

LECTURE 09 THIGH & POPLITEAL FOSSA

FASCIA

The muscles of the thigh are enclosed in a deep fascia like a stocking. This fascia, the fascia lata (see previous lecture) has two inward extensions, the medial and lateral intermuscular septa, separating the anterior compartment from the medial and posterior compartments. There are thus three compartments altogether:

extensors.....	femoral nerve
flexors.....	sciatic nerve
adductors.....	obturator nerve

(abductors, innervated by gluteal nerves, are not present in the thigh).

These three compartments are divided by partitions of fascia radiating from the linea aspera:

sketch

G&S fig 7.08

(Snell 1992)

p598

(Grant and Basmajian 1980){Grant, 1980 #8}

Fig. 22.13

GM11 Fig. 25.14

Extensors: quadriceps and sartorius---femoral nerve (L3,L4).

Quadriceps consists of four muscles, all inserting onto the patellar tendon:

<u>muscle</u>	<u>origin</u>
rectus femoris	ilium (straight head AIIS, refl. head acetabular margin)
vastus medialis	medial lip of lin. aspera (+ spiral line)
vastus lateralis	lateral lip of lin. aspera extends knee
vastus intermedius	anterior + lat. surfaces upper 2/3 femur

All of these extend the knee; rectus femoris flexes the hip as well. EMG evidence shows little difference between the activities of the separate heads, except that vastus medialis has an important stabilising effect on the patella, as we shall see when the knee is discussed.

Sartorius is a narrow, strap-like muscle: the longest muscle in the body. It runs obliquely down from the ASIS to the medial side of the tibia, where it attaches via a broad flat tendon in front of gracilis and semitendinosus. Its actions are

- 1 flexes the thigh (passes in front of the hip joint)
- 2 flexes the knee (passes behind the knee joint)
- 3 laterally rotates the thigh.

Flexors: hamstrings---sciatic nerve (tibial division) L5,S1.

The posterior group of muscles is collectively known as the hamstrings. They are all flexors of the knee, but also extend the hip, because all have an origin on the pelvis, on the ischial tuberosity. This origin is covered by gluteus maximus in the buttock, but as they emerge from under gluteus max. they become more superficial and form the bulk of the back of the thigh.

ATTACHMENTS:

sketch, e.g.

(Green & Silver p 137)

Biceps femoris

- a) only long head crosses hip to insert on ischial tuberosity. Shares tendon of origin with semitendinosus (medial and superior facet on tuberosity).
- b) short head has origin from lower part of linea aspera
- c) inserts on head of fibula

Active in ordinary extension of the hip joint; in contrast with gluteus maximus, which is active only against resistance (Basmajian and De Luca 1985) p245.

Semitendinosus

- a) tendinous below: from medial superior facet on ischial tuberosity to insert on medial shaft of tibia.

Semimembranosus

- a) fleshy below: from lateral superior facet on ischial tuberosity to insert on medial tibial condyle
- b) part recurves to contribute to oblique popliteal ligament.

Since the hamstrings produce flexion of the knee and extension of the hip, they will be at their longest, their most stretched, with the hip flexed and the knee extended. Thus it is difficult to touch one's toes, i.e. to fully flex the hip with the knees extended. It is much easier to flex the hip when the knee is also flexed, so that the hamstrings are not at full stretch.

Adductors of thigh - obturator nerve. (L2, 3,4).

This is the medial group of thigh muscles, in general arising from the ischiopubic ramus, and inserting on the linea aspera. Since the adductor muscles have a restricted origin and a more extended insertion, they generally fan out from the pubis to the linea aspera.

<u>muscle</u>	<u>origin</u>	<u>insertion</u>
adductor longus	lateral to pubic tubercle	linea aspera
adductor brevis	inferior pubic ramus	linea aspera
adductor magnus	ischiopubic ramus	linea aspera
	ischial tuberosity	adductor tubercle
pectineus	pectineal line of pubis	pectineal line of femur
gracilis	inferior pubic ramus	upper medial tibia

The obturator nerve (L 234) has an anterior and a posterior branch, separated by adductor brevis (i.e. the anterior branch runs behind adductor longus and pectineus, the posterior branch runs in front of adductor magnus. See cross-section sketch below.

The adductors are all active during medial rotation as well as adduction (cf. small number of medial rotators). (Basmajian and De Luca 1985), p245; contradicts (Duchenne and Kaplan 1959), p 267.

Adductor magnus, like gluteus maximus, is recruited only against resistance. It has two main parts - the main part from the ischiopubic ramus to the linea aspera, innervated by obturator nerve. The fibres which descend vertically from the ischial tuberosity are innervated by the tibial branch of the sciatic, i.e. this can be thought of as a 'hamstring' component of adductor magnus.

sketch adductors anterior view

Gray 35 Fig 5.88

G&S p 135

sketch cross section adductors
showing position of obturator n
branches.

FEMORAL TRIANGLE

The femoral triangle is the region of the groin, on the inner thigh, where the femoral artery, vein and nerve enter the thigh:

sketch

cf.GM10 fig 20.14

Base: is the inguinal ligament, from ASIS to PT:

Walls: are formed by the medial border of sartorius descending from the ASIS medially across the thigh, and the medial border of adductor longus descending from the PT laterally across to the femur.

Floor: is formed by pectineus and iliopsoas.

Contents: the femoral nerve, artery and vein, (NAV from lateral to medial), and deep inguinal lymph nodes.

Roof: is formed by the cribriform fascia, penetrated by great saphenous vein.

FEMORAL SHEATH The femoral artery and vein (but not the nerve) run from the abdomen into the femoral triangle in the femoral sheath, which also carries the femoral canal, containing lymph vessels.

The sheath is a funnel shaped fascial tube which is an extension of the fascial lining of the abdomen. At the abdominal end of the femoral canal is the femoral ring, and its importance is that one may get a femoral hernia, usually of small intestine, into the femoral canal, whose lymphatic contents are easily squashed.

sketch

T.S.

femoral

sheath

ADDUCTOR CANAL The triangle is like a funnel, which leads into the adductor canal. This carries the femoral vessels and saphenous nerve (a cutaneous branch of the femoral nerve).

These vessels all reach the back of the knee, the popliteal fossa---and to do so they must cross from the anterior compartment of the thigh to the posterior compartment of the thigh. To do this they penetrate the adductor compartment through a hole or hiatus in adductor magnus:

sketch

cf. G&S p 135

LOWER END OF FEMUR AND POPLITEAL FOSSA

The lower end of the femur has two condyles, a medial and a lateral, each with an epicondyle. Note also adductor tubercle, and sites of attachment laterally for lateral gastrocnemius, plantaris, lateral collateral ligament, and popliteus; medially for medial gastrocnemius, adductor magnus, and medial collateral ligament.

sketch

posterior aspect of femur

upper end of tibia

showing attachments

including popliteus

Gray 35 3.185A

McMinn pp 277, 279

NB 1) if we go from superficial to deep on the lateral aspect of the knee, we encounter first the tendon of biceps femoris, then the lateral collateral lig, then the tendon of popliteus

NB 2) note how the medial collateral lig. runs close to the knee joint, while the lateral collateral lig. is held away from it by the fibula.

If we then sketch in the hamstrings above and the medial and lateral gastrocnemius below, they provide the borders of the diamond-shaped popliteal fossa.

Floor is popliteus muscle; contents include the popliteal artery and vein, which have entered via the adductor hiatus, and in addition the tibial and common peroneal nerves. The popliteal artery gives rise to superior and inferior genicular arteries which form an anastomosis around the knee, similar to the anastomosis around the elbow formed by the brachial a. and radial and ulnar aa.

sketch

popliteal fossa, borders

and contents e.g. GM10

CLINICAL ASPECTS

Myositis ossificans: Severe bruising of the quadriceps may also affect the periosteum, and result in myositis ossificans, which can be regarded as an ossified haematoma. It may impair movement, will be visible on X-ray, and can be removed surgically (Kulund 1988) p429.

Hamstring strain: This is relatively common; the most often affected is the short head of biceps, which is not properly a hamstring (Kulund 1988) p431.
Crushed ice is the immediate treatment for both injuries.

References

- Basmajian JV and De Luca CJ. Muscles alive : their functions revealed by electromyography, Williams & Wilkins, Baltimore, 1985, xii, 561 pp.
- Duchenne GB and Kaplan EB. Physiology of motion : demonstrated by means of electrical stimulation and clinical observation and applied to the study of paralysis and deformities, Saunders, Philadelphia, 1959, xxiii, 612 pp.
- Grant JCB and Basmajian JV. Grant's Method of anatomy : by regions, descriptive and deductive, Williams & Wilkins, Baltimore, 1980, xvii, 625 pp.
- Kulund DN. The Injured athlete, Lippincott, Philadelphia, 1988, xviii, 603 pp.