

Medical Student Study Notes

SUBJECT: Anatomy

SYSTEM: Abdomen

TOPICS: Abdominal Wall

1. Learning Objectives

- Understand the anatomy of the abdominal wall.
 - Know the muscles, layers, blood supply, nerve supply, and functions.
 - Recognize common clinical conditions.
 - Apply knowledge to clinical cases.
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2. Functions of the Abdominal Wall

- Protects abdominal organs
 - Supports abdominal viscera
 - Assists respiration
 - Increases intra-abdominal pressure
 - Aids urination, defecation, vomiting, and childbirth
 - Enables trunk movement and posture
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3. Layers of the Anterior Abdominal Wall (Superficial → Deep)

Skin

- Thin and mobile
- Contains sweat glands and hair follicles

Superficial Fascia

Two layers below the umbilicus:

- **Camper's fascia**
 - Fatty layer
 - Continuous with superficial fat elsewhere
- **Scarpa's fascia**
 - Membranous layer
 - Clinically important because urine and blood may spread beneath it

Muscles

- External oblique
- Internal oblique
- Transversus abdominis
- Rectus abdominis
- Pyramidalis (absent in ~20%)

Transversalis fascia

Extraperitoneal fat

Parietal peritoneum

4. Abdominal Wall Muscles

A. External Oblique

- Largest and most superficial
- Fibers run:
 - Downward
 - Forward
 - Medially
- "Hands in pockets" direction

Origin

- Ribs 5–12

Insertion

- Linea alba
- Pubic tubercle
- Iliac crest

Actions

- Flex trunk
 - Rotate trunk opposite side
 - Compress abdomen
-

B. Internal Oblique

Origin

- Thoracolumbar fascia
- Iliac crest
- Inguinal ligament

Insertion

- Lower ribs
- Linea alba
- Pubis

Fibers

- Upward
- Forward
- Medially

Actions

- Flex trunk
 - Rotate trunk same side
 - Compress abdomen
-

C. Transversus Abdominis

Deepest flat muscle

Fibers

- Horizontal

Origin

- Costal cartilages
- Thoracolumbar fascia
- Iliac crest
- Inguinal ligament

Insertion

- Linea alba
- Pubic crest

Function

- Compress abdominal contents
 - Core stability
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D. Rectus Abdominis

Origin

- Pubic symphysis
- Pubic crest

Insertion

- Xiphoid process
- Costal cartilages 5–7

Features

- Vertical muscle
- Tendinous intersections ("six-pack")
- Enclosed within rectus sheath

Functions

- Flex vertebral column
 - Stabilize pelvis
 - Compress abdomen
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5. Rectus Sheath

Formed by

Aponeuroses of:

- External oblique
- Internal oblique
- Transversus abdominis

Contents

- Rectus abdominis
 - Pyramidalis
 - Superior epigastric vessels
 - Inferior epigastric vessels
-

6. Linea Alba

- Fibrous midline structure
 - Runs:
 - Xiphoid process
 - Pubic symphysis
 - Avascular
 - Preferred site for abdominal incision
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7. Inguinal Ligament

- Extends:
 - ASIS → Pubic tubercle
 - Formed by lower border of external oblique
 - Forms floor of inguinal canal
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8. Blood Supply

Arteries

- Superior epigastric artery
- Inferior epigastric artery
- Intercostal arteries
- Subcostal artery
- Deep circumflex iliac artery
- Superficial epigastric artery

Veins

- Follow arteries
- Drain into:
 - Femoral vein
 - Internal thoracic vein
 - External iliac vein

9. Nerve Supply

Thoracoabdominal nerves

- T7–T11

Subcostal nerve

- T12

Iliohypogastric nerve

- L1

Ilioinguinal nerve

- L1

Functions:

- Motor to muscles
- Sensory to skin

10. Lymphatic Drainage

Above umbilicus:

- Axillary lymph nodes

Below umbilicus:

- Superficial inguinal lymph nodes
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11. Surface Anatomy

Umbilicus

- Dermatome:
 - T10

McBurney's Point

- Junction of lateral 1/3 and medial 2/3 of line from ASIS to umbilicus
 - Tender in appendicitis
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12. Clinical Correlations

Hernias

Inguinal Hernia

- Most common abdominal wall hernia
- More common in males

Indirect:

- Lateral to inferior epigastric vessels
- Through deep inguinal ring
- Congenital

Direct:

- Medial to inferior epigastric vessels
- Through Hesselbach's triangle

- Acquired
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Umbilical Hernia

- Common in infants
 - Usually closes spontaneously
 - Adults:
 - Obesity
 - Pregnancy
 - Ascites
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Incisional Hernia

- Occurs through previous surgical scar
 - Due to wound weakness
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Rectus Sheath Hematoma

Cause:

- Trauma
- Anticoagulants
- Severe coughing

Symptoms:

- Localized abdominal pain
 - Tender swelling
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Diastasis Recti

- Separation of rectus muscles
 - Common in pregnancy
 - Not a true hernia
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13. High-Yield Exam Points

- Camper's fascia = fatty layer.
 - Scarpa's fascia = membranous layer.
 - Rectus sheath contains superior and inferior epigastric vessels.
 - T10 = umbilicus.
 - Linea alba is relatively avascular.
 - External oblique fibers run "hands-in-pockets."
 - Transversus abdominis fibers run horizontally.
 - Indirect inguinal hernia is lateral to inferior epigastric vessels.
 - Direct inguinal hernia is medial to inferior epigastric vessels.
 - Above umbilicus drains to axillary nodes; below drains to superficial inguinal nodes.
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Mini Case 1

Scenario:

A 24-year-old man notices a groin swelling after lifting heavy boxes. The swelling extends into the scrotum and is located **lateral to the inferior epigastric vessels**.

Questions

1. What is the most likely diagnosis?
2. Through which opening does the hernia enter?
3. Is it congenital or acquired?

Answers

- Indirect inguinal hernia
 - Deep inguinal ring
 - Usually congenital (persistent processus vaginalis)
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Mini Case 2

Scenario:

A 68-year-old woman on anticoagulants develops sudden abdominal pain after a severe coughing episode. Examination reveals a tender abdominal wall mass that does not cross the midline.

Questions

1. What is the most likely diagnosis?
2. Which blood vessels are commonly involved?
3. Which imaging study confirms the diagnosis?

Answers

- Rectus sheath hematoma
- Superior or inferior epigastric vessels
- Ultrasound or CT scan