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**Physical Examination of the Abdomen: Palpation**  
--Manuscript Draft--

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## Overview

The abdomen is the only body area that allows for manual inspection of internal organs, some of which are positioned quite deep. Palpation, if performed correctly, allows for inspection of the large and relatively superficial organs, and, for a skilled examiner, of the smaller and deeper structures as well. The amount of information that can be obtained by palpation of the abdominal area also depends on the anatomical characteristics of the patient. For example, obesity might make palpation of internal organs difficult and require that additional maneuvers be performed. Abdominal palpation provides valuable information regarding localization of the problem and its severity as it identifies the areas of tenderness as well as presence of organomegaly and tumors. The specific focus of palpation is driven by the information collected during history taking and other elements of the abdominal exam. Palpation helps to integrate this information and develop the strategy for subsequent diagnostic steps.

## Procedure

### 1 Light palpation.

Light palpation allows for determination of the areas of tenderness and abdominal wall resistance due to rigidity (involuntary muscle spasm) or guarding (voluntary contraction of the abdominal wall musculature). It also permits identification of the superficial organs or masses, or, much less frequently, crepitus of the abdominal wall (caused by gas or fluid within the subcutaneous tissues).

1.1. Make sure that the patient is positioned correctly and explain the procedure.

1.2 Ask the patient to indicate the area of pain or tenderness and examine this area last (to avoid generalized abdominal resistance due to apprehension). Examine the painful areas gently and don't try to re-elicite the pain.

1.3 To improve the abdominal relaxation you might need to ask the patient to bend their knees or change their position. You might also need to ask the patient to breath with their abdomen, moving your hand up and down and trying to palpate as the abdominal wall moves during the inspiration/expiration cycles. These measures usually decrease voluntary guarding.

1.4 Using your dominant hand, keep your fingers together and press to a depth of approximately 1cm using the pads (flat surfaces) of your fingers with a gentle circular motion.

1.5 Examine all of the abdominal regions, moving in a clockwise direction. Slightly lift your hand as you move to a different spot and avoid sudden jabs.

**Comment [DM1]:** We could show the same figure of the abdominal regions here that we did in the first video.

1.6 If the patient is ticklish, ask them to place their hand under yours, and then slip your hand underneath the patient's hand after a few moments.

1.7 As you palpate, watch the patient's face for any signs of discomfort or pain.

1.8 Note irregularities of the abdominal wall, superficial organs or masses, and crepitus (crunching feeling during palpation produced by gas or fluid within subcutaneous tissues), if present.

## 2. Deep palpation.

While the superficial palpation provides information about potential areas of tenderness, superficial structures, and the abdominal wall, deep palpation permits inspection of the internal organs and delineation of the intra-abdominal masses. Additional areas of tenderness could be identified by deep palpation as well.

2.1 Start with the quadrant opposite to the one where the pain is located. Continue watching the patient's face for the signs of pain or discomfort as you proceed.

2.2. Place the flat of your hand on the abdominal wall and apply firm pressure downward and longitudinally. Keep your fingers relatively fixed on the skin and use the rolling motion.

2.3 Use the two hand palpation in obese patients or if voluntary muscle resistance is present.

2.3.1 Place your non-dominant hand on the top of your other.

2.3.2 Keep the lower hand relaxed and press with the fingers of the upper hand on the distal phalangeal joints of the lower hand. This way one hand produces the pressure while the other is used to feel.

Palpate over the all four abdominal quadrants. The palpable abdominal organs include the liver, caecum, sigmoid colon, and, sometimes, transverse colon and stomach. Enlarged kidneys, gall bladder, spleen, and aortic masses might be palpable as well. (Figure 1)

3 Liver palpation. The lower edge of the liver can be palpable on inspiration about 3 cm below the right rib cage. The liver palpation can be performed with one hand or bimanually, and in the case of obese patient, so-called "hooking" technique might be helpful as well.

### 3.1 One hand liver palpation

3.1.1 Place your right hand on patient's abdomen, lateral to the rectus muscle, well below the level of percussed border of liver dullness.

3.1.2 Orient your fingers towards patient head or slightly diagonally towards midline. Press your fingers firmly in and up (towards the patient's head).

3.1.3 Ask the patient to take a deep breath. On inspiration the liver descends and its edge meets fingertips of the palpating hand.

3.1.4 Continue palpating moving your hand toward the costal margin until you feel the liver edge (usually a few cm below right costal margin). Note liver edge texture and regularity. Slight tenderness on palpation is normal.

3.1.5 When your fingers meet the liver edge, slightly reduce the pressure on the abdominal wall while the patient is still taking a deep breath in. This maneuver allows the examiner to feel anterior liver surface as it slips under the finger pads. Make a note of the consistency of the liver surface – nodes, granularity etc. (Figure 2)

### 3.2 Bimanual liver palpation

3.2.1 Place the left hand posteriorly at the level of the two lower ribs and gently press upward to elevate the liver into a more accessible position.

3.2.2 Ask the patient to take a deep breath and perform palpation with the right hand as described above.

3.3 “Hooking” technique can be helpful when the liver is not palpable by the standard techniques.

3.3.1 Stand on the right of the patient facing their feet.

3.3.2 Place your flexed fingers over the edge of costal margin.

3.3.3 Ask the patient to take a deep breath and try to feel the liver edge as you press downward and upward (towards the patient’s head).

### 4. Spleen palpation.

A normal size spleen is rarely palpable. Occasionally the tip of the spleen can be felt at the left costal margin. When the spleen is significantly enlarged, it displaces the stomach and expands downward below the rib cage and medially across the abdomen, and might be felt as low as at right lower quadrant (Figure 3).

4.1 Ask the patient to take a deep breath and try to palpate the lower margin of the spleen during expiration.

4.2 Starting in right lower quadrant, move your fingers slightly up with each inspiration-expiration.

4.3 Palpate pressing down and towards the patient’s head and then releasing, in the same motion as for palpating of the lower edge of the liver.

4.3 If the spleen is not felt, repeat the exam with patient lying on their right side.

4.4 Some examiners use the bimanual palpation technique, during which the palpation is performed with the right hand while the left the hand of the examiner is placed behind the left rib cage, and is pressed on the ribs and soft tissues upwards.

#### 5. Kidney palpation.

Kidneys are retroperitoneal organs and are rarely palpable in a healthy adult. Sometimes enlarged kidneys can be assessed using bimanual “balloting” (from the French word “ballotte”, meaning “toss”) technique. The palpating hand is positioned in the upper quadrant lateral to the rectus muscle while the other hand is placed at the costophrenical angle and is pressing upwards (thus bringing the kidney closer to the anterior abdominal wall) (Figure 4). The maneuver is performed on deep inspiration when the kidneys descend and one might feel their lower poles.

5.1 To palpate the right kidney ask the patient to take a deep breath and palpate with upper hand while pressing forward with your lower hand position at the right costophrenical angle.

5.2. Attempt to “capture” the kidney between your hands, or feel it with your upper hand.

5.3 If you feel the kidney on inspiration, ask the patient to exhale deeply and hold their breath for a moment. You might feel the kidney moving back to its expiratory position.

5.4 Repeat the maneuver on the left side. Some examiners prefer to stand on the left side of the patient and palpate with their left hand while balloting the kidney with the right hand, while the others palpate with the right hand reaching with the left hand over the patient.

### **Summary**

Abdominal palpation is the final and an important part of the abdominal exam. This part of physical diagnosis is especially informative when evaluating a patient presenting abdominal pain, as it provides insight into localization, cause, and severity of the problem. One must remember to start with the superficial palpation and follow with the deep palpation systematically going through all the abdominal regions. As in the other sections of the abdominal examination the patient should be comfortably positioned and relaxed. Patient breathing can and should be used to the examiner’s advantage so that the deeper structures are more accessible by palpation on deep expiration. A very common mistake is to overlook significant organomegaly by starting the liver and spleen palpation too high in the abdomen. Abdominal palpation can provide a significant amount of information for a clinician. A few

potential findings are:

- a firm liver edge may be a sign of liver cirrhosis
- large, easily palpable kidneys may help to identify polycystic kidney disease
- a dilated and tender colon could represent inflammatory disease
- an enlarged spleen might be caused by leukemia

Evaluation of the abdominal region by palpation allows for follow up on the findings obtained during the previous stages of the physical examination and to integrate and interpret the information, which will determine the subsequent diagnostic steps. The correlation between the abnormal physical signs at different stages of physical examination increases a likelihood of pathology (such as organomegaly). It is also extremely important not to miss the physical signs of catastrophic events, such as peritonitis causing rebound tenderness, or an abdominal organ perforation causing severe tenderness and guarding.

Figures and Legends.

Figure 1. The Abdominal Organs

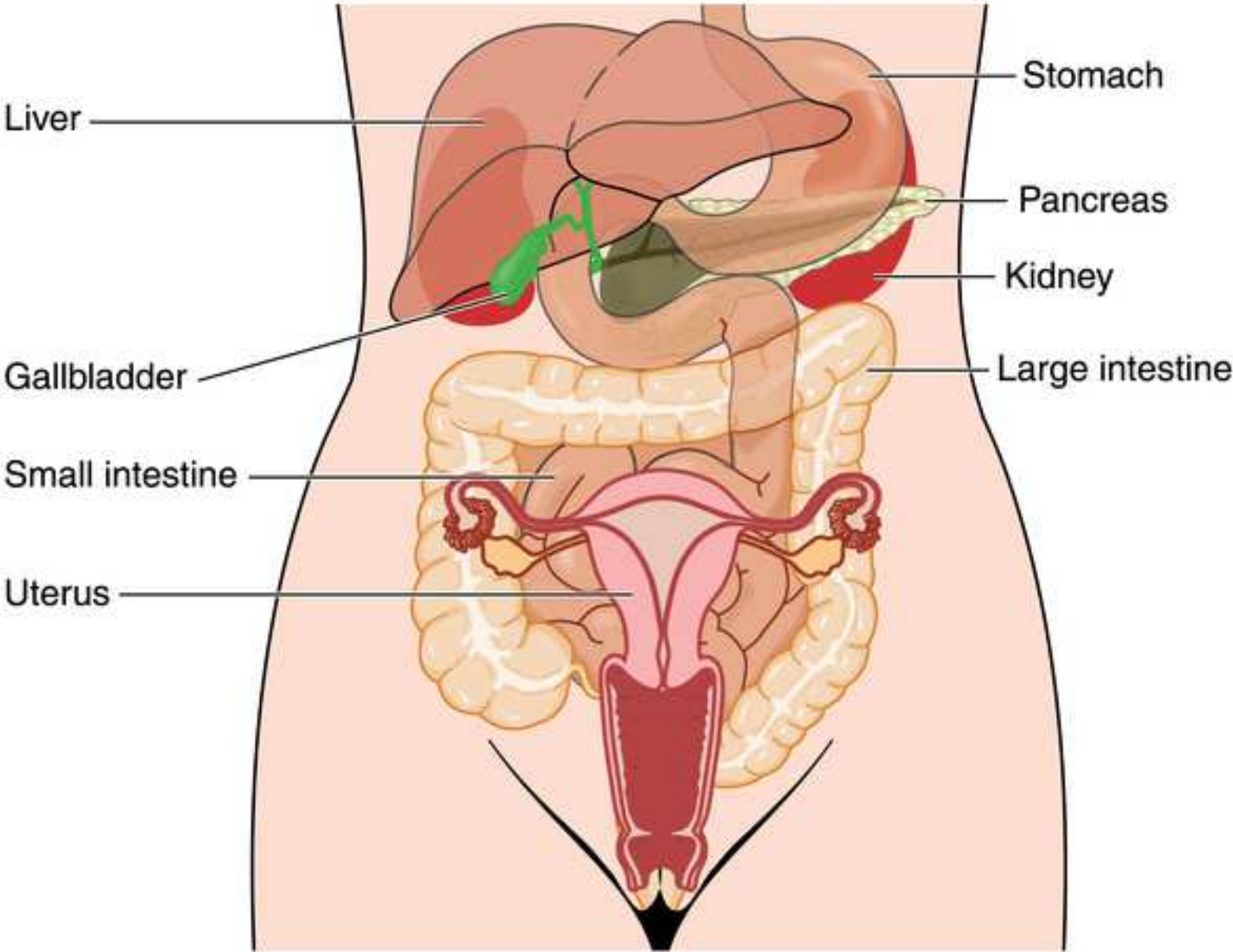
Figure 2. Palpation of the liver.

Request that this be reproduced into motion graphics showing the liver edge in relation to the palpating hand of the physician.

Figure 3. Normal and enlarged spleen.

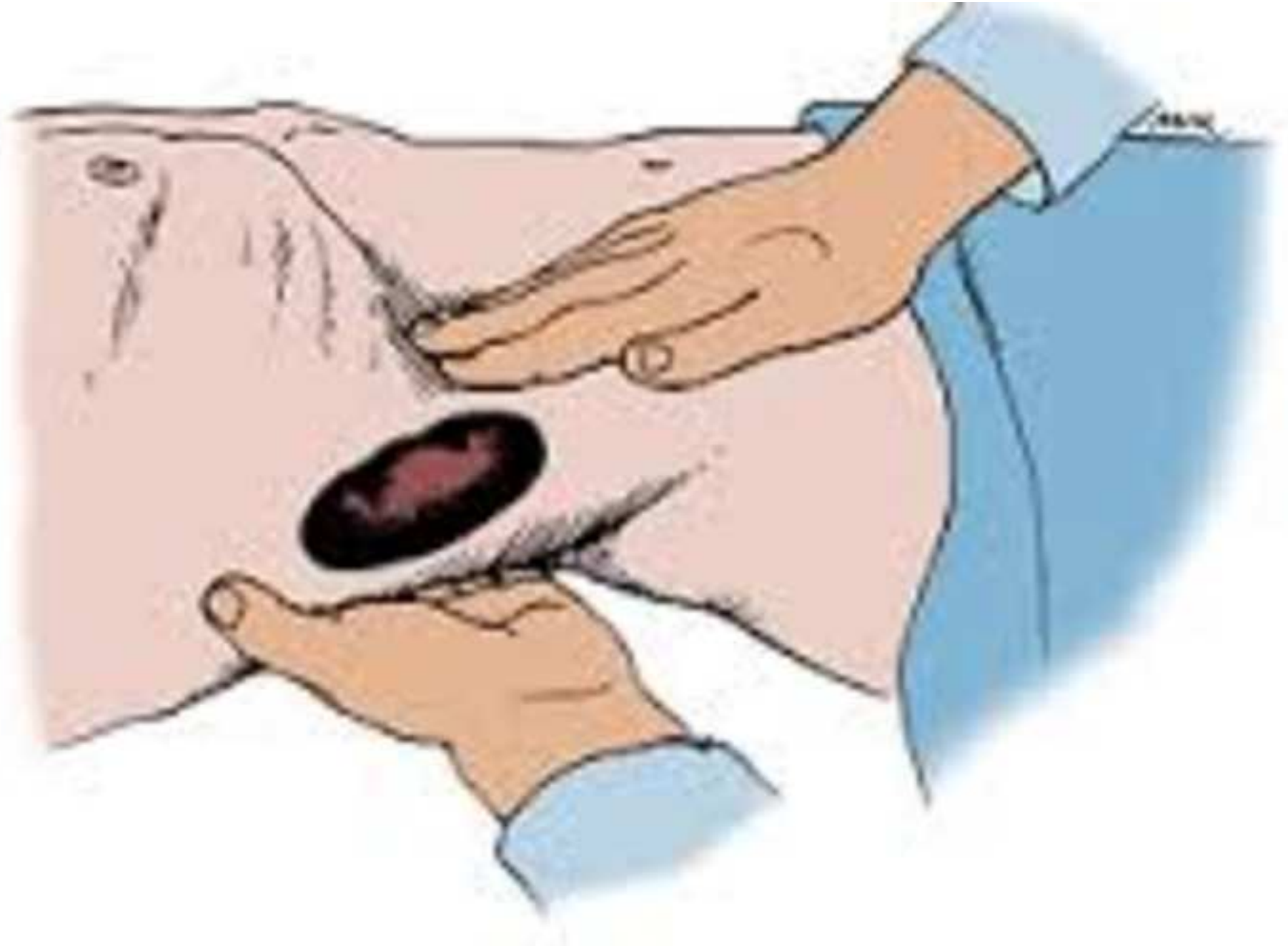
Figure 4. Palpation of the right kidney.

Request that this be reproduced into a cartoon showing kidney position in relation to physician hands and illustrating a principle behind “balloting technique”.



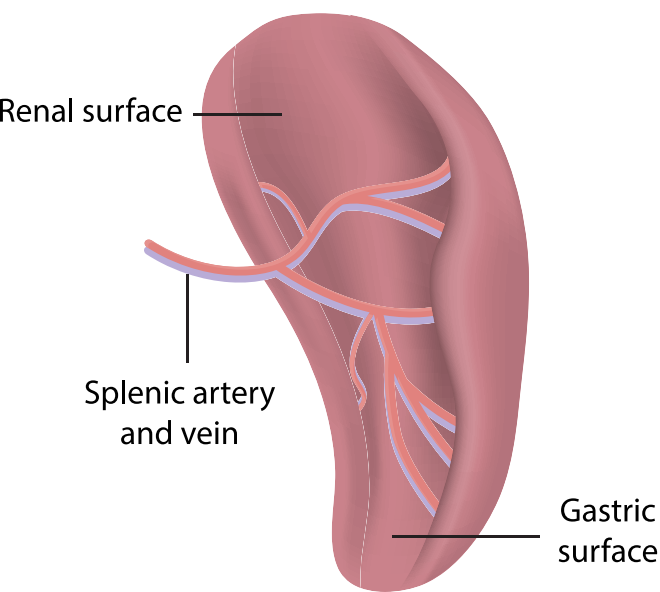






# Splenomegaly

Healthy Spleen



Enlarged Spleen

