

# Gluteal Region: A-Z

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## Introduction

- The **gluteal region** forms the **posterior part of the pelvis and upper thigh**.
- It lies between the **iliac crest above** and the **gluteal fold below**.
- The region is divided into two symmetrical parts — **buttocks** — separated by the **natal cleft**.
- Functionally, it relates to the **hip joint**, **pelvic stability**, and **thigh movement** during locomotion.
- The main muscle bulk is **gluteus maximus**, covered by **thick, fatty skin and fascia**.
  - It provides a **passage for major nerves and vessels** between the pelvis and lower limb through the **greater and lesser sciatic foramina**

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## Surface Landmarks

### 1. Buttock

- Rounded bulge in the lower part of the gluteal region.

- Separated in the midline by the **natal cleft** (begins at the third sacral spine).
- The **gluteal fold** marks the **lower limit**, but **does not correspond** to the lower border of gluteus maximus.

## 2. Ischial Tuberosity

- Large bony prominence deep to gluteus maximus, about **5 cm from the midline** and **5 cm above the gluteal fold**.
- Palpated by pressing fingers upward in the **medial part of the gluteal fold**.

## 3. Greater Trochanter

- Large bony prominence on the lateral aspect of the hip, **a hand's breadth below the iliac crest**.
- Palpable landmark useful for **intramuscular injection guidance**.

## 4. Iliac Crest

- Thick, curved ridge forming the upper boundary of the gluteal region.
- Extends from **ASIS** to **PSIS**.
- **Highest point** corresponds to the **L3–L4 vertebral level**, important for **lumbar puncture**
- The **ASIS to greater trochanter line** marks the **junction** between the gluteal region and the front of the thigh.
- The **PSIS** lies **5 cm from the midline** at the level of the **second sacral spine**, opposite the sacroiliac joint.

## 5. Sacrum and Coccyx

- Sacral spines palpable in the midline; coccyx forms the **floor of natal cleft** and is **slightly mobile** under pressure

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## 6. Sacrotuberous Ligament

- Lies **deep to the lower border of gluteus maximus**; felt by firm pressure between **lower sacrum and ischial tuberosity**

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### Superficial Fascia

- **Heavily laden with fat**, especially in females.
- **Tough and stringy** over the ischial tuberosity, forming a **cushion for sitting**.
- Contains **cutaneous nerves, vessels, and lymphatics**

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### Cutaneous Nerves

The skin of the gluteal region receives innervation from **nerves approaching from all directions**:

1. **Upper anterior part:**

- Lateral cutaneous branches of **subcostal (T12)** and **iliohypogastric (L1)** nerves.

2. **Upper posterior part:**

- Posterior primary rami of **L1–L3** and **S1–S3** spinal nerves.

3. **Lower anterior part:**

- Branches from the **posterior division of the lateral cutaneous nerve of thigh (L2, L3)**.

4. **Lower posterior part:**

- Branches from the **posterior cutaneous nerve of thigh (S1–S3)** and **perforating cutaneous nerve (S2–S3)**

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## Cutaneous Vessels and Lymphatics

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• **Arterial supply:** From **superior and inferior gluteal arteries**.

• **Venous drainage:** Through veins accompanying the above arteries.

• **Lymphatic drainage:** To the **lateral group of superficial inguinal lymph nodes**

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## Deep Fascia

- Above and anterior to **gluteus maximus** (over gluteus medius) ? **thick, dense, and pearly white**.
- Over **gluteus maximus** ? **thin and transparent**.
- The fascia **splits to enclose the gluteus maximus** and continues inferiorly as the **fascia lata of the thigh**.
- Laterally, it thickens to form the **iliotibial tract (IT band)**, which stabilizes the knee joint during standing and walking

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## Dissection

- **Incisions:**
  1. From the **spine of the second sacral vertebra** along the **iliac crest** to its **tubercle**
  2. Vertical incision from **S2 spine** down to the **natal cleft**.
  3. Curve laterally and inferiorly to the **middle of the back of the thigh**.
- Reflect the **thick skin and fascia laterally**.
- Cutaneous nerves and vessels are **difficult to find**; best studied in the text.

- After removing deep fascia, **define the attachments of gluteus maximus**

## Muscles of the Gluteal Region

The gluteal region contains **ten major muscles** arranged in layers.

### 1. Gluteus Maximus

- **Origin:** Outer slope of dorsal iliac crest, posterior gluteal line, dorsal sacrum and coccyx, sacrotuberous ligament, and fascia covering gluteus medius.
- **Insertion:** Upper three-fourths into the **iliotibial tract**, lower one-fourth into the **gluteal tuberosity** of femur.
- **Nerve supply:** **Inferior gluteal nerve (L5, S1, S2)**.
- **Action:** Chief **extensor of the hip**; assists in **lateral rotation, abduction** (upper fibers), and **stabilization of knee** via IT tract.

### 2. Gluteus Medius

- **Origin:** Gluteal surface of ilium between **anterior and posterior gluteal lines**.
- **Insertion:** Lateral surface of **greater trochanter**.
- **Nerve:** **Superior gluteal nerve (L4, L5, S1)**.
- **Action:** **Abduction** and **medial rotation** of thigh; **maintains pelvic stability** during walking.

### 3. Gluteus Minimus

- **Origin:** Gluteal surface of ilium between **anterior and inferior gluteal lines**.
- **Insertion:** Anterior surface of greater trochanter.
- **Nerve:** **Superior gluteal nerve**.
- **Action:** Same as gluteus medius — abducts and medially rotates thigh.

### 4. Tensor Fasciae Latae

- **Origin:** Outer lip of iliac crest (anterior 5 cm).
- **Insertion:** Iliotibial tract.
- **Nerve:** **Superior gluteal nerve**.
- **Action:** **Abductor and medial rotator** of thigh; helps **extend the knee** via IT tract.

### 5. Piriformis

- **Origin:** Pelvic surface of sacrum (S2–S4), upper margin of greater sciatic notch.
- **Insertion:** Apex of greater trochanter.
- **Nerve:** **Ventral rami of S1, S2**.
- **Action:** **Lateral rotation** and **abduction** of thigh; acts as the **key muscle** of gluteal region dividing structures above and below it.

### 6. Superior and Inferior Gemelli

- **Superior:** From ischial spine. Nerve to **obturator internus (L5–S2).**
- **Inferior:** From ischial tuberosity. Nerve to **quadratus femoris (L4–S1).**
- **Action:** **Lateral rotators** of thigh; assist obturator internus.

## 7. Obturator Internus

- **Origin:** Inner surface of obturator membrane.
- **Insertion:** Medial surface of greater trochanter.
- **Nerve:** **Nerve to obturator internus (L5–S2).**
- **Action:** **Lateral rotator** of thigh.

## 8. Quadratus Femoris

- **Origin:** Ischial tuberosity.
- **Insertion:** Quadrate tubercle on intertrochanteric crest.
- **Nerve:** **Nerve to quadratus femoris (L4–S1).**
- **Action:** **Lateral rotation and adduction** of thigh.

## 9. Obturator Externus

- **Origin:** Outer surface of obturator membrane.
- **Insertion:** Trochanteric fossa of femur.
- **Nerve:** **Posterior division of obturator nerve (L2–L4).**

- Action: Lateral rotation of thigh.

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## Structures under Gluteus Maximus

### Muscles

- Gluteus medius and minimus
- Piriformis
- Obturator internus with superior and inferior gemelli
- Quadratus femoris
- Upper hamstring origins from ischial tuberosity
- Adductor magnus (upper fibers)

### Vessels

- Superior and inferior gluteal vessels
- Internal pudendal vessels
- Ascending branch of medial circumflex femoral artery
- First perforating branch of profunda femoris
- Trochanteric and cruciate anastomoses

### Nerves

- Superior and inferior gluteal nerves
- Sciatic nerve (L4–S3)
- Posterior cutaneous nerve of thigh
- Pudendal nerve (S2–S4)
- Nerve to obturator internus
- Nerve to quadratus femoris
- Perforating cutaneous nerves

## **Ligaments and Bursae**

- Sacrotuberous and sacrospinous ligaments
- Trochanteric bursa, ischial bursa, and bursa between gluteus maximus and vastus lateralis

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### **Structures Deep to Gluteus Medius**

- Superior gluteal nerve
- Deep branch of superior gluteal artery
- Gluteus minimus muscle
- Trochanteric bursa of gluteus medius

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## Structures Deep to Gluteus Minimus

- Reflected head of rectus femoris
- Capsule of hip joint

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## Dissection Steps

1. Reflect **gluteus maximus** by cutting from **origin to insertion** along the **posterior cutaneous nerve of thigh**.
2. Identify **piriformis** — the key muscle.
  - **Above piriformis:** Superior gluteal nerve and vessels.
  - **Below piriformis:** Inferior gluteal nerve and vessels, sciatic nerve, posterior cutaneous nerve of thigh, and pudendal vessels.
3. Note the **ischial tuberosity** and **hamstring origins** beneath the lower gluteus maximus.

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## Clinical Anatomy

- **Trendelenburg Sign:** Paralysis of gluteus medius and minimus (superior gluteal nerve injury) causes pelvis to drop on the opposite side when standing on one leg.
- **Sciatic Nerve Injury:** Wrongly placed intramuscular injection in the lower medial quadrant may injure the sciatic nerve ? paralysis of hamstrings and all muscles below the knee.

- **Piriformis Syndrome:** Compression of sciatic nerve by tight piriformis ? pain radiating down posterior thigh.
- **Trochanteric Bursitis:** Inflammation due to friction between gluteus maximus and greater trochanter.
- **Ischial Bursitis:** “Weaver’s bottom” — inflammation due to prolonged sitting.
- **Safe Injection Site:** Upper lateral quadrant of gluteal region — gluteus medius area — avoids major vessels and nerves.

## Sacrotuberous and Sacrospinous Ligaments

### Sacrotuberous Ligament

- A **strong, long ligament** forming part of the boundary of the **pelvic outlet**.
- **Attachments:**
  - **Above:** Posterior superior and inferior iliac spines, lower transverse tubercles of sacrum, lateral sacral margin, and upper coccyx.
  - **Below:** Medial margin of **ischial tuberosity**.
- The part extending along the **ramus of ischium** is the **falciform process**.
- Gives partial origin to **gluteus maximus**.
- Pierced by **perforating cutaneous nerve, S5 and coccygeal nerves**, and branches of the **coccygeal plexus**.

## Sacrospinous Ligament

- Thin, triangular ligament lying deep to sacrotuberous ligament.
- **Attachments:**
  - **Base:** Lateral margins of last piece of sacrum and coccyx.
  - **Apex:** Ischial spine.
- Separates **greater** and **lesser** sciatic foramina.
- Gives origin to the **coccygeus muscle**.
- Morphologically, a **degenerated part of the coccygeus**.

## Function

- Both ligaments **bind the sacrum to the ischium** and prevent upward tilting of the sacral lower end under body weight

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### Nerves of the Gluteal Region

#### Superior Gluteal Nerve (L4, L5, S1)

- Branch of **lumbosacral plexus**.
- Enters the region via the **greater sciatic foramen, above piriformis**.

- Runs between **gluteus medius and minimus**.

- **Supplies:**

- Gluteus medius
- Gluteus minimus
- Tensor fasciae latae

- **Action:** Abduction and medial rotation of thigh; stabilizes pelvis during walking

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### **Inferior Gluteal Nerve (L5, S1, S2)**

- Branch of **sacral plexus**.

- Passes through **greater sciatic foramen below piriformis**.

- **Supplies:** Only **gluteus maximus**, its sole motor target.

- Functionally, it acts as the **chief extensor nerve** of the hip, vital in standing up, climbing stairs, and rising from a sitting position

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### **Sciatic Nerve (L4–S3)**

- **Largest nerve in the body**; main continuation of the **sacral plexus**.

- Enters gluteal region through **greater sciatic foramen below piriformis**.
- Runs downward between **greater trochanter and ischial tuberosity**, then under **gluteus maximus** to enter the **posterior thigh**.
- **No branches in gluteal region.**
- Later divides into **tibial** and **common peroneal nerves**.
- Clinically important for **nerve blocks** and **intramuscular injection safety**

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## Clinical Anatomy

- **Trendelenburg Sign:**

Paralysis of gluteus medius/minimus (superior gluteal nerve injury) causes **pelvic drop** on the opposite side during single-leg stance.

- **Sciatic Nerve Block:**

Local anaesthetic injected **1.5 cm below midpoint** of a line joining **PSIS and upper border of greater trochanter** to produce anesthesia of the posterior thigh and leg

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- **Inferior Gluteal Nerve Lesion:**

Leads to **weakness of hip extension** — difficulty rising from chair or climbing stairs.

- **Piriformis Syndrome:**

Compression of sciatic nerve by piriformis ? **radiating pain** down the posterior thigh

(“sciatica”).

- **Safe Injection Zone:**

Always in the **upper lateral quadrant** of gluteal region to avoid injury to sciatic and inferior gluteal nerves.

## Posterior Cutaneous Nerve of the Thigh

- **Root value:** S1–S3.

- **Origin:** From the **sacral plexus**.

- **Course:**

- Leaves the pelvis through the **greater sciatic foramen** below piriformis.
- Lies **deep to gluteus maximus** and **superficial to sciatic nerve**.
- Descends under the fascia lata in the posterior thigh up to the popliteal fossa.

- **Branches:**

- **Inferior cluneal nerves** — to lower part of buttock.
- **Perineal branches** — to skin of perineum.
- **Cutaneous branches** — to back of thigh and upper leg.

- **Function:** Provides **cutaneous sensation** to posterior thigh and popliteal region.

## Nerve to Quadratus Femoris

- **Root value:** L4, L5, S1.
- **Course:**
  - Arises from anterior surface of **sacral plexus**.
  - Leaves pelvis through **greater sciatic foramen below piriformis**.
  - Lies **anterior to sciatic nerve and obturator internus**.
- **Branches:**
  - To **quadratus femoris** and **inferior gemellus**.
  - **Articular branch to hip joint**

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## Pudendal Nerve

- **Root value:** S2–S4.
- **Origin:** From sacral plexus in pelvis.
- **Course:**
  1. Leaves pelvis via **greater sciatic foramen** below piriformis.

2. Crosses the **sacrospinous ligament** near the ischial spine.
3. Re-enters pelvis through **lesser sciatic foramen** to reach **pudendal canal** in the lateral wall of the ischioanal fossa.

- **Branches:**

- **Inferior rectal nerve** ? to external anal sphincter and skin around anus.
- **Perineal nerve** ? to urogenital muscles and posterior scrotal/labial skin.
- **Dorsal nerve of penis/clitoris** ? terminal sensory branch.

- **Function:** Chief **motor and sensory nerve of the perineum and external genitalia**

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- **Clinical importance:** Used for **pudendal nerve block** near ischial spine during obstetric procedures to anesthetize perineum

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### Nerve to Obturator Internus

- **Root value:** L5, S1, S2.

- **Course:**

- Arises from **sacral plexus**.

- Passes through **greater sciatic foramen below piriformis**, lateral to pudendal nerve.
- Crosses **ischial spine** and re-enters through **lesser sciatic foramen**.

- **Branches:**

- To **obturator internus**.
- To **superior gemellus**

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### Perforating Cutaneous Nerve

- **Root value:** S2–S3.
- **Origin:** From the posterior surface of the sacral plexus.
- **Course:**
  - Pierces the **sacrotuberous ligament** near its medial margin.
  - Passes **below gluteus maximus** to reach the skin over the **lower medial part of the buttock**.
- **Function:** Supplies **skin over inferomedial buttock**; small, purely sensory branch.

## Arteries of the Gluteal Region

The gluteal region is mainly supplied by three arteries — **superior gluteal, inferior gluteal, and internal pudendal arteries**, all branches of the **internal iliac artery**.

These vessels pass from the pelvis to the gluteal region through the **greater sciatic foramen**, accompanied by corresponding nerves.

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### 1. Superior Gluteal Artery

- **Origin:** Largest branch of the **posterior division** of the internal iliac artery.
- **Course:**
  - Passes out of the pelvis through the **greater sciatic foramen above the piriformis**.
  - Divides into **superficial** and **deep branches**.
- **Branches and Distribution:**
  - **Superficial branch** — supplies **gluteus maximus** and overlying skin.
  - **Deep branch** — divides into **superior and inferior divisions** between **gluteus medius and minimus**.
    - **Superior division:** To **gluteus medius and minimus**.
    - **Inferior division:** To **tensor fasciae latae** and contributes to **trochanteric anastomosis**.
- **Anastomoses:** Joins **inferior gluteal, lateral circumflex femoral, and first perforating arteries** around hip joint.

## 2. Inferior Gluteal Artery

- **Origin:** Terminal branch of **anterior division** of internal iliac artery.
- **Course:**
  - Leaves pelvis through **greater sciatic foramen** below **piriformis**.
  - Lies between **piriformis** and **superior gemellus**, emerging with **inferior gluteal nerve**.
  - Descends on **posterior surface of sciatic nerve**.
- **Distribution:**
  - Supplies **gluteus maximus**, **quadratus femoris**, **hamstring muscles**, and **sciatic nerve**.
- **Anastomoses:**
  - Contributes to **cruciate anastomosis** and **trochanteric anastomosis**.
  - Joins branches of **internal pudendal**, **superior gluteal**, and **first perforating artery**.

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## 3. Internal Pudendal Artery

- **Origin:** Smaller terminal branch of **anterior division** of internal iliac artery.
- **Course:**
  - Leaves pelvis through **greater sciatic foramen** below **piriformis** with **pudendal nerve**.

- Curves around **ischial spine** under **gluteus maximus**, then enters **lesser sciatic foramen** to reach the **pudendal canal**.

- **Distribution:**

- Supplies **perineum, external genital organs, and anal region**.
- Gives **inferior rectal, perineal, and artery of penis/clitoris** branches.

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### Trochanteric Anastomosis

- Provides **main arterial supply to head and neck of femur**.

- **Formed by:**

- Descending branch of **superior gluteal artery**.
- Ascending branch of **medial circumflex femoral artery**.
- Ascending branch of **lateral circumflex femoral artery**.
- **Inferior gluteal artery** (sometimes).

- **Clinical Note:** Retinacular arteries from this anastomosis pierce capsule ? supply **femoral head**; damaged in **neck-of-femur fractures** ? **avascular necrosis**.

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### Cruciate Anastomosis

- Lies at the level of the **lesser trochanter**, in the posterior upper thigh.

- Provides **collateral circulation** between internal and external iliac systems.
- **Formed by:**
  - **Inferior gluteal artery** (from internal iliac).
  - **Transverse branch of medial circumflex femoral artery.**
  - **Transverse branch of lateral circumflex femoral artery.**
  - **First perforating artery** of profunda femoris.
- **Function:** Permits blood flow to the lower limb even if the femoral artery is occluded proximal to profunda femoris.

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### Structures Passing through the Greater Sciatic Foramen (Gateway of Gluteal Region)

#### Above Piriformis

- **Superior gluteal nerve and vessels.**

#### Below Piriformis

- **Inferior gluteal nerve and vessels.**
- **Sciatic nerve.**
- **Posterior cutaneous nerve of thigh.**
- **Nerve to quadratus femoris.**

- Pudendal nerve.
- Internal pudendal vessels.
- Nerve to obturator internus.

**Mnemonic:**

“**SISPPIN**” ?

Superior gluteal (above piriformis), then below piriformis: Inferior gluteal, **Sciatic**, Posterior cutaneous, **Pudendal**, Internal pudendal vessels, **Nerves to obturator internus** & quadratus femoris.

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### Structures Passing through the Lesser Sciatic Foramen

- Tendon of obturator internus.
- Nerve to obturator internus.
- Internal pudendal vessels.
- Pudendal nerve.

**Functional Note:**

- The **lesser sciatic foramen** acts as the **gateway to the perineum**.
- The **pudendal nerve and internal pudendal vessels** leave the gluteal region through this opening to enter the **pudendal canal**.