Learning Objectives

- Understand the knowledge of anatomy, especially that which is on the surface or creates superficial bony landmarks in the hip and the pelvis
- Recognize the locations of muscles and their actions in the hip and the pelvis

References


Bony Anatomy of the Hip and Pelvis (1)

- Osseous parts
  - Pelvis: sacrum, coccyx, and two innominate (hip) bones
    - The innominate (hip) bone: a fusion of the ilium, ischium, and pubis
    - The acetabulum
    - Femur
  - Joints*
    - The pubic symphysis
    - The hip (acetabulofemoral or coxal) joint → a ball-and-socket joint
    - The sacroiliac joint
    - The sacrococcygeal joint
Bony Anatomy of the Hip and Pelvis (2)

Acetabulum

Bony Anatomy of the Hip and Pelvis (3)

BONY PALPATION
(From Anterior to Posterior Aspects)
Iliac Crest

- The long, superior edge of the ilium
- Serves as attachment sites for the quadratus lumborum and abdominal muscles
- Each crest is superficial and easily palpable
- Normally, the iliac crest are level in relation to each other
- Not on the same level → Pelvic obliquity

Anterior Superior Iliac Spine (ASIS)

- Located laterally to the umbilicus and slightly inferior
- Serves as the attachment site for the sartorius muscle and the inguinal ligament
- Palpation:
  - Start on the iliac crest laterally and follow the downward curve of the crests anteriorly until the ASISs are located
  - Explore these points and the surrounding structures of the ilium
  - The same level or not? → Pelvic obliquity

Palpating the ASIS

Anterior Inferior Iliac Spine (AIIS)

- Located inferior and medial to the ASIS
  - Locate the ASIS and slide inferiorly and medially approximately 1 inch
- Smaller and flatter than the ASIS
- It is difficult to palpation due to its shape and depth
Pubic Crest and Tubercle and The Superior Aspect of the Pubis

- **The pubic crest:** located directly inferior to the navel and superior to the genitals
- **The pubic tubercle:** approximately 1 cm on either side of the midline on the upper border of the pubic crest
  - Serves as an attachment site for the *adductor longus muscle* and the *inguinal ligament*
- Palpation:
  - Set the heel of your hand on the umbilicus, allowing your palm to rest on the abdomen
  - Slide the hand down → the middle finger contacts the *symphys pubis* and the adjacent fingers contact the tubercles
  - Slide laterally off the tubercle, feeling for buried ridge of the *superior ramus*

Palpating the Pubic Tubercle and the Superior Aspect of the Pubis

![Image of palpation](Image)


Greater Trochanter (GT) of the Femur

- A large, superficial mass located on the side of the hip
- Serves as an attachment site for the *gluteus medius, gluteus minimus and lateral rotators of the hip*
- The top of the GT are on the same level as the *pubic tubercle*
- Palpation:
  - Locate the highest point of the iliac crest with your thumb and reach down on the thigh as far as possible with your middle finger to palpate the GT
  - Medially and laterally rotate your hip as you palpate the trochanter

![Image of palpation](Image)

**Biel A. Trial guide to the body: how to locate muscles, bones, and more. 3E. P 291.**
Palpating the Greater Trochanter

Posterior Superior Iliac Spine (PSIS)
- Located at the posterior end of the iliac crest
- In most people, both PSISes can be visibly identified by the two small dimples found at the base of the low back
- Palpation:
  - Returning to the iliac crest
  - Tracing backwards and medially until the PSIS is reached
  - The PSISes may feel like small humps surrounded by thicker tissues and are not as pronounced as the ASISs

Palpating the PSIS

Ischial Tuberosity
- Also called “sits bones”
- Located on the most inferior aspect of the pelvis at the level of the gluteal fold
  - Gluteal fold → the horizontal crease between the buttocks and thigh
- Serves as an attachment site for the hamstrings and adductor magnus
- Palpation:
  - Have a seat on a hard chair or surface and rock side-to-side feeling your “sits bones”
Palpating the Ischial Tuberosity

Sacrum

- A large, triangular bone at the inferior end of the vertebral column
  - Made up of a series of 4 or 5 vertebrae that are fused together
- Medial sacral crests (median sacral crests, sacral tubercles): running down the center of the sacrum and composed of 3-4 points
- Palpation:
  - Prone lying
  - Locate the midline of the sacrum and explore the points of the sacral crest

Palpating the Sacrum

Sacroiliac (SI) Joint

- The articulation between the sacrum and the ilium
- It is not palpable, due to the overhang of the ilium and the obstruction of the supporting ligaments
- The center of the joint, at S2 → an imaginary line drawn between the PSISes
**Palpating the Sacroiliac Joint**

- Prone lying
- Locate the PSIS and move slightly inferior and medial to locate the SI joint
- Passively rotating the hip medially → a small opening at the joint space

**Femoral Triangle (1)**

- Defined superiorly by the inguinal ligament, medially by the adductor longus muscle, and laterally by the sartorius muscle ridge
- Position for observation:
  - Supine lying
  - The heel of the leg being examined resting upon the opposite knee → The hip in flexion, abduction, and external rotation
- Inguinal ligament: located between the ASIS and the pubic tubercle

**Anatomy of the Femoral Triangle**

Biel A. Trial guide to the body: how to locate muscles, bones, and more. 3E. P 289.
Femoral Triangle (2)

- **Femoral artery**: under the inguinal ligament at about its mid-point
  - The pulse is palpable just inferior to the inguinal ligament → At a point halfway between the ASIS and the pubic tubercle
- **Femoral nerve**: lies lateral to the femoral artery; it is not palpable
- **Femoral vein**: medial to the artery, is a clinical site for venous puncture.
  - It is not palpable.

Palpating the Inguinal Ligament and Femoral Artery

Anatomy of the Sartorius

- The longest muscle in the body, stretching from the ASIS, across the thigh, to the medial knee
- Muscle actions: *two-joint muscle*
  - Flex/laterally rotate/abduct the hip
  - Flex/medially rotate the knee
    → like a tailor use this position to sew
- Palpation:
  - Supine lying
  - Ask your partner to flex/laterally rotate his hip with his knee flexion against the resistance → contracting the sartorius
Rectus Femoris

- Located on the anterior thigh and is the only quadriceps femoris that crosses two joints
- Muscle actions: a two-joint muscle
  - Flex the hip & extend the knee
- Palpation:
  - Supine with knee flexion
  - Locate the AIIS and the patella → draw an imaginary line between these two points
  - Ask your partner to flex his hip and hold his foot up off the table or give the resistance against the subject’s hip flexion → contracting the rectus femoris (as the hip flexor)
Anatomy of the TFL

Tensor Fasciae Latae (TFL)
- A small, superficial muscle located on the lateral side of the upper thigh
- The sartorius and the TFL form a "V"*
  - Medial direction → the sartorius
  - Lateral direction → the TFL
  - Between the "V" → tendon of the rectus femoris
- Muscle actions:
  - Flex/medially rotate/ abduct the hip
- Palpation:
  - Give the resistance against the subject’s hip flexion/ medial rotation

Palpating of the TFL

The "V"
- Medial direction: sartorius
- Lateral direction: TFL
- Between the "V": tendon of the rectus femoris

Anatomy of the Gluteus Medius
**Gluteus Medius**

- Located on the outside of the hip
- Superficial muscle, except for the posterior portion which is deep to the gluteus maximus
- Muscle actions:
  - Abduct the hip (main action)
  - Anterior fibers: flex/medially rotate the hip
  - Posterior fibers: extend/laterally rotate the hip
- Palpation:
  - Sidelying
  - Ask your partner to abduct his hip slightly
  - Palpate in the area from just below the iliac crest to the greater trochanter

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**Anatomy of the Gluteus Maximus**

- The most posterior and superficial of the gluteal muscles
- The fibers run diagonally across the buttock
- Muscle actions:
  - Extend/laterally rotate the hip (Main actions)
- The outline of muscle by using the bony landmarks:
  - Lower border: an imaginary line drawn from coccyx to ischial tuberosity
  - Upper border: an imaginary line drawn from PSIS to slightly above the GT
  - Medial border: from PSIS to coccyx

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**Gluteus Maximus**

- The most posterior and superficial of the gluteal muscles
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- Muscle actions:
  - Extend/laterally rotate the hip (Main actions)
- The outline of muscle by using the bony landmarks:
  - Lower border: an imaginary line drawn from coccyx to ischial tuberosity
  - Upper border: an imaginary line drawn from PSIS to slightly above the GT
  - Medial border: from PSIS to coccyx
Palpating the Gluteus Maximus

- Palpation:
  - Prone
  - Locate the coccyx, the edge of the sacrum, and PSIS
  - Have the subject’s hip extension and lateral rotation

Sciatic Nerve

- The largest nerve in the body
- Formed by the L4-S3 spinal nerves
- Located midway between the greater trochanter and the ischial tuberosity
- Palpation:
  - Turn your partner sidelying and flex the hip
    (When the hip is extended, the nerve is covered by the gluteus maximus)
  - Locate the GT and ischial tuberosity and palpate the midpoint
  - Tenderness of the nerve may be due to a herniated disc in the lumbar spine, a piriformis spasm, or direct trauma to the nerve itself

Anatomy of the Hamstrings

- Semimembranosus
- Semitendinosus
**Hamstrings**

- Located along the posterior thigh
- Includes: *biceps femoris, semitendinosus, and semimembranosus*
- Muscle actions: *two-joint muscle*
  - Extend the hip/flex the knee
- Palpation:
  - Prone lying
  - Place a hand on the posterior thigh between the buttocks and knee
  - Ask your partner to flex his knee → contracting the hamstrings (as the knee flexor)

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**Summary**

- Find, recognize the shape and position of the bone in the hip and pelvis
- Palpate the bony feature and recognize different structures around the bony landmark
- Recognize and palpate the muscle actions in the hip and trace their attachments

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Biel A. *Trial guide to the body: how to locate muscles, bones, and more*. 3E. P 307.