Hip joint and pelvic girdle

Lower Extremity

- The relationship between the pelvic girdle and hip is similar to that between the shoulder girdle and shoulder joint.
- The lower limbs are attached to the axial skeleton via the pelvic girdle.
- The pelvic girdle moves to allow for increased ROM of the hip joint.

Pelvic Girdle

- Two pelvic bones (left and right) articulating with the axial skeleton via the sacrum.
- The pelvic bones are each made up of three bones:
  - ilium
  - ischium
  - pubis
- These bones are fused by puberty to form the pelvic bone.
- The pelvic girdle can only move as a unit (i.e., shoulder girdles can move independent of each other).
### Landmarks
- Acetabulum
- Iliac crest
- Iliac fossa
- Ischium
- Femoral head
- Femoral neck
- Greater trochanter
- Lesser trochanter
- Femoral medial/lateral epicondyles
- Patella
- Tibia/fibula

### Joints
- Symphysis pubis: amphiarthrodial joint (synchondrosis)
  - Anterior joint
- Sacroiliac articulation: amphiarthrodial (syndesmosis)
- Hip Joint: Acetabulofemoral joint
  - Spherical head of femur and acetabulum of pelvis

### Hip Joint
- Aka acetabulofemoral joint
- Classified as an ‘enarthrodial’ (ball and socket)
- Acetabulum is formed by the three bones of the pelvis (ischium, pubis, ilium)
- It provides a deep socket for the femoral head
- Like the glenoid labrum, there is an acetabulum labrum increasing the depth of the socket.
Movements

• About the hip joint
  – flexion/extension
  – abduction/adduction
  – external/internal rotation

• Pelvic movements
  – Sagittal plane
    • anterior/posterior tilt
  – Frontal plane
    • left lateral pelvic rotation: left side moves upward
    • right lateral pelvic rotation
  – Transverse plane
    • left transverse pelvic rotation: left side moves posterior
    • right transverse pelvic rotation

Muscles

• Hip flexors
  – iliopsoas (iliacus, psoas major and minor)
  – pectineus
  – rectus femoris
  – sartorius
  – gracilis
  – tensor fasciae latae
  – rectus femoris
• Hip extensors
  – gluteus maximus
  – biceps femoris
  – semitendinosus
  – semimembranosus
### Muscles

- **Hip (thigh) abductors**
  - gluteus medius
  - gluteus minimus
  - tensor fasciae latae

- **Hip (thigh) adductors**
  - adductor brevis
  - adductor longus
  - adductor magnus
  - gracilis
  - pectineus

- **Hip Internal Rotators**
  - Gluteus medius
  - Gluteus minimus
  - semimembranosus
  - semitendinosus

- **Hip External Rotators**
  - Adductor magnus
  - External Rotators
  - Gluteus medius
  - Biceps femoris

### Adductor brevis muscle (p85)

- **Origin**
  - inferior ramus of the pubis

- **Insertion**
  - pectineal line of the femur
  - upper 1/3 of the linea aspera

- **Action**
  - Adduction about the hip
Adductor Longus Muscle (p86)

- **Origin**
  - Anterior pubis
- **Insertion**
  - Middle third of the linea aspera
- **Action**
  - Adduction
  - External rotation

Adductor Magnus Muscle (p87)

- **Origin**
  - Inferior ramus of the pubis
- **Insertion**
  - Whole length of the linea aspera
  - Medial supracondylar ridge of femur
  - Adductor tubercle of femur
- **Action**
  - Adduction
  - External rotation

Gluteus Maximus Muscle (p88)

- **Origin**
  - Posterior gluteal line of ilium
  - Posterior iliac crest
  - Lateral / posterior aspect of sacrum and cocyx
- **Insertion**
  - Iliotibial band and gluteal line of femur
- **Action**
  - Hip extension
  - External rotation
Gluteus Medius Muscle (p89)

- **Origin**
  - Lateral surface of the ilium
- **Insertion**
  - Superior and lateral surface of the greater trochanter
- **Action**
  - Abduction
  - External rotation (posterior fibers)
  - Internal rotation (anterior fibers)

Gluteus Minimus Muscle (p90)

- **Origin**
  - Lateral surface of the ilium
- **Insertion**
  - Superior/lateral surface of the greater trochanter
- **Action**
  - Abduction about the hip
  - Internal rotation

Iliopsoas Muscle (p91, 93-94)

- **Three muscles:**
  - Iliacus
  - Psoas major
  - Psoas minor
- **Action**
  - Hip flexion
Iliacus

- Origin
  - Iliac fossa
- Insertion
  - Lesser trochanter of the femur

Psoas Major (p93) and Minor (p94)

- Origin
  - Transverse processes of L1-5
- Insertion
  - Minor: pectineal line
  - Major: lesser trochanter

Pectineus Muscle (p92)

- Origin
  - Superior ramus of pubis
- Insertion
  - Pectineal line of femur
- Action
  - Hip flexion
  - Adduction
Tensor Fasciae Latae Muscle (p95)

- **Origin**
  - Anterior iliac crest and surface of the ilium
- **Insertion**
  - Ilio-tibial band
- **Action**
  - Abduction about the hip
  - Hip flexion

Gracilis Muscle (p96)

- **Origin**
  - Symphysis pubis and inferior ramus of pubis
- **Insertion**
  - Upper/anterior-medial surface of the tibia
- **Action**
  - Adduction about the hip
  - Hip flexion
  - Knee flexion

Sartorius Muscle (p97)

- **Origin**
  - Anterior superior iliac spine
- **Insertion**
  - Upper/anterior-medial surface of the tibia
- **Action**
  - Hip and Knee Flexion
  - External rotation about the hip
Rectus Femoris Muscle (p108)

- **Origin**
  - Anterior inferior iliac spine of the ilium
  - Upper lip of the acetabulum
- **Insertion**
  - Superior aspect of the patella and patellar tendon to the tibial tuberosity
- **Action**
  - Hip flexion
  - Knee extension

External Rotators

- Gemellus inferior (p98)
- Gemellus superior (p99)
- Obturator externus (p100)
- Obturator internus (p101)
- Piriformis (p102)
- Quadratus femoris (p103)

  - Posterior to hip joint

Hamstring Muscles (p105-107)

- Biceps Femoris (lateral muscle)
- Semimembranosus (medial muscle)
- Semitendinosus (medial muscle)
- **Actions**
  - Knee flexion
  - Hip extension
  - Thigh and leg rotation
    - Internal (ST, SM)
    - External (BF)
Summary

• Bones
  – Pelvic, femur
• Joint
  – acetabulofemoral
• Movements
  – abd & add, flx & ext, int & ext rot.
• Muscles