🦴 HIP JOINT

🧠 OVERVIEW

The hip joint is a:

- ⚙️ Synovial joint
- 🔵 Ball and socket variety
- ⚖️ Weight-bearing joint

👉 Designed for stability > mobility (contrast with shoulder joint)

🔗 ARTICULAR SURFACES

- 🔹 1. Head of Femur

- Shape: Half a sphere ⚪
- Covered by hyaline cartilage
- Exception: → Fovea capitis (no cartilage; for ligament attachment)

🔹 2. Acetabulum (Hip Bone)

- Lunate (horseshoe-shaped) articular surface
- Non-articular parts:
    - Acetabular fossa (central, fat-filled)
    - Acetabular notch (inferior gap)

🔄 Functional Concept

Head of femur (ball) → fits into → Acetabulum (socket)

→ Deepened by labrum → stability ↑

🛡️ STABILIZING FACTORS

These are frequently asked in exams:

Factor	Role
🧱 Depth of acetabulum + labrum	Strong socket
🔗 Ligaments	Passive stability
💪 Muscles	Dynamic stability
📐 Neck of femur (length + obliquity)	Weight transmission

🔄 Stability Flowchart

Deep acetabulum + labrum → Firm grip on femoral head → Ligaments tighten → Muscles support → Highly stable joint 💪

🧵 CAPSULE OF HIP JOINT

- 🔹 Attachments

Region	Attachment
Medial	Acetabular labrum
Anterior	Intertrochanteric line
Posterior	Neck of femur (halfway)

🔹 Thickness Variation

Area	Feature
Anteroinferior	Thick & strong 💪
Posterosuperior	Thin & weak ⚠️

👉 Clinical relevance: Posterior dislocations occur more easily here.

🔹 Structure of Capsule

- Outer: Longitudinal fibers
- Inner: Circular fibers

👉 Longitudinal fibers form Retinacula → Carry blood vessels → Supply head of femur 🩸

🧪 SYNOVIAL MEMBRANE

- 🔹 Lining
  - Lines:
    - Fibrous capsule
    - Neck of femur (intracapsular part)
    - Acetabular labrum
    - Transverse ligament
    - Fat in acetabular fossa
- 🔹 Special Feature: Covers ligament of head of femur

🔄 Reflection Flowchart

Membrane lines capsule → Reflects onto femoral neck → Returns to acetabulum margin

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🔗 LIGAMENTS OF HIP JOINT

🔹 Classification

i. Extracapsular

ii. Intracapsular

🔶 EXTRACAPSULAR LIGAMENTS

🟡 1. Iliofemoral Ligament

- Strongest ligament in body

- Shape: Inverted Y (Ligament of Bigelow)

Attachments:

- Apex → AIIS
- Base → Intertrochanteric line

Function:

Prevents hyperextension → Prevents trunk from falling backward 🚶

🟢 2. Pubofemoral Ligament

Attachments:

- Superior → Iliopubic eminence + obturator crest
- Inferior → Capsule + iliofemoral ligament

Function:

- Limits excess abduction

🔵 3. Ischiofemoral Ligament

Features:

- Located posteriorly
- Spiral orientation

Function:

- Limits medial rotation

🔷 INTRACAPSULAR LIGAMENTS

🔴 1. Ligament of Head of Femur

- Shape: Flat, triangular

Attachments:

- Apex → Fovea capitis
- Base → Acetabular notch + transverse ligament

Function:

- 🩸 Carries artery to head of femur
  (important in children)

🟣 2. Transverse Acetabular Ligament

- Continuation of acetabular labrum
- Bridges acetabular notch

Function:

Converts notch → foramen → Allows vessels to pass

🟠 3. Acetabular Labrum

- Fibrocartilaginous rim

Functions:

- Deepens socket 🧱
- Increases stability 🔒
- Holds femoral head in place

🔄 Labrum Function Flowchart

Acetabulum (shallow) + labrum → Deep socket → Better grip on femoral head → Joint stability ↑ 🔒

🧠 QUICK REVISION TABLE

Structure	Key Point
Hip joint	Ball & socket, weight-bearing
Head of femur	Hyaline cartilage (except fovea)
Acetabulum	Lunate surface
Capsule	Strong anterior, weak posterior
Iliofemoral	Strongest ligament
Labrum	Deepens socket
Ligament of head	Carries artery

🩺 CLINICAL PEARLS

🔴 Posterior Hip Dislocation

Thin posterior capsule → Vulnerable in trauma 🚗

🔴 Avascular Necrosis

Damage to retinacular vessels → Loss of blood supply → Head of femur necrosis ☠️

🧠 NERVE SUPPLY (Hilton's Law Applied)

👉 Hilton's Law:

Nerves supplying the muscles moving a joint also supply the joint itself.

- 🔹 Nerves Supplying Hip Joint

Nerve	Root Value	Area Supplied
Femoral nerve (nerve to rectus femoris)	L2–L4	Anterior capsule
Obturator nerve	L2–L4	Inferomedial part
Nerve to quadratus femoris	L4–S1	Posterior capsule
Superior gluteal nerve	L4–S1	Superolateral part

🔄 Concept Flowchart

Muscles acting on hip → Same nerves supply joint → Pain may be referred ⚡

🩸 BLOOD SUPPLY

🔹 Main Arteries

Artery	Contribution
Medial circumflex femoral 🏆	Main supply to head of femur
Lateral circumflex femoral	Contributes to anastomosis
Obturator artery	Via ligament of head
Superior gluteal	Trochanteric anastomosis
Inferior gluteal	Cruciate anastomosis

🔄 ARTERIAL ANASTOMOSES

🔴 1. Trochanteric Anastomosis

Superior gluteal + Medial circumflex femoral + Lateral circumflex femoral → Supply head & neck of femur 🩸

🔵 2. Cruciate Anastomosis

Inferior gluteal + Medial circumflex femoral + Lateral circumflex femoral + 1st perforating artery → Collateral circulation around hip 🔄

⚠️ CLINICAL IMPORTANCE

Fracture neck of femur → Retinacular vessels damaged → Avascular necrosis ☠️

🧵 CAPSULE

Feature	Detail
Anterior	Strong, covers full neck
Posterior	Weak, covers half neck
Special	Forms retinacula carrying vessels 🩸

🔗 RELATIONS OF HIP JOINT

🔹 Anterior Relations

- Iliopsoas
- Pectineus

- Rectus femoris

👉 Clinical: Pain may be felt in anterior thigh

🔹 Posterior Relations

- Obturator internus
- Superior & inferior gemelli
- Quadratus femoris

🔹 Superior Relations

- Piriformis
- Gluteus minimus

🔹 Inferior Relations

- Obturator externus tendon

🔄 Memory Flow

Front → Flexors

Back → Rotators

Top → Gluteal muscles

Bottom → Obturator externus

🔄 MOVEMENTS OF HIP JOINT

- 🔹 Types of Movements

- Flexion
- Extension
- Abduction
- Adduction
- Medial rotation
- Lateral rotation
- Circumduction

💪 MUSCLES PRODUCING MOVEMENTS

🔵 1. FLEXION

Muscle	Note
Iliopsoas ⭐	Chief flexor

Rectus femoris	Also extends knee
Sartorius	Weak flexor
Adductors	Assist

🔴 2. EXTENSION

Muscle	Note
Gluteus maximus	Powerful extensor
Hamstrings	Assist

🟢 3. ABDUCTION

Muscle	Note
Gluteus medius ⭐	Key stabilizer
Gluteus minimus	Assists
TFL	Assists
Sartorius, Piriformis	Weak

🟣 4. ADDUCTION

Muscle
Adductor longus
Adductor brevis

Adductor magnus

🟡 5. LATERAL ROTATION

Muscle
Piriformis
Obturator internus & externus
Gemelli
Quadratus femoris
Gluteus maximus (assists)

🔵 6. MEDIAL ROTATION

Muscle
Gluteus medius (anterior fibers)
Gluteus minimus
Tensor fascia lata

🔄 7. CIRCUMDUCTION

Flexion + Extension + Abduction + Adduction → Circular movement 🔄

🩺 CLINICAL CORRELATES

🔴 1. Referred Pain

Hip joint pathology → Pain felt in knee

👉 Due to femoral & obturator nerve overlap

🔴 2. Congenital Dislocation of Hip

- Shallow acetabulum
- Seen in infants 👶

🔴 3. Traumatic Dislocation

Usually posterior → May injure sciatic nerve ⚠️

🔴 4. Osteoarthritis

- Degeneration of articular cartilage
- Pain + stiffness

🔴 5. Hip Replacement 🦿

- Done in severe arthritis
- Prosthetic joint replaces damaged surfaces

🎯 FINAL SUMMARY

- 🧠 Nerve supply → Femoral, obturator, superior gluteal, nerve to quadratus femoris
- 🩸 Main artery → Medial circumflex femoral ⭐
- 🔗 Strong anterior capsule, weak posterior
- ⚙️ Movements → 6 + circumduction
- 🩺 Key clinicals → AVN, dislocation, referred pain

-> The End <-