Muscles of Thigh
Lecture Objectives

• List the muscles of the thigh.
• Describe the attachments of the thigh muscles and their nerve supply.
• Describe the femoral triangle.
• Describe the femoral sheath and its contents.
Thigh compartments

(A) Anterior view

(F) Inferior view

Lateral intermuscular septum

Adductor longus
Adductor canal (deep to sartorius)

Vastus medialis
Saphenous nerve

Femur
Sartorius

Femoral artery and vein
Adductor canal
Medial

Great saphenous vein
Adductor longus
Gracilis
Adductor magnus

Deep artery of thigh and accompanying veins
Anterior Thigh Muscles

Mainly femoral nerve

- Flexors of the hip
  - Pectineus m.
    - Adduction & flexion
  - Iliopsoas m.
    - Iliacus m.
    - Psoas major m.
  - Major flexor
- Sartorius m.
  - Longest
  - Flex hip & knee
Anterior Thigh Muscles

• Extensors of the knee
  • Quadriceps femoris m.
    • Rectus femoris m.
      • Can flex the hip
    • Vastus medialis m.
    • Vastus intermedius m.
      • Articularis genu
    • Vastus lateralis m.
<table>
<thead>
<tr>
<th>Muscle</th>
<th>Proximal Attachment $^a$</th>
<th>Distal Attachment</th>
<th>Innervation $^b$</th>
<th>Main Action(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pectineus (Fig. 5.21A &amp; B)</td>
<td>Superior ramus of pubis</td>
<td>Pectineal line of femur, just inferior to lesser trochanter</td>
<td>Femoral nerve (L2, L3); may receive a branch from obturator nerve</td>
<td>Adducts and flexes thigh; assists with medial rotation of thigh</td>
</tr>
<tr>
<td>Iliopsoas (Fig. 5.21A &amp; C)</td>
<td>Sides of T12–L5 vertebrae and discs between them; transverse processes of all lumbar vertebrae</td>
<td>Lesser trochanter of femur</td>
<td>Anterior rami of lumbar nerves (L1, L2, L3)</td>
<td>Act conjointly in flexing thigh at hip joint and in stabilizing this joint $^c$</td>
</tr>
<tr>
<td>Psoas minor</td>
<td>Sides of T12–L1 vertebrae and intervertebral discs</td>
<td>Pectineal line, iliopectineal eminence via iliopectineal arch</td>
<td>Anterior rami of lumbar nerves (L1, L2)</td>
<td></td>
</tr>
<tr>
<td>Iliacus</td>
<td>Iliac crest, iliac fossa, ala of sacrum, and anterior sacroiliac ligaments</td>
<td>Tendon of psoas major, lesser trochanter, and femur distal to it</td>
<td>Femoral nerve (L2, L3)</td>
<td></td>
</tr>
<tr>
<td>Sartorius (Fig. 5.21A &amp; D)</td>
<td>Anterior superior iliac spine and superior part of notch inferior to it</td>
<td>Superior part of medial surface of tibia</td>
<td>Femoral nerve (L2, L3)</td>
<td>Flexes, abducts, and laterally rotates thigh at hip joint; flexes leg at knee joint, (medially rotating leg when knee is flexed) $^d$</td>
</tr>
</tbody>
</table>

$^a$ The Latin word *insertio* means *attachment*. The terms insertion and origin (L. *origo*) have not been used here (or elsewhere) since they change with function.

$^b$ The spinal cord segmental innervation is indicated (e.g., “L1, L2, L3” means that the nerves supplying the psoas major are derived from the first three lumbar segments of the spinal cord). Numbers in boldface (L1, L2) indicate the main segmental innervation. Damage to one or more of the listed spinal cord segments or to the motor nerve roots arising from them results in paralysis of the muscles concerned.

$^c$ The psoas major is also a postural muscle that helps control the deviation of the trunk and is active during standing.

$^d$ The four actions of the sartorius (L. *sartor*, tailor) produce the once common cross-legged sitting position used by tailors, hence the name.
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<tr>
<td>Quadriceps femoris</td>
<td>Anterior inferior iliac spine and ilium superior to acetabulum</td>
<td>Via common tendinous (quadriceps tendon) and independent attachments to base of patella; indirectly via patellar ligament to tibial tuberosity; medial and lateral vasti also attach to tibia and patella via aponeuroses (medial and lateral patellar retinacula)</td>
<td>Femoral nerve (L2, L3, L4)</td>
<td>Extend leg at knee joint; rectus femoris also steadies hip joint and helps iliopsoas flex thigh</td>
</tr>
<tr>
<td>Rectus femoris</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Vastus lateralis</td>
<td>Greater trochanter and lateral lip of linea aspera of femur</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vastus medialis</td>
<td>Intertrochanteric line and medial lip of linea aspera of femur</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vastus intermedius</td>
<td>Anterior and lateral surfaces of shaft of femur</td>
<td></td>
<td></td>
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*The spinal cord segmental innervation is indicated (e.g., "L1, L2, L3" means that the nerves supplying the quadriceps femoris are derived from the first three lumbar segments of the spinal cord). Numbers in boldface (L3, L4) indicate the main segmental innervation. Damage to one or more of the listed spinal cord segments or to the motor nerve roots arising from them results in paralysis of the muscles concerned.
Medial Thigh Muscles

- Mainly obturator nerve
- Adductor group
  - Adductor longus m.
    - Most anterior
  - Adductor brevis m.
    - Deep to pectineus & adductor longus
Medial Thigh Muscles

- Adductor magnus m.
  - Most posterior
  - Adductor hiatus
    - Adductor part
    - Hamstring part
      - Sciatic nerve
Medial Thigh Muscles

• **Gracilis m.**
  • Most medial and superficial
  • Crosses hip & knee joints

• **Obturator externus m.**
  • Lateral rotation
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<tr>
<td>Adductor longus (Fig. 5.23E &amp; G)</td>
<td>Body of pubis inferior to pubic crest</td>
<td>Middle third of linea aspera of femur</td>
<td>Obturator nerve, branch of, anterior division (L2, L3, L4)</td>
<td>Adducts thigh</td>
</tr>
<tr>
<td>Adductor brevis (Fig. 5.23F &amp; G)</td>
<td>Body and inferior ramus of pubis</td>
<td>Pectineal line and proximal part of linea aspera of femur</td>
<td></td>
<td>Adducts thigh; to some extent flexes it</td>
</tr>
<tr>
<td>Adductor magnus (Fig. 5.23C, D, &amp; G)</td>
<td>Adductor part: inferior ramus of pubis, ramus of ischium Hamstrings part: ischial tuberosity</td>
<td>Adductor part: gluteal tuberosity, linea aspera, medial supracondylar line Hamstring part: adductor tubercle of femur</td>
<td>Adductor part: obturator nerve (L2, L3, L4), branches of posterior division Hamstring part: tibial part of sciatic nerve (L4)</td>
<td>Adducts thigh Adductor part: flexes thigh Hamstrings part: extends thigh</td>
</tr>
<tr>
<td>Gracilis (Fig. 5.23H)</td>
<td>Body and inferior ramus of pubis</td>
<td>Superior part of medial surface of tibia.</td>
<td>Obturator nerve (L2, L3)</td>
<td>Adducts thigh; flexes leg; helps rotate leg medially</td>
</tr>
<tr>
<td>Obturator externus</td>
<td>Margins of obturator foramen and obturator membrane</td>
<td>Trochanteric fossa of femur</td>
<td>Obturator nerve (L3, L4)</td>
<td>Laterally rotates thigh; steadies head of femur in acetabulum</td>
</tr>
</tbody>
</table>

*a Collectively, the five muscles listed are the adductors of the thigh, but their actions are more complex (e.g., they act as flexors of the hip joint during flexion of the knee joint and are active during walking).

*b The spinal cord segmental innervation is indicated (e.g., "L2, L3, L4" means that the nerves supplying the adductor longus are derived from the second to fourth lumbar segments of the spinal cord). Numbers in boldface (L3) indicate the main segmental innervation. Damage to one or more of the listed spinal cord segments or to the motor nerve roots arising from them results in paralysis of the muscles concerned.
Femoral Triangle: Boundaries

- Superior
- Lateral
- Medial

- Floor
  - Iliopsoas
  - Pectineus
Femoral Triangle: Content

• Lateral ➔ Medial
  • Nerve – artery – vein – lymphatics

• Femoral sheath
  • Continuation of
    • Transversalis fascia – anteriorly
    • Iliacus fascia - posteriorly
  • Content
    • artery – vein – lymphatics

• Femoral canal
  • Femoral ring
Adductor (Subsartorial) Canal

- **Location**
- **Boundaries**
  - Anteromedial – Sartorius
  - Posterior – longus & magnus
  - Lateral – Vastus medialis
- **Content**
Femoral Artery

- Its entrance to the thigh
  - Position
    - Midway between ASIS and pubic symphysis
  - Femoral sheath
- Relations
  - Sartorius
  - Iliopsoas & adductor muscles
  - Femoral vein and nerve
- Exit to popliteal region
  - Adductor hiatus
- Profunda femoris a. (deep a. of thigh) (thigh region)
  - Deep to the adductor longus
Femoral Nerve

- Largest branch of the lumbar plexus
- Relations
  - Psoas m.
  - Iliacus m.
  - Inguinal ligament
  - Femoral sheath
Saphenous Nerve

- Cutaneous branch of the femoral nerve
- Relations
  - In Femoral triangle
  - Within Adductor canal
  - Cross Femoral a.
  - Between Sartorius & gracilis tendons
  - Companies great saphenous v.
  - Anterior to Medial malleolus
Obturator Nerve: Divisions

- **Anterior**
  - Anterior to obturator externus & adductor brevis mm.

- **Posterior**
  - Traverse obturator externus m.
  - Posterior to adductor brevis m.
  - Anterior to adductor magnus m.
Posterior Thigh Muscles

- Hamstring muscles
  - Extend hip & flex knee
  - Tibial division of sciatic nerve
- Semitendinosus m.
- Semimembranosus m.
- Biceps femoris m.
  - Long head
  - Short head
   - Fibular division of the sciatic nerve
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<tr>
<td>Semitendinosus</td>
<td>Ischial tuberosity</td>
<td>Medial surface of superior part of tibia</td>
<td>Tibial division of sciatic nerve part of tibia (L5, S1, S2)</td>
<td>Extend thigh; flex leg and rotate it medially when knee is flexed; when thigh and leg are flexed, these muscles can extend trunk</td>
</tr>
<tr>
<td>Semimembranosus</td>
<td>Ischial tuberosity</td>
<td>Posterior part of medial condyle of tibia; reflected attachment forms oblique popliteal ligament (to lateral femoral condyle)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biceps femoris</td>
<td>Long head: ischial tuberosity</td>
<td>Lateral side of head of fibula; tendon is split at this site by fibular collateral ligament of knee</td>
<td>Long head: tibial division of sciatic nerve (L5, S1, S2) Short head: common fibular division of sciatic nerve (L5, S1, S2)</td>
<td>Flexes leg and rotates it laterally when knee is flexed; extends thigh (e.g., accelerating mass during first step of gait).</td>
</tr>
</tbody>
</table>

*a Collectively these three muscles are known as hamstrings.

*b The spinal cord segmental innervation is indicated (e.g., “L5, S1, S2” means that the nerves supplying the semitendinosus are derived from the fifth lumbar segment and first two sacral segments of the spinal cord). Numbers in boldface (L5, S1) indicate the main segmental innervation. Damage to one or more of the listed spinal cord segments or to the motor nerve roots arising from them results in paralysis of the muscles concerned.
Sciatic Nerve: Relations

• Greater sciatic notch
• Piriformis m.
• Gluteus maximus m.
• Biceps femoris m.
• At the superior part of the popliteal fossa divides into its terminal branches
  • Tibial n.
  • Common peroneal n.
Surface Anatomy of Femoral Triangle
Surface Anatomy of Anterior Thigh

- Femoral triangle
  - Femoral artery
  - Femoral vein
  - Femoral nerve
- Patellar ligament
Catheterization

• Femoral artery catheterization
  • Midway between the ASIS and the symphysis pubis
  • Just below the inguinal ligament

• Femoral vein catheterization
  • Just medial to the felt femoral artery
  • High incidence of thrombosis
Surface Anatomy Sciatic Nerve

- Location of sciatic nerve
  - Line between greater trochanter and ischial tuberosity
  - Down middle of posterior thigh
- Tibial nerve
  - Middle popliteal fossa
- Common fibular nerve
  - Tendon of biceps femoris muscle
Surface Anatomy of Posterior Thigh

- Gluteus maximus
- Sciatic nerve
- Iliotibial tract (over vastus lateralis)
- Biceps femoris
- Semimembranosus
- Semitendinosus
- Gracilis
- Semitendinosus tendon
- Tibial nerve
- Gastrocnemius, medial head
- Common fibular nerve
- Biceps tendon
- Gastrocnemius, lateral head
- Vastus lateralis
- Biceps femoris tendon
- Semitendinosus tendon
- Popliteal fossa
- Gastrocnemius, medial head
- Head of fibula
- Gastrocnemius, lateral head
- Fibularis longus
- Soleus
- Fibularis brevis
- Calcaneal tendon
- Fibularis longus tendon
- Lateral malleolus