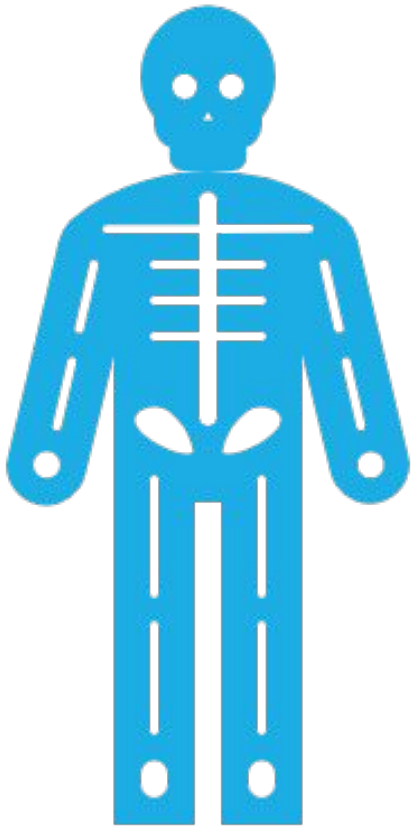
THE HIP AND PELVIS ASSESSMENT

Page 724 & 765



THE HIP JOINT

Largest, Most Stable

Multi Axial Ball and Socket Joint

Resting Position

- 30 Degrees of flexion and abduction, and slight lateral rotation

Close packed position

- Full extension, medial rotation and abduction

CAPSULAR PATTERN OF THE HIP

Capsular pattern

- Flexion, abduction and medial rotation

When considering movement be aware whether the pelvis is moving on a stable femur (weightbearing) or femur of the pelvis (non weightbearing)

THE PELVIS ANATOMY

The Pelvis AKA Pelvic Girdle is made up of the two hip (innominate) bones and the sacrum

The innominate bones are made up of three fused bones

The Ilium, Ischium and Pubis

There are five Articulations in the Pelvic Girdle

2 Sacroilliac Joints	2 Coxa articulations	1 pubic joint

JOINTS – SACROILIAC

Synovial and Fibrous diathrodial joint (freely moveable)

The PSIS cover the SI joint completely

Iliosacral motion is when the innominates move on the sacrum

Sacroiliac motion is when the sacrum moves on the innominates

During Iliosacral motion the innominates rotate anterior and posterior during the walking cycle

Sacroiliac motion will be addressed during the Sacrum Lesson

SI JOINT

Resting Position – Neutral

Capsular Pattern – Pain when joints are stressed

Close Pack- Nutation

Open Pack – Counter nutation

https://youtu.be/ycKM-Kw2H2s

JOINT – PUBIC JOINT

AKA Pubic Symphysis

Located anteriorly between pubic bones

Fibrocartilaginous amphiarthrosis Joint held together by the Pubic Ligament

Does allow limited movement

Has an interpubic disc between the joint surfaces

- a cartilage disc which allows compression of the innominates without affecting the axis of the plane of motion

Dysfunction of this joint will affect proper motion of the pelvis

FUNCTIONS OF THE PELVIS

The Pelvis has a couple very important functions in the body

- Supports the weight of the body and transfers that through the femurs are down the body
- Protects the viscera
- Provides attachment sites for muscles travelling up the back and down the leg
- The motions of the pelvis (and lower back) are important for correct gait
- Transfers impact from the ground to the vertebral column

ILIOSACRAL MOTION DURING GAIT

Summary

The innominate on the opposite side of the forward leg is rotated anteriorly

The innominate on the opposite side of the leg that is posterior is rotated posteriorly

Factors that affect Gait

Imbalances of the muscles used in the walking cycle

Imbalances in the pubic symphysis can effect the SI Joint and vice versa

SI JOINT MOTION VIDEOS

SI Motion

https://youtu.be/xxktB0kqIeY

Sacral motion

https://youtu.be/ycKM-Kw2H2s

FORCES ON THE HIP

Standing: 0.3 times the body weight

Standing on one limb: 2.4-2.6 times the body weight

Walking: 1.3-5.8 time the body weight

Walking upstairs: 3 time the body weight

Running: 4.5+ time the body weight

ALL OF THE MUSCLES THAT ATTACH ONTO THE PELVIS

Latissimus Dorsi

Erector Spinae

Multifidus

External Oblique

Internal Oblique

Transverse abdominus

Rectus Abdominus

The semi's & biceps

QL/TFL

Rectus Femoris

Psoas Major

Iliacus

Glute Max/Med/Min

Obturator In/Ex

Piriformis

Gemellus sup/inf

Pectineus

Sartorius

AD mag/long/brevis

Gracilis

HIP LIGAMENTS

Iliofemoral Ligament

- Strongest ligament in the body
- Prevents excessive extension
- Limits IR
- Anterior pelvic tilt slackens inferior/medial bands=increased hip ABD (posterior tilt vice versa)

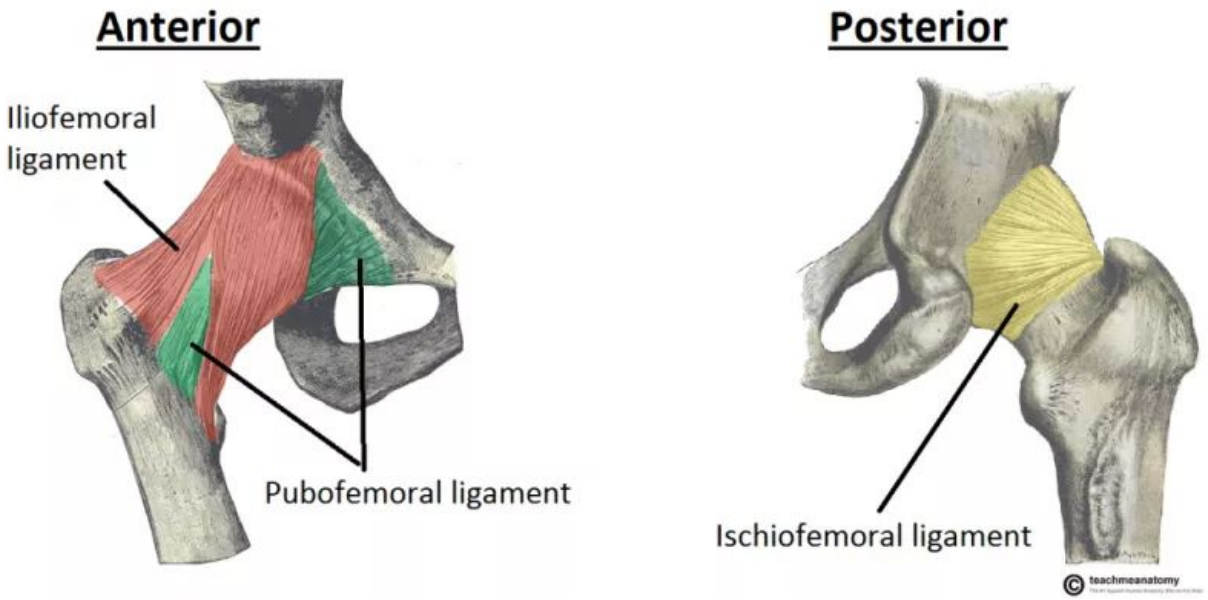
HIP LIGAMENTS

Ischiofemoral

- Weakest
- Helps stabilize joint in extension
- Limits IR

Pubofemoral

- Limits extension and excessive ABD
- Limits Internal rotation



HIP LIGAMENTS

HIP LIGAMENTS

Ligamentum Teres (Ligament to the head of femur)

- Attaches to femoral head within acetebulum
- Provides no stability
- Conduit for secondary blood supply to head of femur via obturator artery

PUTTING IT ALL TOGETHER

- Ligaments of the hip provide stability for the hip joint
- Most limit extension
- Why is this important?
- What is the significant of an anterior pelvic tilt?

PELVIC LIGAMENTS

Sacrospinpous Ligament

- Ishial spine to the lateral and anterior aspects of the sacrum and coccyx. Stabilizes the innominate to the sacrum and in that way the spine

Sacrotuberous Ligament

- Ischial Tuberosity to the sacrum. Longer and stronger than the sacrospinous Ligament. Same function as sacrospinous

PELVIC LIGAMENTS

Iliolumbar Ligament

- Transverse process of 4th and 5th lumbar vertabrae and attaches to the illiac crest. Stabilizes the innominate to the spine

Inguinal Ligament

- ASIS to the pubic tubercle. Formed by the inferior margin of the external oblique

PELVIC LIGAMENTS

Superior Pubic Ligament

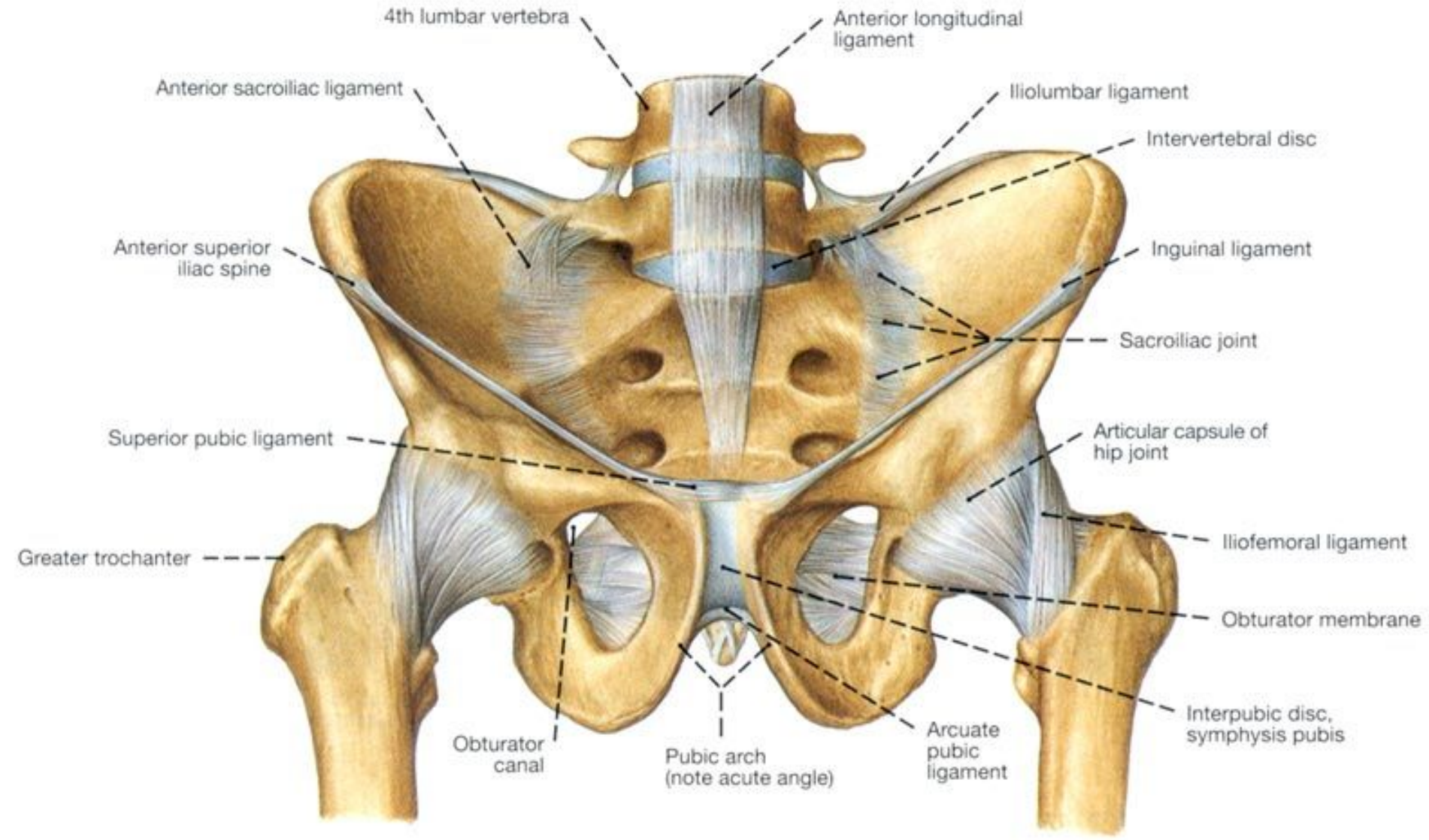
- Travels on the superior surface of the pubic symphysis and unites the pubic bones. Provides superior stability

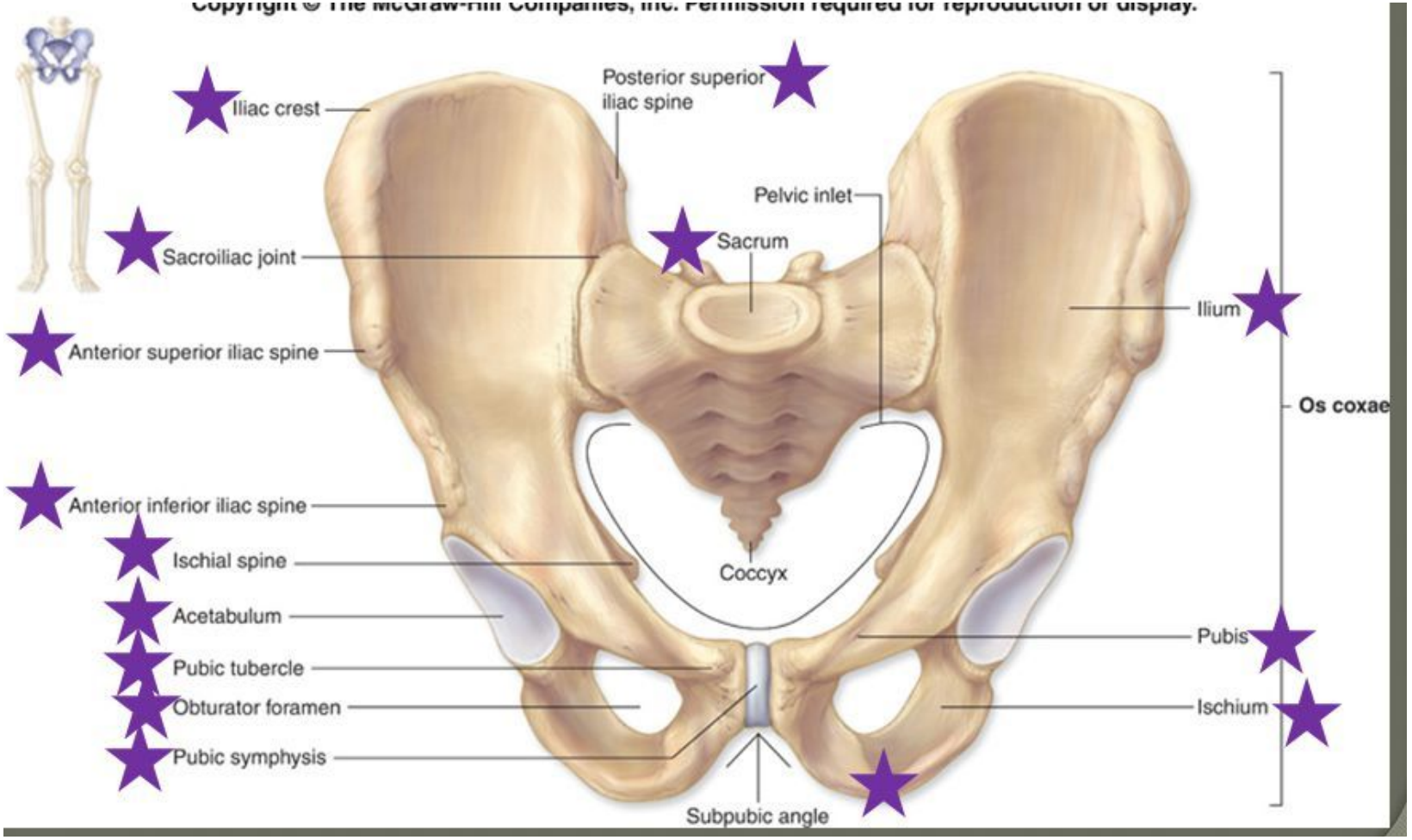
Inferior Pubic Ligament

- Travels on the inferior surface of the pubic symphysis and unites the pubic bones. Provides inferior stability

https://youtu.be/pskEkYof95w

Pelvis and Ligaments, Front View, Male





BONY LANDMARKS

AXES OF MOTION IN THE BODY

An axis is an imaginary line that run through the center of an object

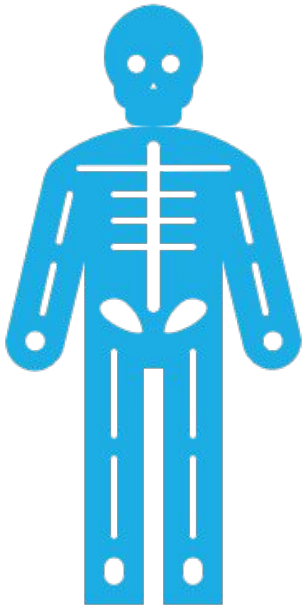
In the body Joint motion occur around these Axes

There are 3 Axes in the body

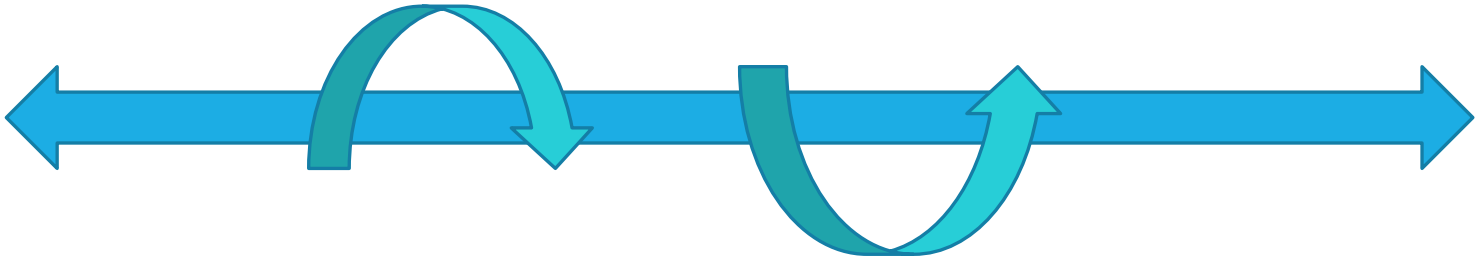
- X aka Transverse Axis
- Y aka Longitudinal Axis
- Z aka Sagittal Axis

Occasionally we use 2 oblique Axis known as Oblique axis which are named from an anterior view Right and Left

Axes occur at right angles to the planes of the body



X AXIS

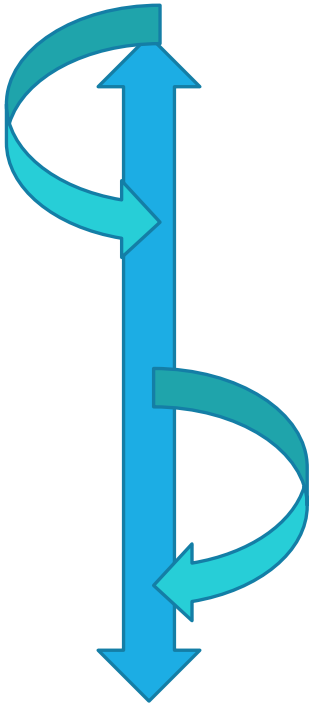


X axis travel from left to right

Motion occurs around the axis from top to bottom

Or across the axis left to right (or reverse☺)

Y AXIS



The Y Axis travels from top to Bottom

Rotation occurs right to left

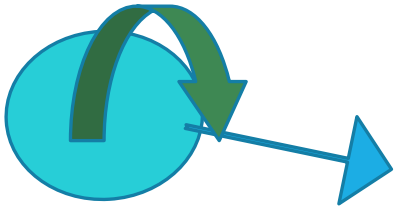
Movement can occur up or down the axis

Z AXIS

The Z Axis Travels From front to back

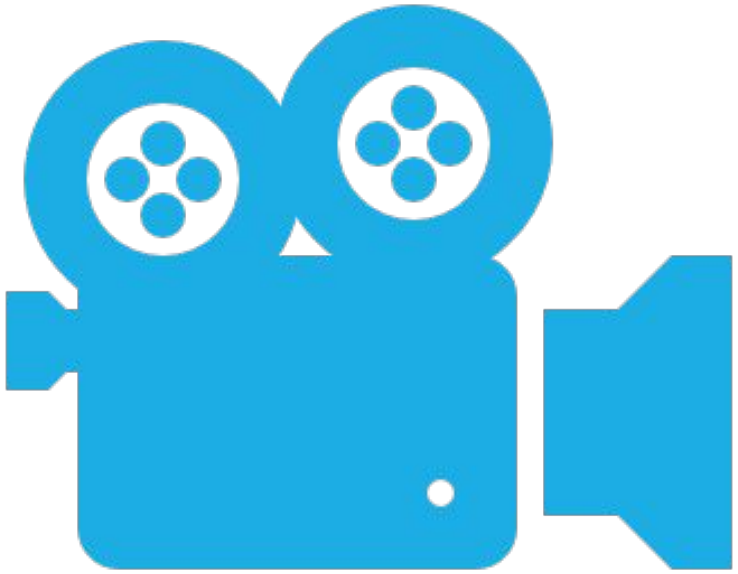
Rotation occurs clockwise or counterclockwise

Movement can occur back to front



PLANES AND AXIS VIDEO

https://youtu.be/yq8cE-EDtuE



SI JOINT AND INTRODUCTION TO ITS AXES

The shape of the SI joint is known as Auricular (ear like)

The Iliac surface is Convex

The Sacral surface is slightly concave

As we age the surfaces have more irregular ridges and depressions

The SI Joint has 3 Transverse axes that run through it which allow for different movements. For now the motion at the inferior transverse axis is our focus for iliosacral motion

SI JOINT AXIS

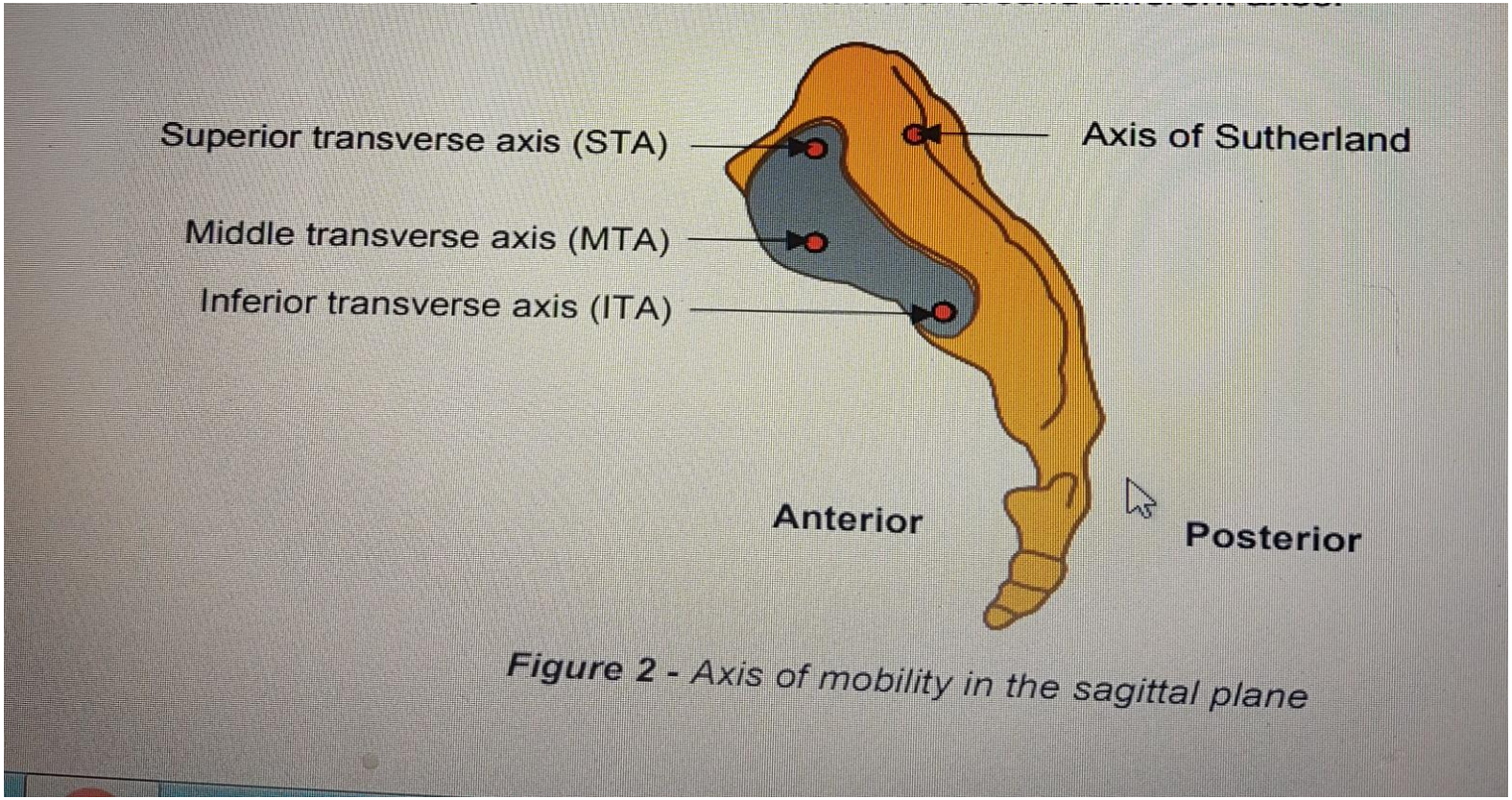


Figure 2 - Axis of mobility in the sagittal plane

ANGLE OF TORSION

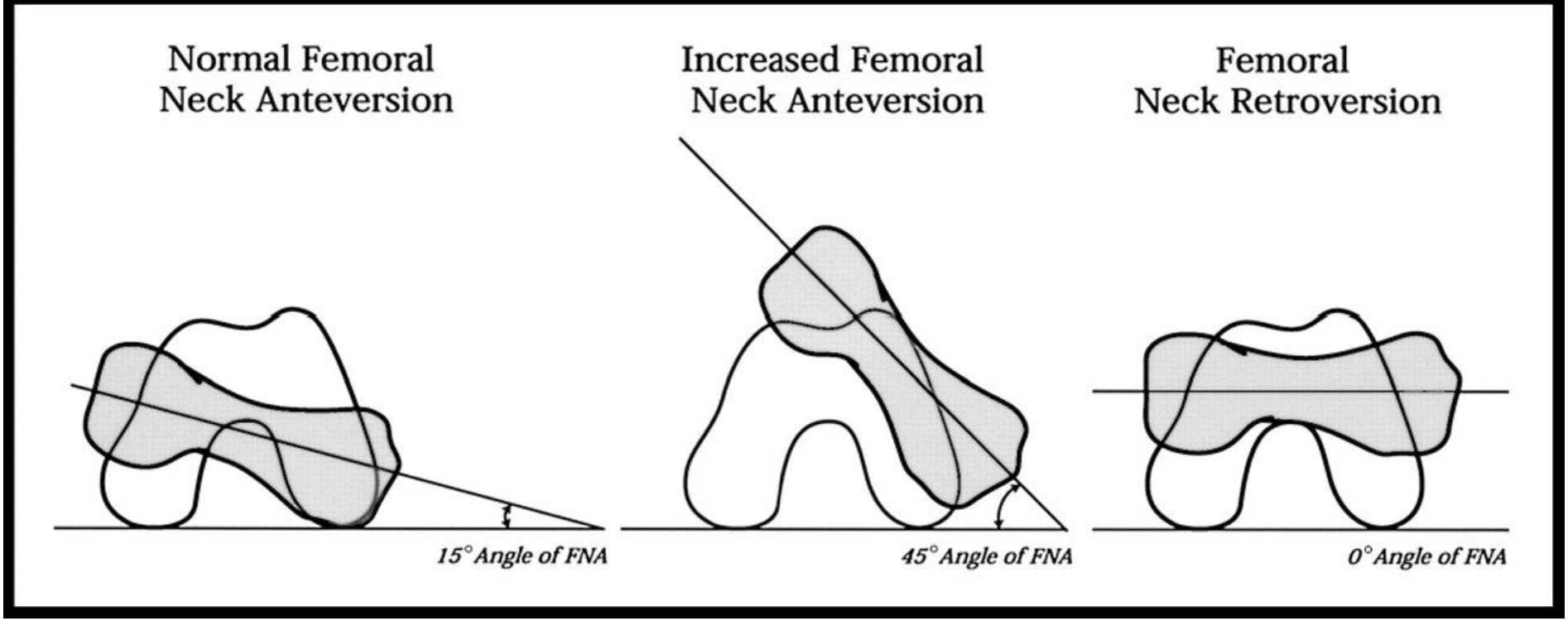
The angle between the femoral neck and transverse femoral condyles

8-15 degrees is normal

Anteversion vs. retroversion

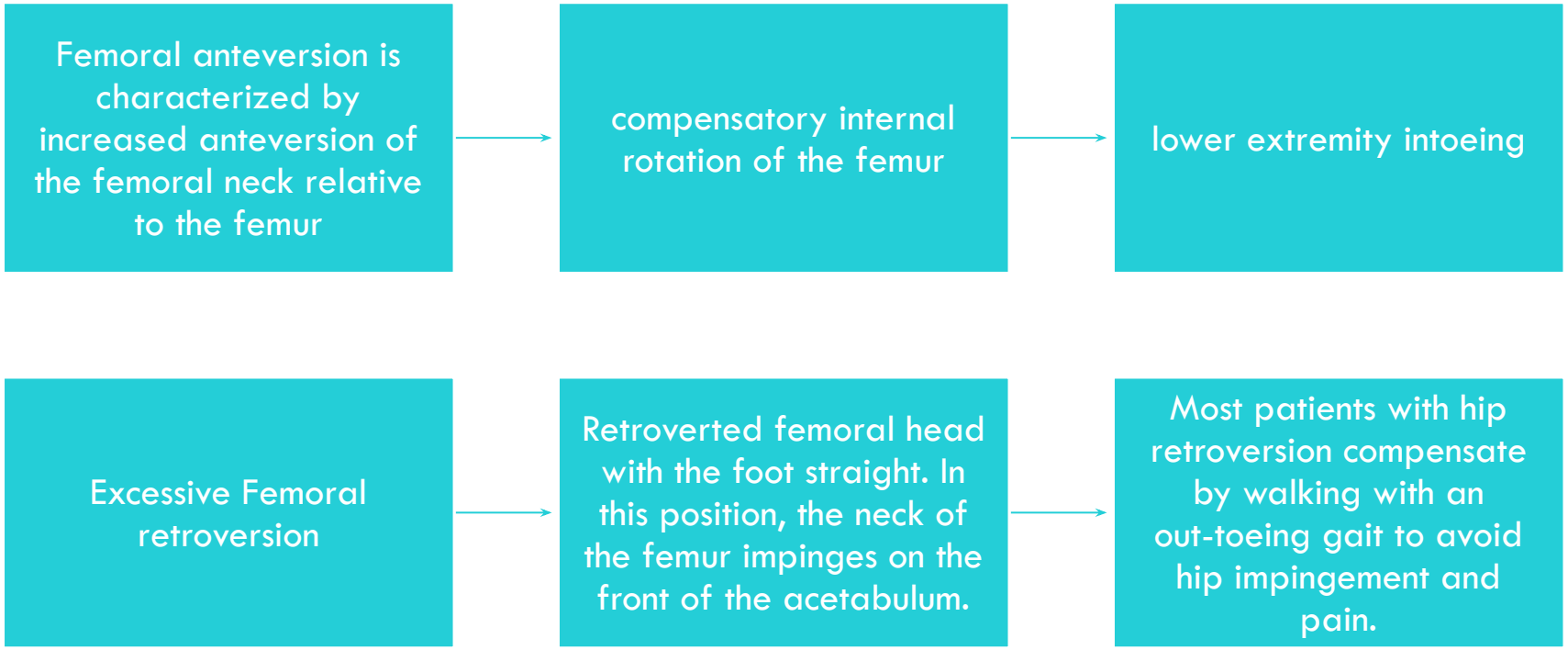
- Greater than normal=anteversion (medial femoral torsion)
- Less than normal =retroversion (lateral femoral torsion)

Femoral anteversion is forward torsion of the femoral neck in relation to the coronal plane



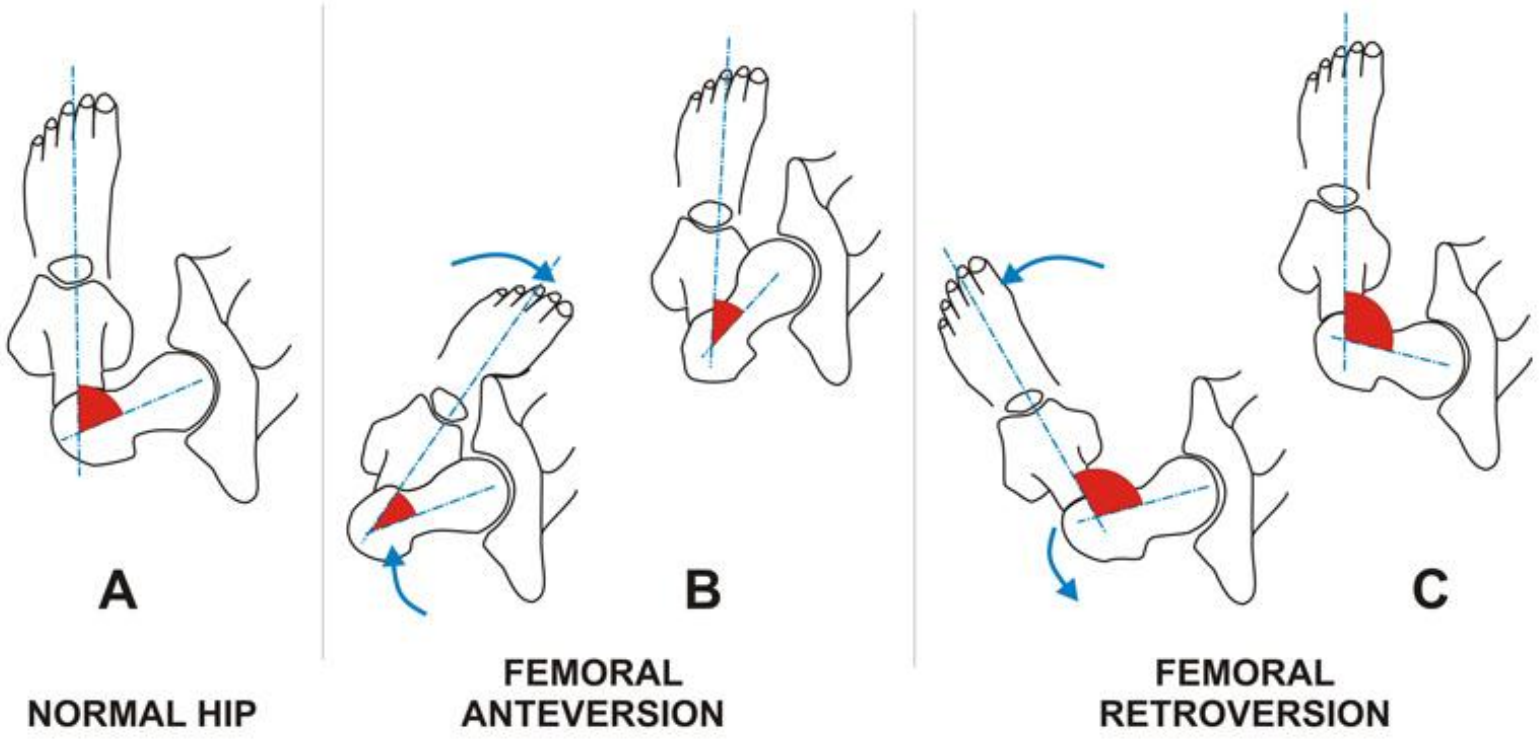
M. Tannast, In- & out-toeing: a reliable diagnostic sign for femoral malversion?, Hip Symposium 2018 - YouTube

ABNORMAL ANGLES



IMPLICATIONS ON LOWER EXTREMITY

ANTEVERSION, RETROVERSION AND THE LOWER LIMB



FEMORAL ANTEVERSION

https://youtu.be/NHE4kH1RRig

CRAIG'S TEST

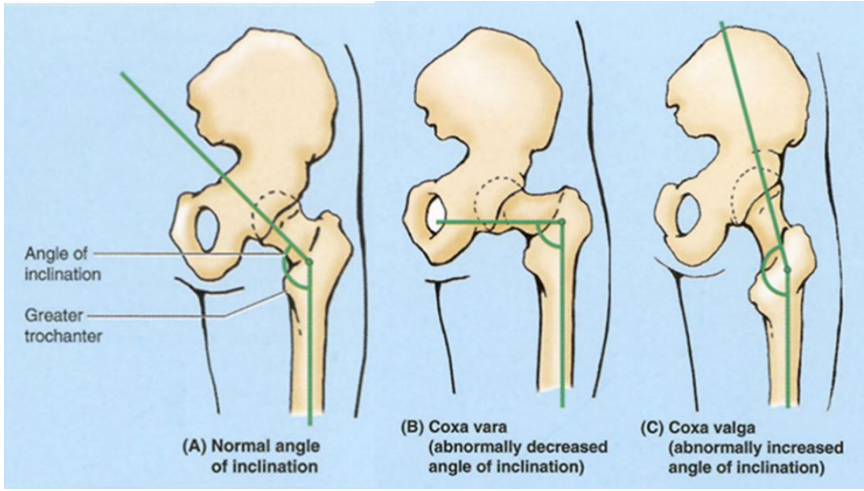
Patient prone, knee flexed to 90, examiner palpates the posterior, the hip is then passively rotated medial and lateral until the greater trochanter is parallel with the examiners table or reaches its most lateral position, the degree of anteversion can then be estimated, based on the angle of the lower leg with the vertical

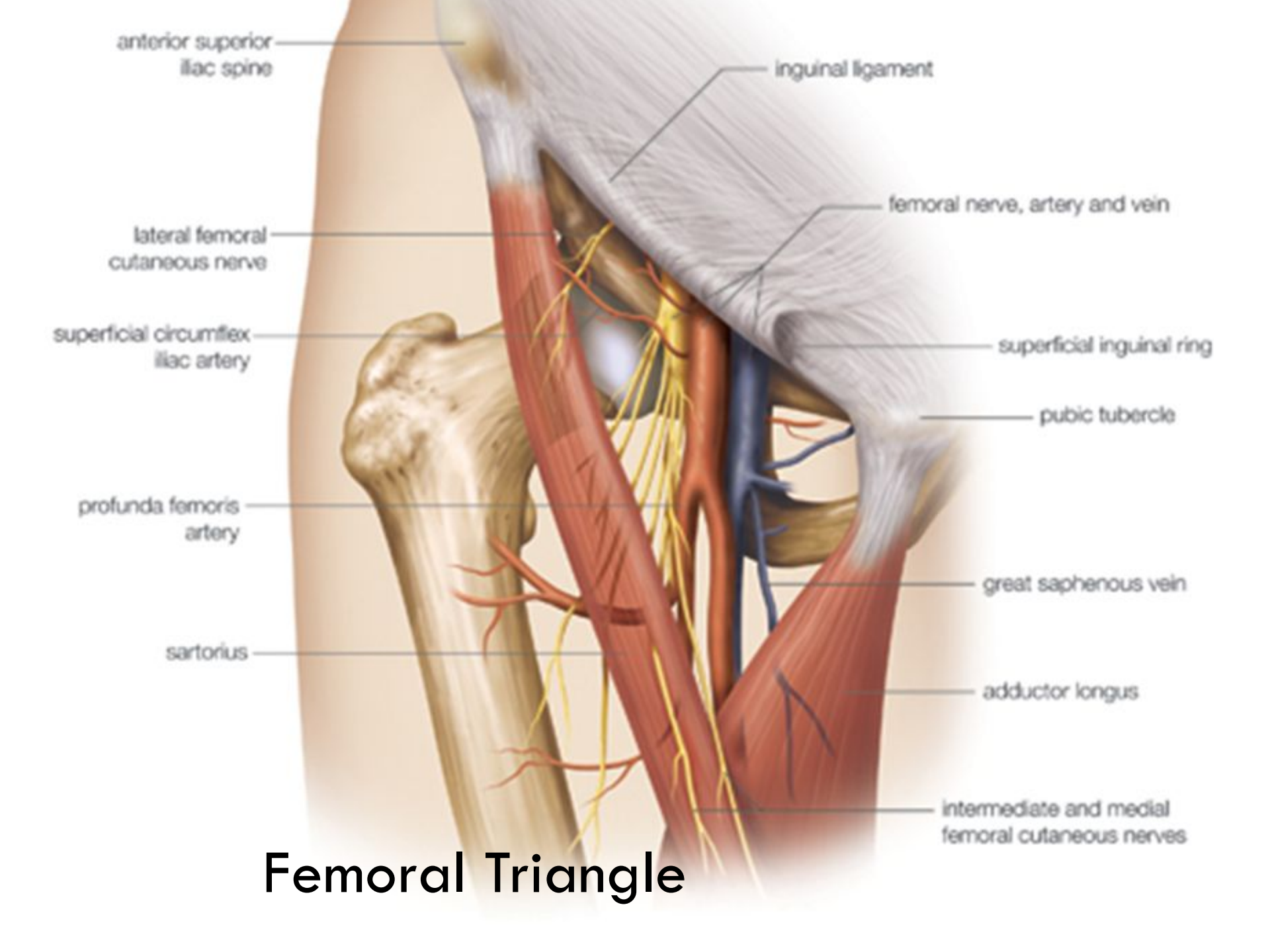
Pg 793

https://www.youtube.com/watch?v=QNtBBV-DcBI

ANGLE OF INCLINATION

Angle between long axis of femoral shaft and the femoral neck





Femoral Triangle

FEMORAL TRIANGLE

The femoral triangle is a hollow area in the anterior thigh. Many large neurovascular structures pass through this area, and can be accessed relatively easily. Thus, it is an area of both anatomical and clinical importance.

BORDERS OF FEMORAL TRAINGLE

As this area is a triangle, it has three borders:

Superior border – Formed by the inguinal ligament, a ligament that runs from the anterior superior iliac spine to the pubic tubercle.

Lateral border – Formed by the medial border of the sartorius muscle.

Medial border – Formed by the medial border of the adductor longus muscle. The rest of this muscle forms part of the floor of the triangle.

Note: Some sources consider the lateral border of the adductor longus to be the medial border of the femoral triangle. However, the majority state that it is the medial border of the adductor longus – and this is definition we have gone with.

CONTINUED

It also has a floor and a roof:

Anteriorly, the roof of the femoral triangle is formed by the fascia lata.

Posteriorly, the base of the femoral triangle is formed by the pectineus, iliopsoas and adductor longus muscles.

The inguinal ligament acts as a flexor retinaculum, supporting the contents of the femoral triangle during flexion at the hip.

CONTENTS

The femoral triangle contains some of the major neurovascular structures of the lower limb. Its contents (lateral to medial) are:

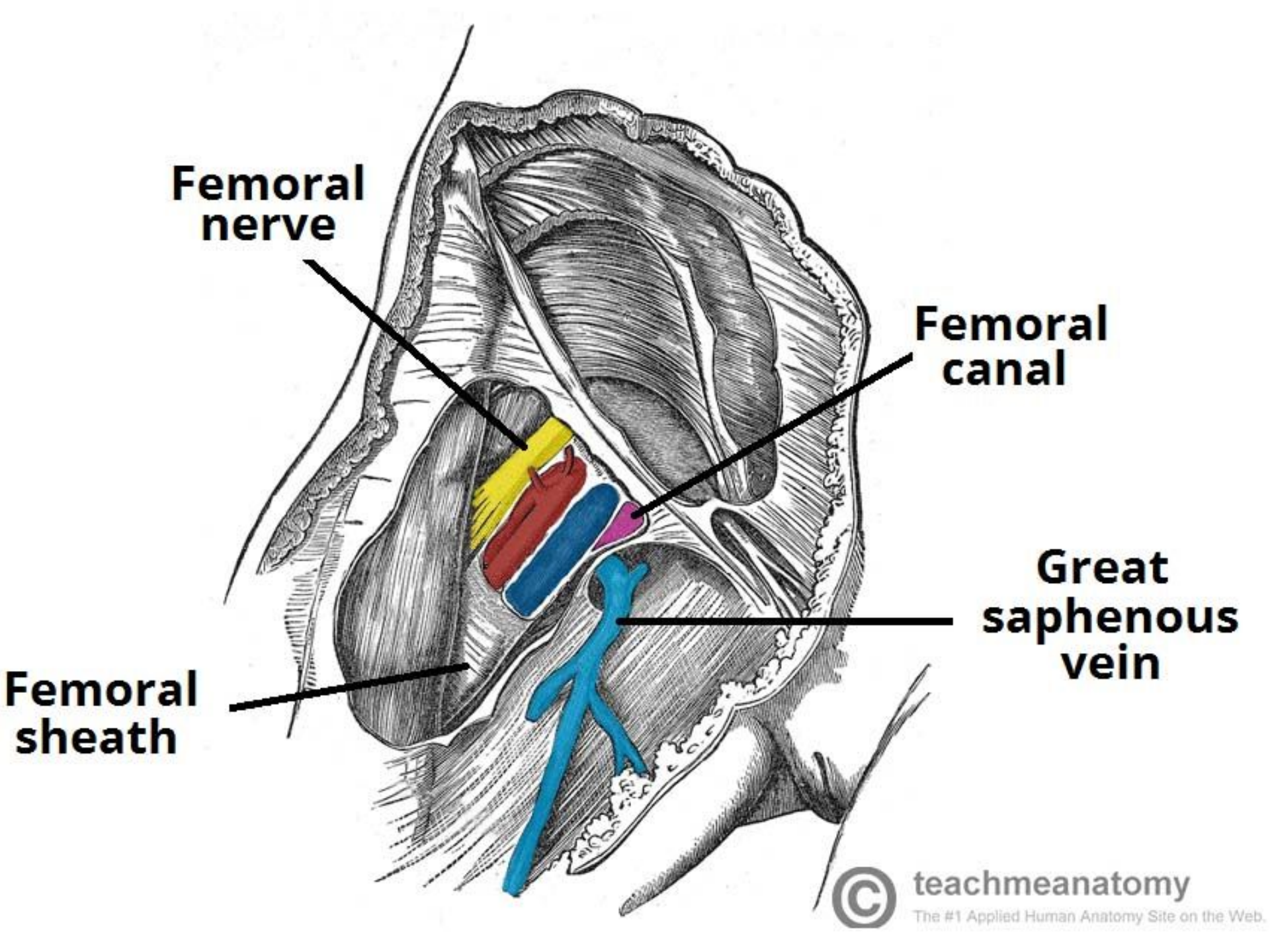
Femoral nerve – Innervates the anterior compartment of the thigh, and provides sensory branches for the leg and foot.

Femoral artery – Responsible for the majority of the arterial supply to the lower limb.

Femoral vein – The great saphenous vein drains into the femoral vein within the triangle.

CONTINUED

- FEMORAL CANAL – A STRUCTURE WHICH CONTAINS DEEP LYMPH NODES AND VESSELS.
- THE FEMORAL ARTERY, VEIN AND CANAL ARE CONTAINED WITHIN A FASCIAL COMPARTMENT – KNOWN AS THE FEMORAL SHEATH.


Femoral nerve
Femoral canal
Great saphenous vein
Femoral sheath
© teachmeanatomy
The #1 Applied Human Anatomy Site on the Web.

REMEMBER IT!!

A good way of remembering the contents is using the acronym NAVEL:

N: Nerve.

A: Artery.

V: Vein.

E: Empty space (this is important as it allows the veins and lymph vessels to distend, so they can cope with different levels of flow).

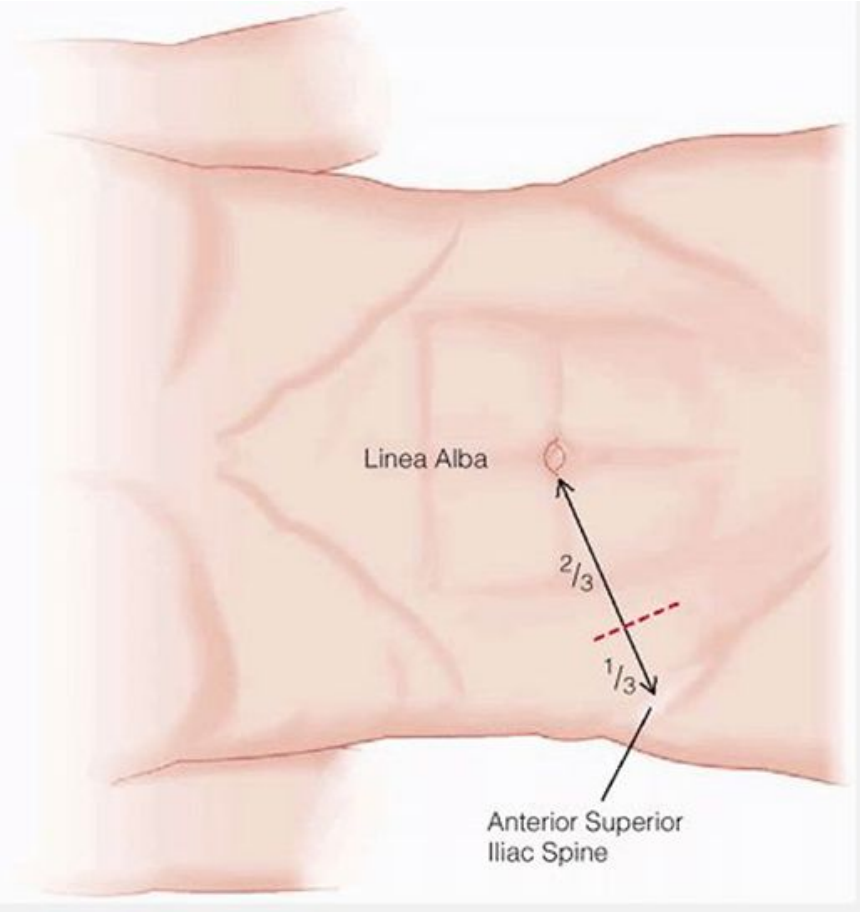
L: Lymph canal.

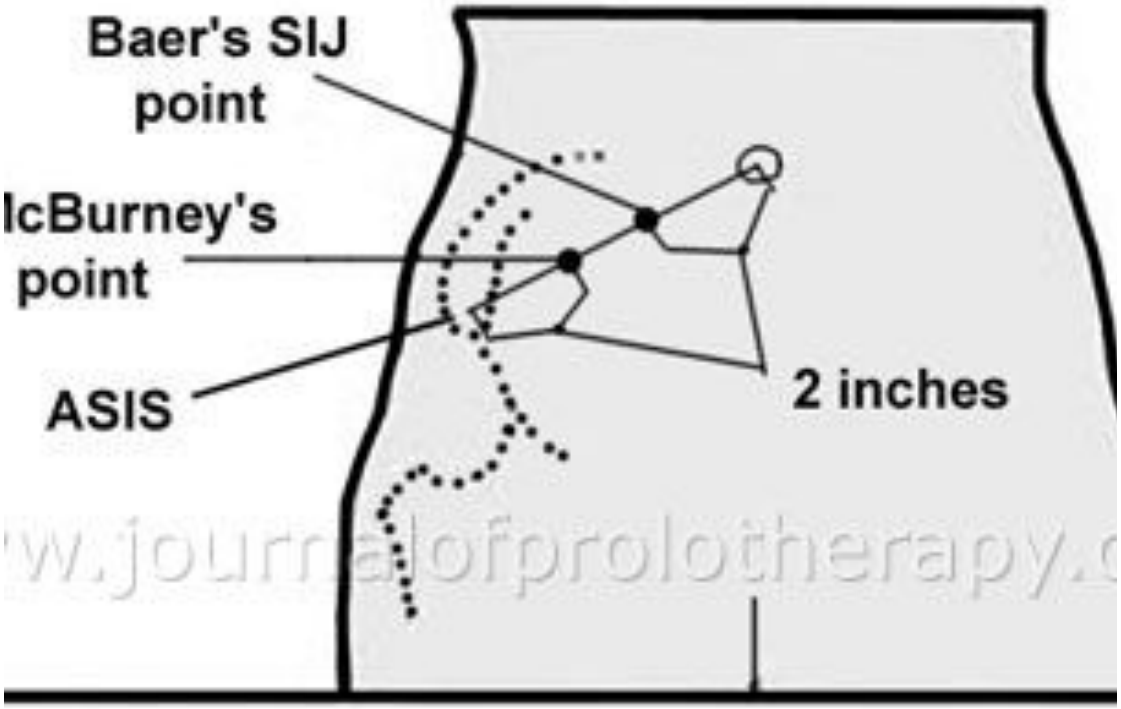
Source – Teach me anatomy

MCBURNEY'S POINT

Line from ASIS to umbilicus, one third of way from ASIS is McBurney's point

If tender can indicate appendicitis





BAER'S POINT

Slightly medial to McBurney's point

Tender with infection, SI ligament strains, iliacus spasm

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CLIENT HISTORY

Pg. 729 pelvis
Pg. 769 Hip

Group read

Pg. 729 pelvis

Pg. 769 Hip

ADDITIONAL QUESTIONS

When dealing with hip conditions here are some useful questions that may be helpful to determine possible dysfunction or pathology

- Be aware of clients age – different conditions affect different ages, ROM decreases with age, osteoperosis in elderly, congenital conditions in children
- What is the mechanism of injury if traumatic? (knowing the mechanism often leads to determination of dysfunction)

What are the details of the present pain and other symptoms?

- Hip intra-atricular pain, including labral tears and anterior impingment – felt mainly in the groin and along front and medial side to the knee
- Posterior labral tears, and lumbar problems generally presents as buttock pain
- Adductor pain can be the result of pelvic instablilty or overactive adductors
- Pain in the lateral hip may be referred from the lumbar spine. Further causes of lateral hip pain can be trochanteric bursitis, tear of glut medius tendon, may simulate L4 nerve root pain.
- Sports hernias – come on gradual, unilateral dull aching pain in groin, can be sharp or burning, may radiate into proximal thigh, low back, lower abdominal muscles, perinuem and scrotum. Aggravated by sudden acceleration, cutting or kicking

Is the condition improving, worsening or staying the same?

Does any type of activity ease the pain or make it worse?

- Trochnteric bursitis – poor running mechanics generally cause it

Any movements that feel weak or abnormal?

- Piriformis symdrome traps sciatic nerve weakness occurs in abduction and lateral rotation

What are the patients usual acitivty?

- Repetive or strained positions causing the issue

Past medical, surgery or development issues?

OBSERVATION / PALPATION

Are the posture or gait normal?

- Counternutation= anterior rotation of the illium
- Nutation= posterior rotation of the illium

Are the ASIS level?

- This will tell you to proceed to specific muscle length tests

Are the PSIS Level?

- If ASIS and PSIS are higher on 1 side this indicates and upslip or short leg
- If ASIS is higher on 1 side and PSIS is lower on the other this indicates an anterior torsion of the sacrum

Are the ischial tuberosities level?

- If one is higher this indicates an upslip on the higher side

Are the sacral sulci equal?

- If one is deeper this indicates a sacral torsion

AROM/PROM DEGREES OF MOTION (HIP)

Flexion- 110-120

Extension- 10 - 15

ABD- 30-50

ADD- 30

ER- 40-60

IR- 30-40

Additionally we would include ROM Testing of lumbar spine

ENDFEELS

Flexion – Tissue Stretch or approximation

Extension – Tissue Stretch

Abduction – Tissue Stretch

Adduction Tissue approximation or stretch

IR/ER – Tissue Stretch

RIM

Flexion

Extension

ABD

ADD

ER

IR

Knee flexion

Knee extension

FUNCTIONAL TESTS OF THE HIP

Squatting

Going up and down stairs one at a time

Figure 4

Going up and down stairs 2 or more at a time

Running straight ahead

Running and decelerating

Running and twisting

One leg hop

jumping

SPECIAL TESTS

SI Joint Tests

INDICATIONS FOR PELVIC ASSESSMENT

Pain in the SI Joint

Leg length difference

Restrictions at the hip

Positive Standing flexion test

Tibial Conditions

Lumbar conditions

Sacral Conditions

TESTS TO RULE OUT SEVERE PATHOLOGY

- Valsalva
- Slump Test
- Well Leg straight leg
- Why and when do we choose to use these?

VALSALVA

Performed to assess for the possibility of disc Pathology

How its done?

- Ask client if the experience the pain reoccur or become more severe while bearing down to have a bowel

Positive Sign?

- A positive response to the questioning

SLUMP TEST

How its done?

- Client seated on the edge of the table
- Examiner asks client to flex one hip, extend knee and dorsiflex their foot without bending their knee, then have the client slump forward

Positive Sign

- Recreation of pain (pain, numbness and tingling low back and down leg)
  - https://youtu.be/HFGfP84uwEo

WELL LEG/STRAIGHT LEG

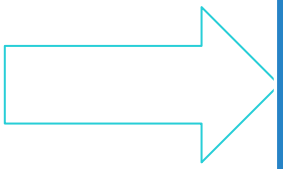
The well leg/straight leg test can provide a lot information on a patients condition including

- Hamstring length
- Sciatic nerve
- Lumbar Spine for disc pathology

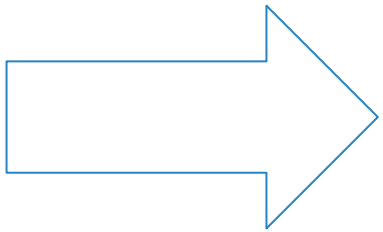
How its done?

Client supine, legs extended

Examiner Grasps the ankle of the uninvolved leg. Elevate to the point where pain is felt. If the pain radiates to the opposite leg this indicates Disc Pathology



Next move to the affected leg, grasp ankle and elevate leg to the point where pain is felt again, ease off elevation and then Dorsiflex the foot, if pain returns it indicates Sciatic Condition



If Dorsiflexion does not recreate pain then it is indicative of Hamstring Dysfunction

DETERMINING ANATOMICAL SHORT LEG

If a client has a low illiac crest and a corresponding low Greater Trochanter on the same side it is determined that they have an anatomical short leg.

Low Illiac crest and = GT's indicate possible pelvic imbalance

=Illiac crest and low GT indicate possible pelvic OR Hip imbalance

Low illiac crest on one side and GT on the other indicates Pelvic or Hip imbalance

WEBER-BARSTOW MANEUVER

How its done?

- Stand at pt. feet, palpate the distal aspect of the medial malleoli with your thumbs.
- Pt. lifts hips and the places them back down (resetting the pelvis)
- Passively extend pt. legs and compare the medial malleoli.
- To measure just femoral length do not extend the legs. Look at the heights of the knees when hips and knees are flexed.

Positive Sign

- Medial malleoli higher than other side
- https://www.youtube.com/watch?v=K2VWpuqDQjU

STANDING FLEXION TEST

How its done?

- Client standing
- Therapist positioned behind client, eyes level with PSIS, place thumbs on the inferior surface of PSIS
- Have Client flex slowly forward as far as comfortable
- Therapist notes which side travels the greatest distance

SEATED FLEXION TEST

Performed in the same way as standing only client is now seated

Seated flexion helps rule out false positives based on hamstring involvement is now taken out.

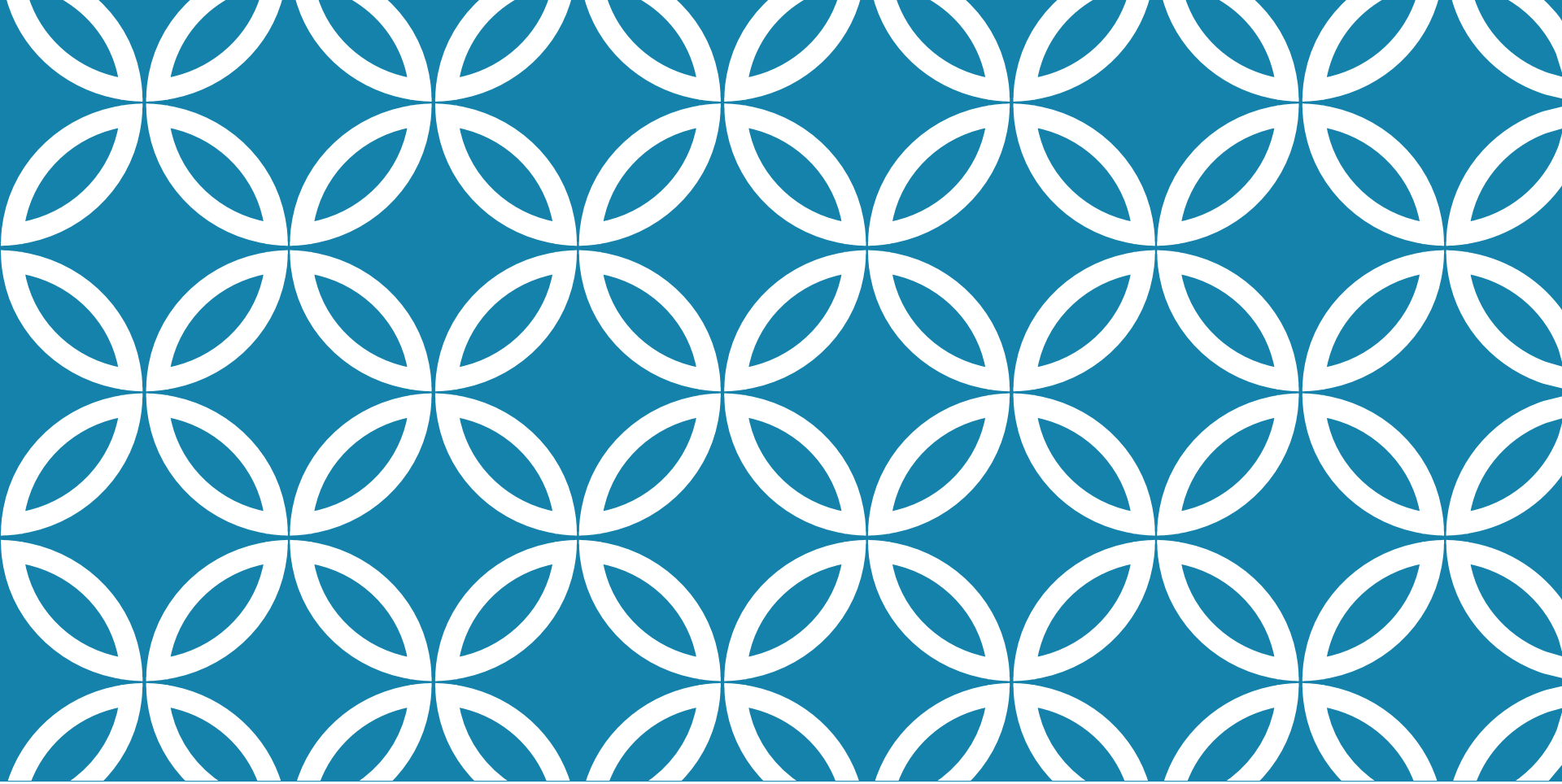
RESULTS – If the Test now shows equal movement we know that hamstrings are involved ON THE SIDE THAT HAD THE LEAST MOVEMENT in standing flexion. This is due to tight hamstrings not allowing the innominate to move in the same way as the unaffected side

STANDING/SEATED FLEXION TEST RESULTS CONT.

Possible results include

- +R Standing +R Seated = Right side dysfuction
- +R Standing = Seated = Hamstrings on Left
- +R Standing +L Seated = Possibility of pelvis and sacral dysfunction

- If Hamstrings are indicated proceed next with a passive test of hamstrings



SIJ

GILLET'S TEST

Gillet

- Method:
- client standing, palpate PSIS's with one hand the other thumb parallel on sacrum.
- Patient asked to stand on one foot while lifting the other to the chest. (they may be close to a wall and face it if needed for stability)
  - Normally this cause the innominate to rotate posteriorly thusly the psis would become lower than the thumb on the sacrum
- Positive: PSIS moves superiorly or has no movement
- https://www.youtube.com/watch?v=dvhvKXnXAac

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GAENSLEN'S TEST

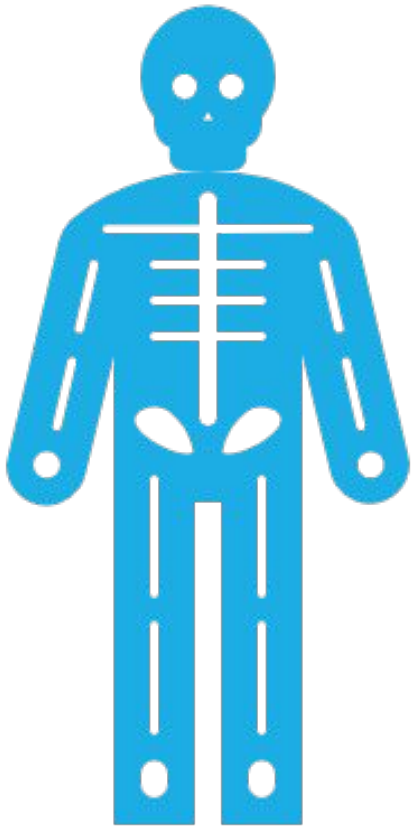
Method:

client side lying on unaffected side and holds unaffected leg flexed to chest

Therapist stabilizes pelvis and extends hip of the upper leg

Positive: Pain or reproduction of symptoms

- Indicates - Ipsilateral joint lesion, hip pathology or L4 nerve root lesion
- https://www.youtube.com/watch?v=aXLig1qoPKo
- 746



FABER (PATRICK TEST)

Method: Patient supine, place test ankle over unaffected knee stabilize contralateral hip and lower test knee

Positive: Test leg remains above opposite straight leg indicates: hip pathology, Iliopsoas spasm, or SI Joint pathology

https://www.youtube.com/watch?v=89Qiht82zmg

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YEOMAN'S TEST

Method

- client prone
- therapist flexes clients knee to 90 degrees and extends hip

Positive?

- Localized pain to SI Joint indicates pathology in the anterior sacroiliac ligaments
- Lumbar pain indicates lumbar involvement
- Anterior thigh pain may indicate femoral nerve stretch
- https://www.youtube.com/watch?v=TFdv7dGweR4
- 748

IMPINGEMENT TESTS

ANTEROPOSTERIOR IMPINGEMENT TEST

Tests for hip dysplasia, slipped capital femoral epiphysis, and femoroacetabular impingment

Patient is supine with hips flexed to 90°

Examiner medially rotates and adducts the hip.

+= pain

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POSTEROINFERIOR IMPINGEMENT TEST

Test for global acetabular over coverage, global femoral neck offset abnormalities and posterior acetabular cartilage damage.

Pt. lies supine with the legs hanging over the edge of the plinth to ensure maximum hip extension.

Examiner laterally rotates hips quickly.

+= deep seated groin or buttocks pain

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LIGAMENT TESTS

POSTERIOR SIJ LIGAMENT TESTS

Squish Test

- Method: client supine, compress ASIS together
- Positive: LBP, reproduction of symptoms

Approximation

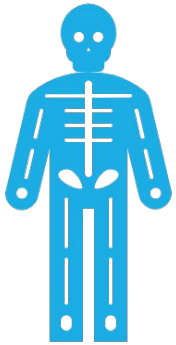
- Method: client side lying, press uppermost iliac crest towards table
- Positive: LBP, reproduction of symptoms

- Video has some discrepancies. We do not do 3 thrust we only do one compression of moderate pressure
- https://www.youtube.com/watch?v=pWjvrhWMR4w

ANTERIOR SIJ LIGAMENT TEST

Gap Test

- Method: client supine, separate ASIS with arms crossed
- Positive: reproduction of symptoms – only positive if unilateral gluteal or posterior leg pain is produced. INDICATES – sprain of Anterior Sacroiliac joint Ligament



LABRAL LESION

ANTERIOR LABRAL TEAR (FADDIR) TEST

Tests for anterior-superior impingement syndrome, anterior labral tear and iliopsoas tendinitis

Pt. in supine position, examiner takes the hip into full flexion, lateral rotation, and full abduction as a staring position.

Examiner then extends the hip, combined with medial rotation and adduction.

+ = production of pain, recreation of symptoms with or without a click, or apprehension.

https://www.youtube.com/watch?v=xyJUlhsL4Ig

LUMBAR NERVE ROOT COMPRESSION TESTS

WELL LEG/STRAIGHT LEG, PRONE KNEE BEND

- Followed after Well leg/straight Leg

Positive: pain in low back or leg

Prone Knee Bend (PKB)

- Method: client prone, flex clients knee to end range
- Positive: anterior thigh/hip pain dysfunctional rectus femoris, LBP L3 nerve compression

HIP PATHOLOGY TESTS

FABER, QUADRENT TEST (HIP SCOURING TEST)

Fabers

- Positive: hip pain, LBP, reproduction of symptoms – Indicates hip pathology, SI joint pathology or iliopsoas spasm

Quadrant

- Method: Client supine, flex hip to 90 and IR/ER while in adduction and abduction while maintaining the hip in flexion
- Positive: hip pain, clicking, grinding – indicates hip pathology and the approximate location of dysfunction

https://www.youtube.com/watch?v=MX7hlrS_m3Y

MUSCLE LENGTH TESTS

THOMAS TEST

How its done?

- Client supine, feet on edge of table
- Have client bring one knee to chest and hold
- Observe the extended leg

Positive Sign

- test leg moves into ABD (tight ITB)
- knee does not remain extended(tight quad)
- test hip lifts off table (psoas)

https://youtu.be/NMDd-4NspHs

90/90 STRAIGHT LEG TEST

How its done?

- Client supine hips and knees flexed to 90, clients hands behind their knees
- One at a time have them attempt to extend the knee

Positive Sign

- Client unable to actively extend within 20 degrees of normal knee extension

https://youtu.be/meM4S1vrbpk

TRIPOD SIGN

How its done?

- Client seated knees flexed to 90 over the table
- Examiner passively extends the knee one at a time

Positive Sign

- Client extends or slumps spine to take pressure off the hamstrings

- https://www.youtube.com/watch?v=mRab9U81HSU

PIRIFORMIS TEST

How its done?

- Client side lying
- Affected leg up
- Flex affected hip to 60 knees can be flexed
- Examiner stabilizes hip and presses test knee to the table

Positive sign

- pain in buttock, leg pain

https://youtu.be/zha5jlv4_44

OBER'S TEST

Method: client side lying, stabilize hips while bringing top leg into hip extension with the knee bent, passively lower leg

Positive: leg remains abducted, does not go lower than the table. Indicates *ITB Contracture*

https://youtu.be/Amjv6FzDeLE

ELY'S TEST

Method: prone knee bend (passive knee flexion to end range)

Positive: test hip lifts off table as therapist flexes knee

https://www.youtube.com/watch?v=0FgacndWb4Q

MUSCLE WEAKNESS TESTS

TRENDELENBURG SIGN

Tests the Glute Med muscle

How its done?

- Client is standing
- Therapist stands behind client and has them raise one knee. The side being tested is the leg that maintains contact with the floor

Positive sign?

- contralateral hip drops while balancing on ipsilateral leg
  - https://youtu.be/0rcczDEWDqU

BARLOW'S TEST

Test for DDH in Newborns- 6 months of age

Infant is supine, legs facing examiner.

Flex hips to 90° and knees are fully flexed

Each hip is evaluated individually, one hand steadies the femur and pelvis.

Middle finger are placed over each GT, thumbs over the inner side of knee and thigh opposite to the LT

Take one hip into abduction, middle finger applies and anterior pressure.

+= if the femoral head slips forward into acetabulum (click clunk or jerk) hip was dislocated

Then examiner thumb to apply a posterior and outward pressure to the inner thigh, if femoral head slips out over the posterior lip of the acetabulum then reduces once the pressure is removed.

This means the hip is unstable. It is not dislocated but it is dislocatable

ORTOLANI'S SIGN

CDH one valid if tested within first few weeks of birth

Infant is supine, legs facing examiner.

Flex hips and grasp the legs so your thumbs are against the inside of the knees and thighs, fingers are along the outside of the thighs to the buttocks.

With gentle traction, the thighs are abducted and pressure is applied against the GT of the femora.

+= if the femoral head slips forward into acetabulum (click clunk or jerk) hip was dislocated

JOINT PLAYS

JOINT PLAY MOVEMENTS OF THE SI JOINT

1. Cephalad movement of the sacrum with caudal movement of the ilium (left and right)
2. Caudal movement of the sacrum with cephalad movement of the ilium
3. Anterior movement of the sacrum on the ilium
4. Anteroposterior translation ilium on sacrum
5. Superoinferior translation “ “ “”
6. Inferoposterior translation
7. Superoanterior translation

EXPLAINED

1. Client Prone, heel of hand on iliac crest and heel of hand on apex of sacrum. Apply a superior pressure to sacrum and inferior pressure to lliac crest
2. Client prone, heel of hand on ischial tuberosity and heel of other hand on base of sacrum. Apply a superior force on ischial tuberosity and an inferior force at the base of the sacrum

3. Client prone, heel of one hand over the sacrum and other hand under the ASIS of one side. The hand on the sacrum will apply an anterior pressure while the other hand lifts up, repeat on the other side

4. Anteroposterior translation of ilium on sacrum – Client supine, One hand placed underneath palpating sacral sulcus to lumbosacral joint. With the other hand apply a posterior pressure through ASIS and iliac crest. Note posterior movement of the ilium end range is when the pelvis is felt to move at L5-S1

5. Superoinferior translation – client prone, place palpating fingers at sacral sulcus, apply a superior pressure through the ischial tuberosity. End range is when you feel pelvic girdle bend beneath L5 – S1

6. Inferoposterior translation - Client supine, palpating hand as in scenario 4, with the other hand apply and anterior rotational force to the ipsilateral asis and iliac crest

7. Superoanterior translation - Client supine palpating hand as above, with the other hand apply posterior rotating force ASIS and Iliac crest

JOINT PLAY MOVEMENTS OF THE HIP

Caudal glide of the femur (long leg traction)

Compression

Lateral distraction

Quadrant test

EXPLAINED

Caudal glide- examiner places both hands around the pt's leg, slightly above the ankle. Examiner leans back applying a long axis traction/distraction to the entire limb. If knee dysfunction is suspected, place both hand just proximal to the knee and apply traction this way.

Compression- examiner places the pt's knee in the resting position and the applies a compressive force to the hip through the longitudinal axis of the femur.

Lateral distraction- Examiner applies a lateral force at the hip by placing a wide strap around the leg as high up in the groin as possible. The strap is then wrapped around the examiner's buttocks. The examiner leans back, applying a distraction. The proximal hand is used to palpate the hip or greater trochanter movement, while the distal hand prevents abduction of the leg.

PERIPHERAL NERVE INJURIES

PELVIS

Meralgia Paresthetica

- Result of pressure or entrapment of the lateral femoral cutaneous nerve near ASIS (this nerve passes under the ingiunal ligament)
- May be caused by trauma
  - Seat belt in car accident, during delivery
  - Tight clothing
  - Complication of surgery
- Sensory nerve only so patient experiences sensory alteration or burning pain on lateral thigh

ILIOINGUINAL NERVE

Lies within transverse abdominus, may be compressed by spasm of nerve

Sensory nerve only nerve pain occurs

- Superior aspect of the anterior thigh
- Scrotum or labia

Research shows this nerve may be entrapped with injury to the external oblique (hockey players syndrome)

- Patient feels pain especially on ipsilateral hip extension and contralateral torso rotation
- Pain may radiate into groin, scrotum, hip and back

HIP

Sciatic Nerve

- May be injured anywhere along its path from lumbosacral spine down the back of leg to the knee
- Most COMMONLY injured in the hip
- If injured in pelvis or femur (posterior hip dislocation) – Hamstrings and all muscle below knee results in high steppage gait and inability to stand on heel or toes
- Sensory alteration entire foot minus instep and medial malleolus
- If piriformis is affected pain and weakness on hip abductioni and lateral rotation and stretching pain on medial rotation

SUPERIOR GLUTEAL NERVE

May be compressed as it passes piriformis and inferior border of glute min.

May be injured during hip surgery

Patient complains of

- Acute gluteal pain increases with ambulation
- Hip is often medial rotated
- Weakness of hip abductors = trendelenburg gait
- Tenderness may be palpated lateral to greater sciatic notch

FEMORAL NERVE

Not commonly injured

May be compressed during child birth, anterior dislocation of femur, or during hernia surgery, stripping of varicose veins

Patient not able to flex thigh on trunk or extend the knee, deep tendon reflex is lost, wasting of quad muscles is evident, sensory loss includes medial apsect of the distal thigh and medial aspect of leg and foot

OBTURATOR NERVE

May be compressed as it leaves the pelvis and enters the leg in the obturator tunnel

Injury can be caused by pelvic or hip surgery, pregnancy, fractures or tumors and has been know to be a source of groin pain in athletes

Controls mostly the adductors so adduction will be weak as well as knee flexion (gracilis) and lateral rotation (obturator externus)

Small sensory symptoms involving a small area in the middle medial part of the thigh

Client may also complain of pain form pubic symphysis to medial aspect of the knee

HIP MUSCLES AND REFERRAL OF PAIN

Muscle	Pattern
Iliopsoas	Lateral to Lumbar spine, anterior thigh
Gluteus Maximus	Sacral & Gluteal area to Lateral aspect of pelvis and posterosuperior thigh
Gluteus Medius	Lumbar & sacral gluteal area to lateral aspect of pelvis and upper thigh
Gluteus Minimus	Gluteal area below Iliac crest down lateral aspect of thigh and leg
Piriformis	Sacrum, gluteal area down lateral aspect of thigh and leg
TFL	Lateral thigh
Sartorius	Anteromedial thigh (along the course of the muscle)

Muscle	Pattern
Pectineus	Groin to upper medial thigh
Rectus Femoris	Anterior thigh to knee
Adductor Longus & Brevis	Anterior thigh to middle thigh to anteromedial leg to ankle
Adductor magnus	Groin along medial thigh to above knee
Gracilis	Anteromedial thigh to knee
Hamstrings	Gluteal area along posterior thigh to knee and posteromedial calf