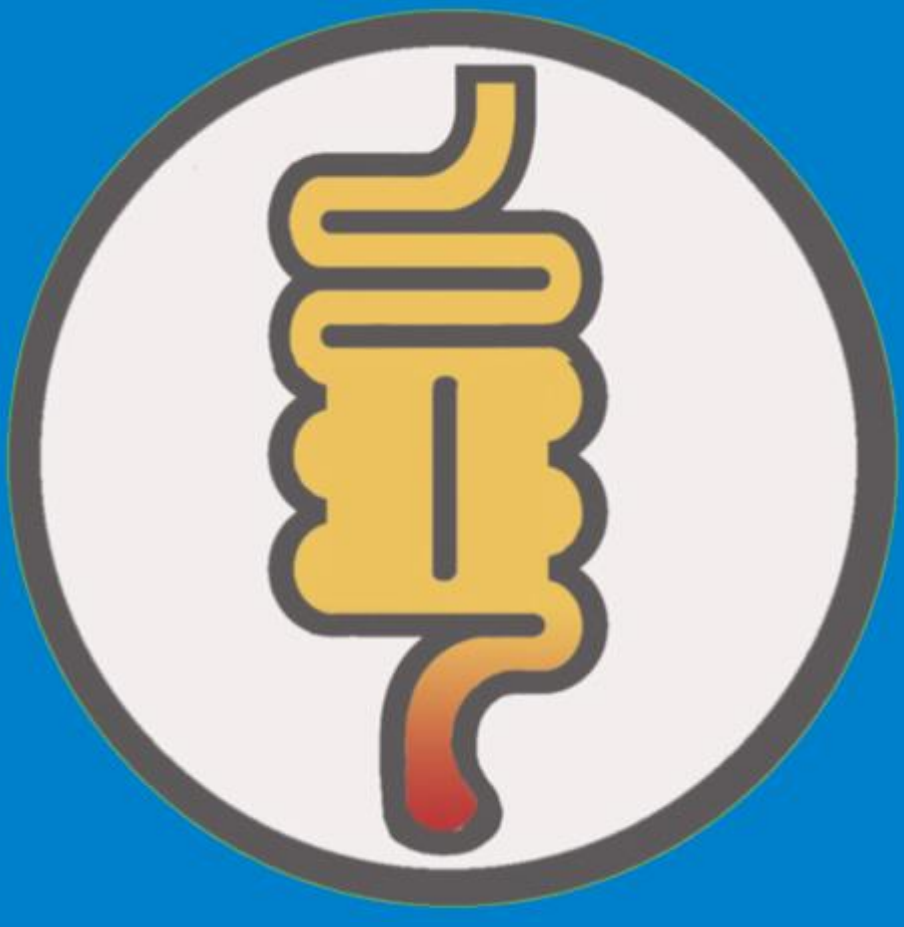
Simulation Training Overview

AMPATH Surgical App

Simulation Training Overview

After you have assembled your own simulation model and have practiced the basic skills, you are now ready for appendectomy procedure training on the model. You will practice each step of the procedure in the five general categories listed below:

1. Safe Abdominal Entry
2. Identification of the Appendix
3. Appendectomy
4. Abdominal Closure



Simulation Training

Safe Abdominal Entry

AMPATH Surgical App

1 | Identify McBurney's Point

A. Draw the line from the right anterior superior iliac spine (ASIS) to the umbilicus.
B. Identify the point of max tenderness (or McBurney's point).

Live Procedure Review

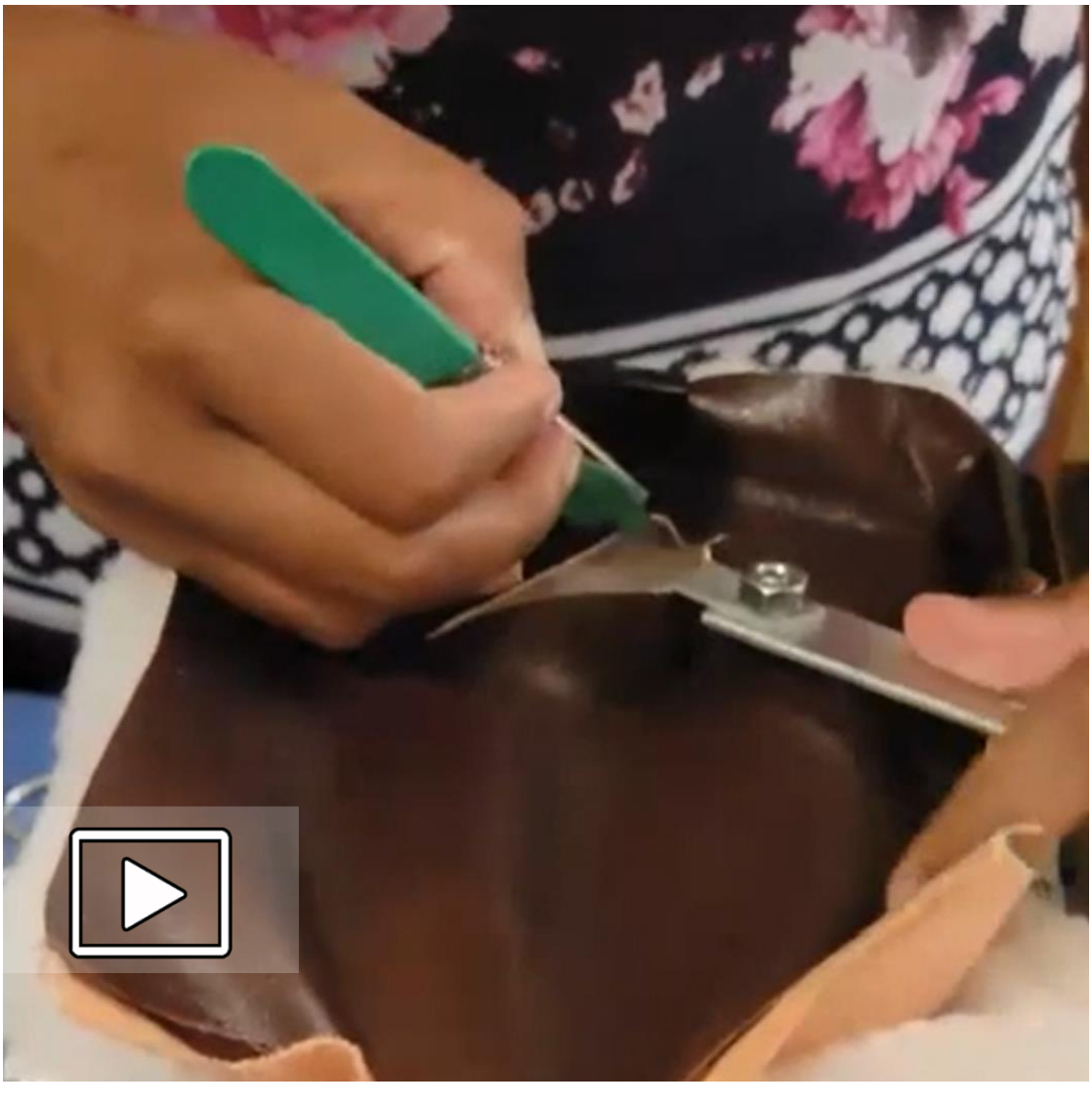
2 | Skin Incision

Using a scalpel make a 4-6 cm incision along lines of Langer that is bisected by the point of interest.

Live Procedure Review

3 Soft Tissue Dissection

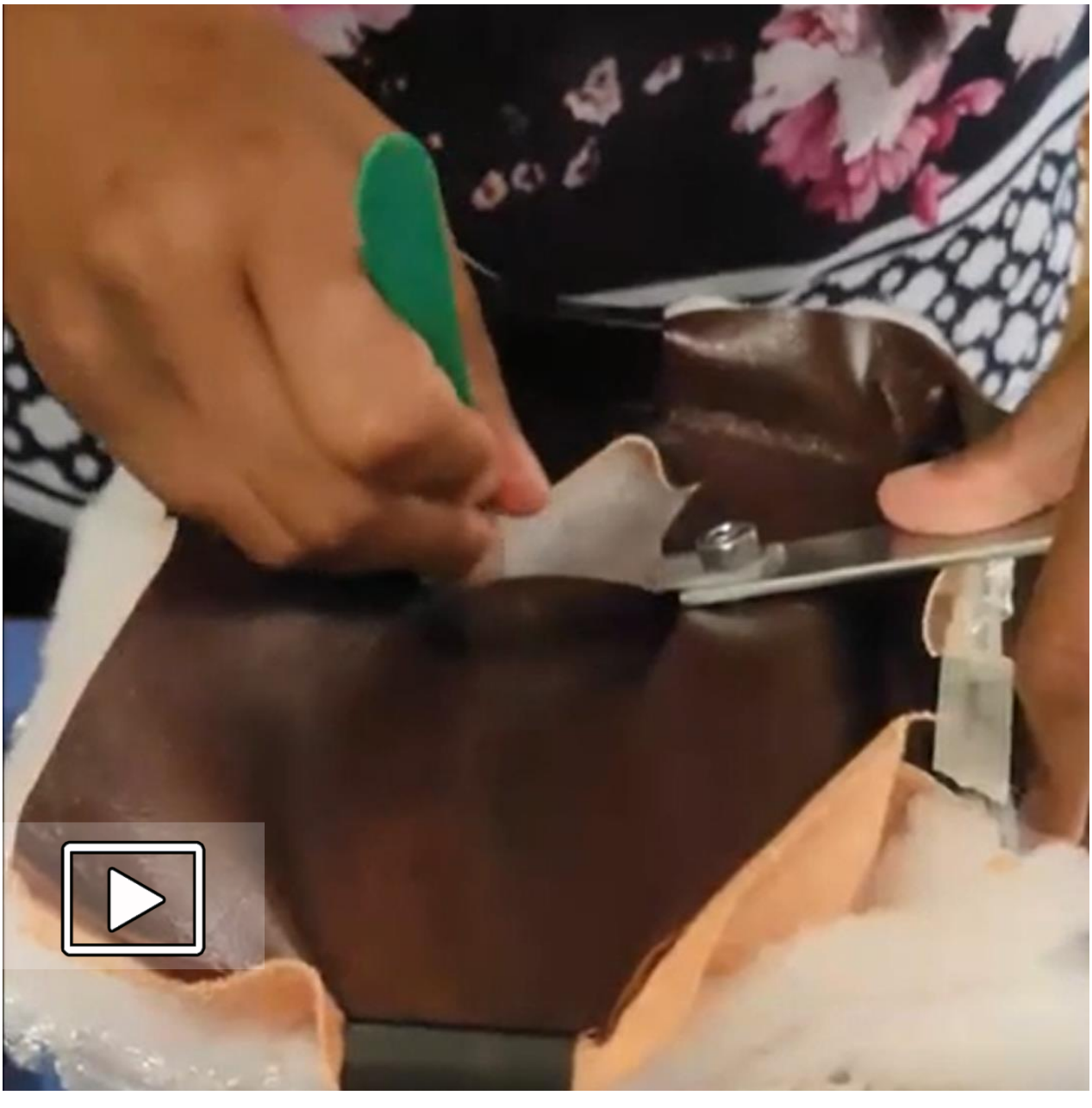
Use sharp dissection. There will be two layers including a fatty layer and then a membranous layer (Scarpa's). There may also be a small layer of fat below the membranous layer.



Live Procedure Review

4 | Aponeurosis Layer

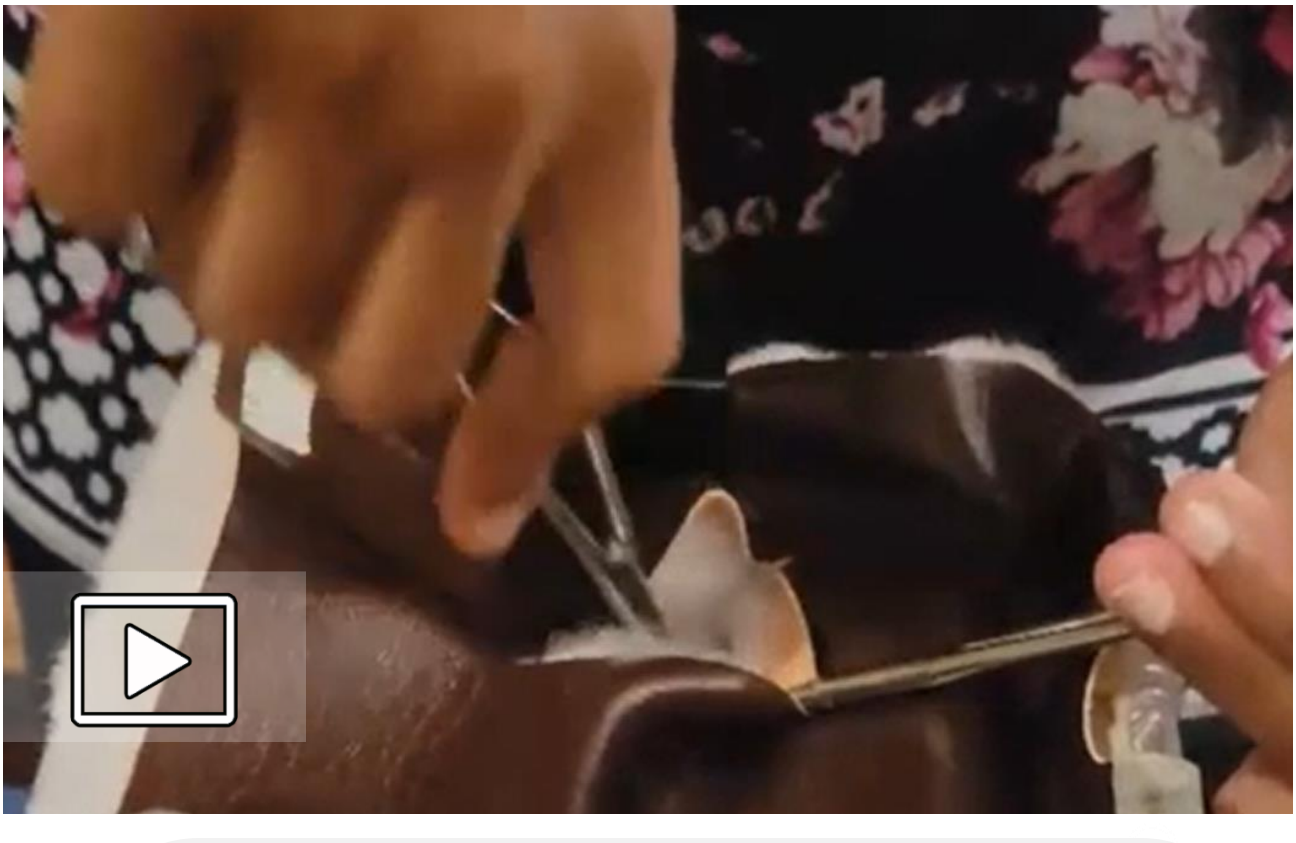
Incise the external oblique aponeurosis The fibers point medially to inferiorly.



Live Procedure Review

5 Muscle Dissection

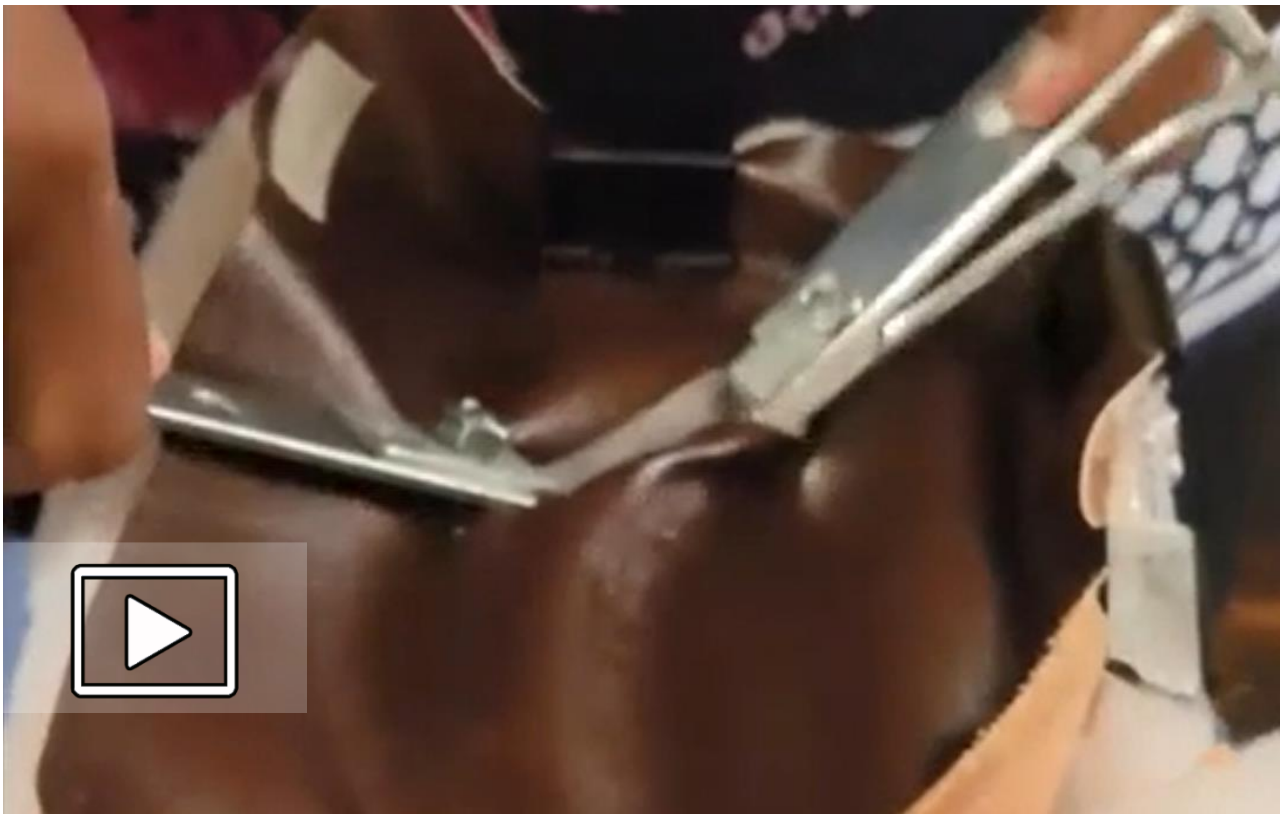
The first layer of the muscle to be dissected is the **external oblique**. Its fibers run parallel to the incision. To dissect through the muscle, you will put a haemostat into the muscle and bluntly spread it along the pattern of the muscle fibers to create an opening wide enough to fit two army-navy retractors. You will then place the retractors into the opening and pull to continue to spread the opening along the length of the muscle.



Live Procedure Review

6 Muscle Dissection Continued

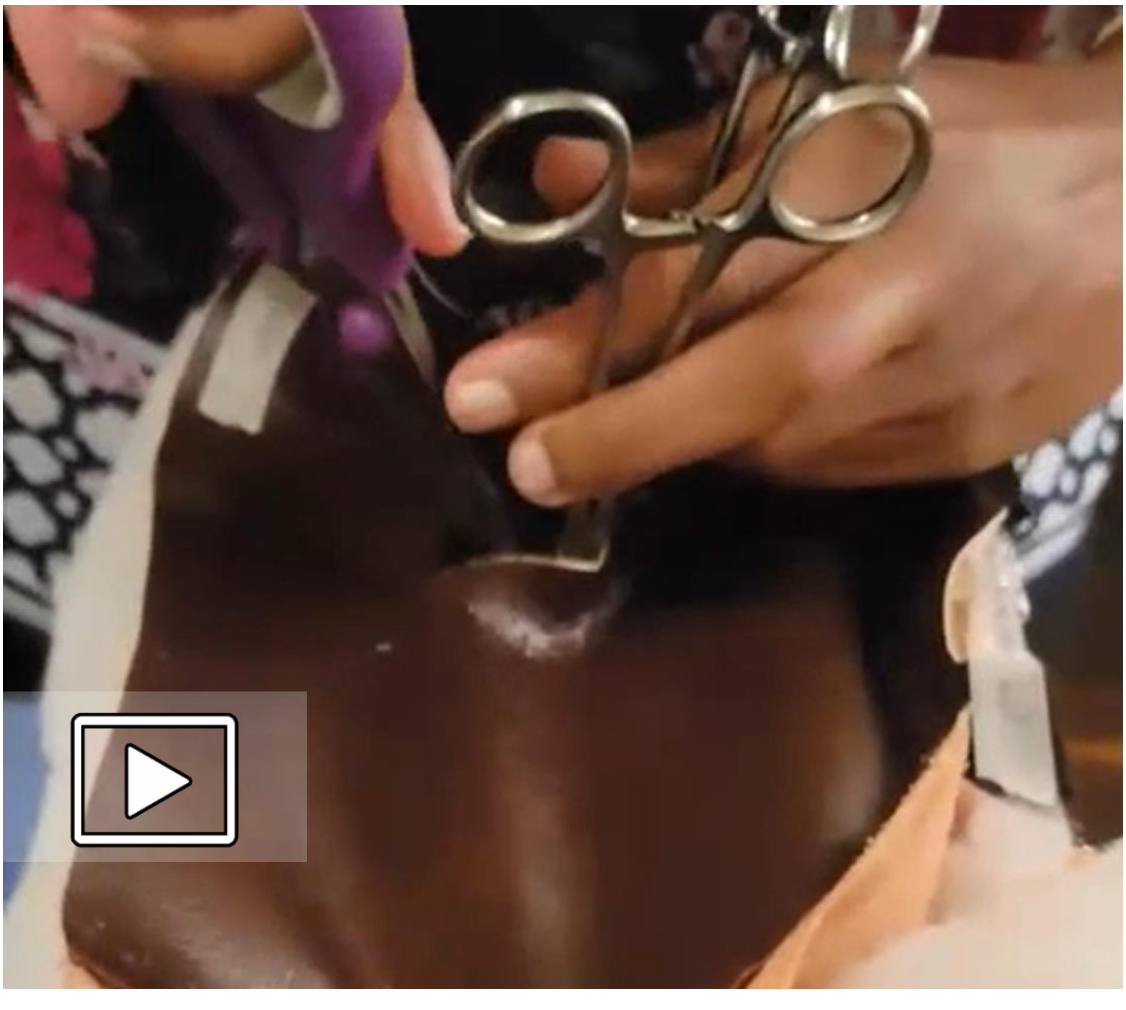
The second layer of the muscle to be dissected is the **internal oblique**. Put a haemostat into the muscle and bluntly spread it along the pattern of the muscle fibers to create an opening wide enough to fit two army-navy retractors. You will then place the retractors into the opening and pull to continue to spread the opening along the length of the muscle.



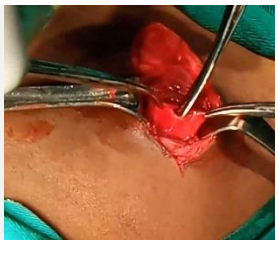
Live Procedure Review

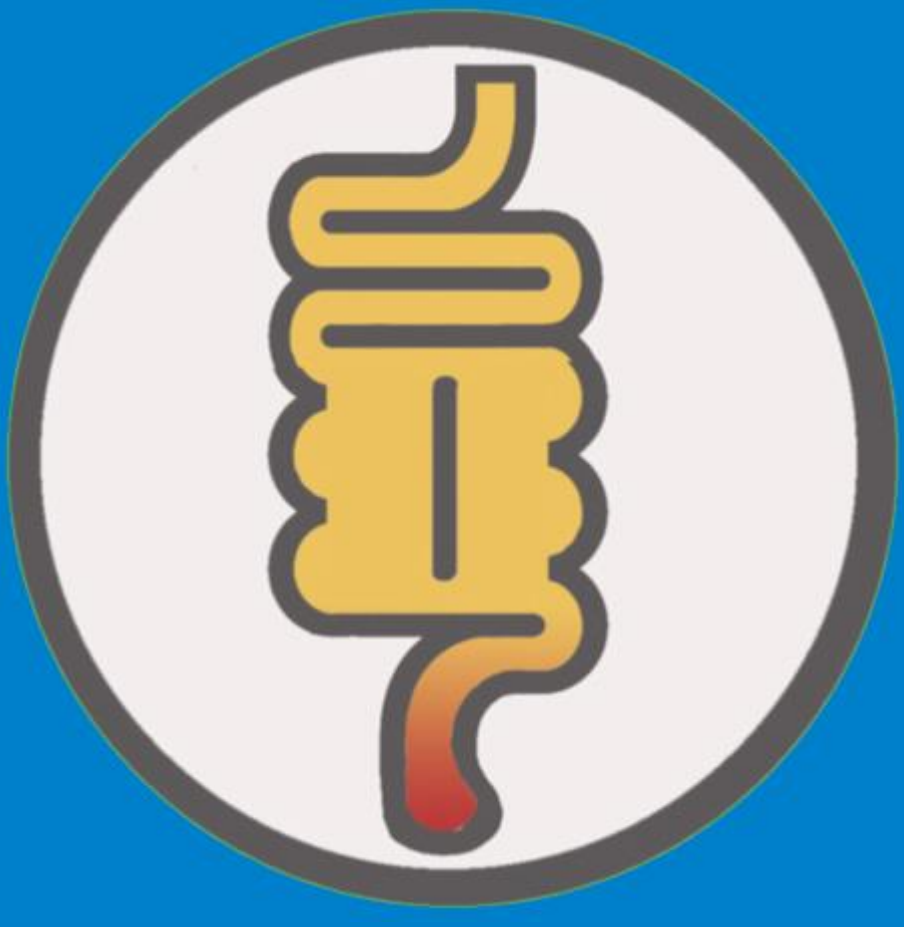
7 Peritoneum

Grasp the edge of the peritoneum with a haemostat and elevate it and place a second haemostat 5 mm away from the original. Then palpate the elevated peritoneum to ensure there is no bowel or omentum within the contents and then sharply incise it.



Live Procedure Review





Simulation Training

Identification of the Appendix

AMPATH Surgical App

1 Obtaining Proper Visualization

Retract the muscles with two army-navy retractors by tucking in the retractor under the peritoneum and elevating the muscle.

Live Procedure Review

2 | Identify the Cecum

Visualize the anterior taenia coli. Follow the taenia coli inferiorly to the base of the appendix. The cecum appears a lighter pink than the redder small bowel.

Need New Image/Video

Live Procedure Review

3 Deliver the Cecum

Grasp the cecum with a Babcock and using the Babcock in the left hand and the thumb and index in the right hand deliver the superior aspect first by retracting inferiorly and then the inferior portion by retracting superiorly.

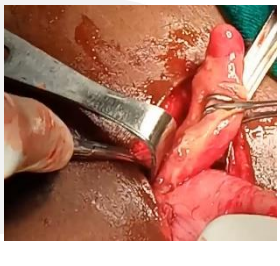
Live Procedure Review

4 | Identify the Appendix

Follow the taenia coli where all 3 converge at the base of the appendix and atraumatically grasp the appendix within the Babcock such that it encases the appendix. Confirm the identity of the appendix by identifying attachment to the cecum and identification of the terminal ileum.

Need New Image/Video

Live Procedure Review



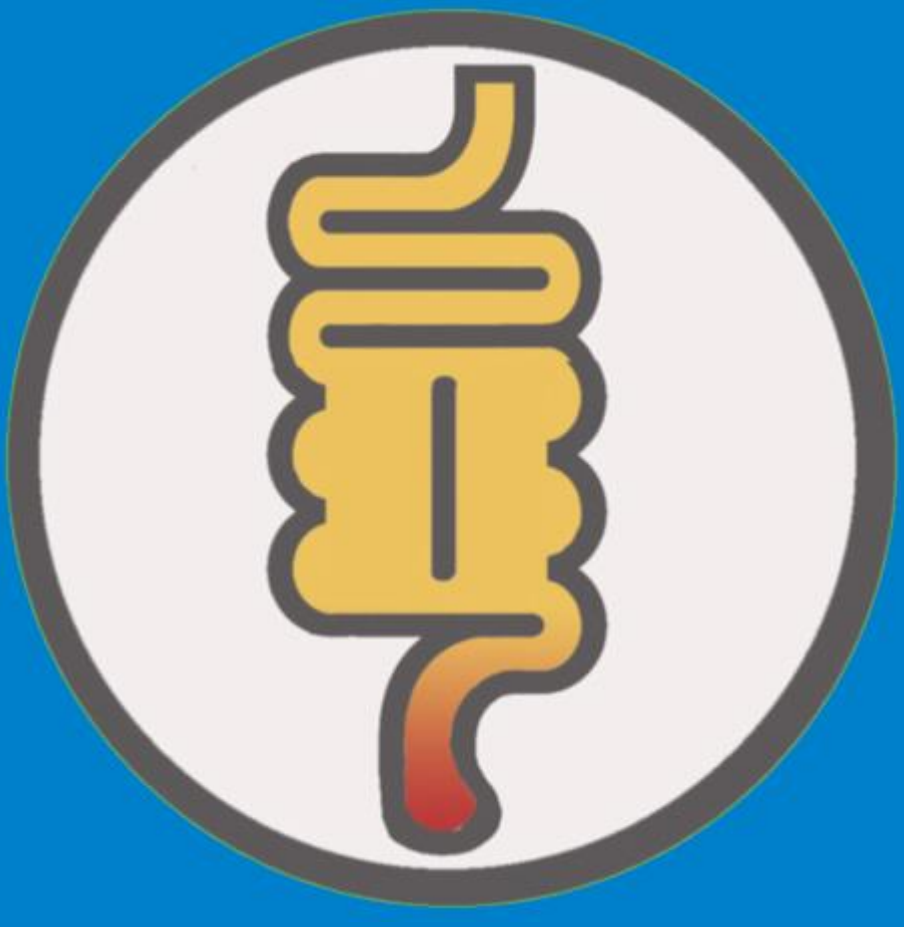
5 | Assess the Appendix

Determine the extent of pathology of the appendix to determine next steps of the procedure.

- Inflamed Appendix: Complete the appendectomy
- Gangrenous Base: Assess if there is enough healthy cecum. If so, complete the appendectomy; if not, consider cecectomy or right hemicolectomy
- Caecal tumour: Close the patient and write your operative note. Send the patient and the operative note to the referral centre for oncologic resection.

Need New Image/Video

Live Procedure Review



Simulation Training

Appendectomy

AMPATH Surgical App

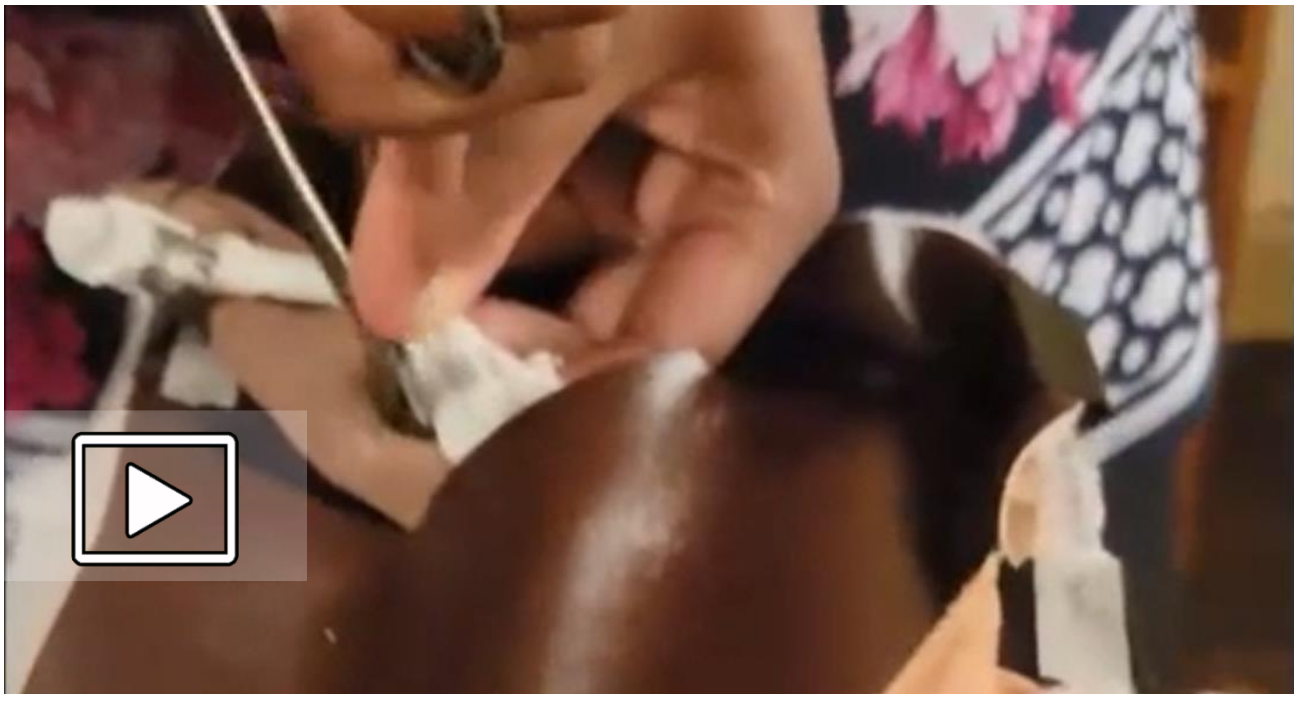
1 Identify the Mesoappendix

Identify the mesoappendix. The mesoappendix contains the appendiceal artery.

Live Procedure Review

2 | Create a Window

Create a small window within the mesoappendix near the base of the appendix by using a haemostat with the curve of the haemostat follows the curve of the appendix. Gently insert the haemostat tips into the mesoappendix near the base of the appendix and slowly spread, remove the haemostats while they are still open and repeat until you have created a window within the mesoappendix.



Live Procedure Review

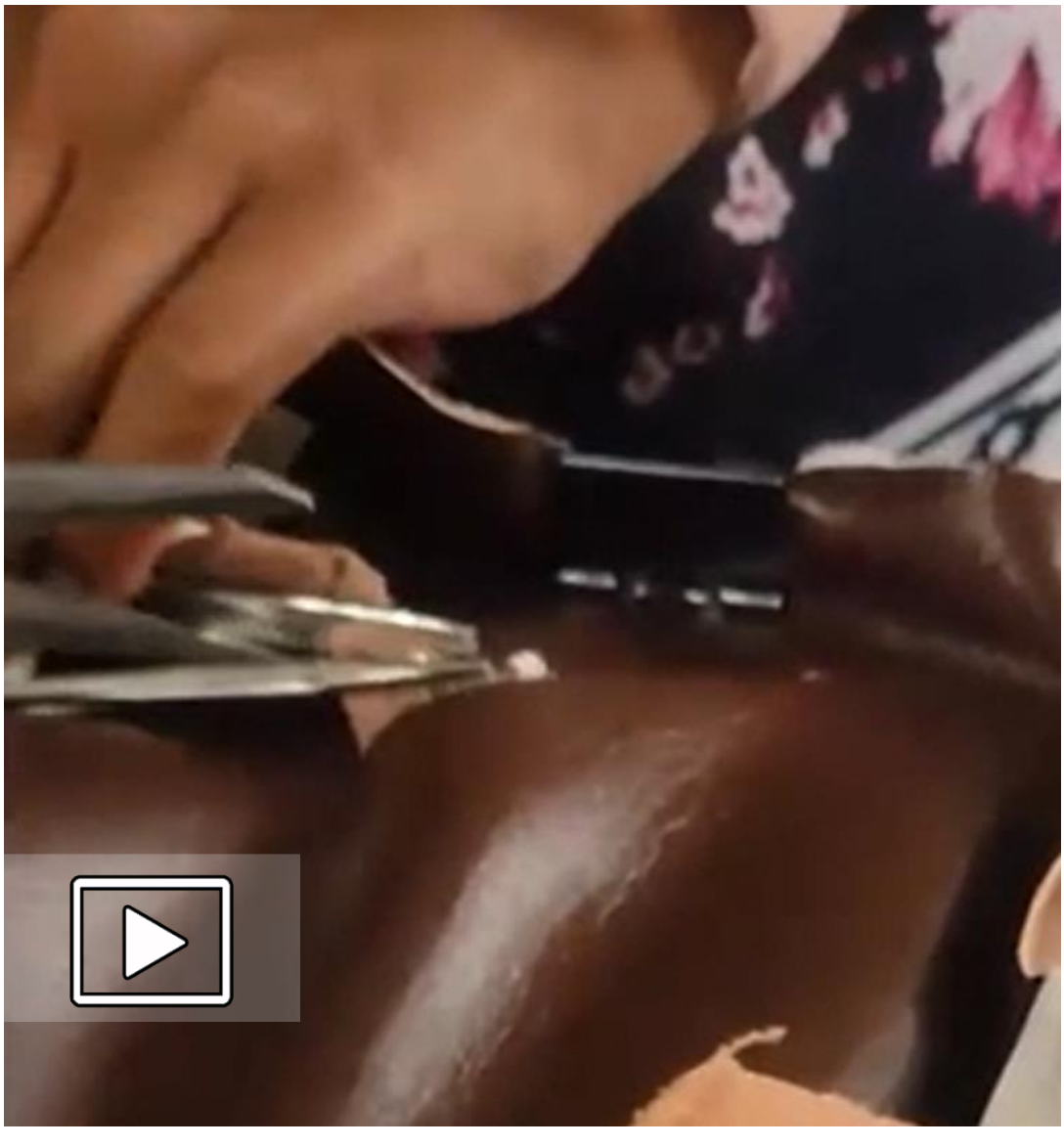
3 Clamp the Mesoappendix

Clamp the portion of the mesoappendix proximally near the base of the appendix with a haemostat. Clamp the portion of the mesoappendix distally near the end of the window with another haemostat.

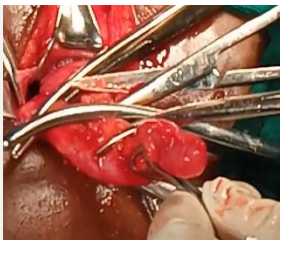
Live Procedure Review

4 Cut the Mesoappendix

Using Metzenbaum scissors, divide the mesoappendix between the haemostats but leave the haemostats in place.

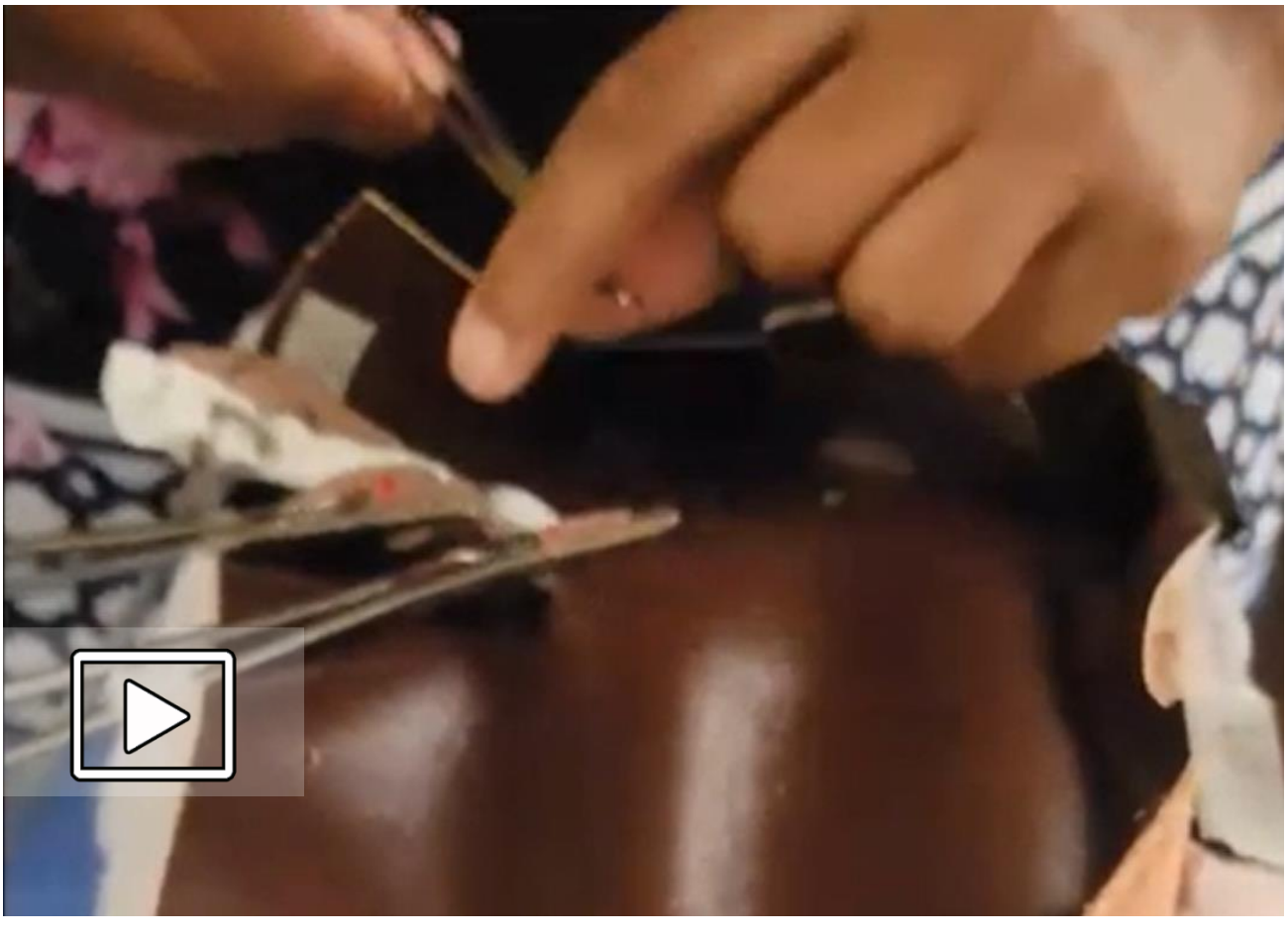


Live Procedure Review



5 | Ligate the Mesoappendix

Using the end of your 2-0 vircyl, pass the suture around the haemostat, bring the suture down to the clamp in a tip-to-tip fashion which will allow the suture to be hooked under the clamp and throw your first knot.



Live Procedure Review

6 | Remove Proximal Clamp

After your knot has been tightened, ask your assistant to slowly remove the haemostat from the vessel to ensure haemostasis; complete a total of 3 knots for vicryl.

Need New Image/Video

Live Procedure Review

7 | Skeletonize Base of Appendix

Skeletonize the base of the appendix using blunt dissection.

Need New Image/Video

Live Procedure Review

8 Place a Distal Clamp on the Appendix

Clamp the appendix 5 mm from the base with a Kelly clamp. Now, place another Kelly clamp 3-5 mm distally along the appendix with enough space to fit a scalpel in between the two clamps

Live Procedure Review

9 Excise the Appendix

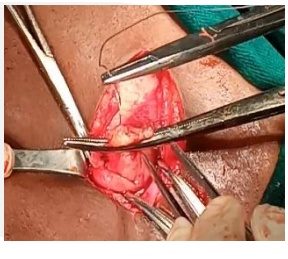
Excise the appendix in between the clamps with a scalpel or scissors. Remove the specimen from the abdomen.

Live Procedure Review

10 Suture Ligate Base of the Appendix

Suture ligate the base of the appendix. If cecum appears to friable, you may have to run a suture through healthy cecum to prevent fistula formation.

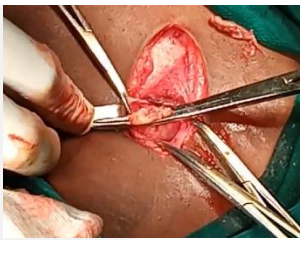
Live Procedure Review

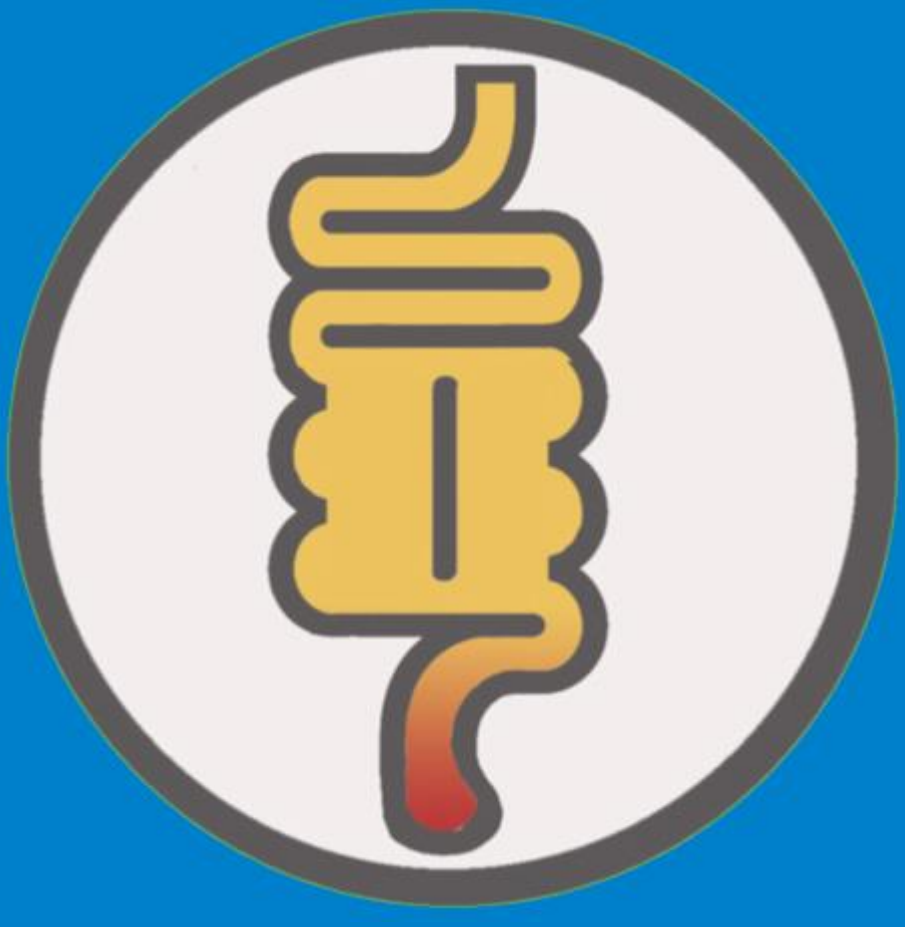


11 Inspect the Appendiceal Stump

Inspect the appendiceal stump. If stump appears intact, no further steps are necessary. If the base of the appendix is very indurated: Bury the stump using the remaining 2-0 vicryl, place a purse string around the base of the appendix.

Live Procedure Review





Simulation Training

Abdominal Closure

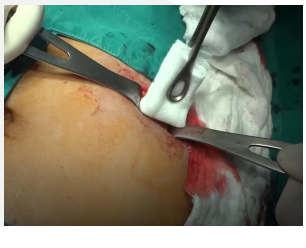
AMPATH Surgical App

1 Final Abdominal Inspection

Ensure haemostasis of the mesoappendix prior to placing the cecum and ileum back into the abdomen. Inspect the pelvis by placing a suction into the pelvis to ensure no purulence.

Need New Image/Video

Live Procedure Review



2 Closure of External Oblique Aponeurosis

Remove retractors slowly, inspecting for haemostasis within the muscles. If there is bleeding, temporize with diathermy.

Close the external oblique aponeurosis with a 0-vicry running suture.

Need New Image/Video

Live Procedure Review

3 | Close Scarpa's Layer

Close the membranous layer (Scarpa's) with the remaining 0-vicryl suture.

Need New Image/Video

Live Procedure Review

4 | Close Skin Incision

Use interrupted sutures if the appendix was grossly purulent. Space sutures approximately 1 cm apart.

Need New Image/Video

Live Procedure Review

Simulation Assessment

AMPATH Surgical App

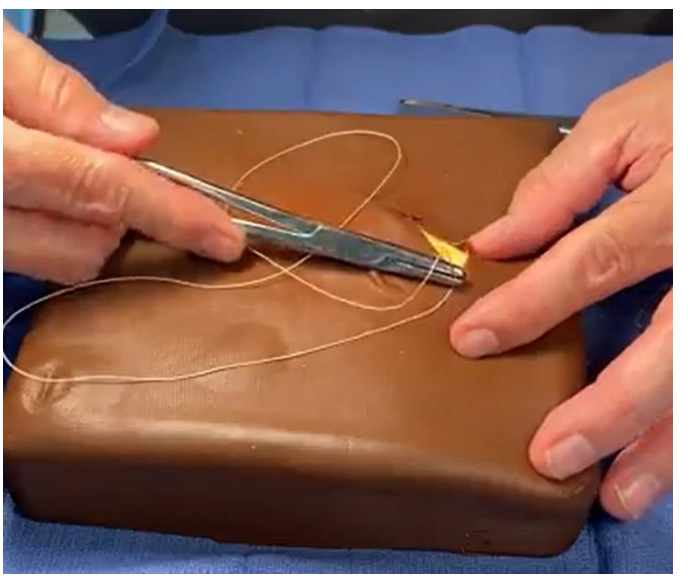
Simulation Assessment

You will now be assessed on a more realistic open appendectomy simulation model. You will complete all of the steps of the procedure in the 4 categories below and send your recorded video for review.

Safe Abdominal Entry

Identify the Appendix

Appendectomy



Abdominal Closure

Self-Rate Your Performance

Rate your performance for the overall procedure on the 1 to 5-point Likert scale below.

- 5. Extremely satisfied
- 4. Very satisfied
- 3. Somewhat satisfied
- 2. Not very satisfied
- 1. Not at all satisfied

Self-Assessment

Describe below the steps of the procedure that were particularly challenging for you.

Enter your answer below or submit a video or audio answer instead.

Review the Steps of the Procedure

Skills Assessment

It is important to get feedback from experts in the field and from peers when you are learning surgical skills and a new procedure. Videotape your simulation on the high fidelity simulation model and upload to get objective feedback.

Video of Procedure

Upload/submit your video.

Expert Reviewer Checklist

Checklist Assessment

Check if the trainee successfully completed the steps.

Safe Entry into the Abdomen

- ❑ Identifying ASIS/Umbilicus
- ❑ Skin Incision
- ❑ Soft Tissue Dissection
- ❑ Divide External Oblique Aponeurosis
- ❑ Muscle Dissection
- ❑ Peritoneum Incision

Identifying the Appendix

- ❑ Obtaining Proper Visualization
- ❑ Delivering Cecum
- ❑ Identifying the Anterior Taenia Coli
- ❑ Identifying the Appendix

Appendectomy

- ❑ Identify the Mesoappendix
- ❑ Creating Window in Mesoappendix
- ❑ Clamp Mesoappendix
- ❑ Divide Mesoappendix
- ❑ Tie Off Appendiceal Artery
- ❑ Clamp the Base of the Appendix
- ❑ Appendectomy
- ❑ Suture Ligate Base of the Appendix

Abdominal Closure

- ❑ Final Abdominal Inspection
- ❑ Close external oblique aponeurosis
- ❑ Close Subcutaneous Tissue
- ❑ Close the skin

Reviewer Comments

Provide constructive feedback for the trainee to improve her/his performance for this procedure.

Enter your feedback below or submit video or audio feedback instead.

Click the button below to send your feedback to the trainee.

Send Feedback to Trainee

References and Resources

AMPATH Surgical App