The Hip Joint

Orthopedics and Neurology

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Goals

1. Discuss specific orthopedic conditions of the hip.
2. Teach specific orthopedic tests and signs
3. Enable differentiation of hip joint conditions and diseases

The Hip Joint

- The hip is a ball-and-socket synovial joint
- The hip is an exceptionally strong and stable joint, with a wide range of multiaxial movements

The Hip Joint

Loading forces acting on the hip

1. Standing transfers one third of the body weight to the hip joint mechanism
2. Standing on one limb transfers 2.4 to 2.6 times the body weight to the hip joint mechanism.
3. Walking transfers 1.3 to 5.8 times the body weight on the hip joint mechanism.

The Hip Joint

Four major components of the proximal femur

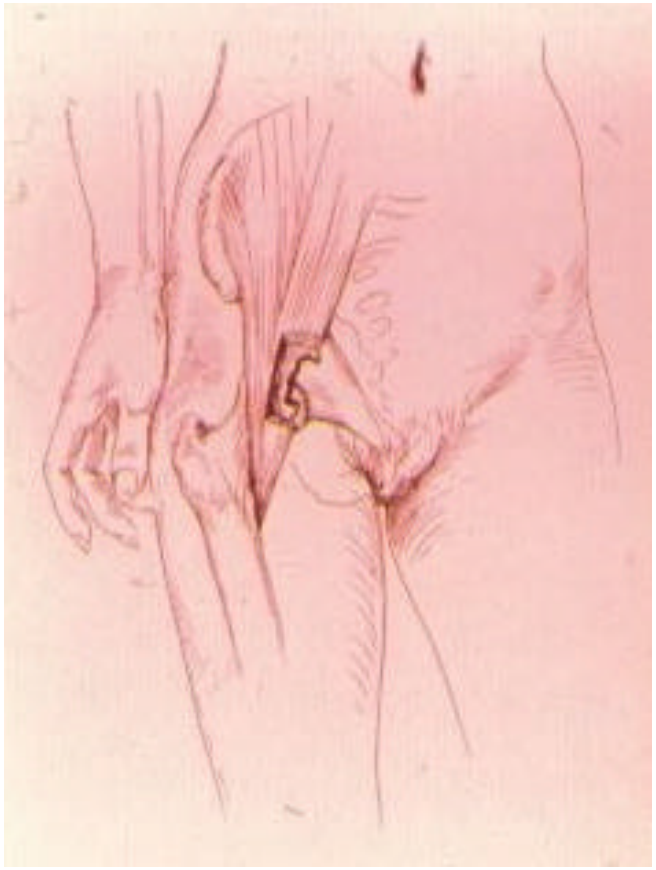
1. Greater trochanter
2. Lesser trochanter
3. Femoral neck
4. Femoral head

The Hip Joint

Three most clinically important hip bursae

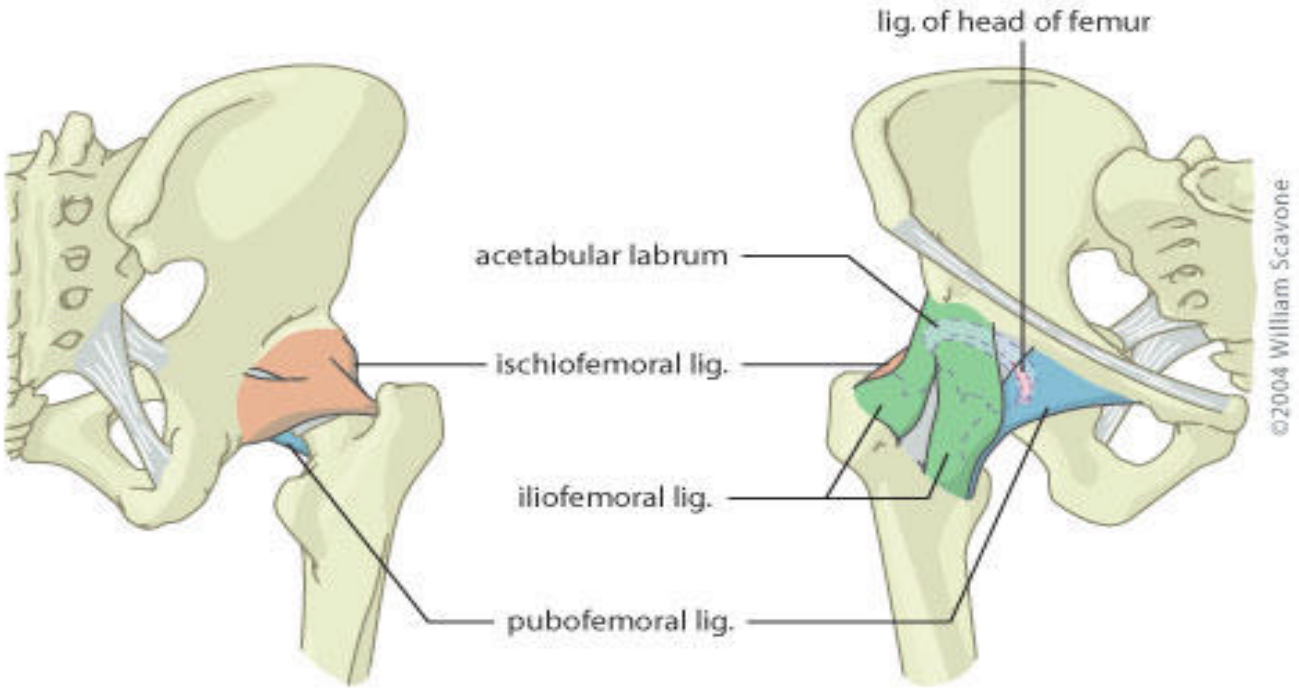
1. Trochanteric bursa
2. Iliopsoas bursa
3. Ischiogluteal bursa

Iliopsoas Bursitis



Hip Ligaments

Ligaments screws home the femoral head with extension (close-packed)



Iliofemoral Ligament

- Reinforces the fibrous capsule anteriorly
- Y-shaped and attaches to the anterior inferior iliac spine and acetabular rim proximally, and the intertrochanteric line distally.
- With extension, the ligament screws the femoral head into the acetabulum ("close-packed" position).

The Hip Joint

Sciatic nerve distribution

- Sciatic nerve exits the pelvis via the sciatic notch
- It usually passes under the piriformis
- Superior gluteal n, a branch of the sciatic, innervates the gluteus medius, minimus, and the tensor fascia lata. (Occurs prior to piriformis)

The Hip Joint

Sciatic nerve distribution

- Inferior gluteal n innervates the gluteus maximus and passes under the piriformis
- Sciatic n is predisposed to injury from hip joint to popliteal fossa
- Sciatic and peorneal mononeuropathies are second and first most common mononeuropathies in lower extremity

The Hip Joint

Hip range of motion by patient

- Supine

1. Raises leg above body with knee extended (flexion of hip)
2. Knee to chest, opposite leg extended (flexion of hip)
3. Swings leg laterally and medially with knee extended (Abduction and adduction)
4. Side of foot on opposite knee and moves flexed knee toward table (external rotation)
5. Flexes knee and rotates leg to move knee inward (internal rotation)

The Hip Joint

Hip range of motion by patient

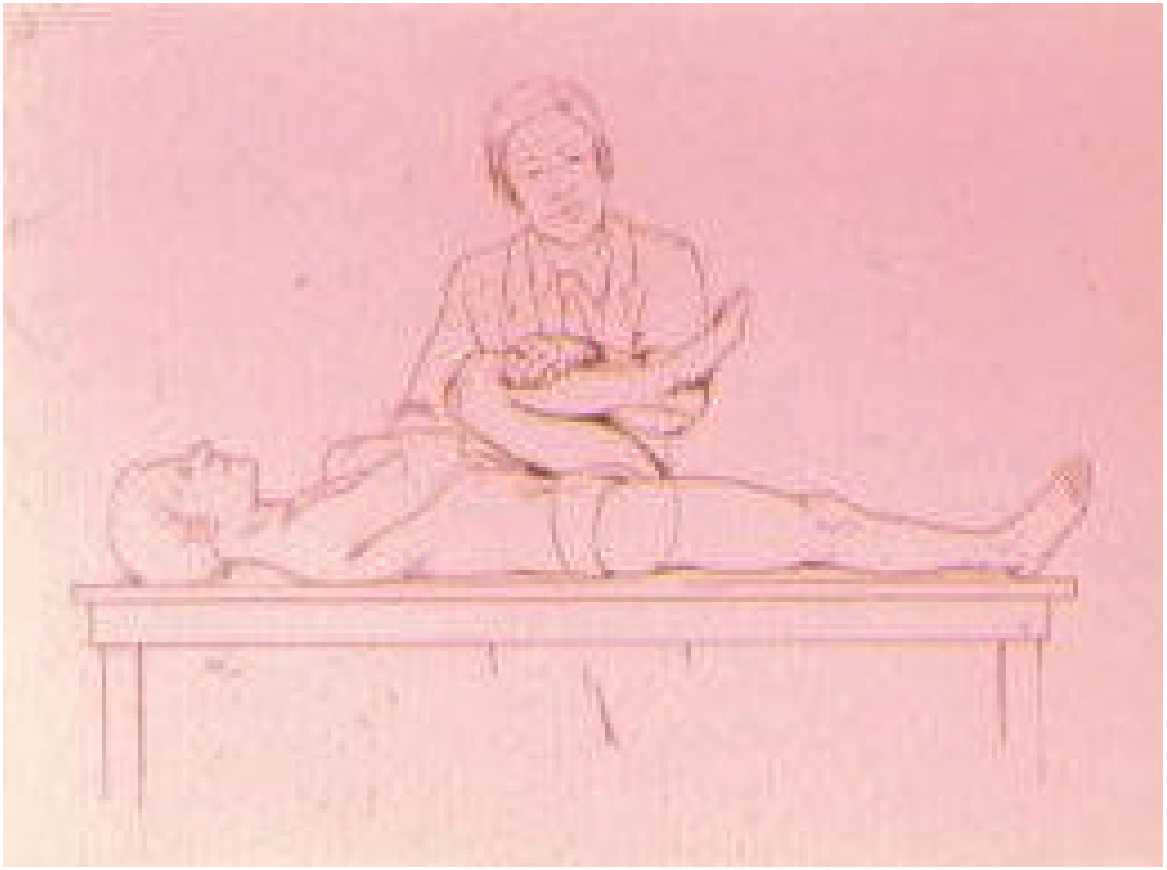
- Prone or standing

1. Swings the straightened leg behind the body

   (see page 685)

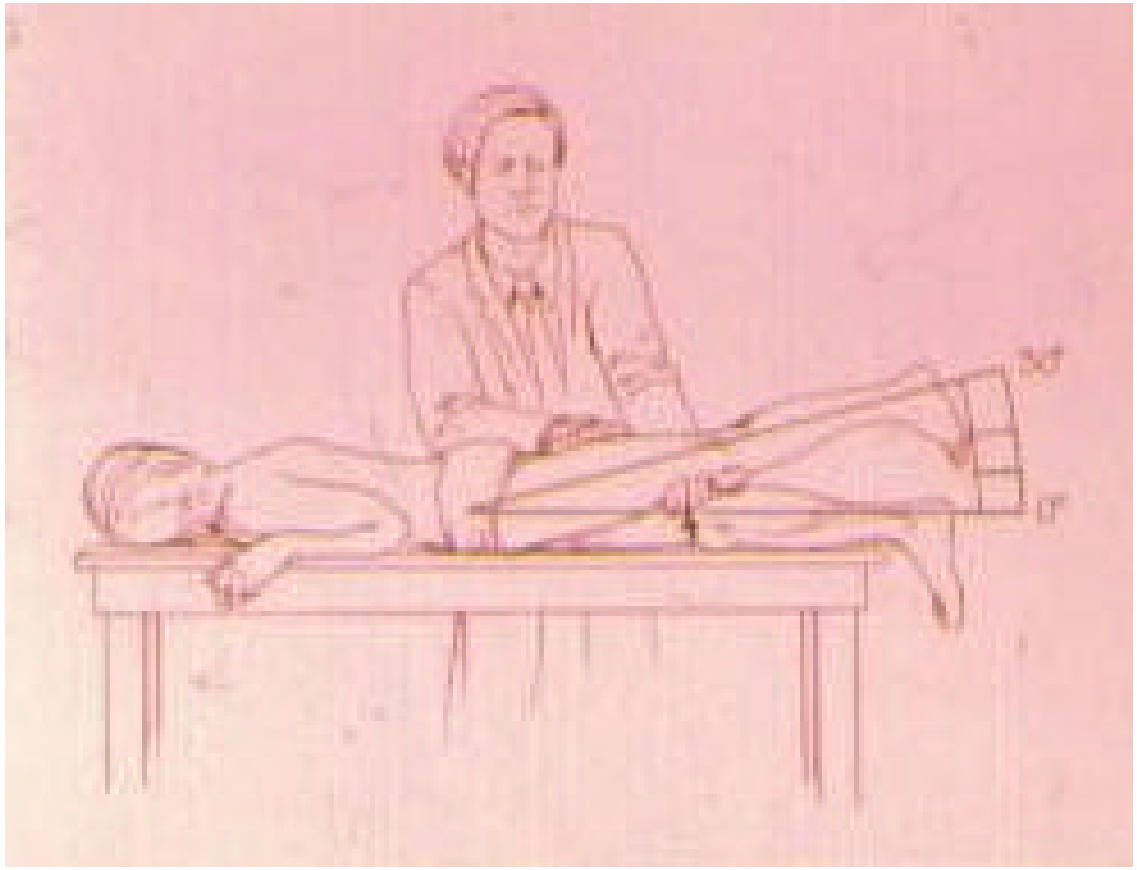
Hip Flexion

Approximately 135 degrees



Hip Extension

Normally 30 degrees



Hip Abduction

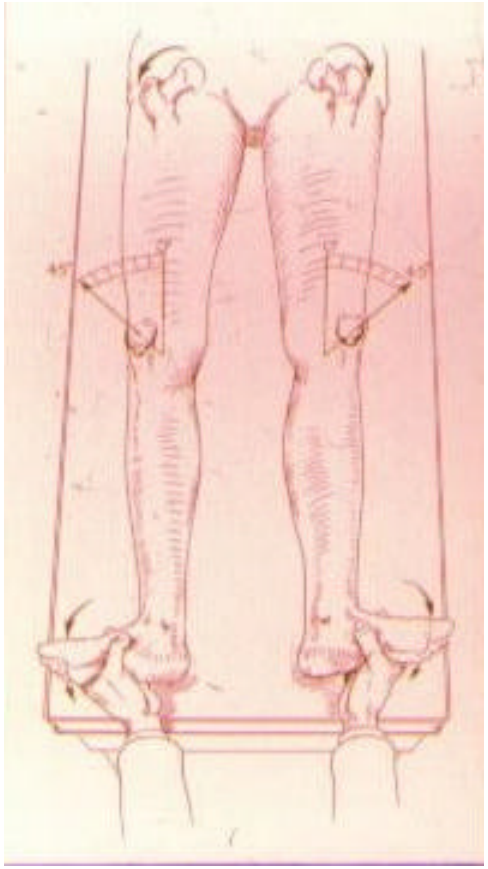
Normal limits 45-50 degrees

Hip Adduction

Normal limits 20-30 degrees

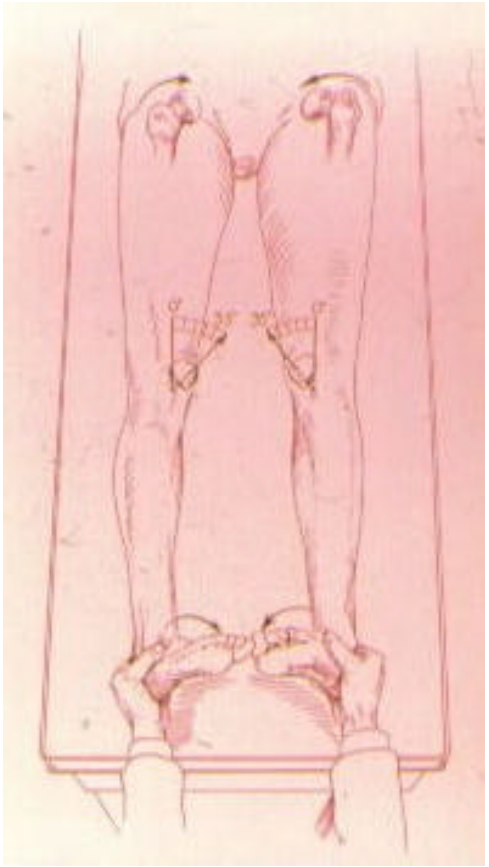
Hip External Rotation

Normal limit 45 Degrees



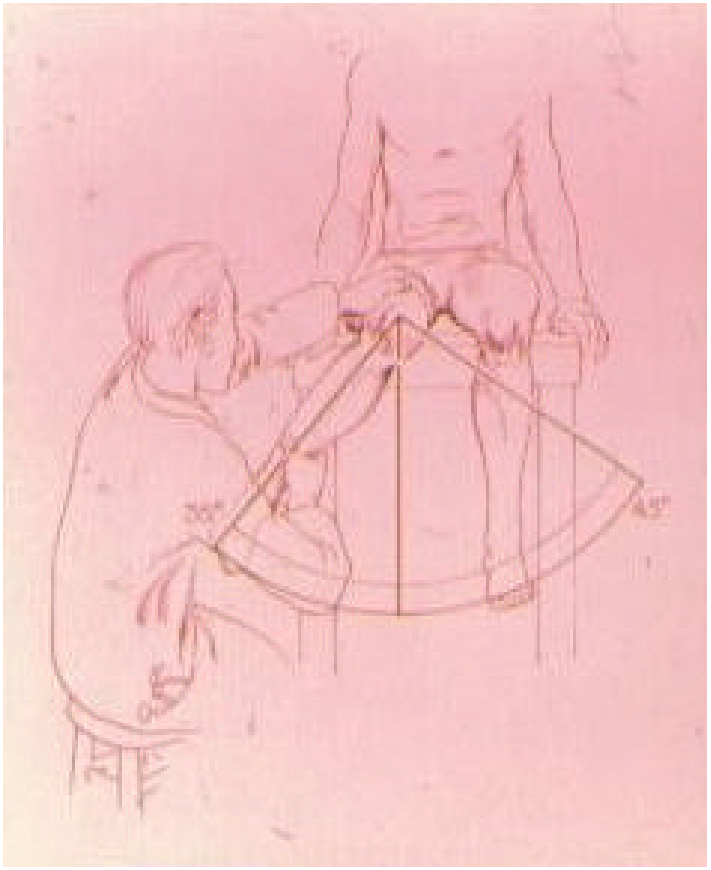
Hip Internal Rotation

Normal limit 35 degrees



Internal and External Hip Rotation

Flexed position



Basic Hip Radiological Study

1. AP pelvic view
2. AP spot hip view
3. Lateral (frog leg) spot view of affected side

The Hip Joint

Osseous deformities of the proximal femur

1. Coxa vara
2. Coxa valga
3. Femoral anteversion
4. Femoral retroversion

Coxa Vara

Developmental and acquired conditions

1. Intertrochanteric fracture
2. Slipped capital femoral epiphysis
3. Legg-Calve-Perthes disease
4. Congenital hip dislocation
5. Rickets
6. Paget’s disease

Coxa Vara

- Coxa vara, by definition, includes all forms of decrease of the femoral neck shaft angle to less than 120-135°.

  (see page 681Evans figure 10-4)
- Yochum states 120-130 degrees is normal for the "Femoral angle"

1. Coxa vara (less than 120 degrees)
2. Coxa valga (more than 130 degrees)

http://www.emedicine.com/Orthoped/topic474.htm

Coxa Vara

Medical therapy

- Many forms of nonoperative treatment have been proposed in the past, including spica cast immobilization and skeletal pin traction with bed rest, with generally unsatisfactory results.
- It is generally accepted that no place remains for conservative nonoperative measures for individuals requiring treatment for either symptomatic or progressive CCV.

Coxa Vara

Surgical intervention

- Most patients seem to present for evaluation and are considered for treatment when aged 5-10 years.
- Femoral osteotomy procedures are technically easier in the older child, as more bone stock is present.

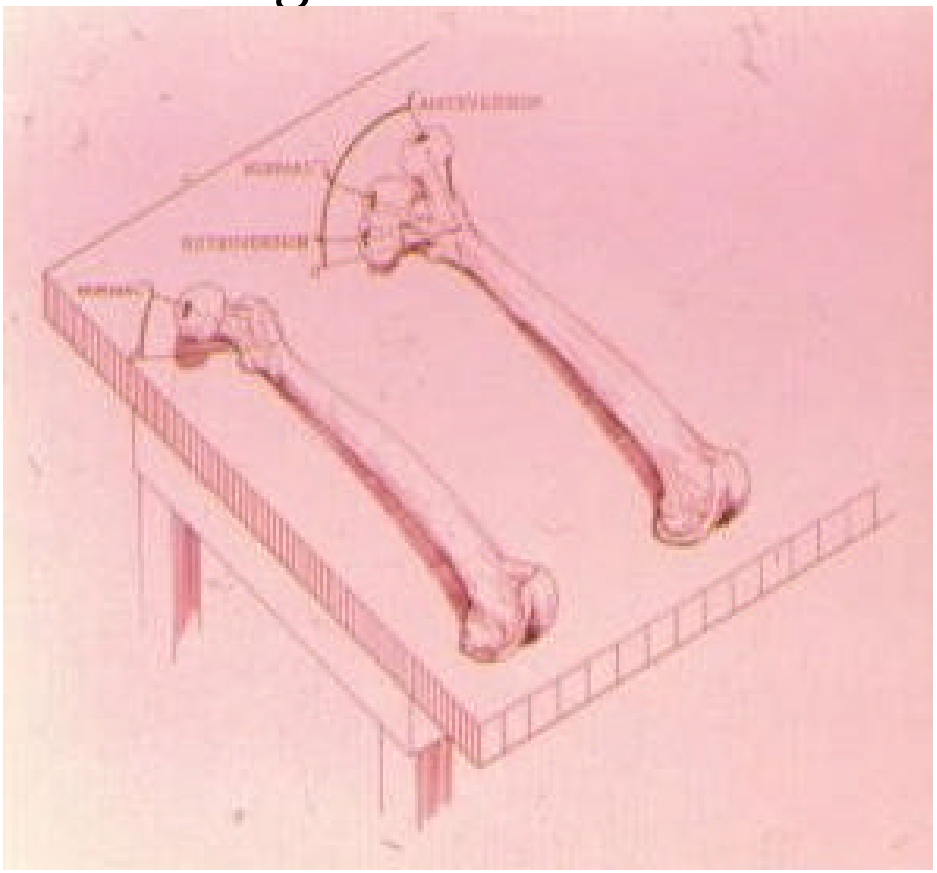
The Hip Joint

Anteversion and retroversion

- Normal angle of anteversion is 15 degrees (adults)
- Increase in angle = excessive femoral anteversion
- Decreased angle = femoral retroversion

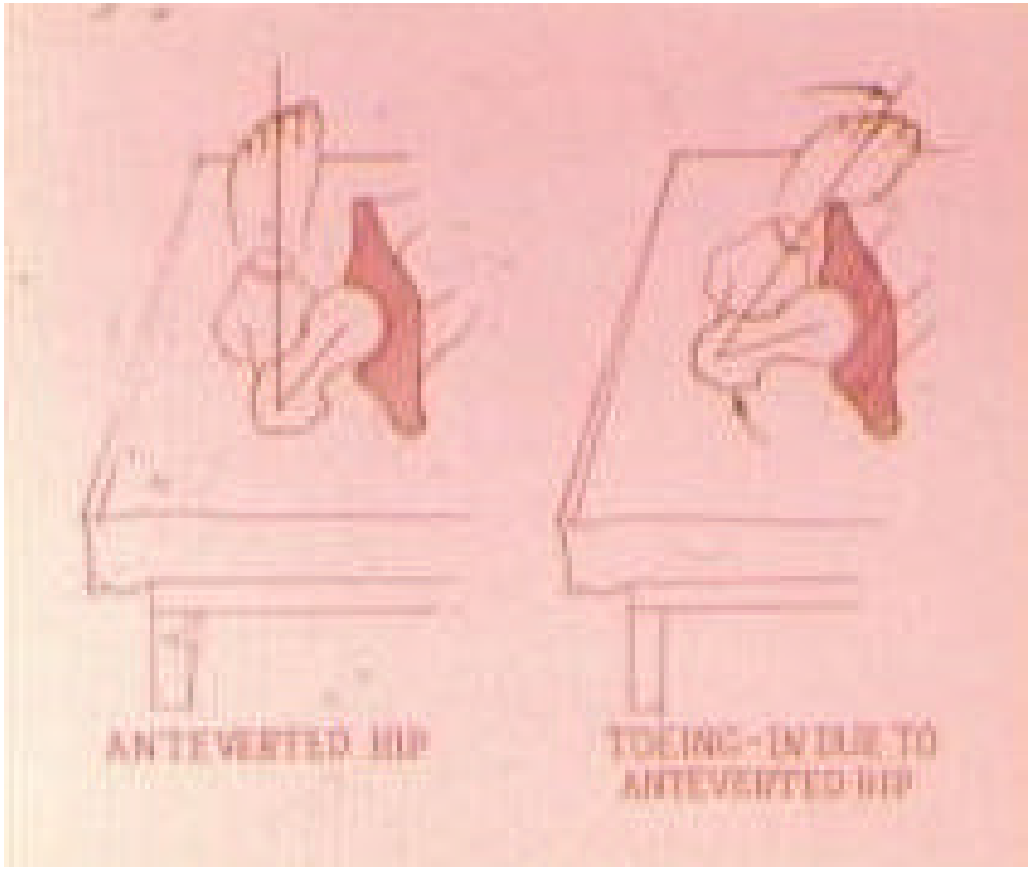
Normal, Anteversion, and Retroversion

Anterior anterior angulation of the neck of the femur



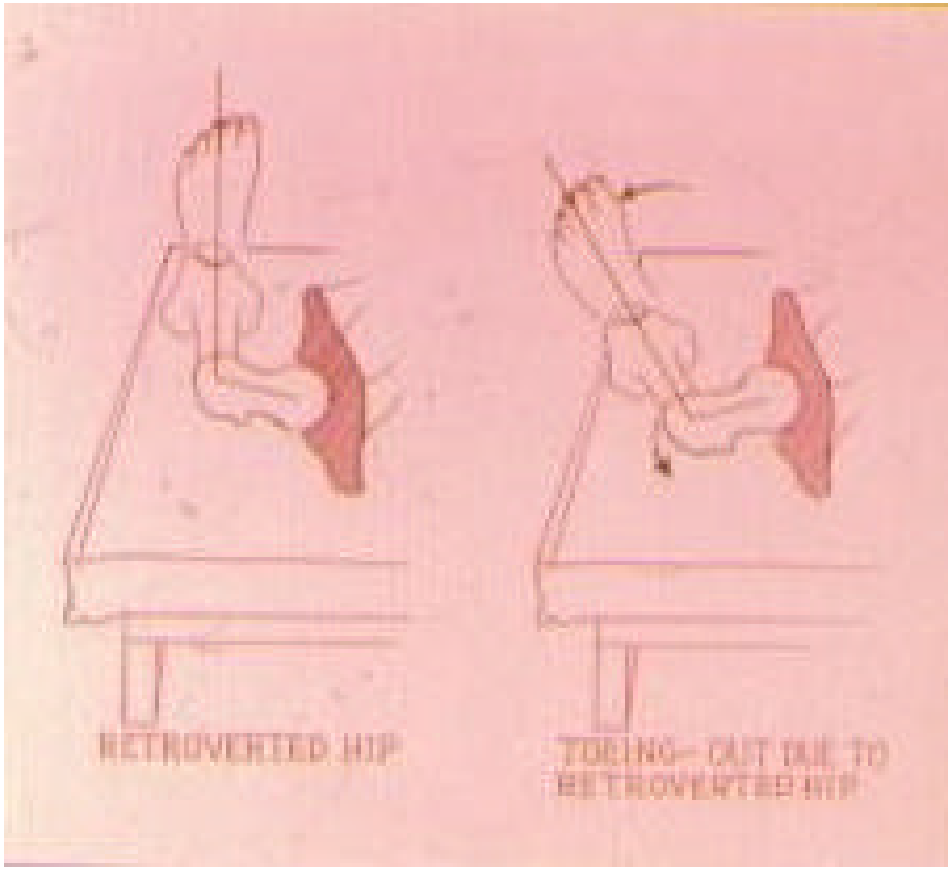
Anteversion of Hip

Toe-in-gait



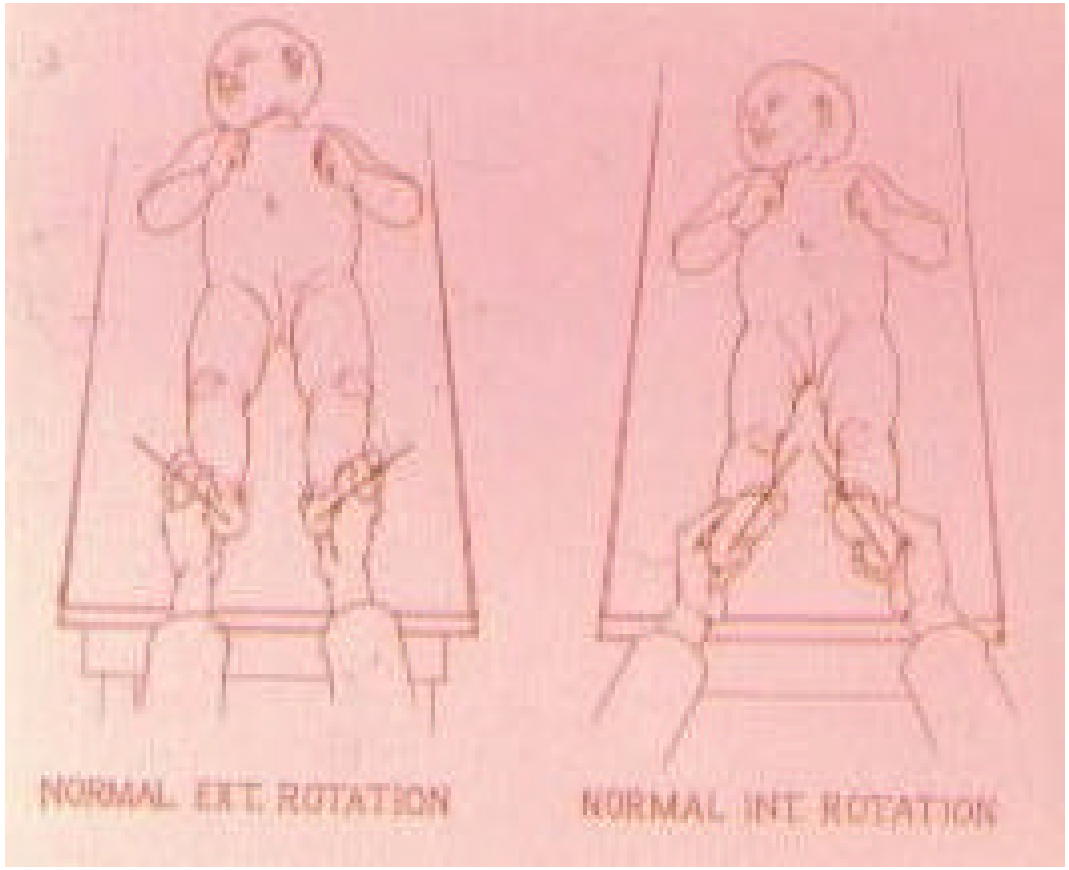
Retroversion of Hip

Toe-out-gait



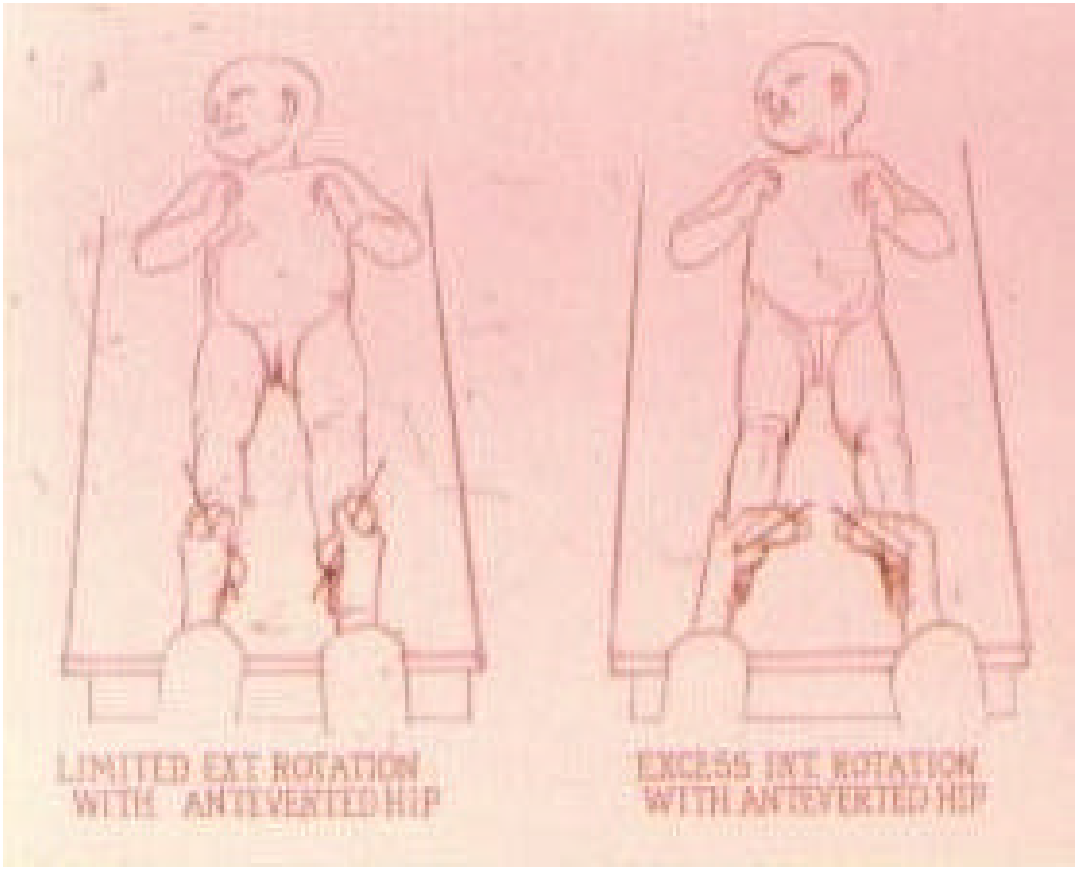
Normal Femoral Rotation

Infants



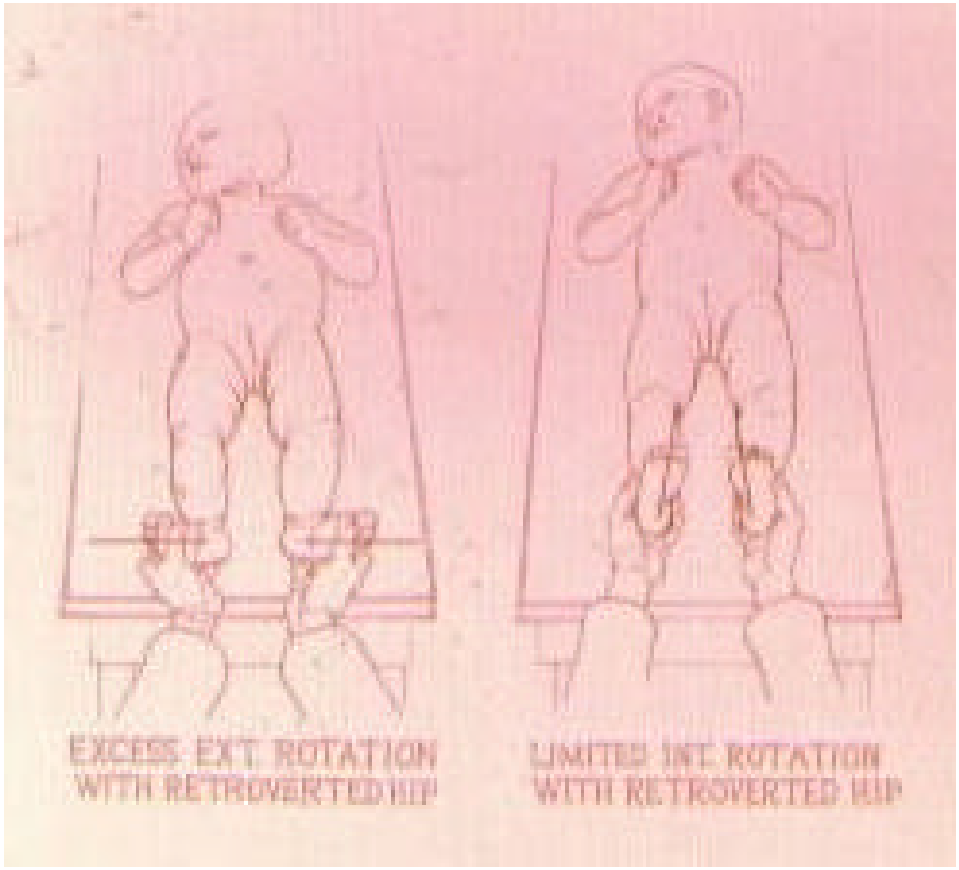
Excessive Anteversion

More common in infants



Excessive Femoral Retroversion

Infants



Motor Testing of Hip

Primary flexor = Iliopsoas

Secondary = Rectus femoris Femoral nerve, L1,2,3

Motor Testing of Hip

Primary extensor = Gluteus Maximus

Inferior Gluteal nerve, S1

Motor Testing of Hip

Primary abductor = Gluteus medius

Superior gluteal nerve, L5

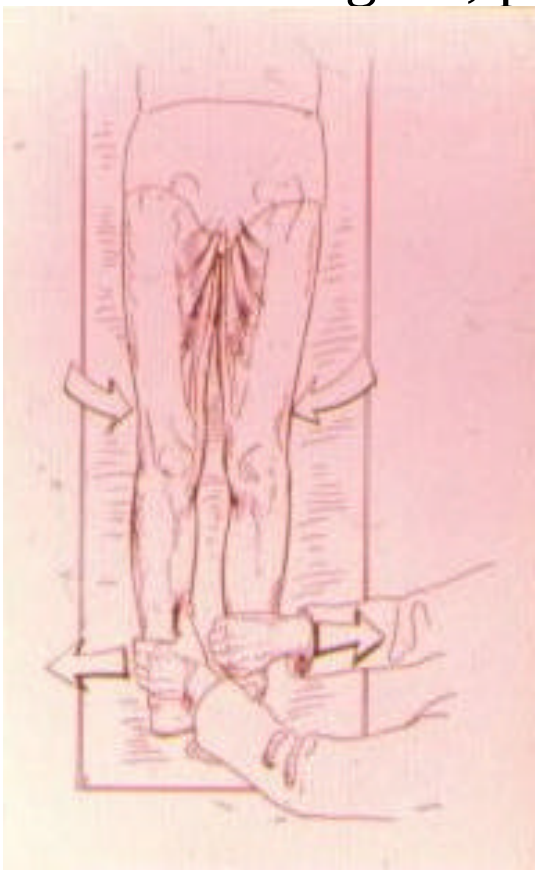
Secondary abductor = Gluteus minimus

Motor Testing of Hip

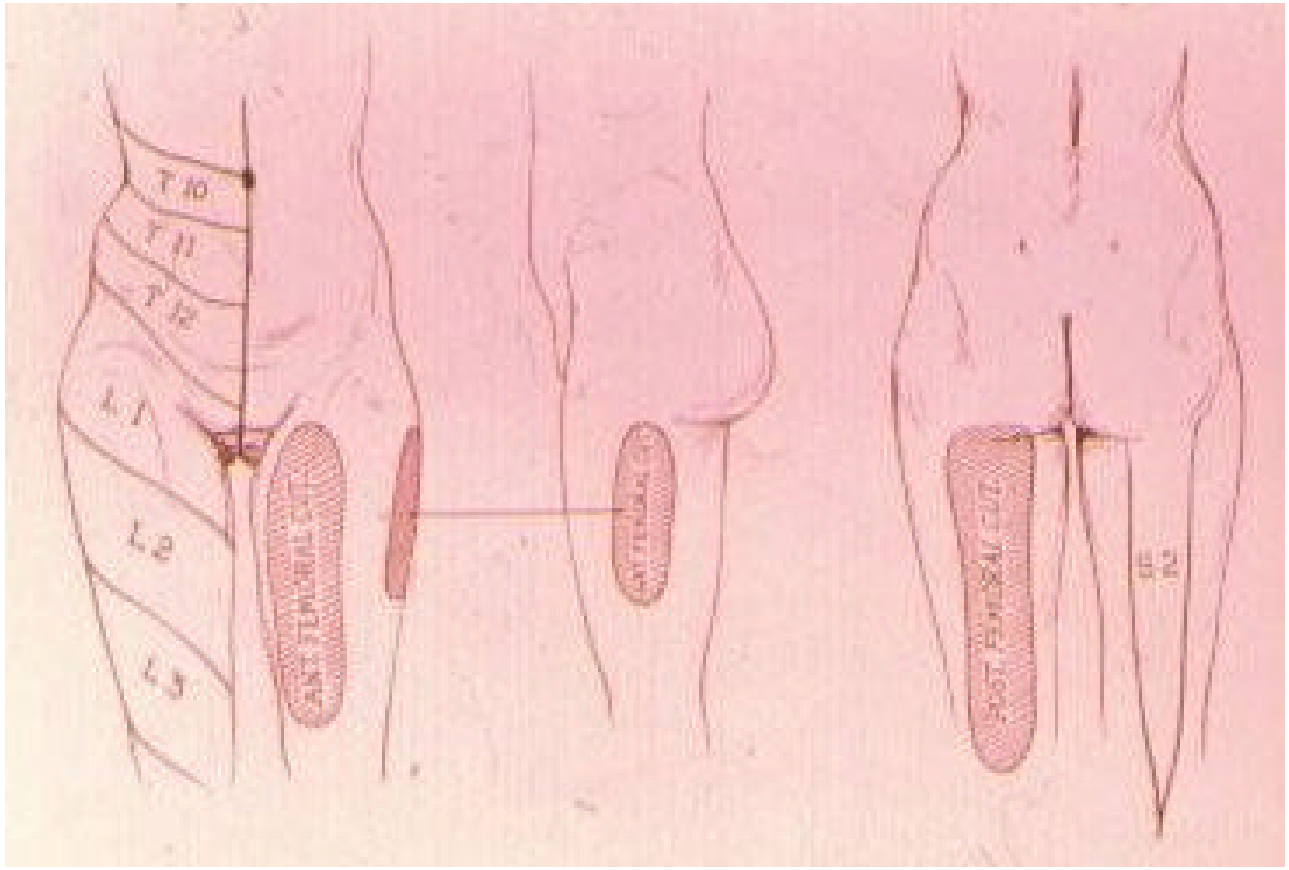
Alternate motor test for abduction

Motor Testing of Hip

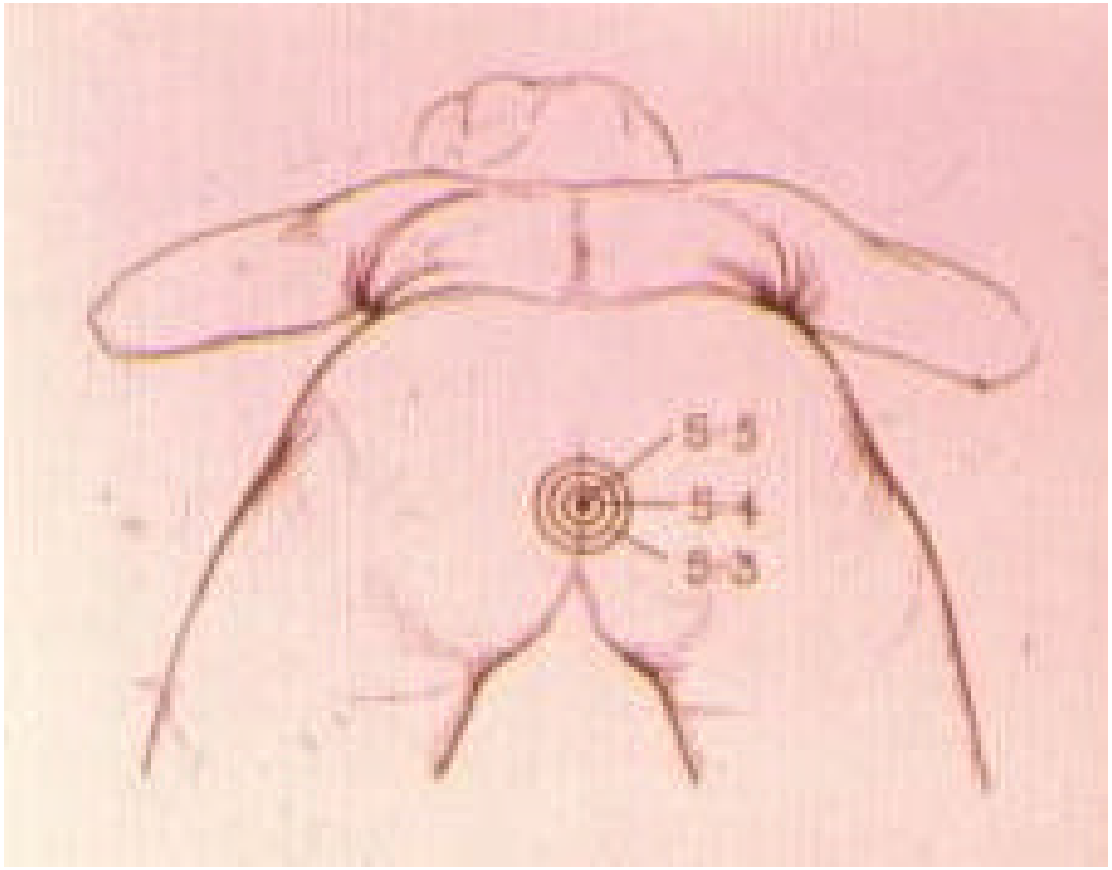
Primary adductor = Adductor Longus,
Obturator nerve, L2,3,4
Secondary = Add. Brevis/magnus, pectineus, gracilis



Sensory Distribution
Hip and pelvis

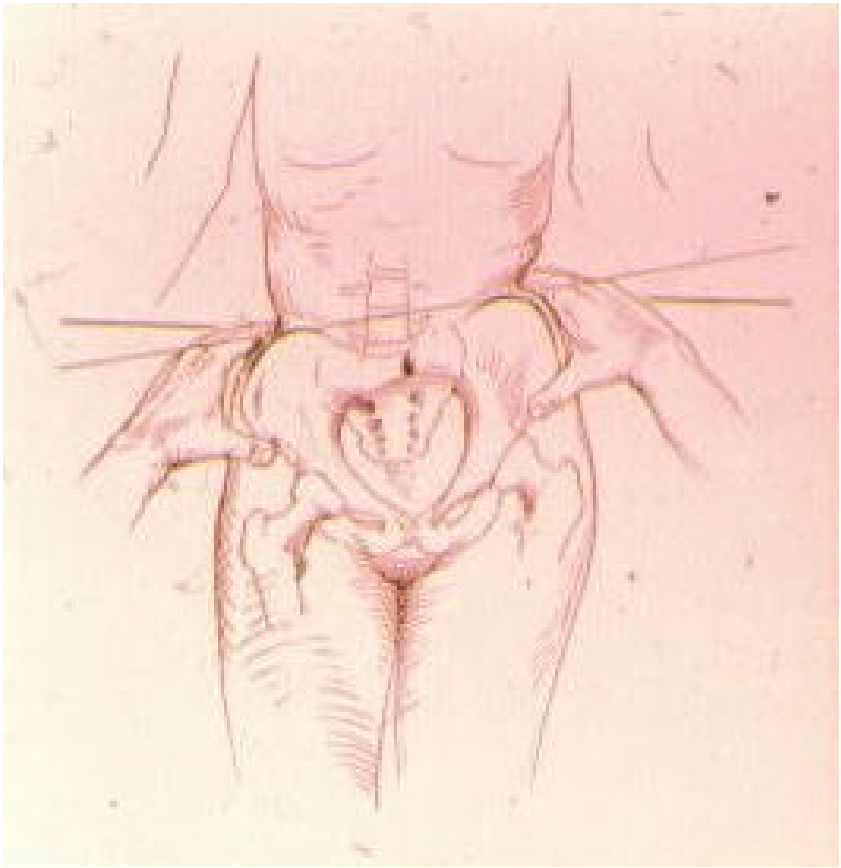


Sensory Distribution
Anus

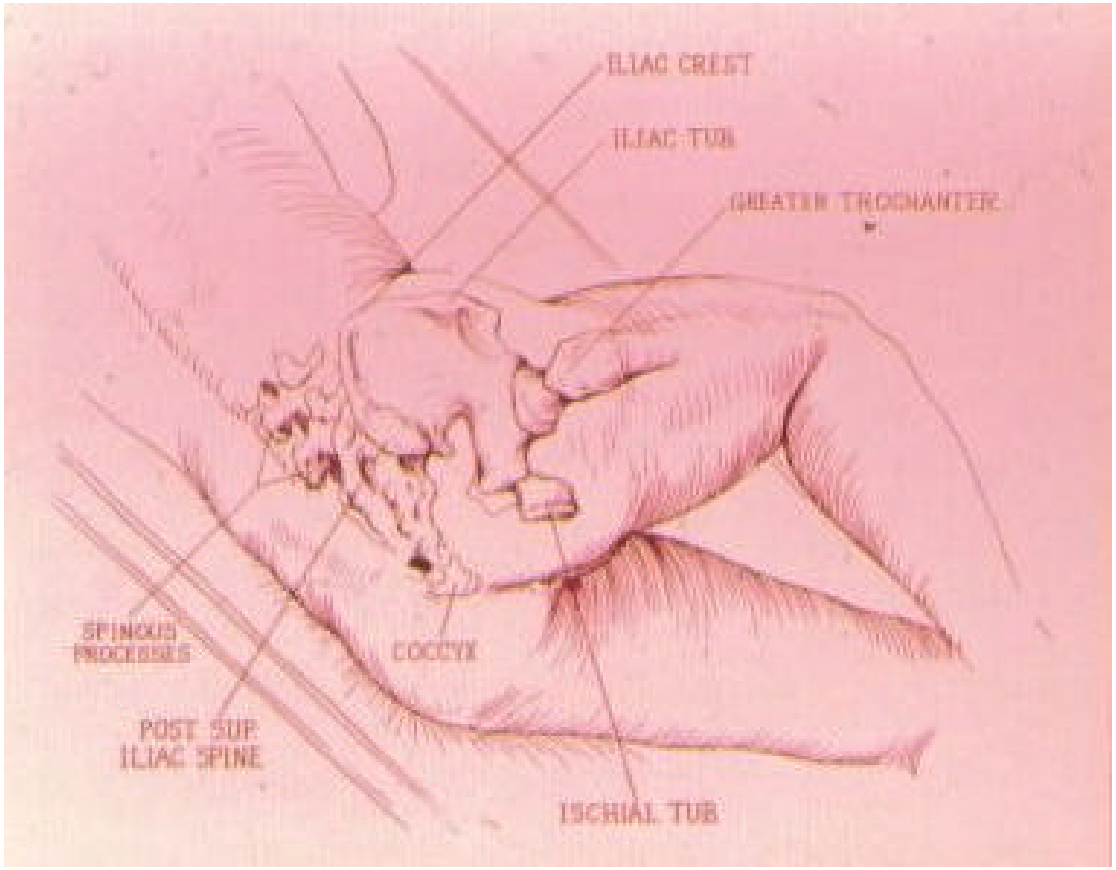


Palpation

Pelvic obliquity



Bony Anatomy of Hip and Pelvis

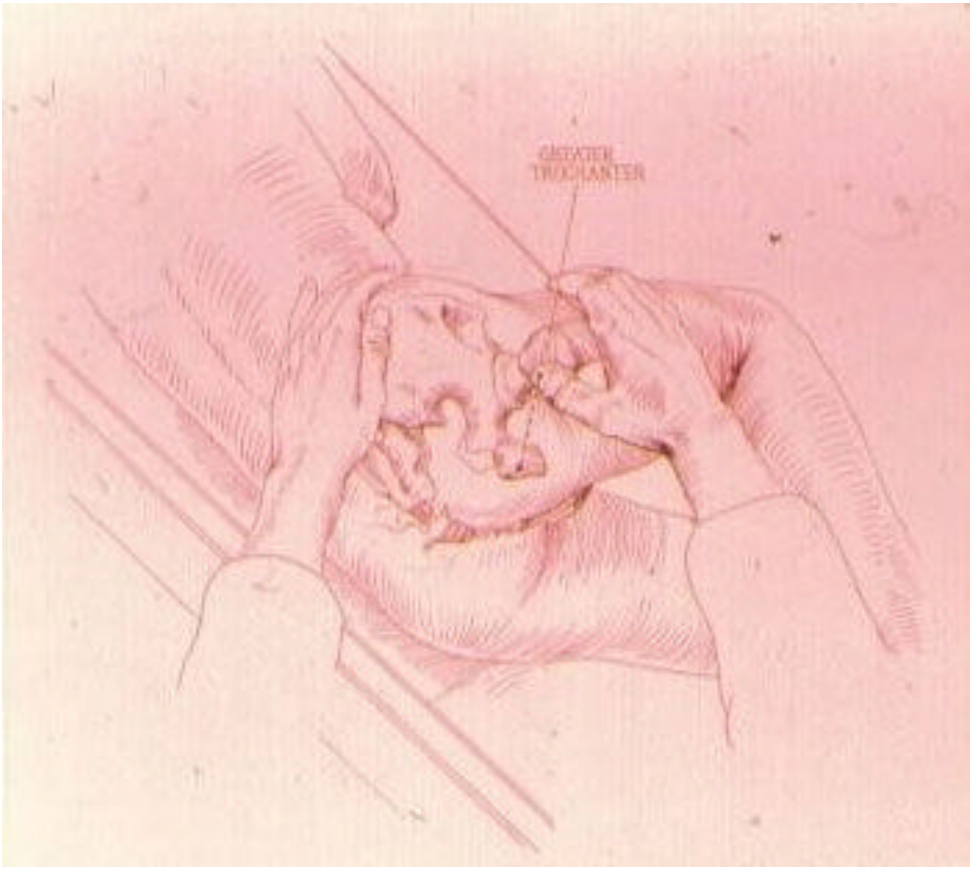


Palpation

Iliac crest and tubercle

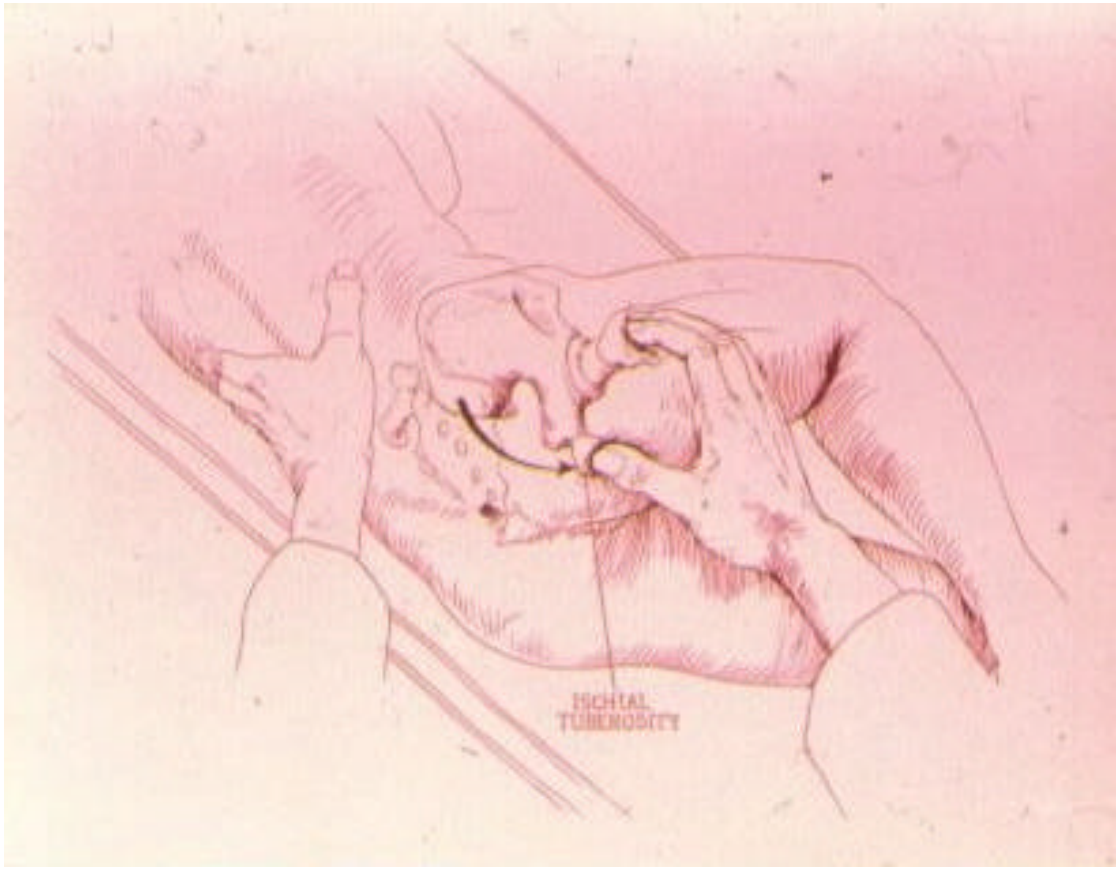
Palpation

Greater trochanter (posterior aspect)

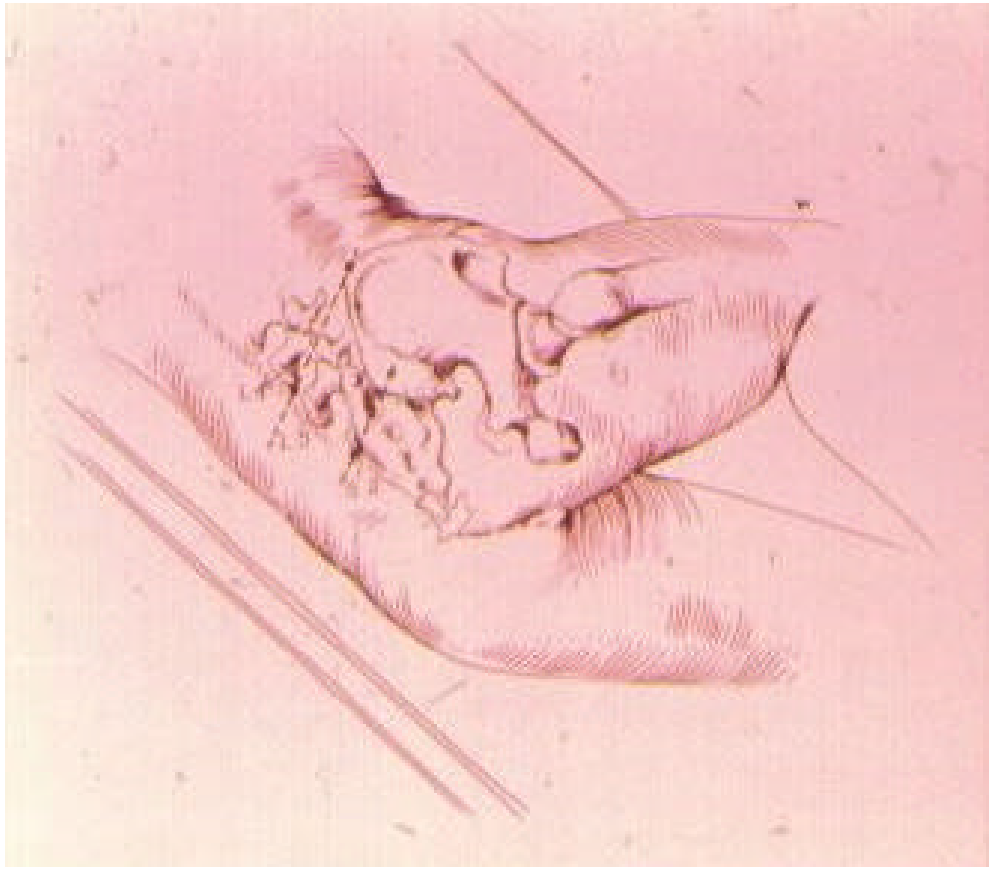


Palpation

Ischial tuberosity

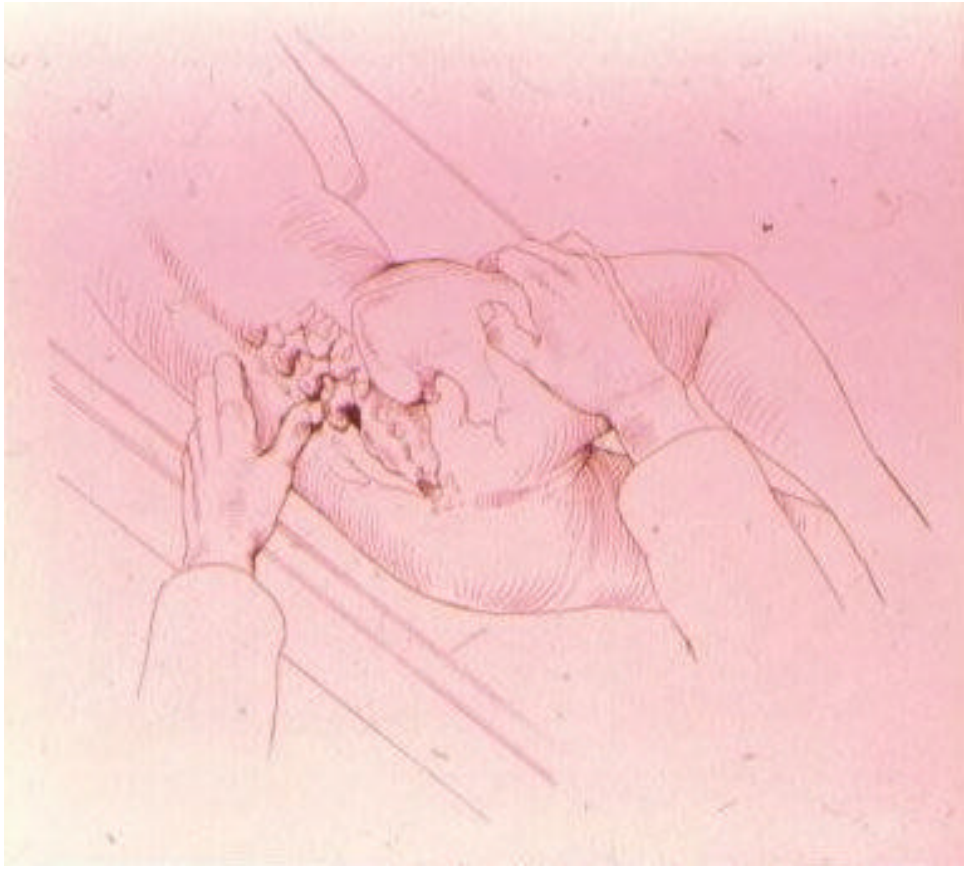


Sacroiliac Joint



Palpation

L4-5 spinous process



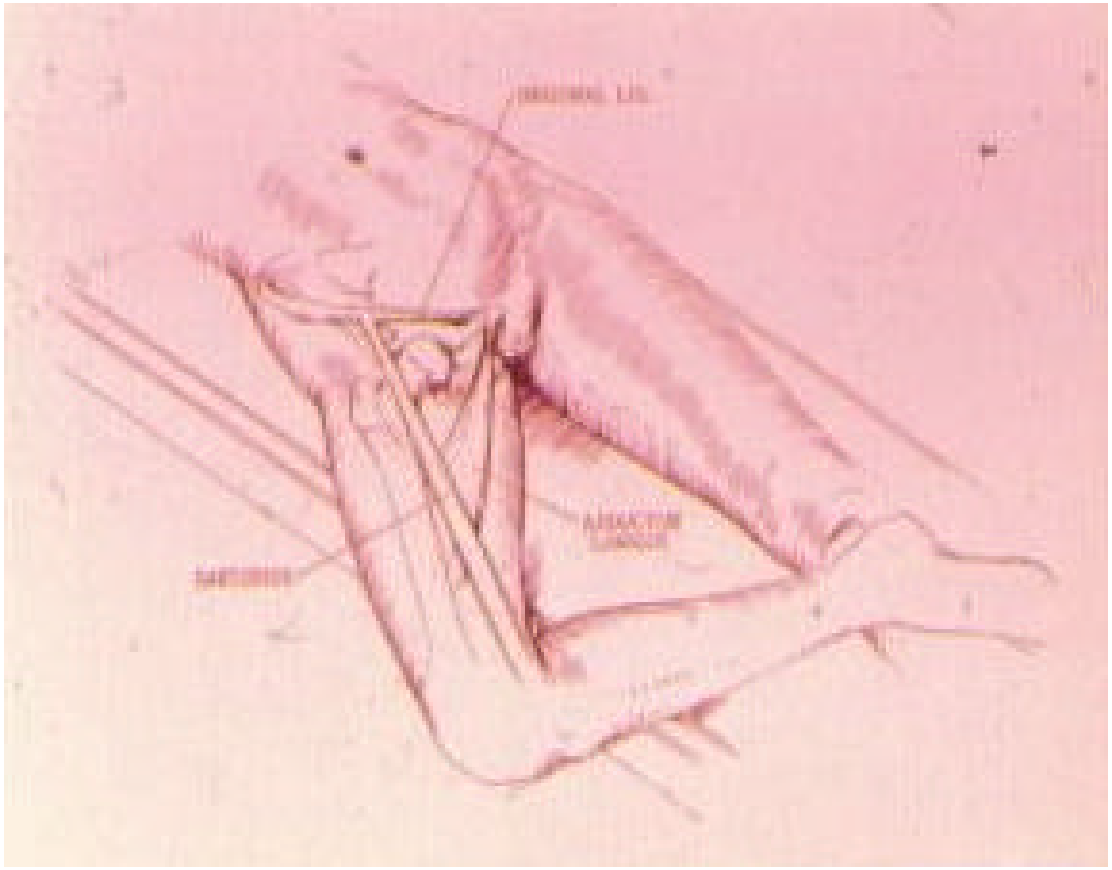
Informed Consent
Palpation

1. Explain procedure to patient
- Technique
- Area to be examined
- Reason for examination
2. Request and gain permission to perform
3. Medical assistant present

Soft Tissue Palpation

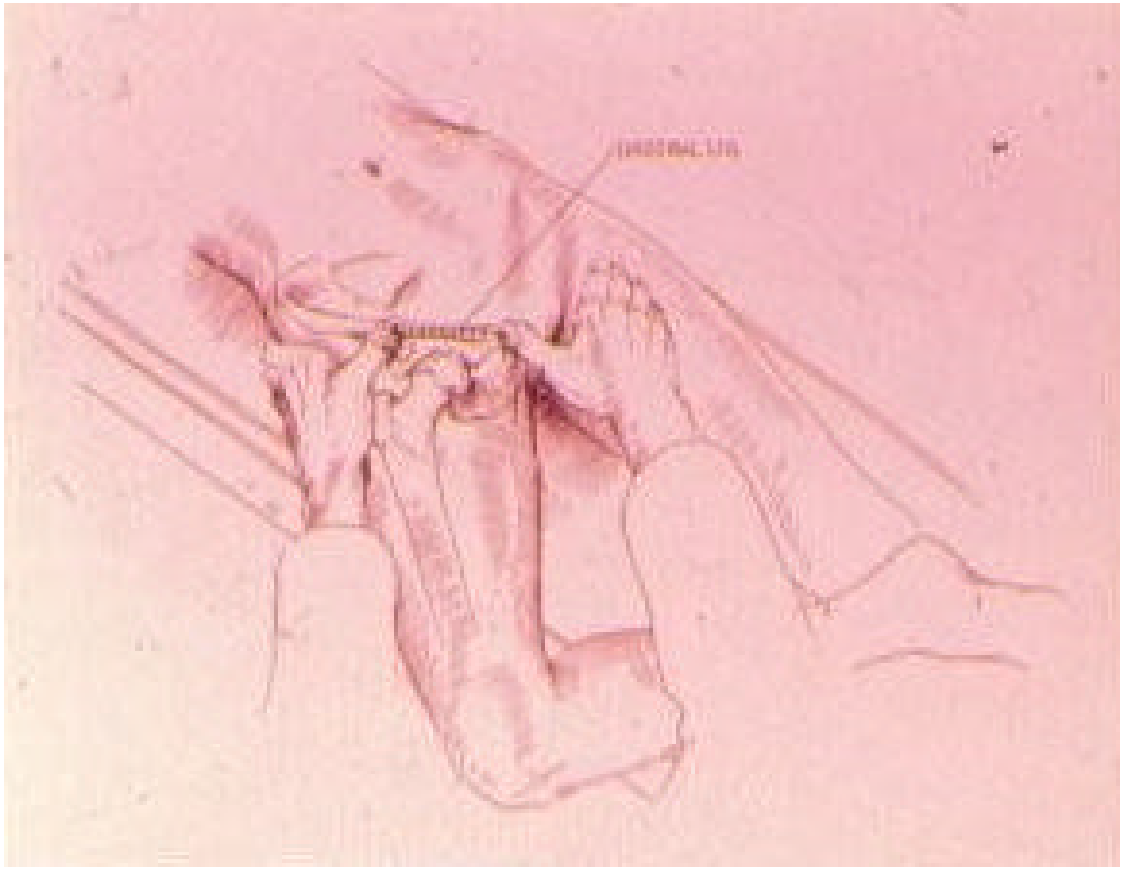
Femoral triangle of Scarpa

Sartorius, inguinal ligament, and adductor longus



Soft Tissue Palpation

Inguinal ligament

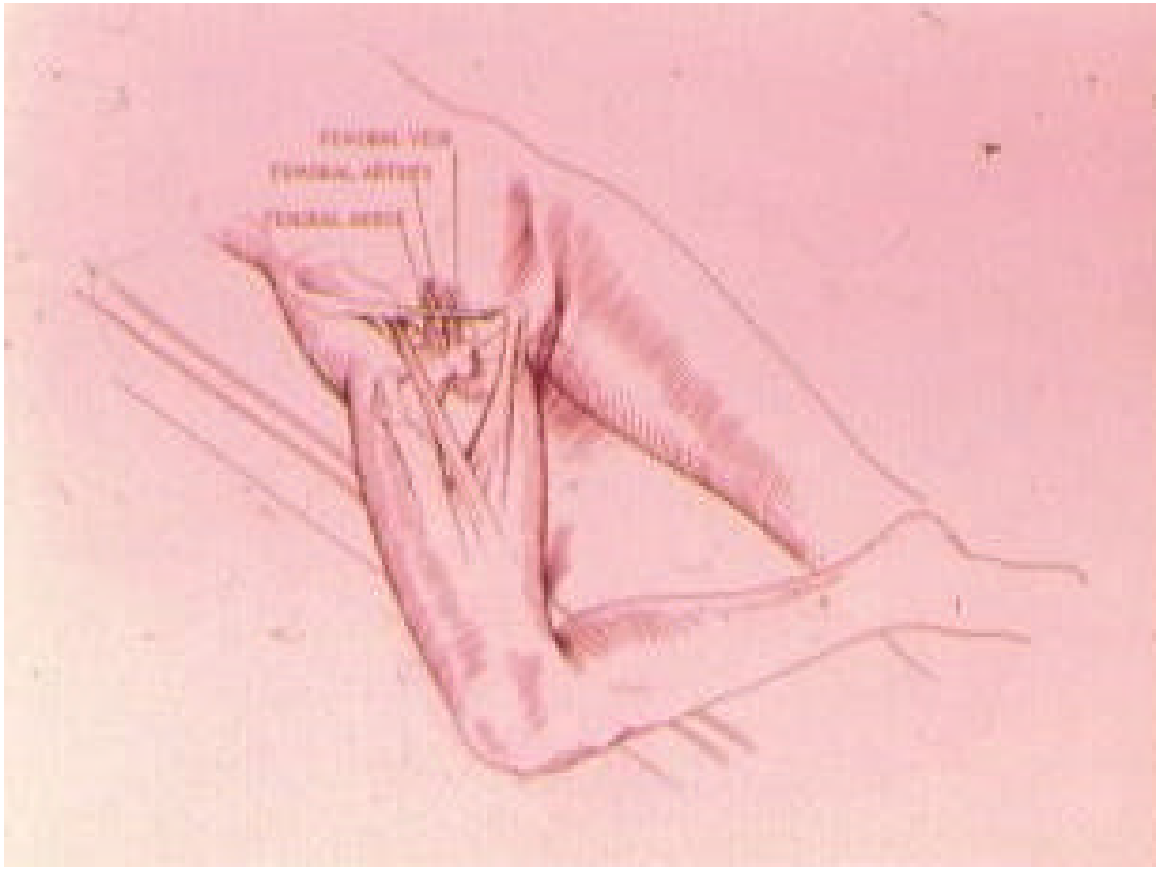


Soft Tissue Palpation

Femoral artery

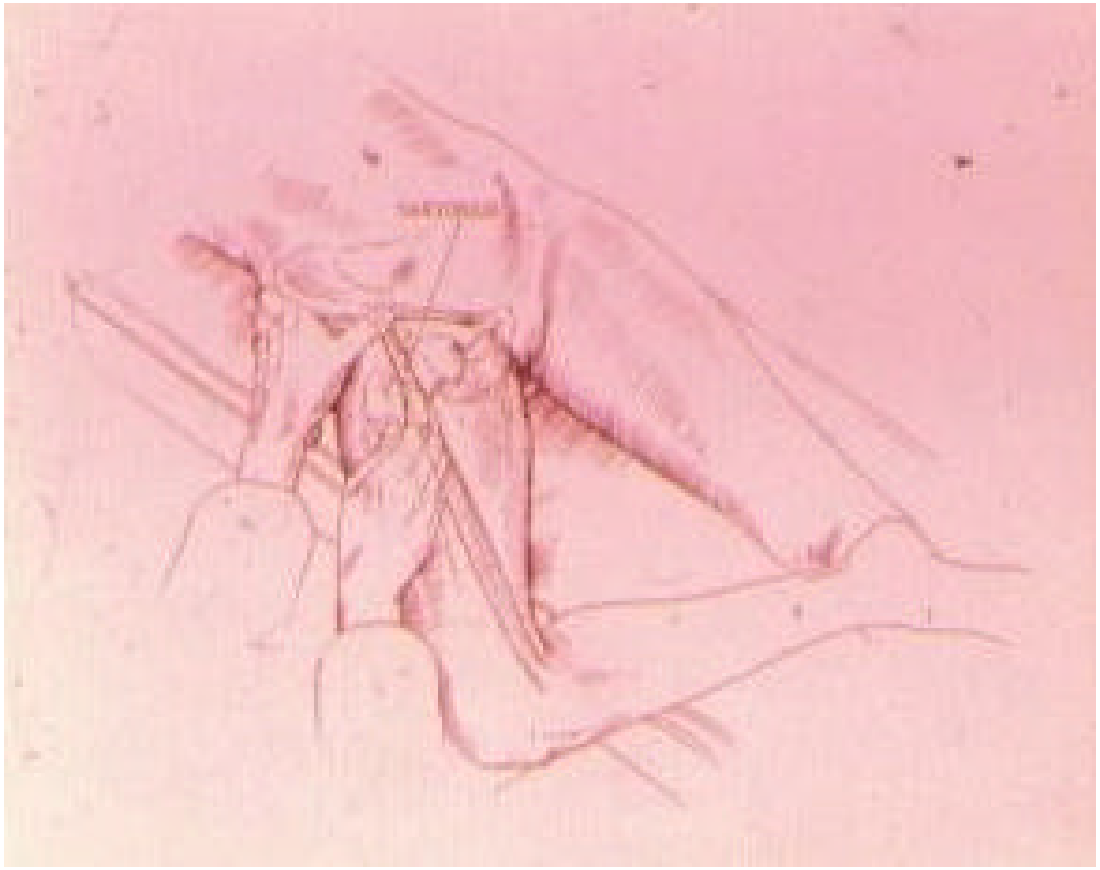
Soft Tissue Palpation

Normally, the femoral vein and nerve are not palpable



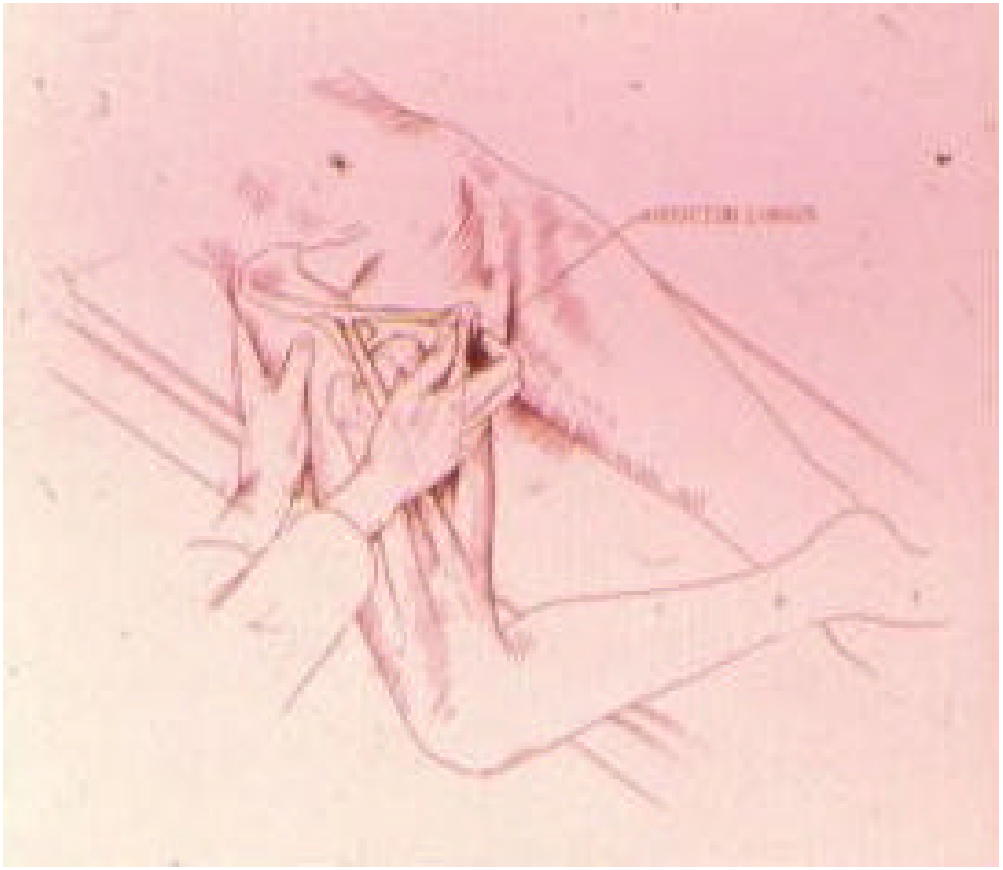
Soft Tissue Palpation

Sartorius muscle



Soft Tissue Palpation

Adductor longus muscle



Femoral Triangle

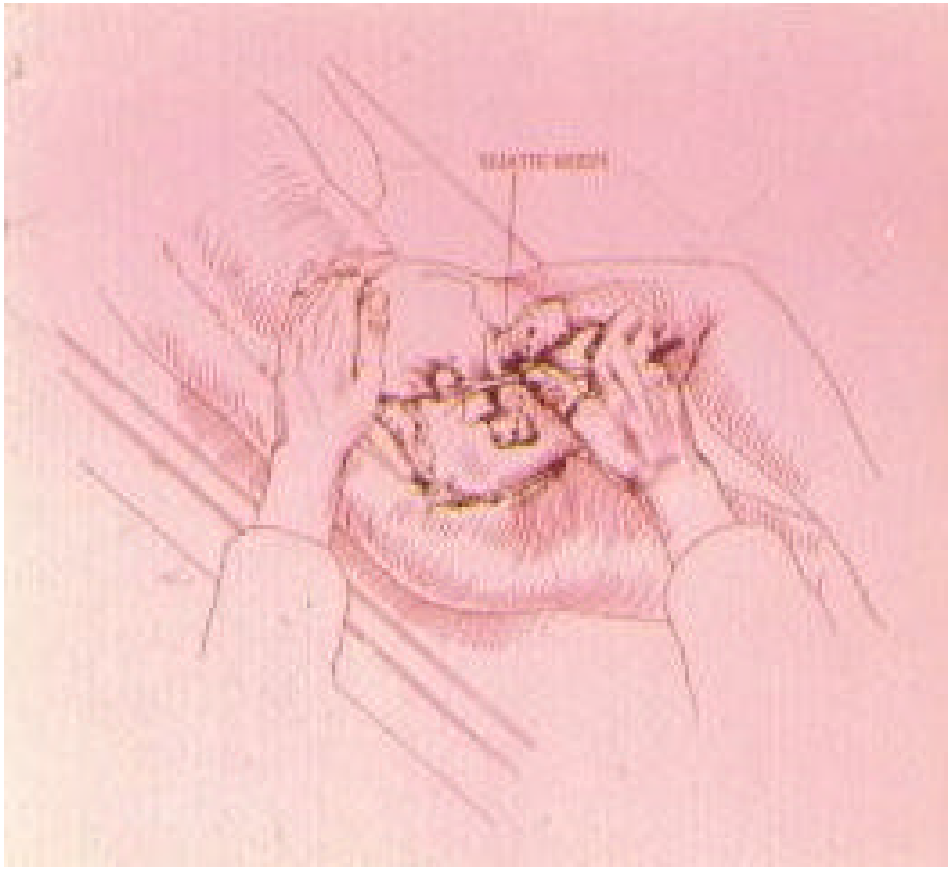
Tenderness and swelling in the femoral triangle may indicate enlarged lymph nodes as a result of an ascending infection or local pelvic problems

Soft Tissue Palpation

Trochanteric bursal pain may be confused with sciatic pain

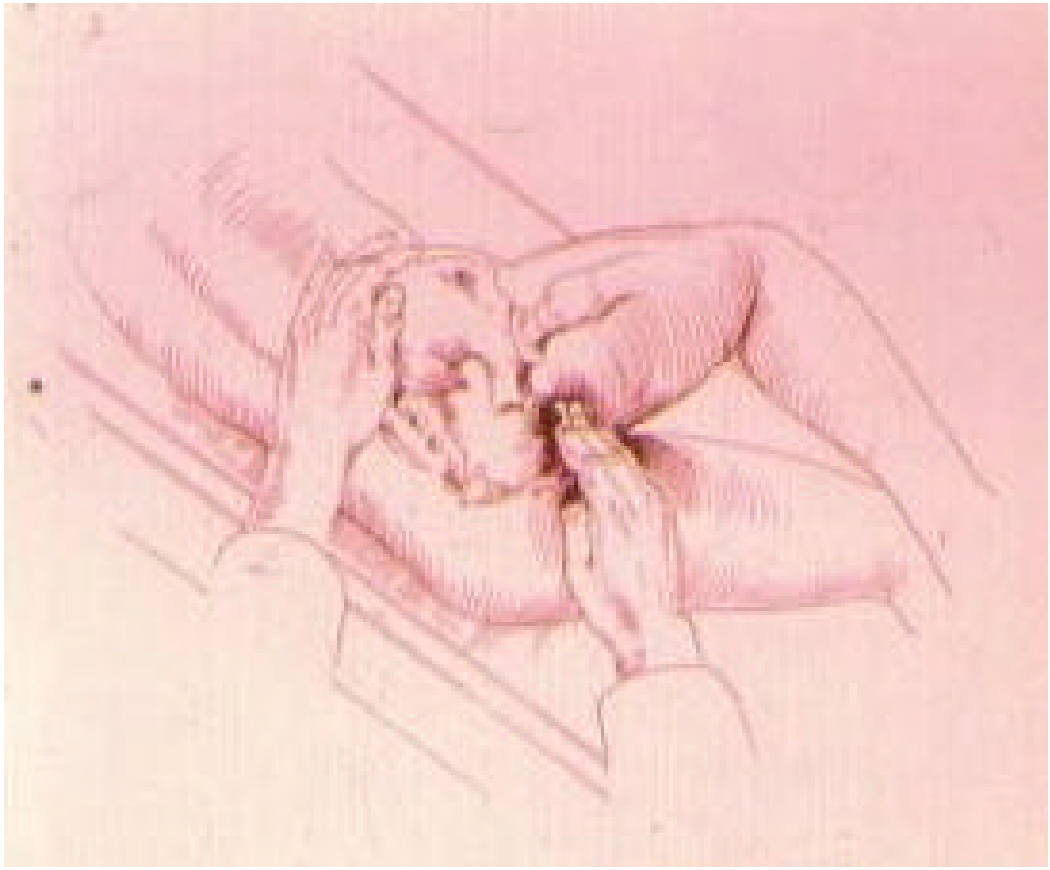
Soft Tissue Palpation

Sciatic nerve is halfway between ischial tuberosity & greater trochanter

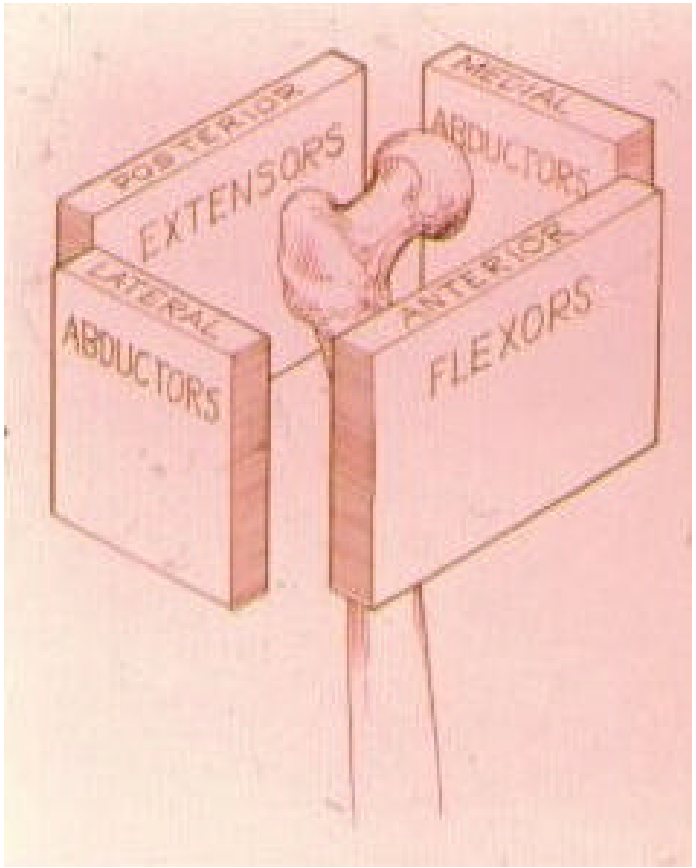


Soft Tissue Palpation

Ischial bursitis might be confused with sciatic pain



Superficial Hip and Pelvic Muscles

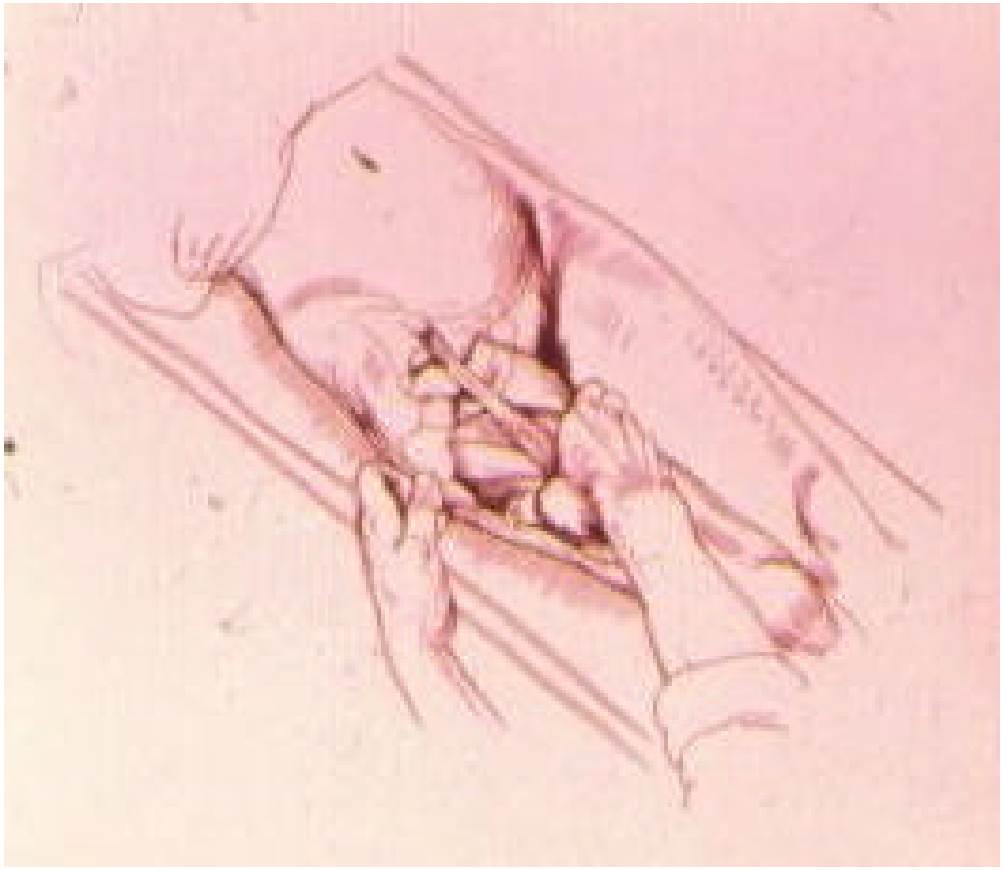


Soft Tissue Palpation

Rectus femoris

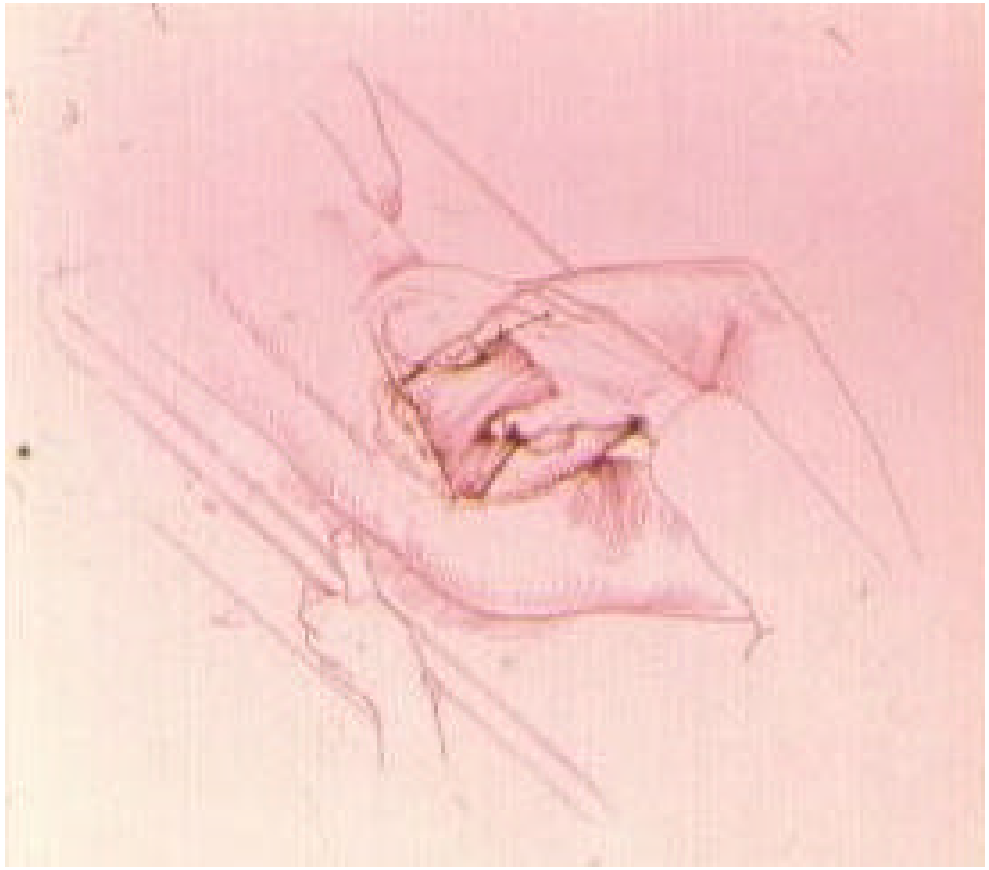
Soft Tissue Palpation

Quadriceps



Soft Tissue Palpation

Origin of gluteus maximus



Hip Joint Orthopedic Tests

Hip dislocation

- Allis test
- Ortolani’s Click test
- Hip telescoping test

Allis Test

Hip dislocation

- Procedure

1. Supine
2. Knees flexed
3. Feet approximated

Allis Test

Galeazzi's Sign

Hip dislocation or bone dysplasia

Rationale

- A difference in height of the knees = + test (supine posture)

1. Short knee (affected side) = posterior displacement of femoral head or decreased tibial length
2. Long knee (affected side) = anterior displacement of femoral head or increased tibial length

Ortolani's Click Test

Procedure

1. Infant supine
2. Grasp both thighs with thumbs at lesser trochanters
3. Flex and abduct thighs bilaterally

Ortolani's Click Test

Rationale

1. Either a palpable and/or audible click indicate a + test
2. Femoral displacement of femoral head
3. Common use with small children, in order to determine a hip dislocation

Congenital Hip Dislocation

- The condition is more accurately called “dislocatable hips” or “developmental dislocation of the hips” (DDH).
- Waddling, limping, toe-walking, and unequal leg lengths in a toddler or older child may be the sign of a hip problem that went undiagnosed in infancy.
- In babies, parents may notice an unequal number of thigh skin folds, uneven knee position, or legs that appear to be different lengths.

http://www.drgreene.com/21_1056.html

Congenital Hip Dislocation

- Hip dislocation is often associated with congenital torticollis. If a baby has torticollis or turned-in feet, careful attention should be paid to the hips.
- Unless the problem is corrected before the baby begins to bear weight, long-term hip damage can occur.
- Often hip instability cannot be prevented.
- Avoiding excess exposure to estrogens or medicines that relax the hips and avoiding breech delivery may prevent some cases.

Congenital Hip Dislocation

- Treatment depends on the developmental status of the hips.
- Treatment often involves holding the hips in the correct position so that they can continue their development.
- This might be accomplished with harnesses, splints, or other devices.
- Sometimes surgery is needed to correct the problem.

Hip Telescoping Test

Assessment for congenital dislocation of the hip articulation

Procedure

1. Supine posture
2. Hip and knee flexed to 90 degrees
3. Depress femur toward table
4. Lift leg from table
5. Considerable movement with dislocatable hips

Hip Joint Orthopedic Tests

Leg Length

- Actual leg-length test
- Apparent leg-length test

Actual Leg-Length Test

Assessment for true leg-length discrepancy

Procedure

1. Supine posture with feet together and lower extremities extended
2. Measure distance from apex of ASIS to medial malleolus
3. Actual leg length shortening is caused by an abnormality above or below the trochanter

Apparent Leg-Length Test

Assessment for apparent leg length discrepancy

Procedure

1. Measure from umbilicus to apex f medial malleolus
2. Measurement is an index of the functional length of the lower extremity
3. A scanogram is the most accurate confirmatory test.

   http://backandneck.about.com/od/conditions/ss/tiltedpelvis_3.htm

Hip Joint Orthopedic Tests

Fracture

- Anvil test
- Chienes’ test
- Ludloff’s sign

Anvil Test

Assessment for fractures of femoral neck or head

Procedure

1. Supine posture
2. Tap with fist the inferior calcaneus.

Rationale

Localized pain indicates area of fracture, such as, femoral, tibial, fibular, or calcaneal

Chienes' Test

Assessment for fracture of the neck of the femur

Procedure

1. Supine posture with legs extended
2. Measure circumference of thigh at level of greater trochanter of affected limb
3. Measure and record opposite leg
4. Compare to opposite leg

Chienes' Test

Assessment for fracture of the neck of the femur

Rationale

1. Increased diameter indicates a lateral rolling of trochanter
2. Increased diameter correlates with fracture of the neck of femur

Ludloff's Sign

Assessment for traumatic separation of the lesser trochanter

Procedure

1. Seated posture
2. Unable to raise affected limb from table
3. Ecchymosis and edema in Scarpa's triangle

Hip Joint Orthopedic Tests

Intracapsular

- Guavain’s sign
- Jansen’s test
- Patrick’s test

Guavain's Sign

Assessment for tuberculous arthritis of the hip joint or adult-onset osteonecrosis of the femoral head

Procedure

1. Supine with affected limb up and extended
2. Passively rotates thigh

Rationale

1. Sign is present if contraction of abdominal muscles noted on ipsilateral side of rotation

Jansen’s Test

Assessment for osteoarthritis of hip joint

Procedure

1. Supine posture
2. Active crossing of legs with ankle resting on opposite knee

Rationale

1. Patient unable to perform if significant disease exists

Patrick's Test

Also known as FABERE Sign

Assessment for intracapsular coxa pathology

Procedure

1. Supine posture
2. Passive flexion, abduction, externally rotated, and extended of thigh

Rationale

1. Hip pain with maneuver is a positive test for a coxa pathologic condition.

Hip Joint Orthopedic Tests

Muscular dysfunction

- Ober’s test
- Phelp’s test
- Thomas test
- Trendelenberg’s test

Ober's Test

Assessment for iliotibial band contracture

Procedure

1. Side-lying with affected hip down
2. Grasps ankle while steadying pelvis
3. Abducts and extends thigh

Ober's Test

Assessment for iliotibial band contracture

Rationale

1. Leg remains abducted with contracture
2. Test is positive with contracture with both anesthetized and conscious patients
3. + test may occur with - radiological study
4. May cause lumbosacral spinal disorders with or without sciatica

Phelp's Test

Assessment for contracture of gracilis with associated pathology of hip joint

Procedure

- Prone posture with knees extended and thighs maximally abducted (pain & resistance)
- Actively flex knees bilaterally to right angle
- Note changes in hip abduction

Phelp's Test

Assessment for contracture of gracilis with associated pathology of hip joint

Rationale

1. Positive test if knee flexion increases hip abduction
2. Positive test if knee extension decreases hip abduction
3. Test indicates contracture of gracilis muscle

Thomas Test

Assessment for flexion contracture involving the iliopsoas

Procedure

1. Supine posture
2. Thigh is flexed with the knee bent uon the abdomen
3. Patient’s lumbar spine should flatten

Thomas Test

Assessment for flexion contracture involving the iliopsoas

Rationale

1. Lordosis maintained = + test
2. Indicates hip flexion contracture as from a shortened iliopsoas

Trendelenberg's Test

Assessment for insufficiency of the hip abductor system

Procedure

1. Patient stands on affected side and raises opposite limb into flexion of thigh and knee
2. Normal hip will demonstrate inferior iliac crest ipsilateral to planted foot and opposite iliac crest will present superior

Trendelenberg's Test

Assessment for insufficiency of the hip abductor system

Rationale

1. Hip-joint involvement and muscle weakness will present an inferior iliac crest on the unaffected side and a superior iliac crest on the affected side (planted foot)
2. Legg-Calve Perthes, poliomyelitis, epiphyseal separation, coxa ankylosis, dislocation, fracture, or subluxation

Hip Joint Orthopedic Tests

Meningeal Irritation

- Guilland's sign

Procedure

1. Pinch quadriceps with patient supine
2. Usually when sign is present the contralateral hip and knee flex
3. Presence of sign is due to meningeal irritation