

Hip Joint



References

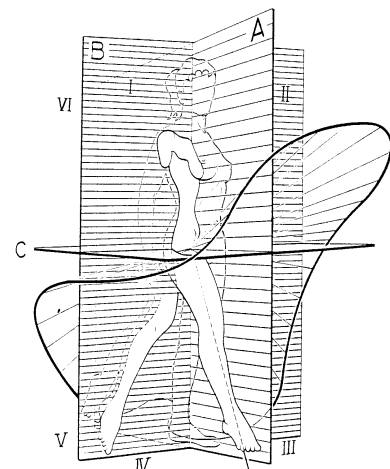
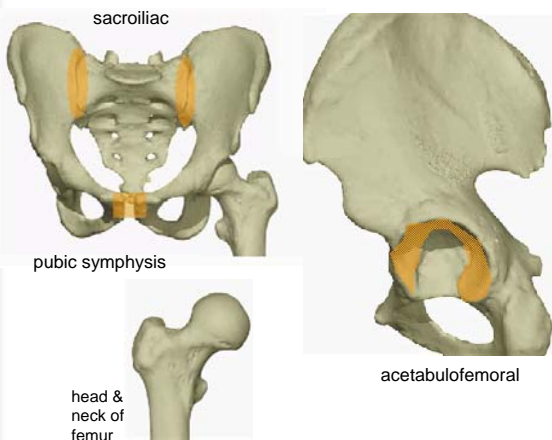
- Link to MedNet hip pages from lecture notes...
- Few diagrams in your manual

Hip joint: *outline*

- anatomy
- motion available
- clinical assessment
 - transverse plane position
 - Trendelenburg sign/test
 - vs. Coxalgic gait
 - Hamstring extension
- biomechanical basis of hip pain
 - piriformis syndrome

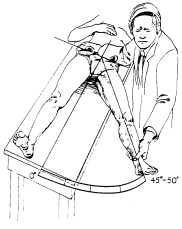
Hip joint

- pelvic girdle comprised of 3 joints:
 - sacroiliac
 - pubic symphysis
 - acetabulofemoral
- acetabulofemoral joint
 - true polyaxial joint
 - capable of significant motion in all three planes
 - abduction / adduction
 - inversion / eversion (int/ext rotation)
 - extension / flexion
 - also capable of complex triplanar motion: circumduction

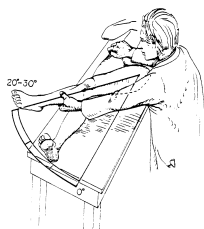


Hip circumduction

Motion at the hip joint



Approx. 40°
abduction



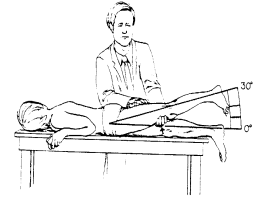
Approx. 25°
adduction

Motion at the hip joint



Approx. 120°
Flexion

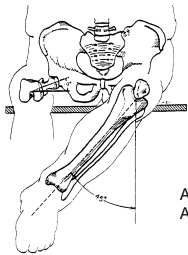
(gait: 30° required)



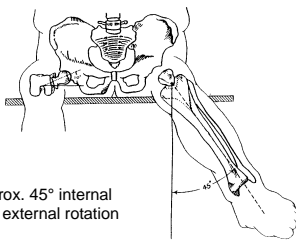
Approx. 10-20°
Extension

(gait: 10° required)

Motion at the hip joint



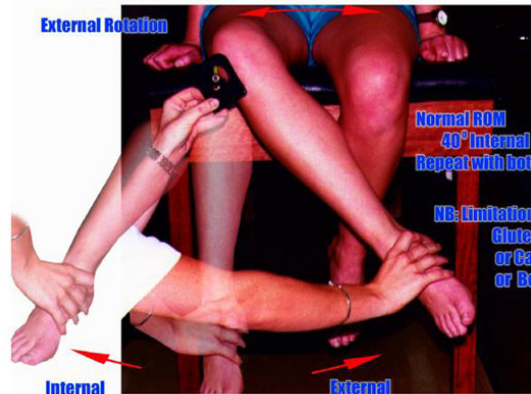
Approx. 45° internal
And external rotation



(15-20° rotation
Required in gait)

Patient Sitting: Hip Assessment

External Rotation



Normal ROM
40° Internal 40° External
Repeat with both legs

NB: Limitations from:
Gluteus Maximus
or Capsule
or Bony

AVERAGE ROTATION of the HIP JOINT: Various Ages

Age (yrs)	External	Internal
0.5	50°	25°
1	50°	30°
2	45°	30°
3	40°	35°
4	40°	35°
5	40°	35°
6- adult	35-40°	35-40°

Birth - 1 year = 2x external: 1 internal ROM

By 4 years = adult = (external = internal)

Pelvic motion during gait

- hip takes part in major determinants of gait to allow smooth progression of the centre of mass
- Pelvic rotation
 - occurs in transverse plane
 - approximately 4 degrees (anterior and posterior)
- Pelvic list
 - occurs in the frontal plane
 - approximately 5 degrees (medial and lateral)

Hip joint: ilium, ischium, pubis

- ligamentous support
 - pubo-femoral ligament
 - Relatively weak
 - ilio-femoral ligament
 - Anterior aspect of hip joint
 - ischiofemoral ligament
 - Posterior aspect of hip joint

Strong fibrous capsule

Hip muscles

- muscles acting at hip joint
 - very *complex*
 - most muscles crossing the hip have more than one action
 - difficult to isolate clinically
 - we are most concerned about the effect of contracture in the transverse plane
 - Abduction/adduction
 - Look at patellar position, angle of gait
 - 4 major groups of muscles

Anterior Internal rotators

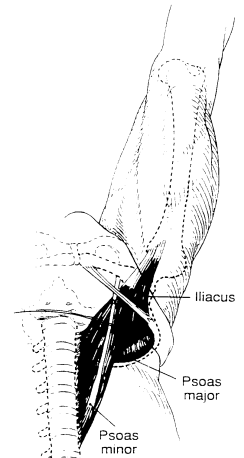
Posterior Internal rotators

Anterior External rotators

Posterior External rotators

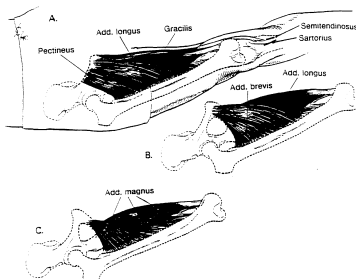
Anterior internal rotators

- iliopsoas
 - consists of psoas major and iliacus
 - originates from the anterior aspect of the lower lumbar spine and iliac crest respectively
 - inserts into lesser trochanter of femur
 - primarily a hip flexor & stabiliser of the hip joint



- adductors
 - adductor longus, brevis, magnus
 - originate from pubic ramus and insert into linea aspera, medial condyle of femur
 - primarily adduct the hip joint

Posterior internal rotators



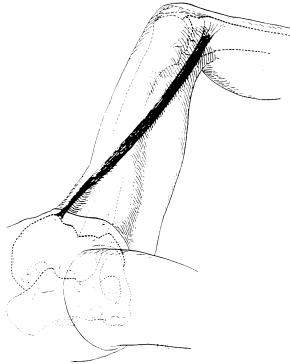
Posterior internal rotators...

- g. medius and minimus
 - Origin: ilium, inserts into greater trochanter of femur
 - **Abduct** hip as well as internally rotate it

Anterior external rotators

■ Sartorius

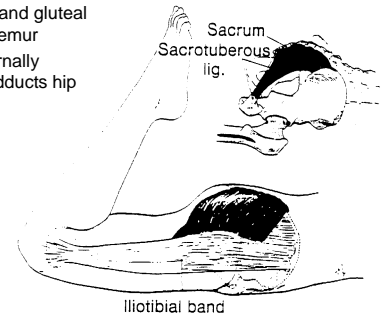
- Longest muscle in the body
- originates from ASIS, inserts into pes anserinus (medial surface of proximal tibia)
- flexes, externally rotates and abducts the hip joint
(though it doesn't abduct very efficiently)



Posterior external rotators

■ gluteus maximus

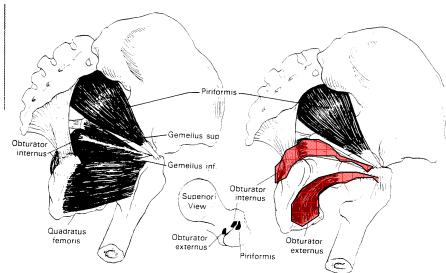
- originates from gluteal line of ilium, inserts into iliotibial band and gluteal tuberosity of femur
- extends, externally rotates and adducts hip joint



Deep hip muscles

■ obturator internus / externus, gemelli

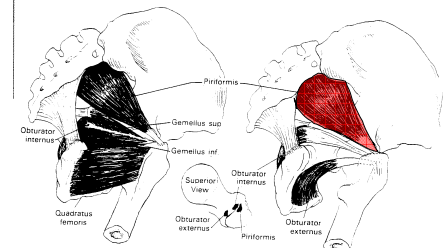
- anterior fibres externally rotate
- posterior fibres internally rotate
- stabilising role



Deep hip muscles

■ Piriformis

- Pear shaped muscle
- Posterior external rotator
- Originates from anterior surface of sacrum, inserts into greater trochanter
- sciatic nerve passes inferior to it...



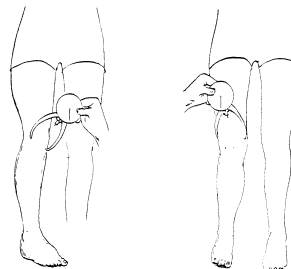
Clinical Assessment



■ two techniques

■ Root et al.

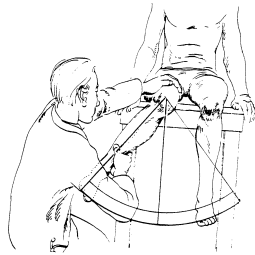
- pt. supine, knee extended
- palpate femoral condyles
- internally and externally rotate leg
- measure with gravity goniometer



Clinical assessment

Clinical assessment...

- **McCrea**
 - pt. supine, knee flexed
 - leg used as pendulum
 - internally and externally rotate leg
 - visualise upside-down protractor
 - estimate ROM
- in both cases, normal ROM is 45 degrees internal and external



Clinical assessment...

- limited internal rotation - tight external rotators
- limited external rotation - tight internal rotators
- hip extended - anterior muscles taut
- hip flexed - posterior muscles taut
- no difference: femoral bone twisting problem
- difficult to Ddx between ligamentous and osseous contracture
- eg: limited internal rotation with hip extended > tight anterior external rotator (sartorius)

Clinical assessment

Internal rotators

Anterior

iliopsoas

Posterior

g. medius
g. minimus
adductors

External rotators

Anterior

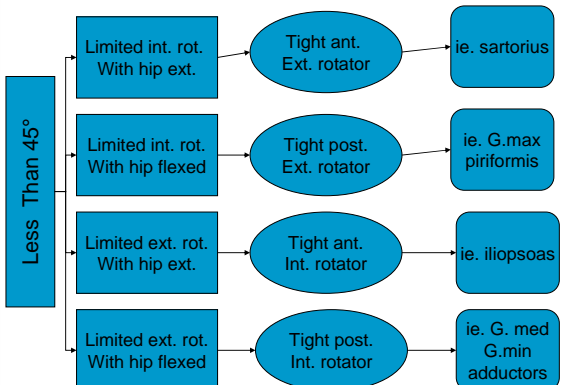
sartorius
deep ant. fibres

Posterior

g. maximus
piriformis
deep post. fibres

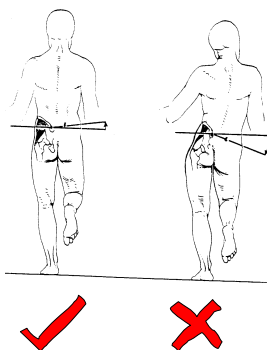
- hip flexed: posterior taut
- hip extended: anterior taut

So you've found <45° of motion in a transverse plane HJ test...



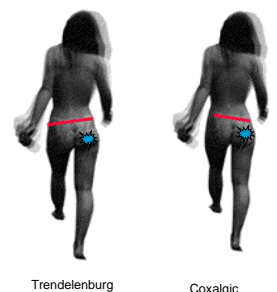
Clinical assessment

- **Trendelenburg test**
 - test for weak hip abductors (gl. medius)
 - stand on one leg: unsupported hip should be level or slightly higher than supported side
 - if unsupported side drops, weak gl. medius on supported side
 - In gait: tilting of torso to unaffected side, but person 'lurches' CoG so as not to fall
 - Bilateral problem - 'waddle' gait



...but don't confuse Trendelenburg with...

- **Coxalgic gait**
- Painful hip -- decrease compressive force on the joint by hip abductors shifting upper torso towards the affected side
- Similar to Trendelenburg, but pelvis on opposite (non-affected) side tilts **up** instead of sagging down

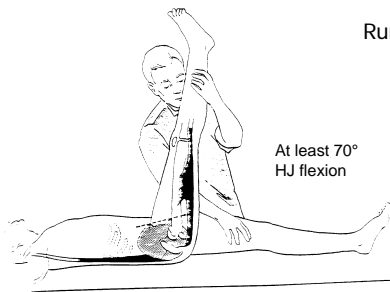


Trendelenburg

Coxalgic

Clinical assessment

■ Hamstring extension



Runners?

At least 70°
HJ flexion

How does the foot relate to the hip biomechanically?

Foot mechanics and hip pain

- mainly related to LLD
 - osteoarthritis due to relative coxa vara
 - malalignment of sacro-iliac joint
 - piriformis syndrome
- piriformis syndrome
 - compression of sciatic nerve as a result of spasm, oedema and contracture of piriformis, which passes through the greater sciatic foramen
 - usually unilateral, with a limp on the affected side
 - pain on resistance of external rotation (hip flexed)
 - unilateral XS pronation of the foot leads to XS internal rotation of femur...
 - > stretch / overuse of piriformis > inflammation / hypertrophy

Summary

- anatomy / ROM
- mainly concerned with transverse plane position
- clinical tests
 - McCrea
 - Trendelenburg sign
 - hamstring flexibility
- referral to physio / myotherapist
- LLD, XS pronation and hip pain

