

"Dang! ... Stiff neck!"

- "Better call Dr Wedel"

Evaluation, Diagnosis and Treatment of Selected Somatic Dysfunctions related to the SHORT LEG

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Learning Objectives

- Review and Apply the following diagnostic techniques related to causes of an apparent short leg:
 - Malleolus comparison
 - ASIS compression test
 - Spring test
 - Sacral palpation and landmark ID
 - Standing flexion test
 - Seated flexion test

Iliac-Sacral Techniques Covered:

1. Prone and Supine direct, muscle energy and HVLA for Innominate dysfunction: posterior rotation and upslip
2. Prone and Supine direct, muscle energy, and HVLA for sacral rotation on both same and opposite axes (torsions)
3. Prone, direct, muscle energy for sacral shears

ASIS SUPERIOR
COMPRESSION +
MALLEOLI SHORT
PSIS SUPERIOR
SULCUS DEEP
ILA INF/ POST
SPRING (IT DID)
LUMBAR SPASM
SEATED FLEXION +
STANDING FLEXION+

R____
R____
R____
R____
R____
R____
R____
R____
R____

L____
L____
L____
L____
L____
L____
L____
L____
L____

DIAGNOSIS:

UPSLIP INNOMINATE

SACRAL SHEAR – UNILATERAL FLEXION OR EXTENSION

POSTERIOR/ ANTERIOR INNOMINATE

ANTERIOR / POSTERIOR SACRAL TORSION

TREATMENT CHOICE

ME_____

HVLA_____

DID IT WORK

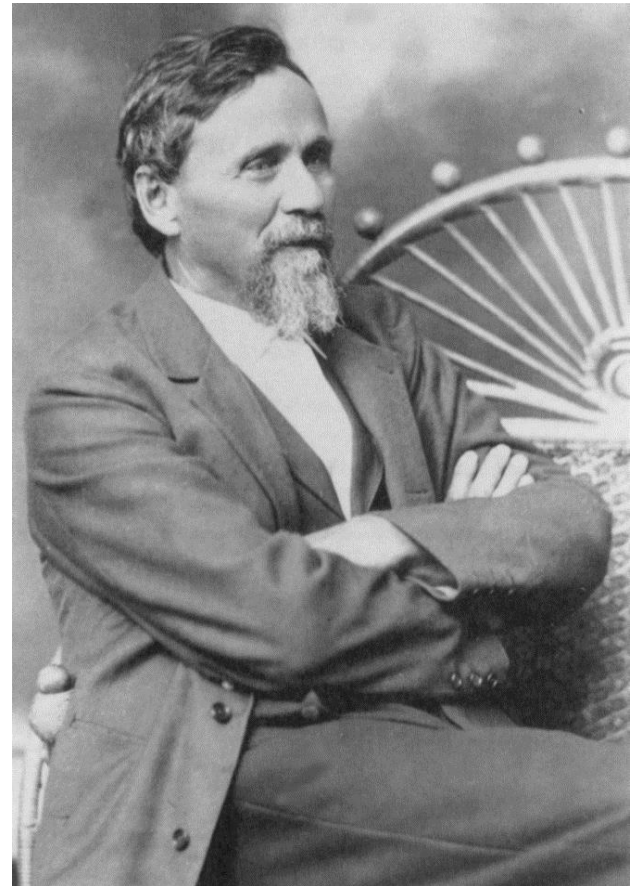
YES_____

NO_____

Background and Basis

The 4 Osteopathic Tenets (Principles)

1. The body is a unit; the person is a unit of body, mind, and spirit.
2. Structure and function are reciprocally inter-related.
3. The body is capable of self-regulation, self-healing, and health maintenance.
4. Rational treatment is based upon an understanding of these basic principles.



Somatic Dysfunction - Defined

- “Impaired or altered function of related components of the somatic (body framework) system:
 - Skeletal, arthrodial, and myofascial structures,
 - And...
 - Related vascular, lymphatic, and neural elements”

Treatment Options for Somatic Dysfunctions

- All somatic dysfunctions have a restrictive barrier which are considered “pathologic”
- This restriction inhibits movement in one direction which causes asymmetry within the joint:
- The goal of osteopathic treatment is to eliminate the restrictive barrier thus restoring symmetry....

Somatic Dysfunction: CHARACTERISTICS

“The acronym TART is used to remember the abnormal changes that accompany somatic dysfunction. (Tenderness by itself is not always an indication of somatic dysfunction):

- **Tissue texture changes**
- **Asymmetry**
- **Restricted range of motion**
- **Tenderness**

Kimberly Manual, chapter 3

Treatment Methodologies

- Indirect – movement away from the barrier and more functional than structural
 - Cranial-sacral
 - Counterstrain
 - Balanced ligamentous tension (BLT)
 - Facilitated Positional Release

Treatment Methodologies

- Direct – engagement of the restrictive barrier and movement through it and to it by using the body part as a lever
 - Muscle Energy and MFR
 - HVLA
 - Chapman's and Lymphatics

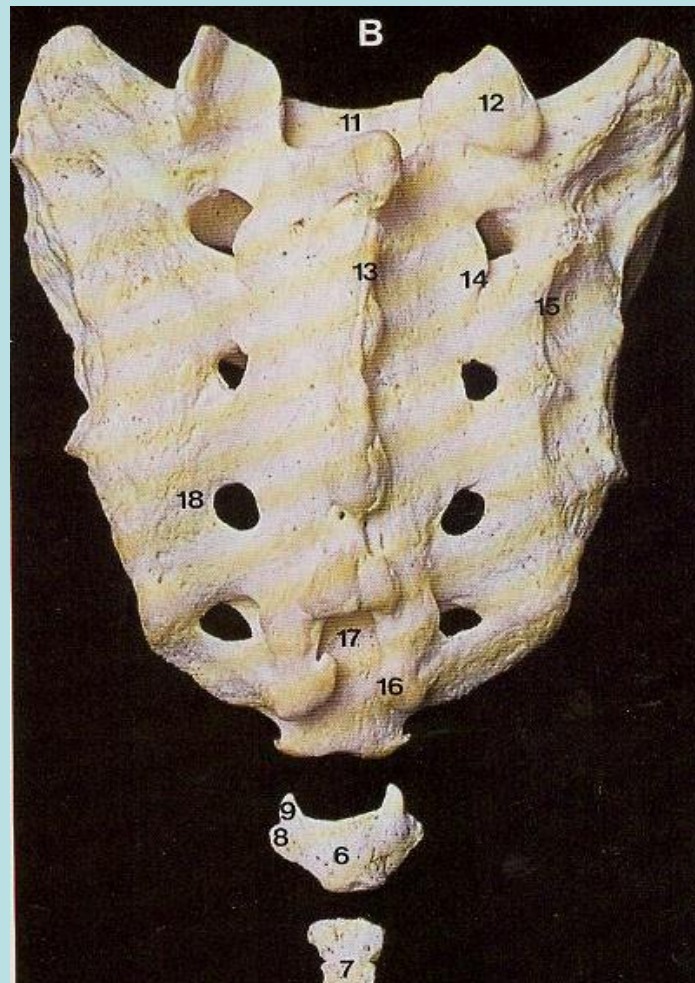
- ANATOMY

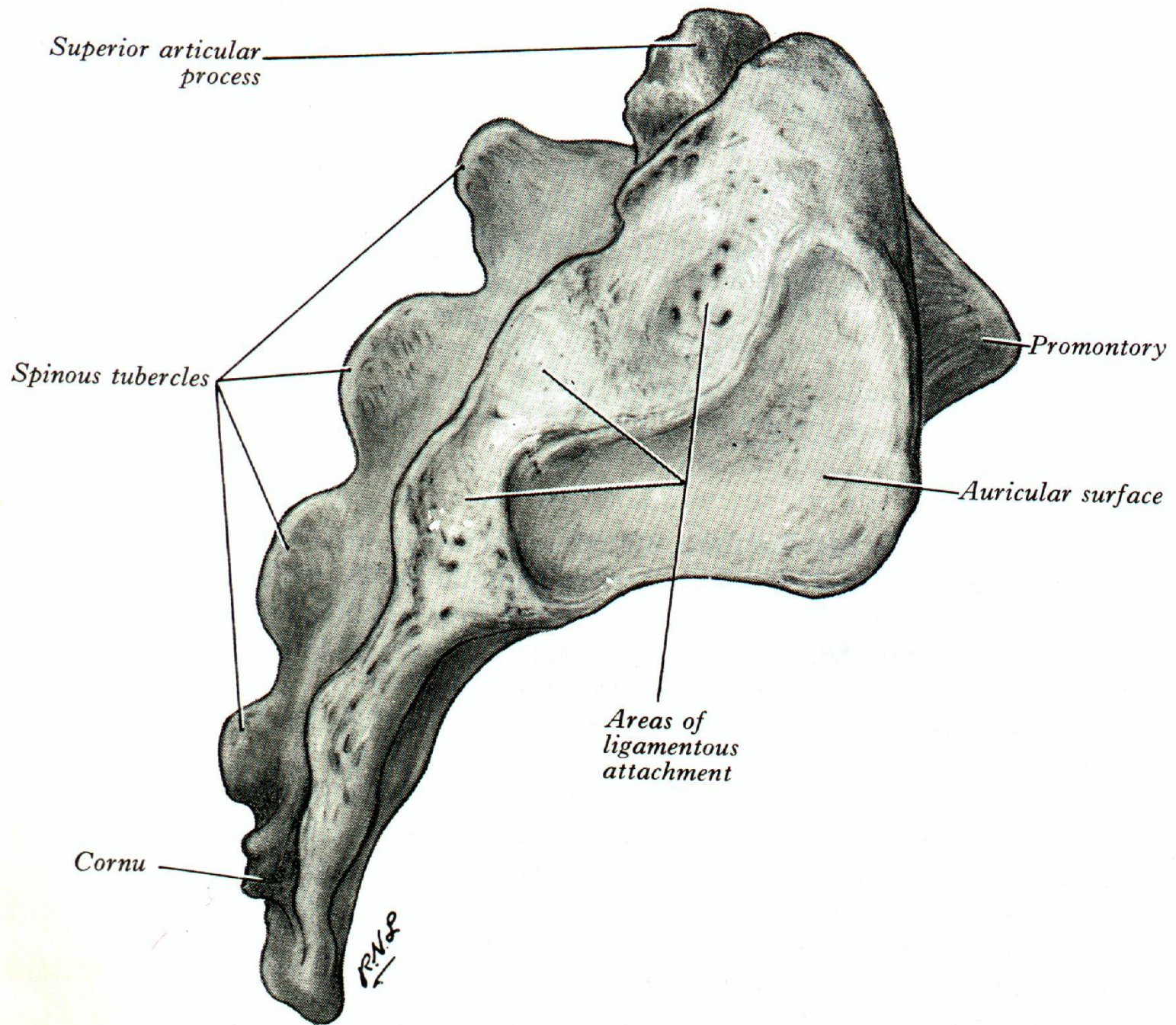
SACRAL
STRUCTURE, LIGAMENTS AND
MUSCLES

THE SACRUM

Means “sacred”

because of its density it is the last bone to decay and because it
protects
the reproductive system





Forces on the sacrum

- Angle of the sacroiliac joint “wedges” the sacrum in an anterior direction
 - Prevents posterior movement
- Dorsal (posterior) sacroiliac ligaments much stronger than anterior sacroiliac ligaments
- Purpose: counteract significant pelvic forces pushing apex posteriorly.

Major Pelvic Ligaments

- Iliolumbar
 - from ilia to 5th lumbar vertebrae
- Sacrospinous
 - Sacrum to spine of the ischium
- Sacrotuberous
 - Sacrum to ischial tuberosity
- Sacroiliac Ligament
 - Covers much of the sacroiliac joint, ant & post

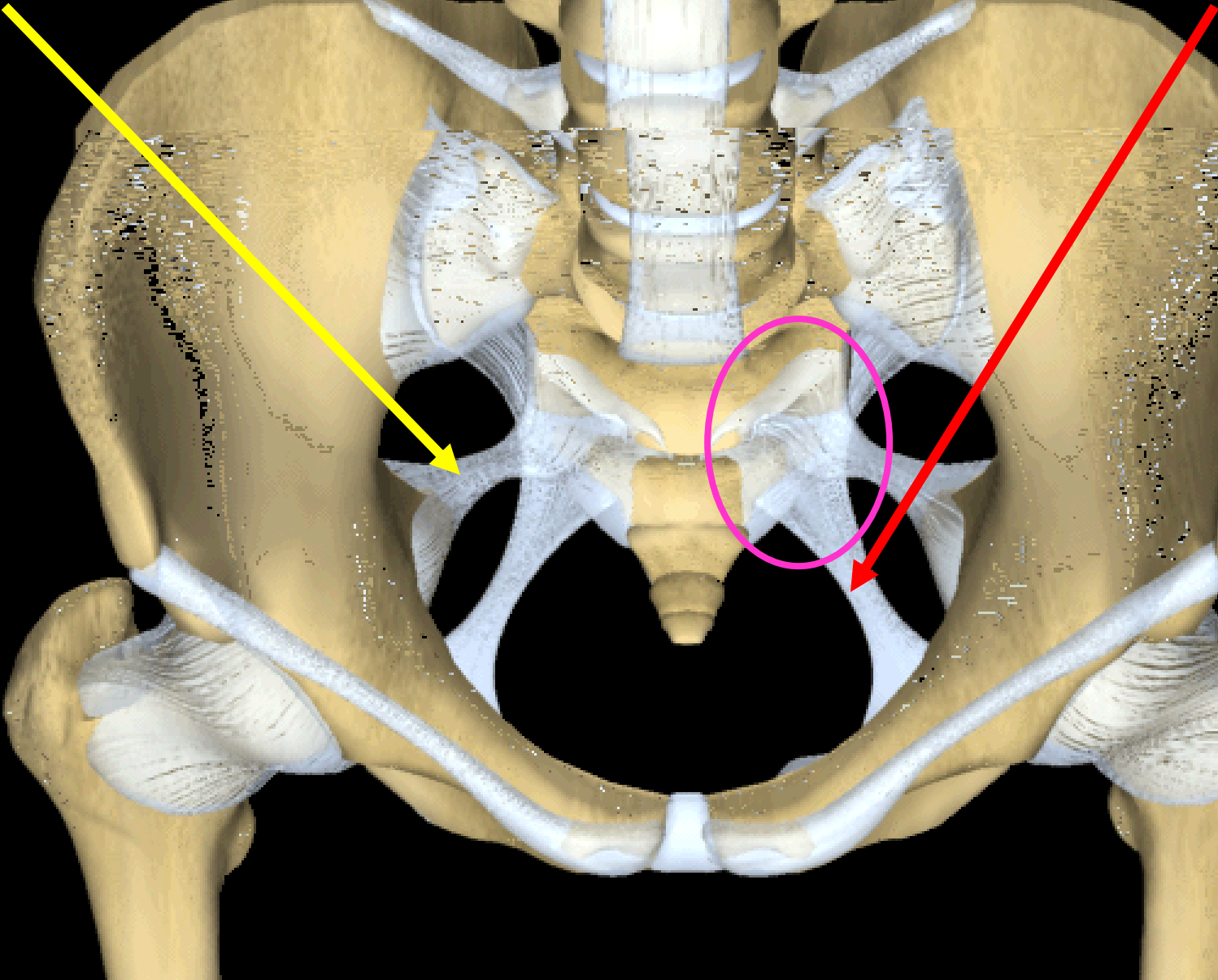


Iliolumbar ligaments

Stabilizes the 5th (4th)
Lumbar vertebrae to
the ilia

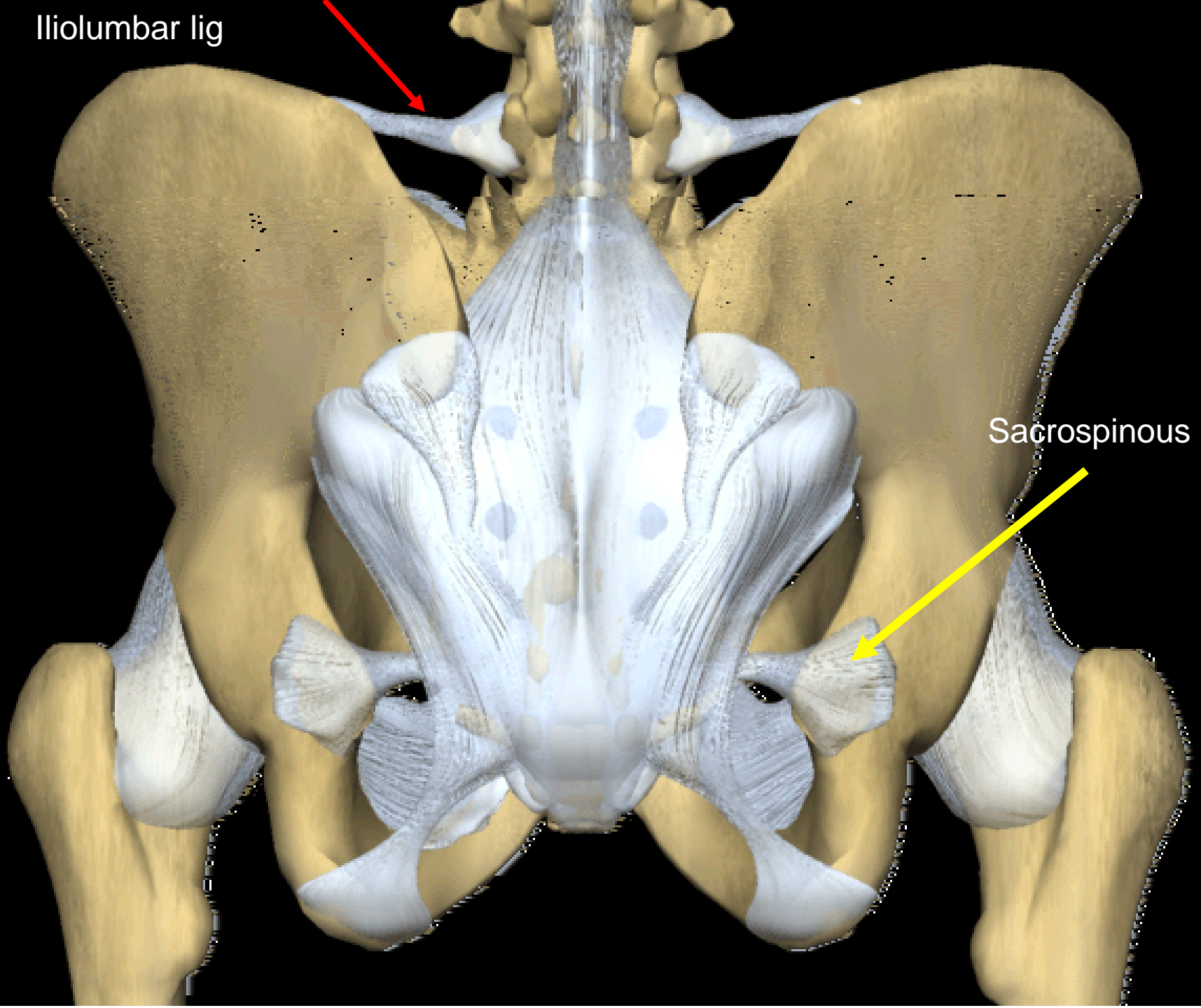
Sacrospinous ligament

Sacrotuberous ligament



Iliolumbar lig

Sacrospinous

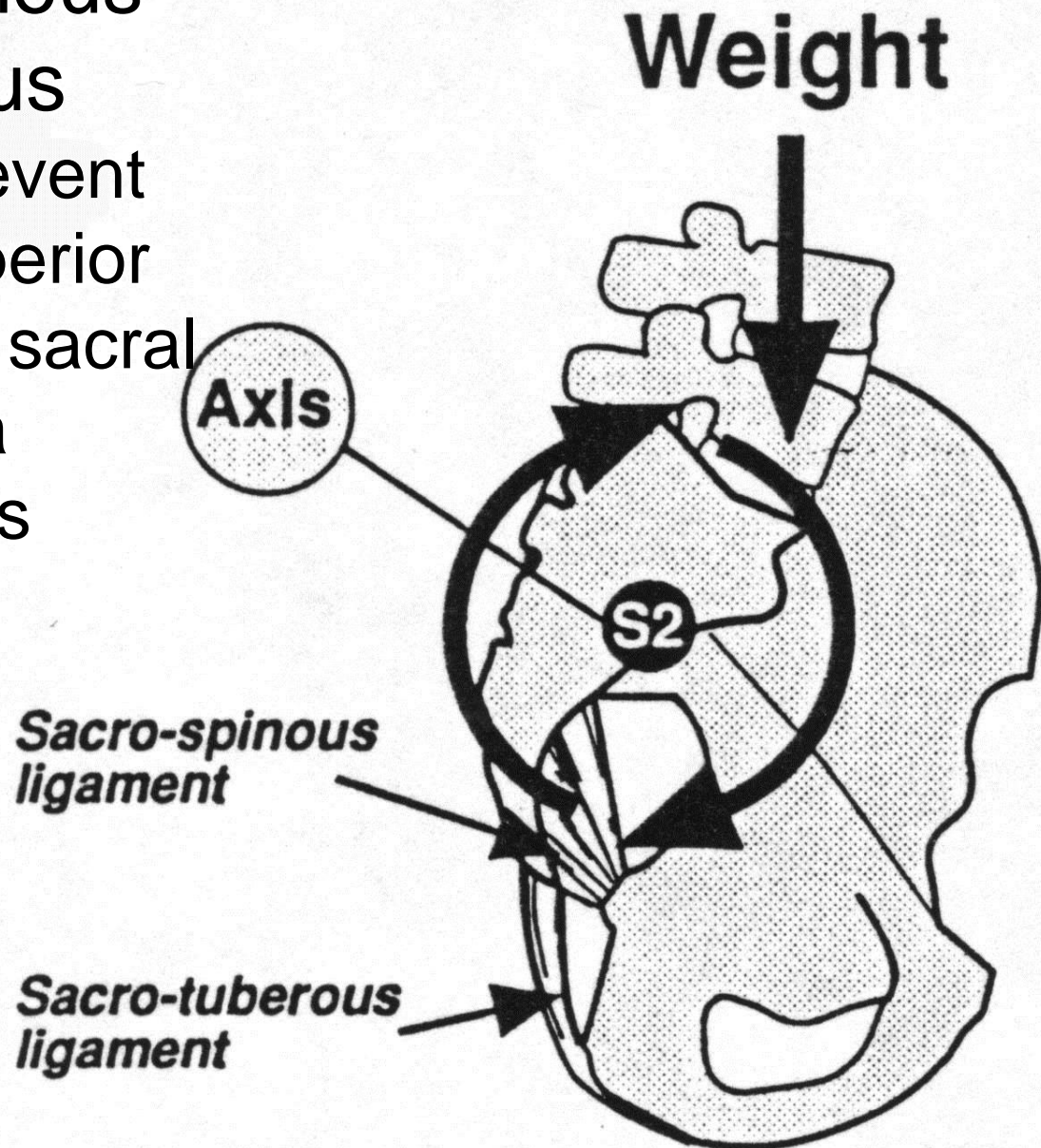


Sacrospinous Ligament

- Runs from lower sacral tubercles to ischial tuberosity
- Gluteus maximus attachment
- Tendon of the biceps femoris attachment
- Connects with fascia of the pelvis
 - from sacrum to ischial tuberosity
 - stabilizes anterior motion

Both Sacrospinous & Sacrotuberous

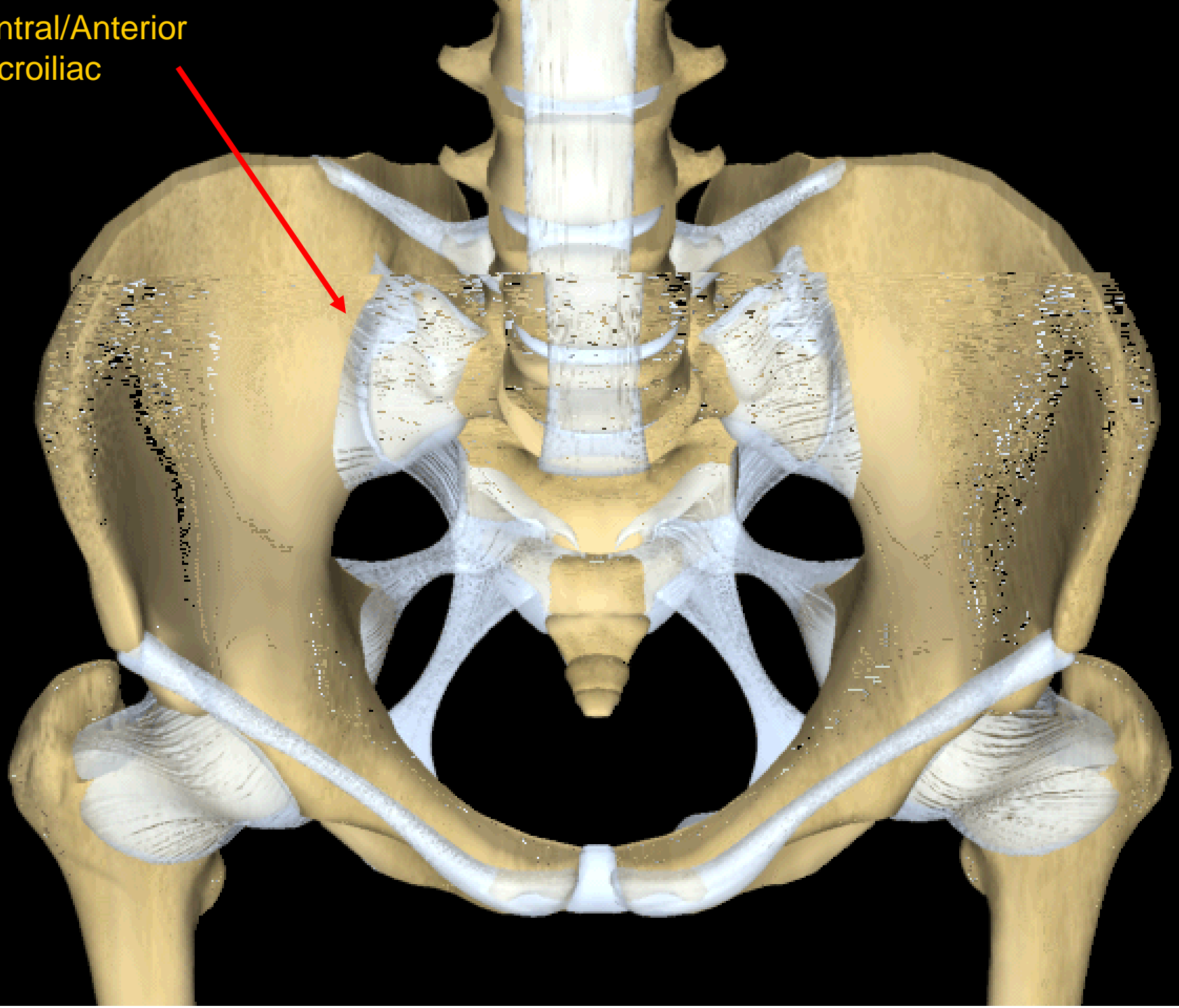
stabilize to prevent posterior - superior *rotation* of the sacral apex around a transverse axis



Sacroiliac Ligament

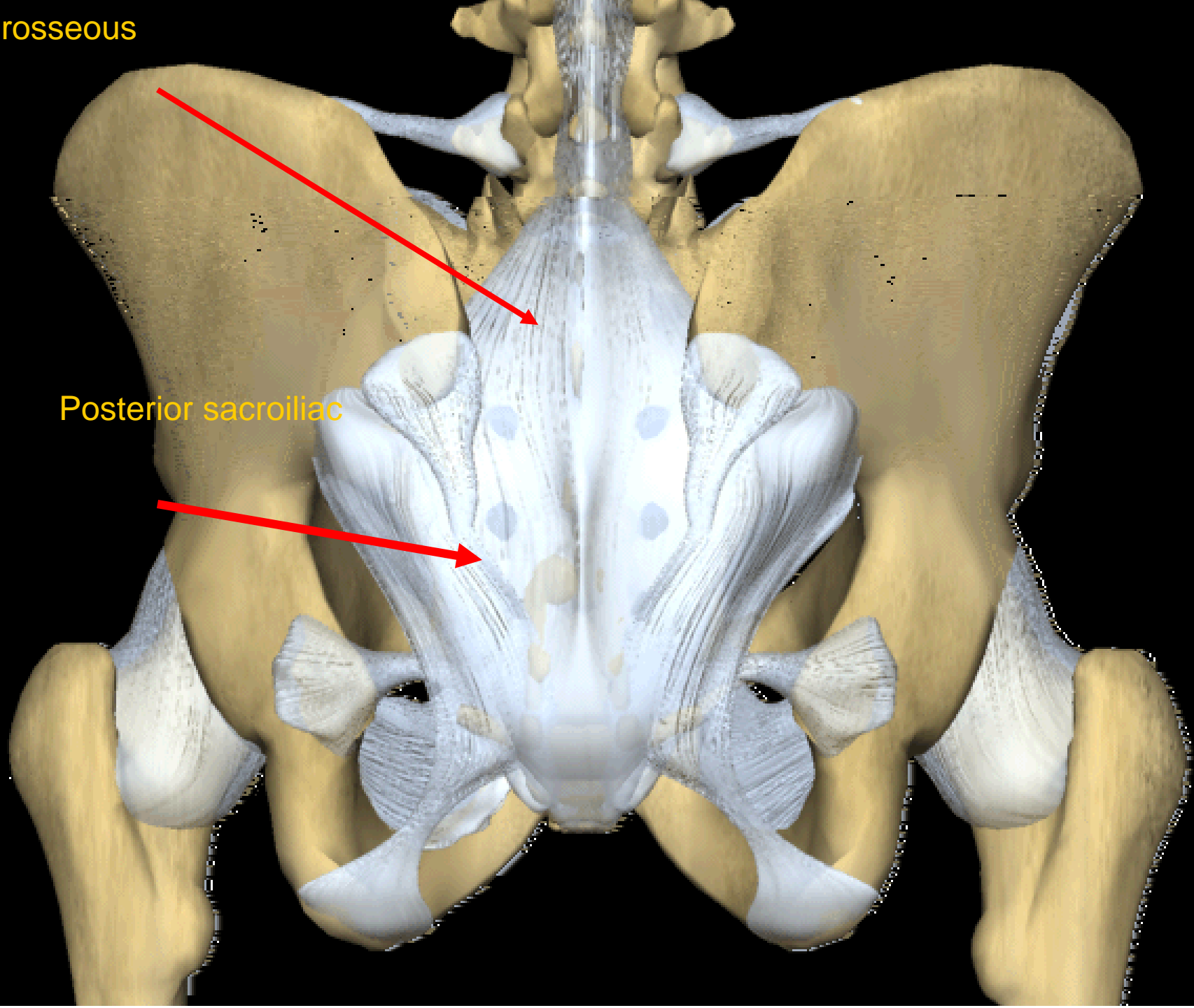
- Sacroiliac
 - **actually three ligaments**
 - Anterior or ventral sacroiliac
 - from 3rd sacral segment to lateral preauricular sulcus
 - interosseous sacroiliac
 - massive bond between the upper parts of the joint
 - dorsal sacroiliac
 - Partly covers the interosseous, from lateral sacral crest to PSIS and internal iliac crest.

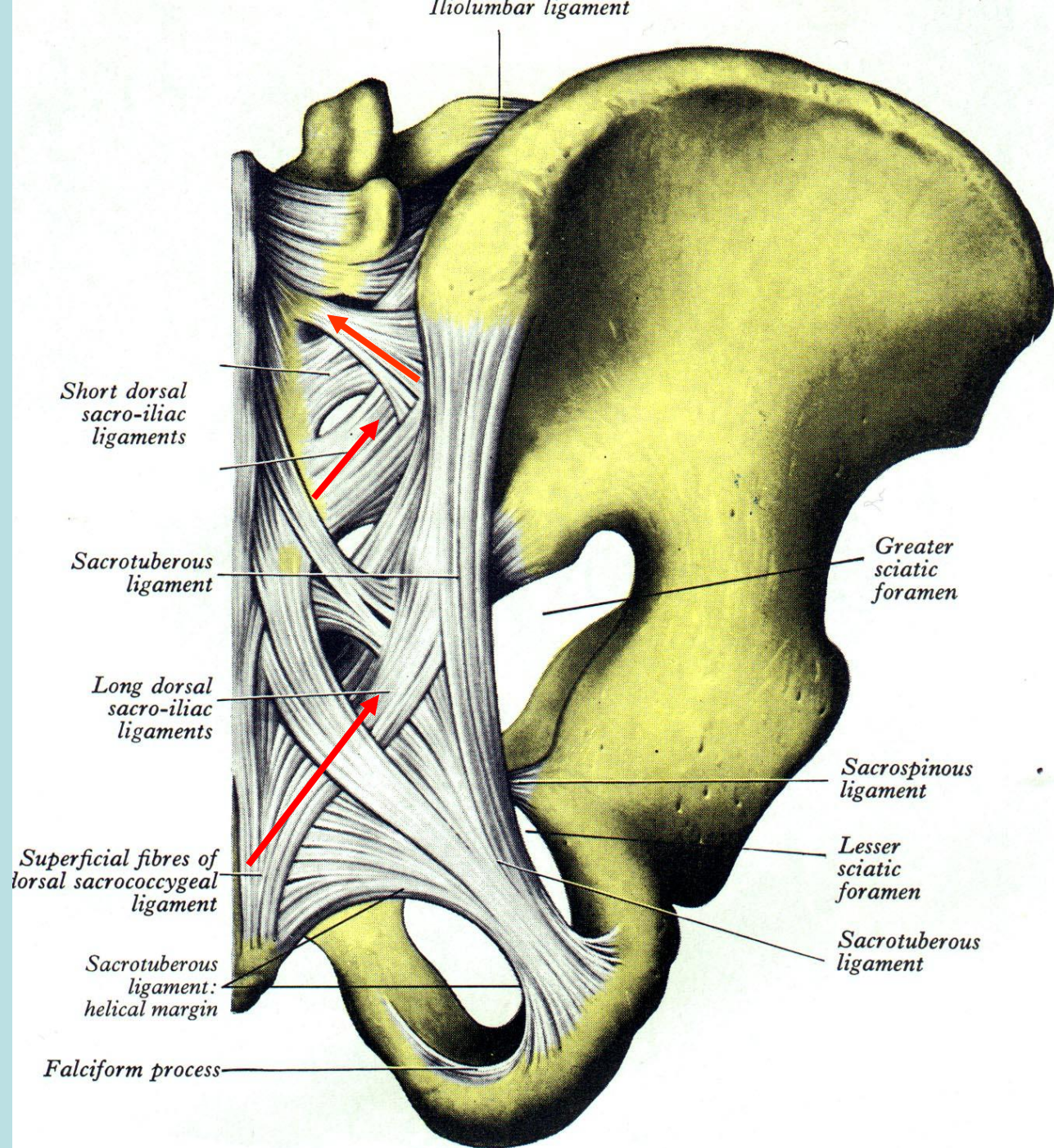
Ventral/Anterior
Sacroiliac



interosseous

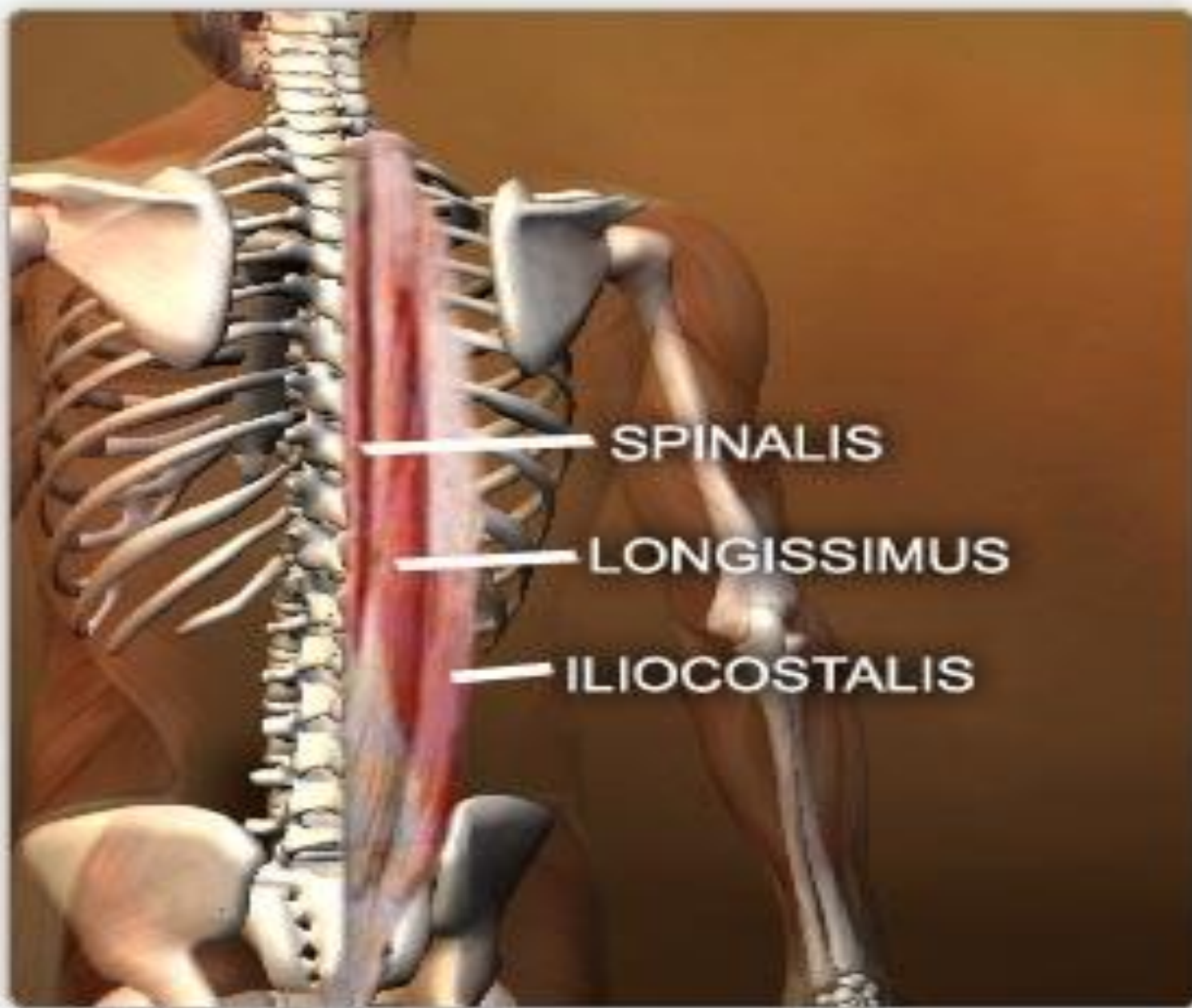
Posterior sacroiliac





Pelvic muscle attachments from above.

- Attach to Sacrum
 - Erector Spinae
 - Iliocostalis
 - Longissimus
 - Spinalis
 - Multifidus
- Attach to Innominates
 - Obliques (internal, external, transverse)
 - Quadratus Lumborum

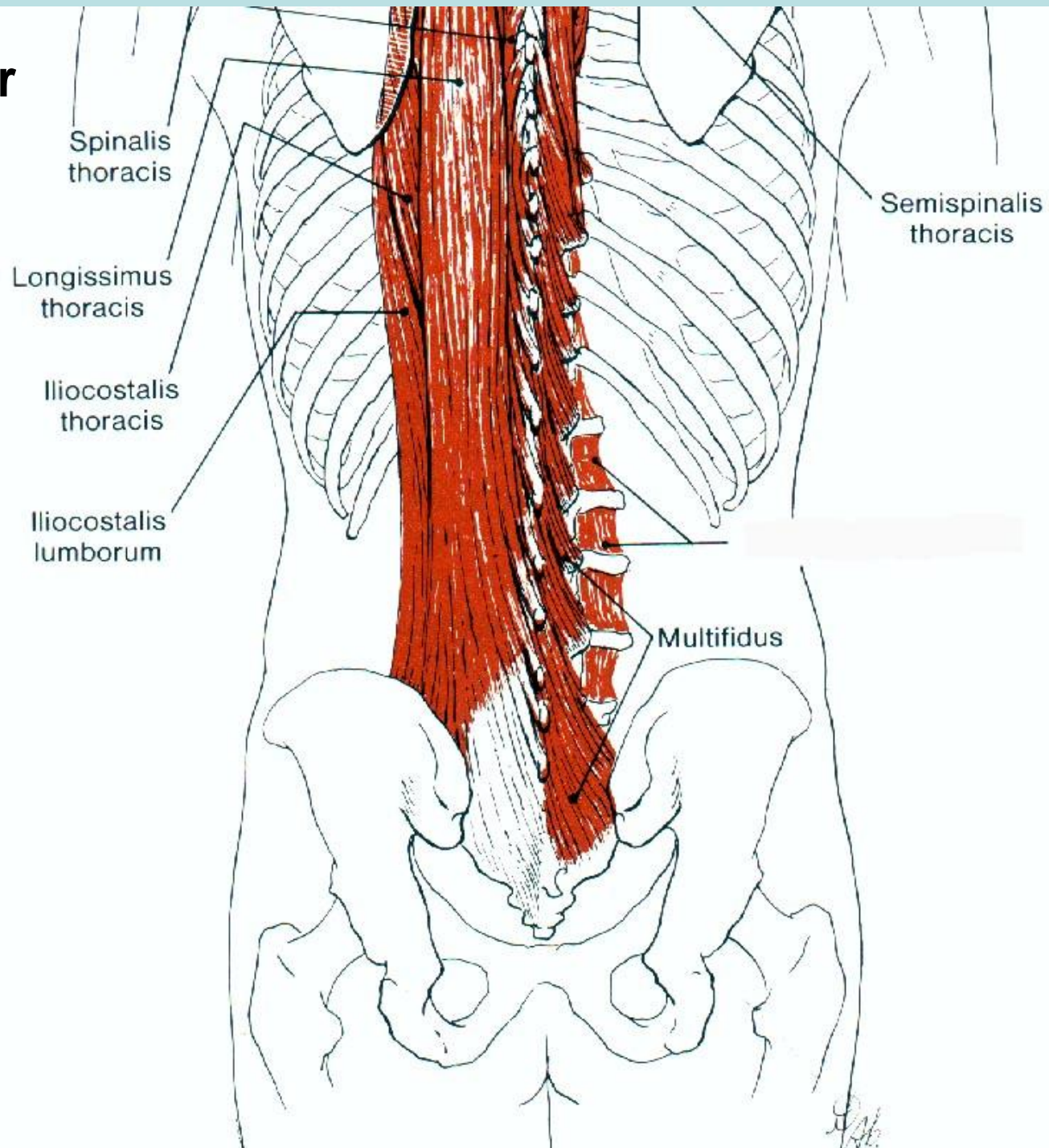


SPINALIS

LONGISSIMUS

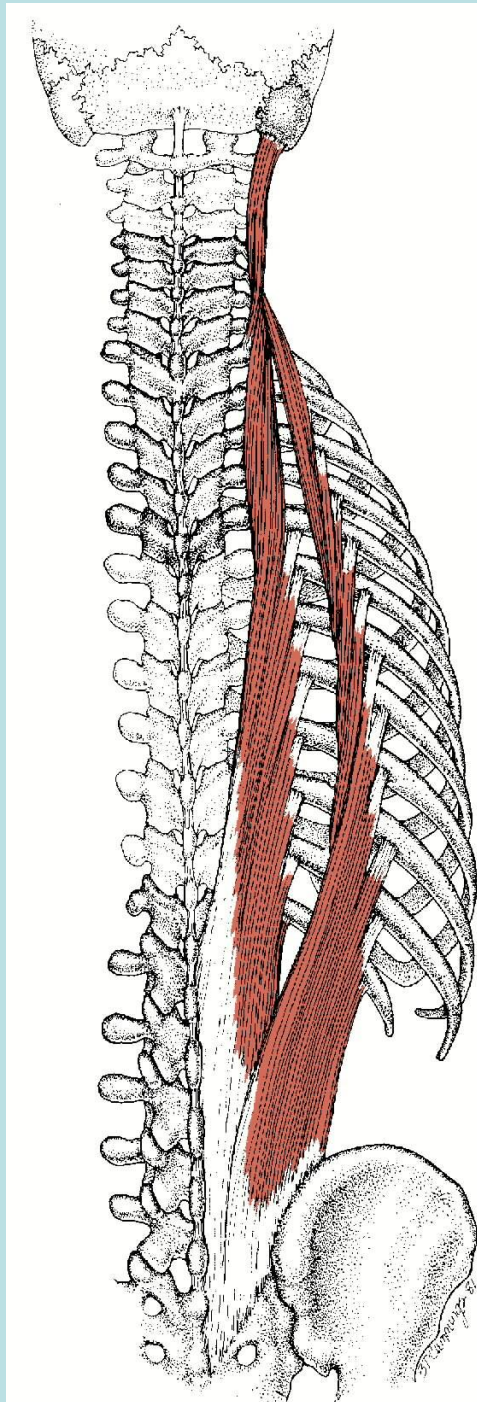
ILIOCOSTALIS

Posterior Muscles



Erector Spinae

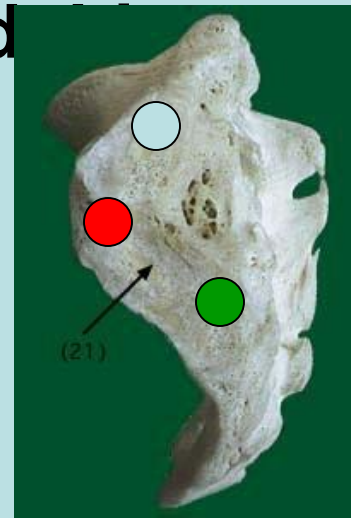
(sacrospinalis
and iliocostalis)



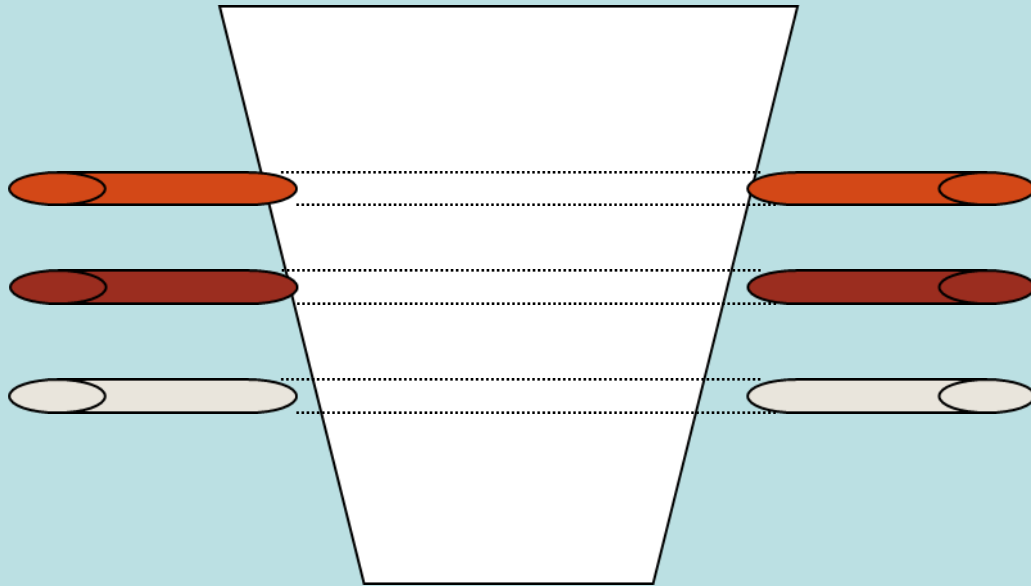
SACRAL ANATOMICAL AXES

Transverse axis

- Superior: the cranial&primary respiratory mechanism creates motion around this axis
- Middle: sacral base anterior and posterior (FB/BB) occur around this axis
- Inferior: the innominates rotate around this axis



SACRAL MOTION



Respiratory motion:
inhalation sacral base
moves posteriorly
(counter-nutates)

Respiratory
exhalation: sacral
base moves anteriorly
(nutates)

Inherent
(craniosacral) motion:

***Craniosacral
flexion-base rotates
posteriorly (counter-
nutates)

Craniosacral
extension-base rotates
anteriorly (nutates)

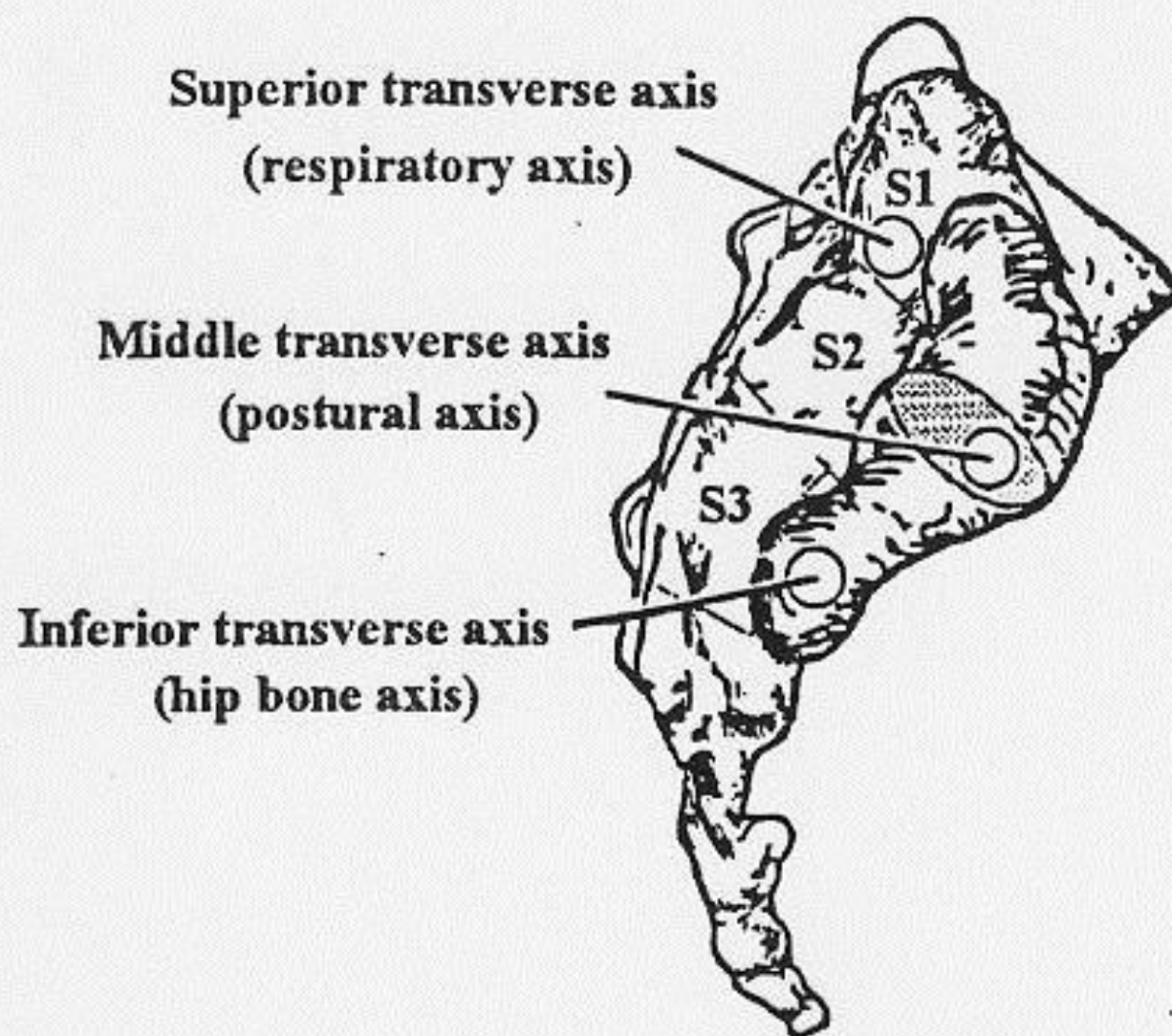
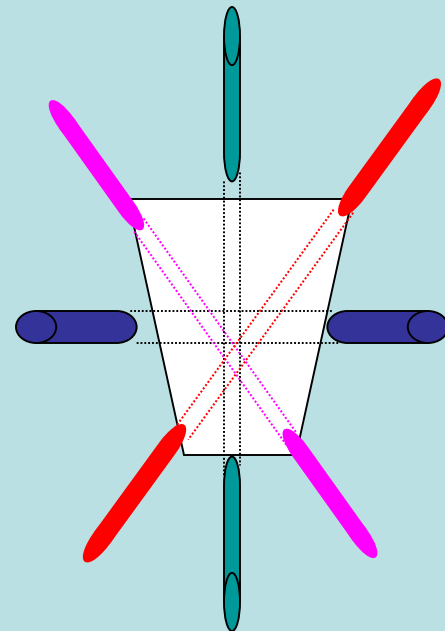


Figure 19. Sacral transverse axes

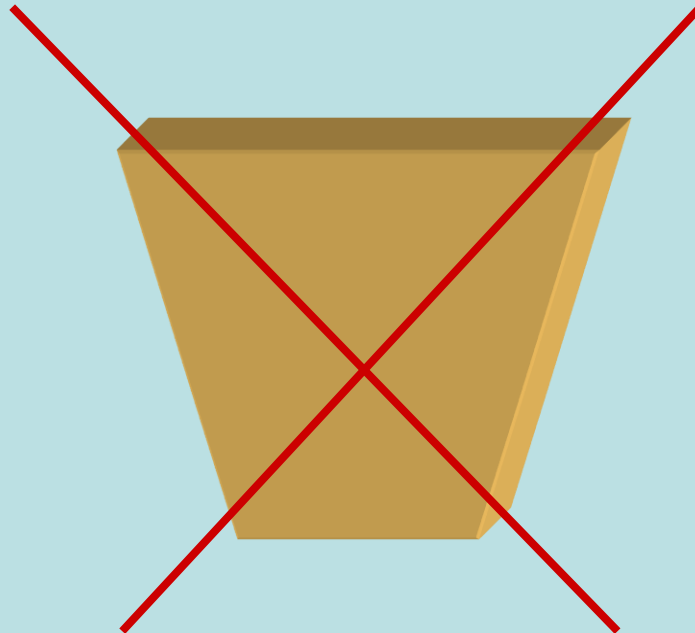
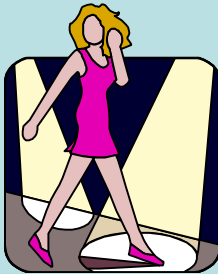
SACRAL PHYSIOLOGIC AXES

- Oblique: both **left** and **right** oblique axes are named for the superior pole
- Sagittal: includes both mid-sagittal and an infinite number of parasagittal axes
- Horizontal: functional axis of sacral flexion/extension occur around this axis (analogous to the middle transverse axis above)



Why are the Oblique
Axes so
significant?

They are the Axes of Walking.



The walking cycle as it applies to our discussion

1. From a standing (**neutral**) position, when you take a step forward, your weight is shifted onto one lower extremity.
2. This induces spinal column SB to the weight bearing side, and pins the upper pole of the sacrum on the side of the SB.
3. As the free lower extremity swings forward, it carries the free pole of the sacrum anterior, creating rotation of the sacrum about the Oblique Axis, towards the weight bearing extremity.

Ex.: R_L on LOA



R_R on ROA



Bottom Line: You form Oblique Axes with every step you take!

The other aspect of the walking cycle is the movement of the torso.

1. From a standing (**neutral**) position, as you step forward, note how your body compensates. What does your torso do?
2. Answer: Rotates towards the moving lower extremity (ie.: away from the weight bearing lower extremity).



Bottom Line: Your spine (most notably Lumbar spine) rotates in the opposite direction of the sacrum in a neutral moving situation.

Useful Tests

SUPINE

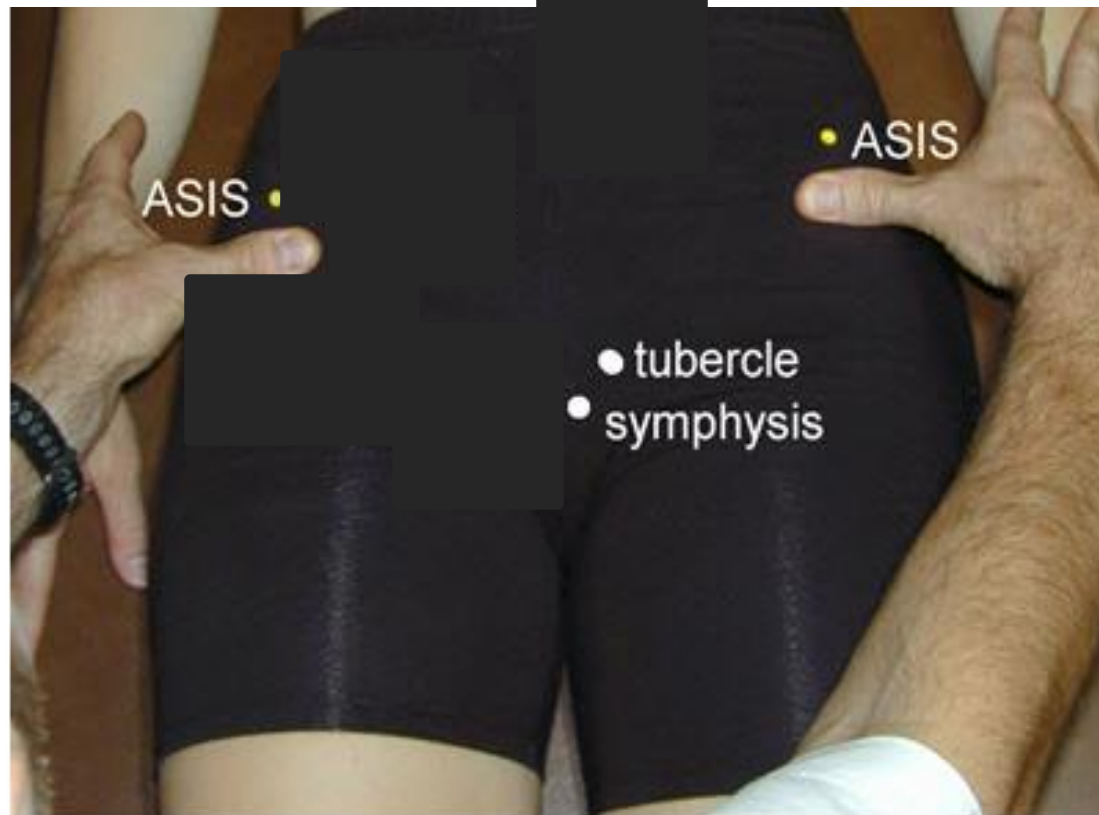
Hip flop

- Patient supine
- Knees up, feet on table, lift buttocks off table, then down again, and straighten legs



ASIS Levelness

- b) ASIS levelness - place your thumbs on the undersurface of the ASIS and compare for superior-inferior levelness, naming for the side of pelvis restriction;



Anterior lumbar and pelvic palpation (ASIS asymmetry shown)

ASIS Compression Test

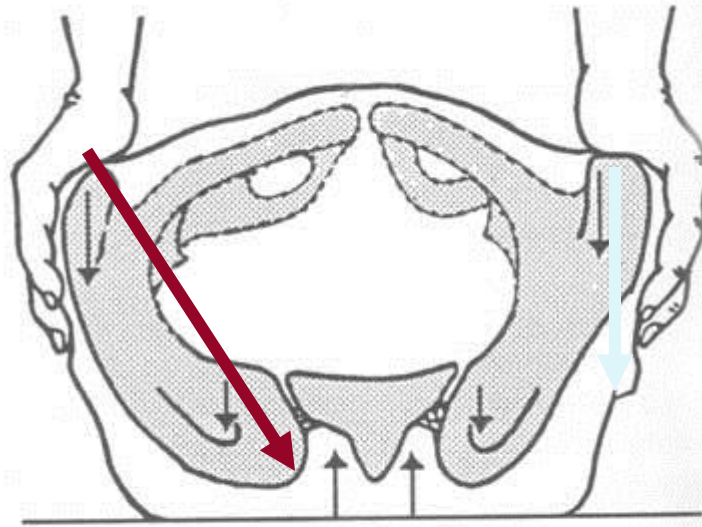
- ▶ Have the patient lie supine. The patient is then asked to raise his/her bottom up off the table and then set it back down again.
- ▶ Doctor Stands with head and shoulders centered over the patient.
- ▶ Contact the ASIS
 - Stabilize one ASIS while applying pressure at a 45 degree angle to the other ASIS
- ▶ Positive test – restricted movement of the Sacroiliac joint → rock like motion
- ▶ Negative test – a sense of give or resilience => bounce or spring like motion



ASIS compression test figure

Approx. 45
degree angle

Aim toward
SI Joint



Stabilization

**Positive - Resistance to compression (or a
lack of spring)**

Medial malleolus position



Grasp ankles bilaterally,
with thumbs Inferior to
medial malleolus on
each side

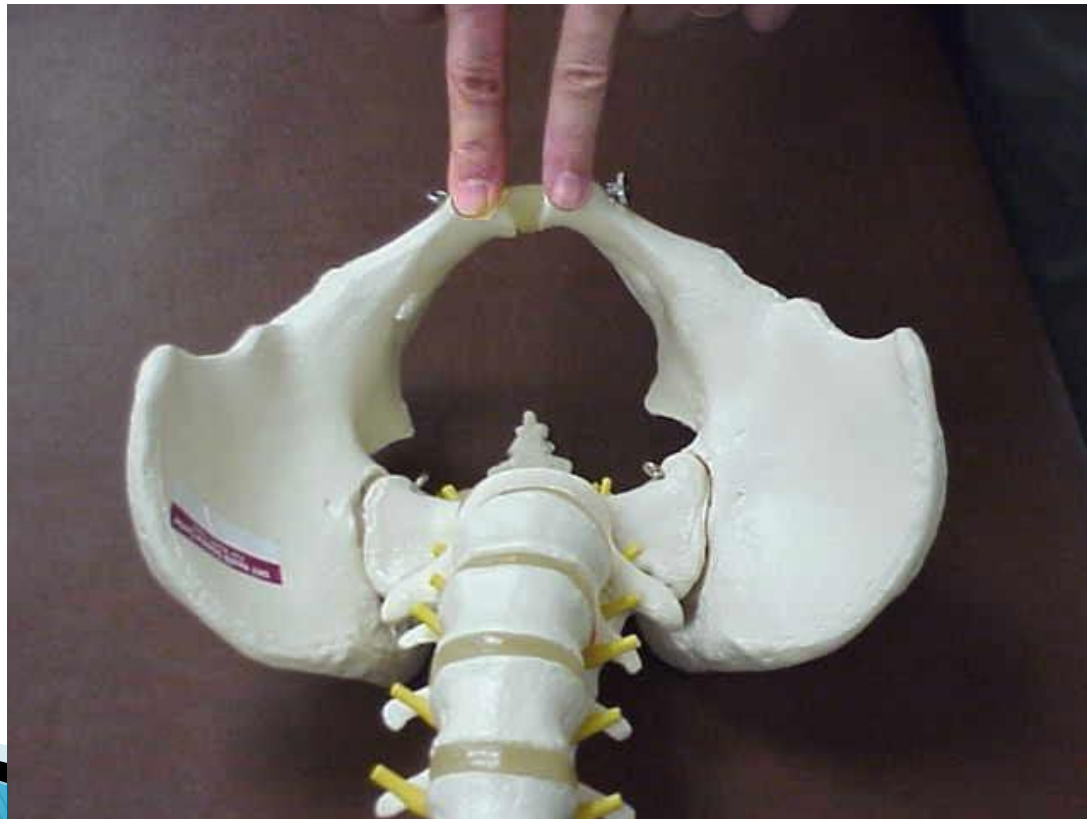
Make sure lower
extremities are lying
straight

Assess relative levelness
of medial malleolus
(superior/inferior)

Record position of *Side
of Lateralization*

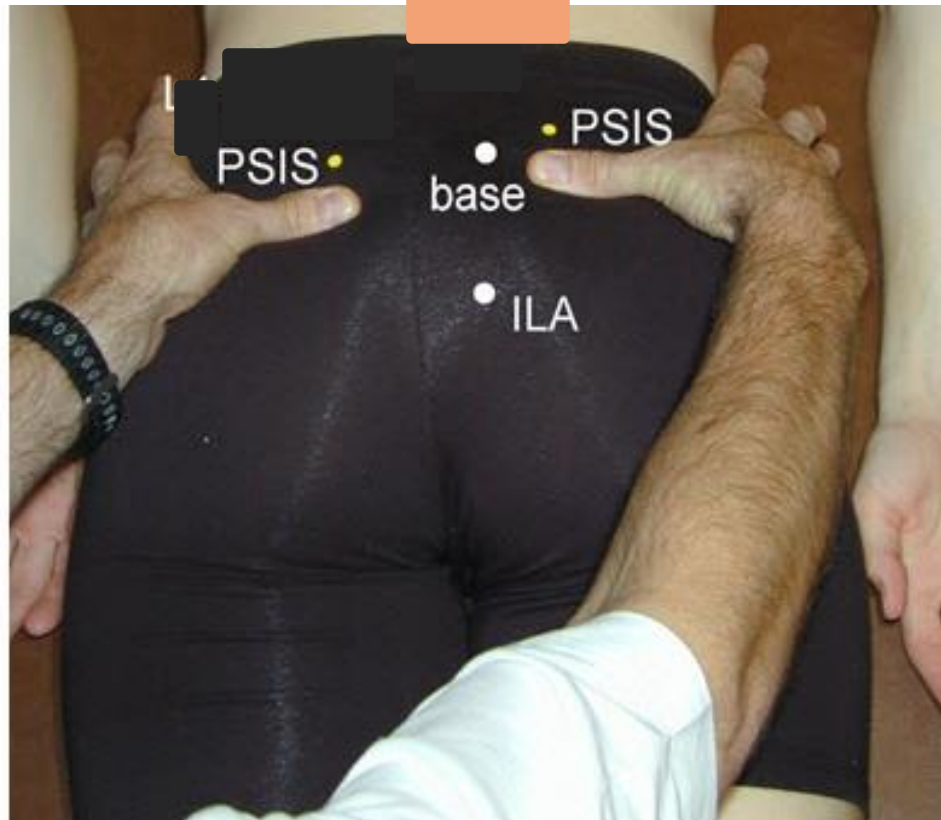
Pubic Tubercle Levelness

- c) Pubic tubercle levelness – place your thumbs on the superior surface of the pubic tubercles located $\frac{1}{4}$ - $\frac{1}{2}$ " lateral to the symphysis and compare for superior-inferior levelness, naming for the side of pelvis restriction.



PRONE

- b) PSIS levelness - place your thumbs on the undersurface of the PSIS and compare for superior-inferior levelness, naming for the side of pelvis restriction.



Posterior lumbosacral and pelvis palpation (PSIS asymmetry shown)

Sacral Base

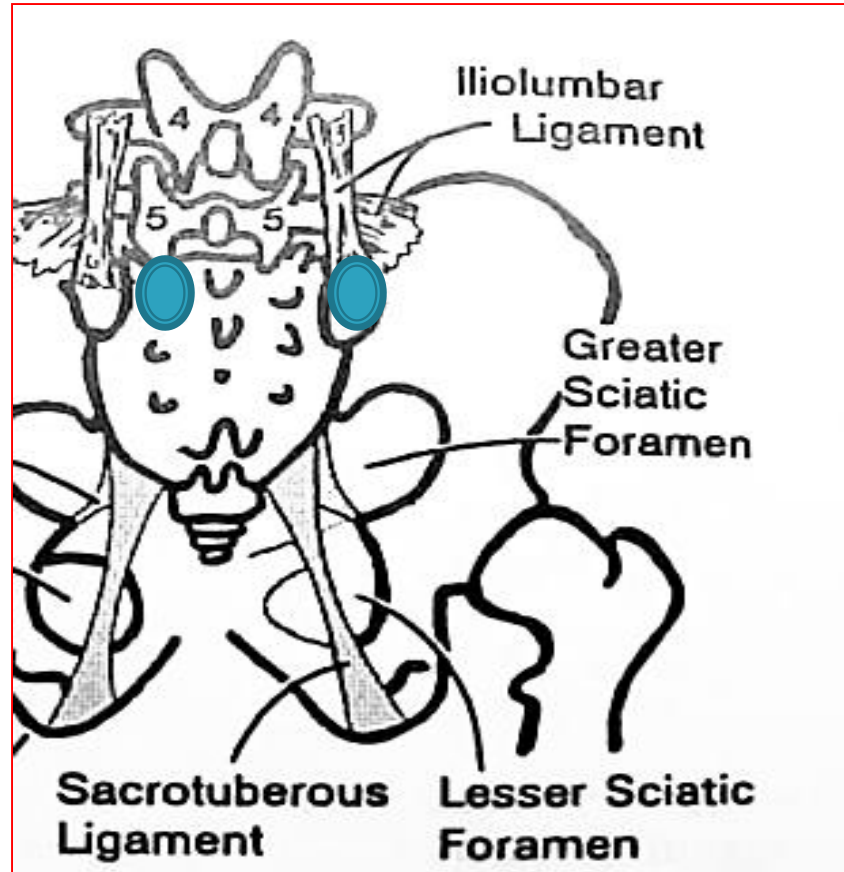
- ▶ Judge whether the tip of the thumb is more anterior on one side than the tip of the thumb on the other side.
- ▶ Can also bring index fingers over onto sacral base and take measurement on the lateralized side.
- ▶ Record which base is anterior.



Sacral base palpation

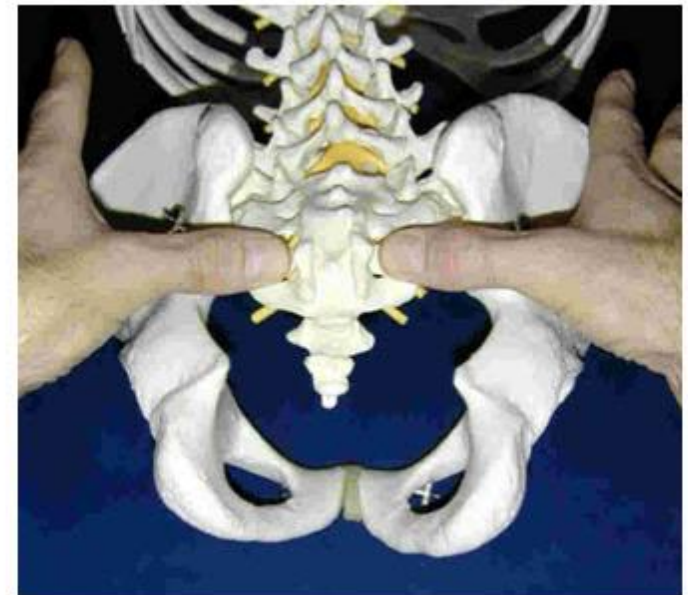
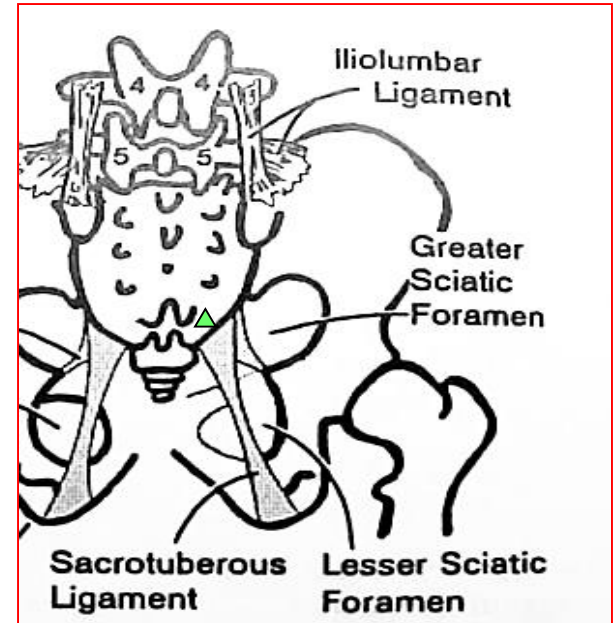
Sacral Sulcus Depth

- ▶ Palpable groove just medial to PSIS.
 - ▶ Space between sacral spines and lateral sacral crest.
 - ▶ Place thumbs in inferior border of PSIS.
 - ▶ Move $\frac{1}{2}$ –1" up and medial to PSIS.
 - ▶ Push thumb tips on sacral base.
 - ▶ Pads of thumbs are on ilium and tips on sacral base.
 - Measure the depth of each sacral sulcus relative to opposite sulcus?
 - Record even, deep, or shallow, comparing one side to the other.
- Both sides may be shallow or deep as well.



Inferior Lateral Angle

- ▶ 1. Place flat of hand over sacrum near its caudal end and identify the coccyx.
- ▶ 2. Thumbs approximately 1" apart. Place thumbs in gluteal area about 1" caudal and on each side of coccyx.
- ▶ 3. Push thumbs cephalad until pads rest on inferior margin of ILA. Take a reading on the lateralized side: Inferior or superior? Possibly even?
- ▶ 4. Move thumbs approximately 1" cephalad from the inferior margin of the ILAs and place the pads of the thumbs over the posterior surface of the ILAs near the apex of the sacrum.
- ▶ 5. Use moderate equal pressure & judge if one side is more anterior or posterior than the other one or are they equal? Record on the lateralized side.



ILA palpation

Sacral Motion Testing

- ▶ Motion testing over the 4 Corners of the Sacrum
- ▶ Place thumb on the right sacral base. Keep arms extended. Spring anteriorly
- ▶ Place thumb on the left sacral base. Keep arms extended. Spring anteriorly
- ▶ Place thumb on the right ILA. Keep arms extended. Spring anteriorly
- ▶ Place thumb on the left ILA. Keep arms extended. Spring anteriorly
- ▶ Record (+), (-), or (+/-).
 - + means a sense of resiliency, springs back
 - - means little to no motion, bricklike
 - +/- means some motion

Lumbosacral Spring Test

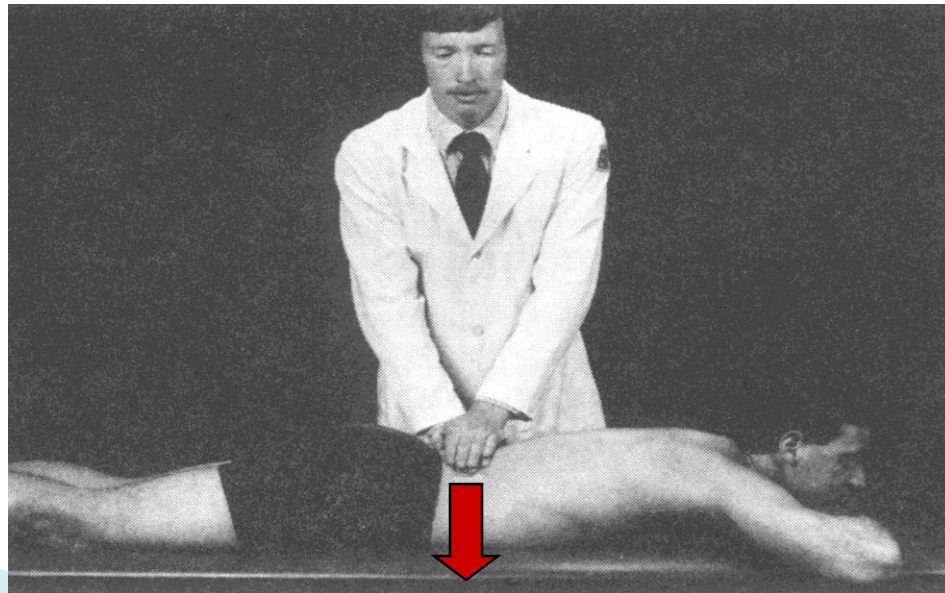
- ▶ Patient Prone
- ▶ Physician at Side of Table
- ▶ Place Heel of Hand over Lumbosacral Junction (L5–S1)
- ▶ Keep arms straight, and lean with body
- ▶ Spring Several Times –
- ▶ Negative Test is a Mobility to Springing (motion is felt at joint)
- ▶ Positive Test is Restriction to Anterior Springing



Lumbosacral spring test

Spring Test

1. Find sacral base
2. Place heel of hand over Lumbosacral junction
3. Spring in an Anterior motion
4. Results:
 - a. Positive test = If there is NO springing allowed = Non-neutral condition
(AKA Backward torsion)
 - b. Negative test = If there is springing allowed = Neutral condition.



SIT

SEATED FLEXION TEST

1. Place your thumbs on the undersurface of the posterior superior iliac spines (PSIS) of the seated patient;
2. Ask the patient to bend forward with feet on the floor and allow your thumbs to follow PSIS movement;
3. The side of last superior PSIS movement is the side of sacrum restriction;
4. False positives: Pelvis somatic dysfunction on same side.



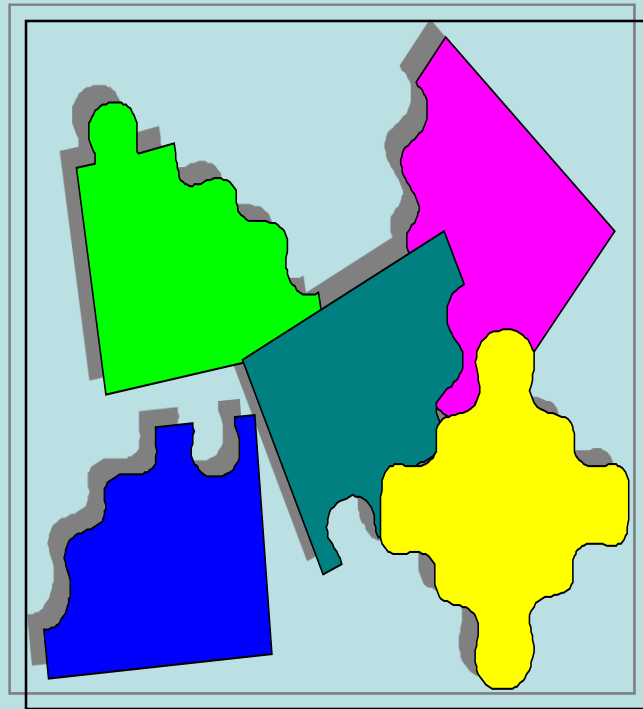
STAND

STANDING FLEXION TEST

- The patient stands
 - feet are hip's width apart
 - knees extended
- The physician's
 - fingers on the iliac crest
 - thumbs rest on the posterior superior iliac spines (PSIS).
- Ask the patient, "Bend forward slowly without flexing the knees"
- Physician feels and observes the superior movement of the PSIS
(The side which moves first and furthest indicates restriction of the iliosacral joint on the same side.)



To make a Sacral Diagnosis you will need to know the following:



- Static (Pure) Landmarks
 - Sacral base - Ant/ Post
 - ILA -Ant/Post
 - ASIS & PSIS -Sup./Inf.
 - Pubes -Sup./Inf & Ant./Post
- Mixed Landmarks
 - Sacral Sulcus- Deep/Shallow
 - STL - Tight/ Loose/ Equal
- Motion Testing
 - Spring test
 - L5
 - Sacrum

HANDS ON SECTION 1

- TIME TO GO : TO THE TABLES
- WITH A PARTNER
- GET INSTRUCTIONS AND RESULTS SHEET

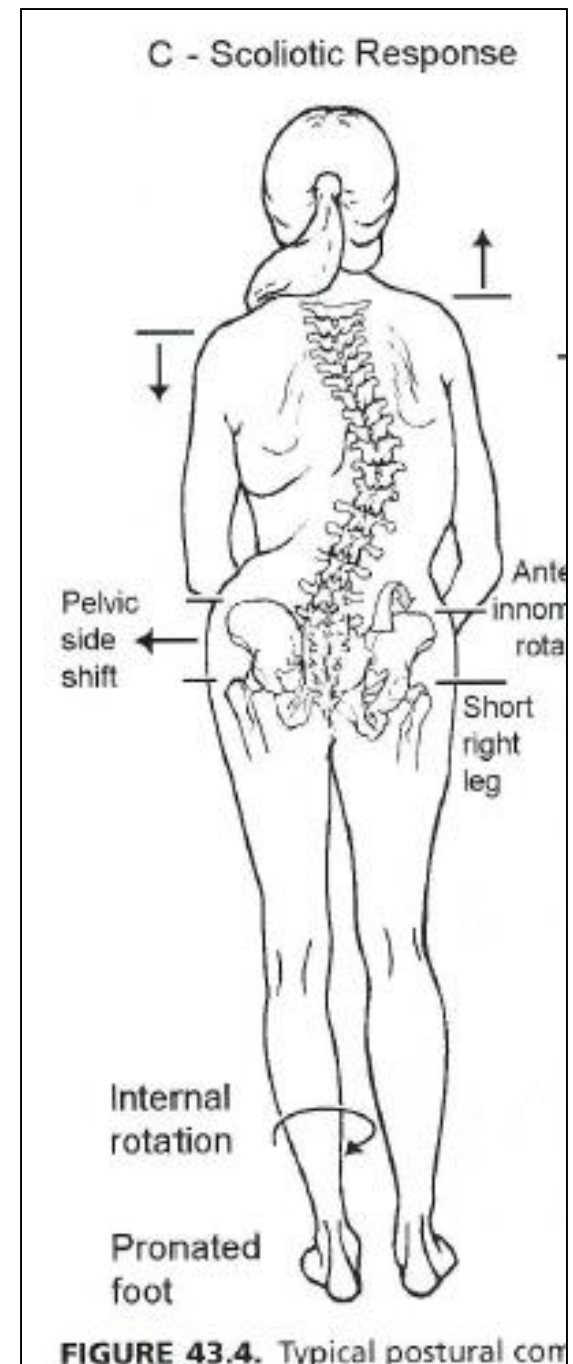
- Ideally, you have now enough information to make one of the following diagnoses:
- We will go through each and its treatment options
- You will then go back to tables and choose a method to fix your partner's problem

SHORT LEG CONDITIONS

- Anatomic –congenital or acquired
- Sacral Shear
- Sacral Torsion
- Posterior Innominate
- Upslipped Innominate

Effects of Short Leg

- ▶ Pelvis side shifts and rotates **toward long leg**
- ▶ Innominate rotates **anterior** on side of short leg or posterior on side of long leg
- ▶ Foot of long leg **pronates**, **internally rotating** lower leg
- ▶ Lumbosacral angle increases by 2 to 3 degrees



Sacral Shears

To diagnose a sacral shear

- 1) need positive seated flexion test
- 2) need a deep sulcus
- 3) need an ILA that is posterior on same side as deep sulcus

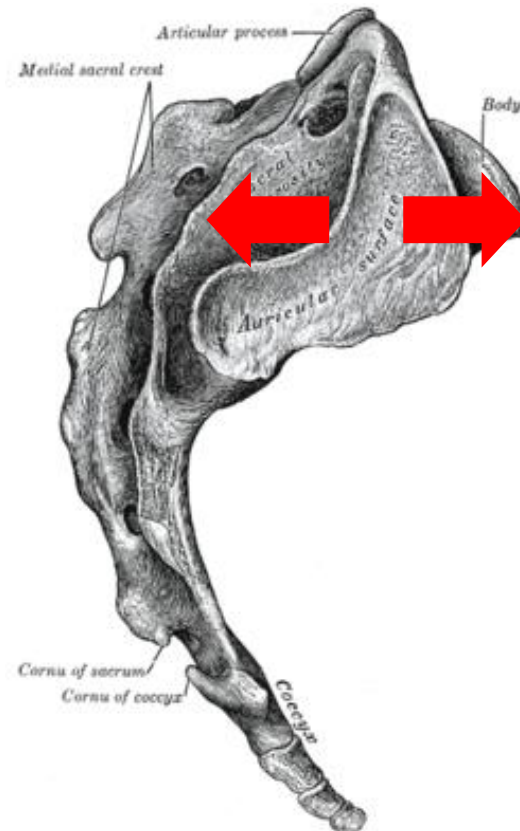
If deep sulcus and ILA are right sided but seated flexion + on L = unilateral extension;
if deep sulcus and ILA are right sided and seated flexion + on R = unilateral flexion

SHEARS

- So – a shear is either a
- Unilateral sacral flexion or a
- Unilateral sacral extension
- The extension shear will have a Short Leg
- The flexion shear will have a Long leg – but the other will be Short (relatively)

Sacral Shears

- Produced when the sacrum shifts forward within the sacroiliac joint.
- Two Types:
 - Unilateral Sacral Flexion
 - Unilateral Sacral Extension
- Sx: Chronic low back pain.



Findings for Sacral Shear

- The distinct finding of the static landmarks that indicates a sacral shear is:

Markedly Inferior ILA
(on the lateralized side)



Left sacral shear

Naming the Shear

- The shear is named for the side of the inferior ILA..

The sulcus is deep on same side- (which distinguishes this from a torsion)

The seated flexion positive side will tell you how to interpret whether it is a unilateral flexion or extension,

i.e.,sulcus deep and ILA on R with R seated flexion + =

R unilateral Flexion;

L unilateral extension if seated is + L with the same findings of: deep sulcus R and ILA post/inf R



Sacral Shear Extension(unilateral)

UNILATERAL SACRAL EXTENSION

Diagnostic findings: (Left unilateral sacral extension as an illustration)

- Tissue texture changes over the dysfunctional sacroiliac joint
- Iliac crests are equal
- Left base is posterior
- Left ILA is substantially superior
- Left ILA is slightly anterior
- Left sulcus is shallow
- Left sacrotuberous ligament is loose
- ASIS compression test is positive on the left
- Motion of the left base is restricted
- Motion of the left ILA is present but limited
- Motion of the right base and ILA may be altered
- Tenderness to palpation over the sacroiliac joints

TREATING A SHEAR

Treatment Unilateral Extension

A. Prone--direct method—LVMA (springing) (4527.11A)

Diagnosis: Left unilateral sacral extension

1. Patient is prone and the physician stands at the side of the table
2. Physician places the heel of the caudad hand on the inferior aspect of the ischial tuberosity and the hypothenar eminence of the other hand on the sacral base
3. Physician carries the ischial tuberosity superiorly and the sacral base anteriorly and inferiorly to the restrictive barrier
4. Low velocity, moderate amplitude springing is applied directing both hands toward each other
5. Recheck



- Sacral Shear – Unilateral sacral flexion
- The treatment side leg here will be long but the other leg will be short

UNILATERAL SACRAL FLEXION (SACRAL SHEAR)

Diagnostic findings: (Left unilateral sacral flexion as an illustration)

- Tissue texture changes over the sacroiliac joints
- Iliac crests are level
- Left base is anterior
- Left sulcus is deep
- Left ILA is substantially inferior
- Left ILA is slightly posterior
- Left sacrotuberous ligament is loose
- ASIS compression test is positive on the left
- Motion of the left base is present but limited
- Motion of the left ILA is restricted
- Motion of the right base and ILA may be altered
- Tenderness to palpation over the sacroiliac joints

Shear Treatments-unilateral flexions

Springing Respiratory Force
Left unilateral sacral flexion



Springing Respiratory Force
Left Unilateral Sacral Flexion A



Monitor at PSIS

Abduct and internally rotate
LE until motion is felt.

Maintain that position by
leaning of the patient's
femur/leg

Springing Respiratory Force

Left Unilateral Sacral Flexion B

1. Contact left ILA and apply superior and anterior pressure
2. Have the patient take a deep breathe in and hold (encourages sacral base to move posteriorly)
3. Spring anteriorly and superiorly while patient is holding breathe
4. Exhale while physician maintains gain in position
5. Repeat steps 2, 3, 4
6. Recheck



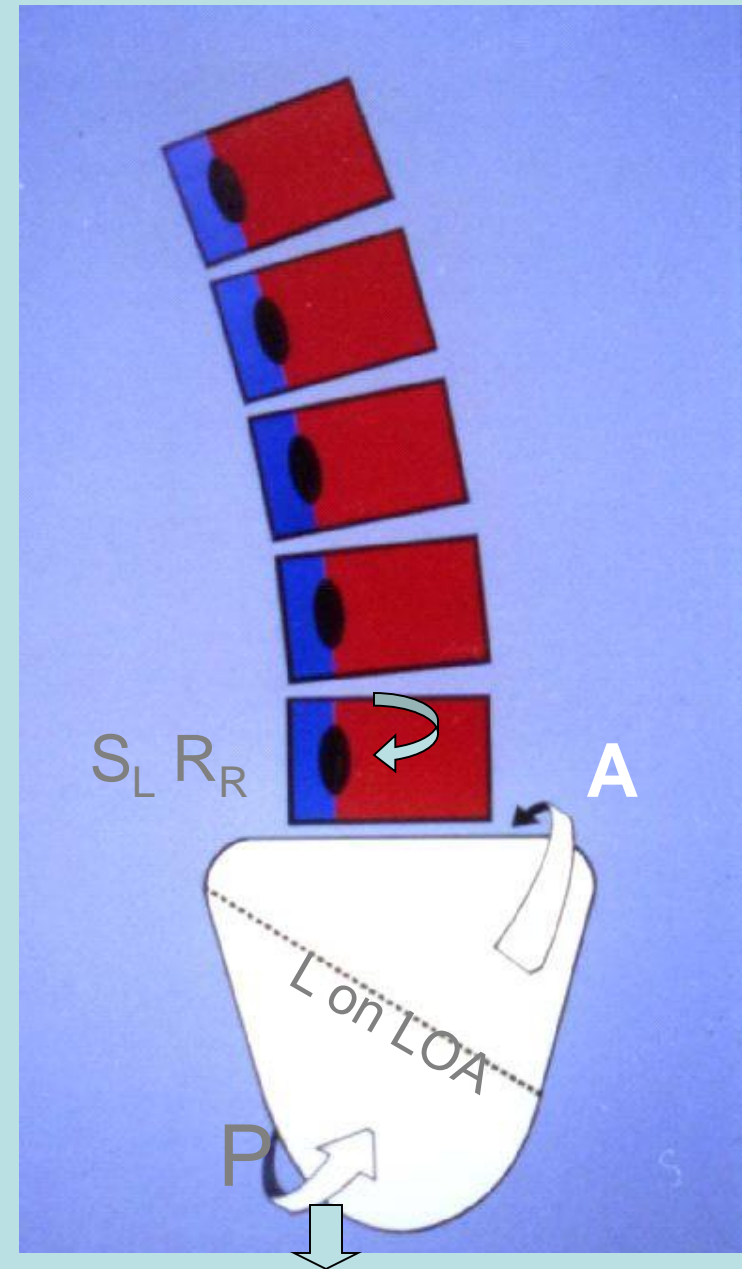
- A FEW DETAILS ON LUMBAR AND SACRAL DIAGNOSES - sorry

FRYETTE'S LAWS

- **Law I:** When the spine is in neutral, **sidebending to one side** will be accompanied by horizontal **rotation to the opposite side**. In **type I** somatic dysfunction, this law can be seen when more than one vertebrae are out of alignment and cannot be returned to neutral by flexion or extension. The involved group of vertebrae demonstrates a coupled relationship between side bending and rotation. When the spine is neutral, side bending forces are applied to a group of typical vertebrae and the entire group will rotate toward the opposite side: the side of produced convexity. Extreme type I dysfunction is similar to scoliosis.
- **Law II:** When the spine is flexed or extended (non-neutral), sidebending to one side will be accompanied by rotation to the same side. In **type II** somatic dysfunction of the spine, this law can be seen when only one vertebrae is out of place and becomes much worse on flexion or extension. There will be **rotation and sidebending in the same direction** when this dysfunction is present
- **Law III:** When motion is introduced in one plane it will modify (reduce) motion in the other two planes. Type III sums up the other two laws by stating dysfunction in one plane will negatively affect all other planes of motion

Lumbosacral Mechanics

- Example L rotation on LOA
- Lumbar spine neutral: $S_L R_R$ (note in all torsions, L5 will rotate opposite of sacrum)
- Requires normal lordosis
- Occurs when (R) sacral base rotates anterior (“forward”) and does not rotate back (feels “springy”)
- left ILA posterior, & inferior



(i.e. taking a step forward on r

Lumbosacral motion

- Lumbar spine and sacrum rotate in **OPPOSITE** directions
- Neutral (type I) mechanics:
 - Example: L on LOA, the right sacral base moves anteriorly while L5 is $S_L R_R$
- In non-neutral (type 2) mechanics, the sacral base rotates backwards...
 - Example: R on LOA, the right sacral base moves posteriorly while L5 is $R_L S_L$

Sacral Motion

In Neutral (type I) mechanics:
the sacral base moves *Anteriorly* and
rotates opposite to the rotation of L5 ;

Its axis motion is the SAME as the SB
side of L5 so :

Example: L5 RrSI causes a L on LOA, (L
on L) sacral torsion the R edge is
rotated L and anterior while the axis is
left so it = to the SB side of L5

Sacral Motion

In Non-Neutral (type 2) mechanics, the sacral base rotates *backwards*.

It is still opposite to the L5 rotation side and
Its axis is the same as the L5 SB side

Example: L5 RISI causes a R on LOA, the
right sacral base moves *Posteriorly* while
its axis side is Left and oblique

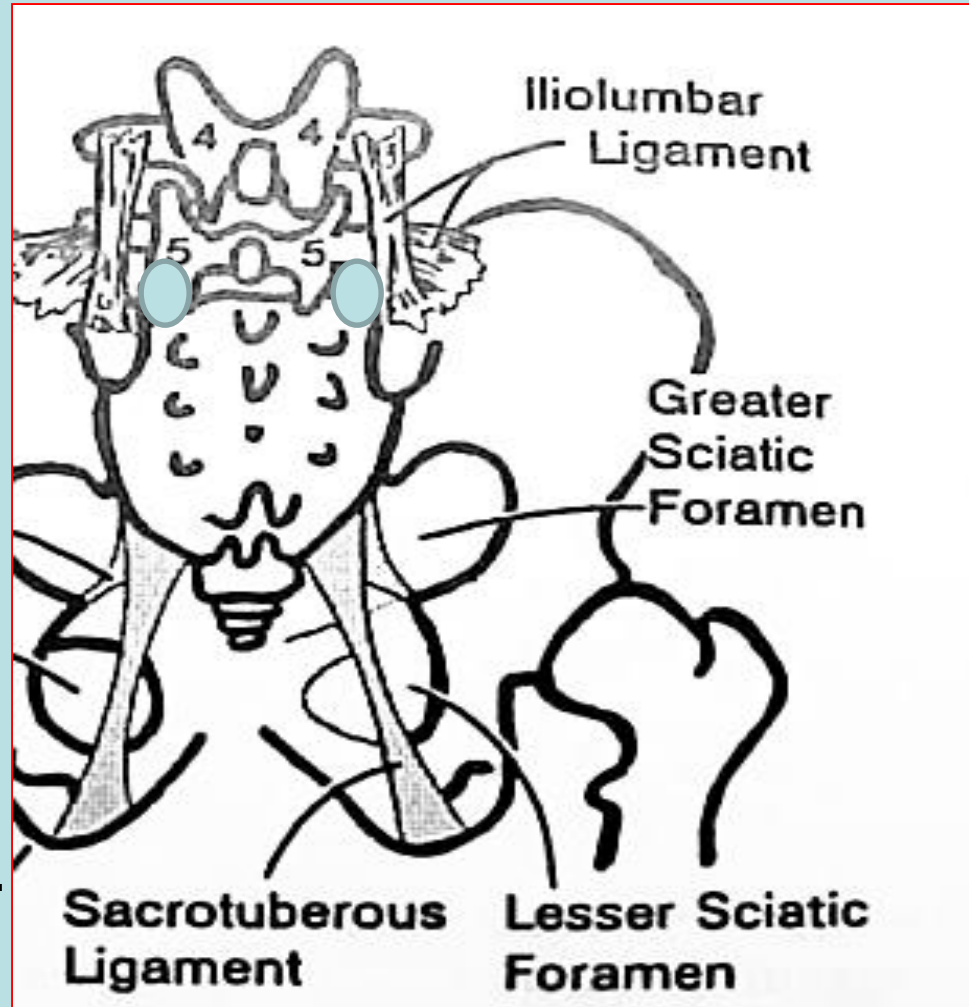
Sacral Torsion Rules

- A sacral torsion requires a deep sulcus and a posterior and inferior ILA to be on opposite sides

A deep right sulcus must have an posterior and inferior ILA on the Left by the above definition

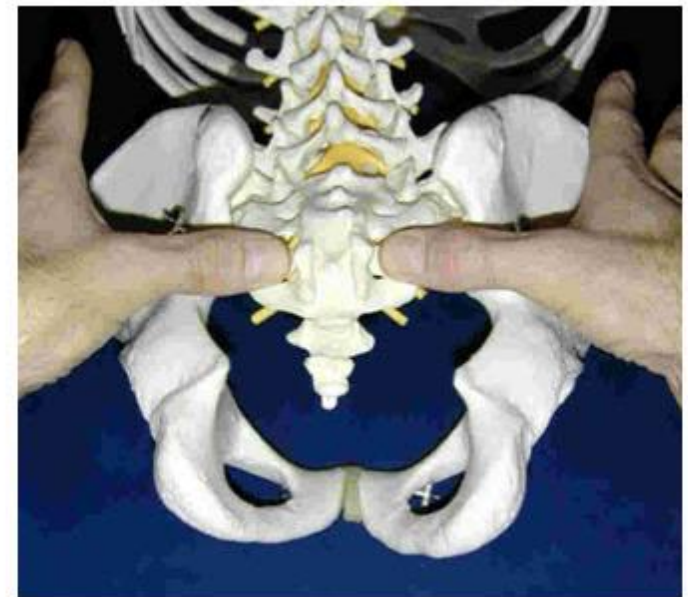
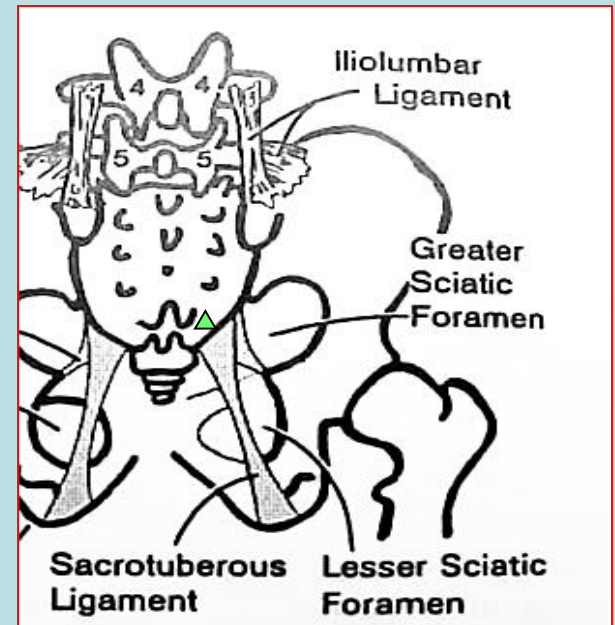
Sacral Sulcus Depth

- Palpable groove just medial to PSIS.
- Space between sacral spines and lateral sacral crest.
- Place thumbs in inferior border of PSIS.
- Move ½-1" up and medial to PSIS.
- Push thumb tips on sacral base.
- Pads of thumbs are on ilium and tips on sacral base.
 - **Measure the depth of each sacral sulcus relative to opposite sulcus?**
 - **Record even, deep, or shallow, comparing one side to the other.**
 - **Both sides may be shallow or deep as well.**



Inferior Lateral Angle

- 1. Place flat of hand over sacrum near its caudal end and identify the coccyx.
- 2. Thumbs approximately 1" apart. Place thumbs in gluteal area about 1" caudal and on each side of coccyx.
- 3. Push thumbs cephalad until pads rest on inferior margin of ILA. Take a reading on the lateralized side: Inferior or superior? Possibly even?
- 4. Move thumbs approximately 1" cephalad from the inferior margin of the ILAs and place the pads of the thumbs over the posterior surface of the ILAs near the apex of the sacrum.
- 5. Use moderate equal pressure & judge if one side is more anterior or posterior than the other one or are they equal? Record on the lateralized side.



ILA palpation

Sacral Torsion Rules

- Name of lesion:
- Is for rotation and axis sides:
- R on R = right rotation on a right axis

R on L = right rotation on left axis

Sacral Torsion Rules

- **Rotation side** = the 1st of the 2 letters:
- L on L, or L on R, R on R, or R on L
- **The 1st Letter**
- Is also the *posterior or backward* edge of the sacral base
- Is the Short leg side
- Is the side of the posterior/ inferior ILA

Sacral Torsion Rules

The ***second letter*** (R on R) refers to the **Axis side** of the sacrum that is in play

*Is the same as the side bent side of L5
i.e., if L5 is Sidebent R the sacrum will
be on its R axis*

Sacral Torsion Rules

Seated flexion test is + on the side of the dysfunctional edge of the sacral base that is rotated either R or L *and* is either forward or backward

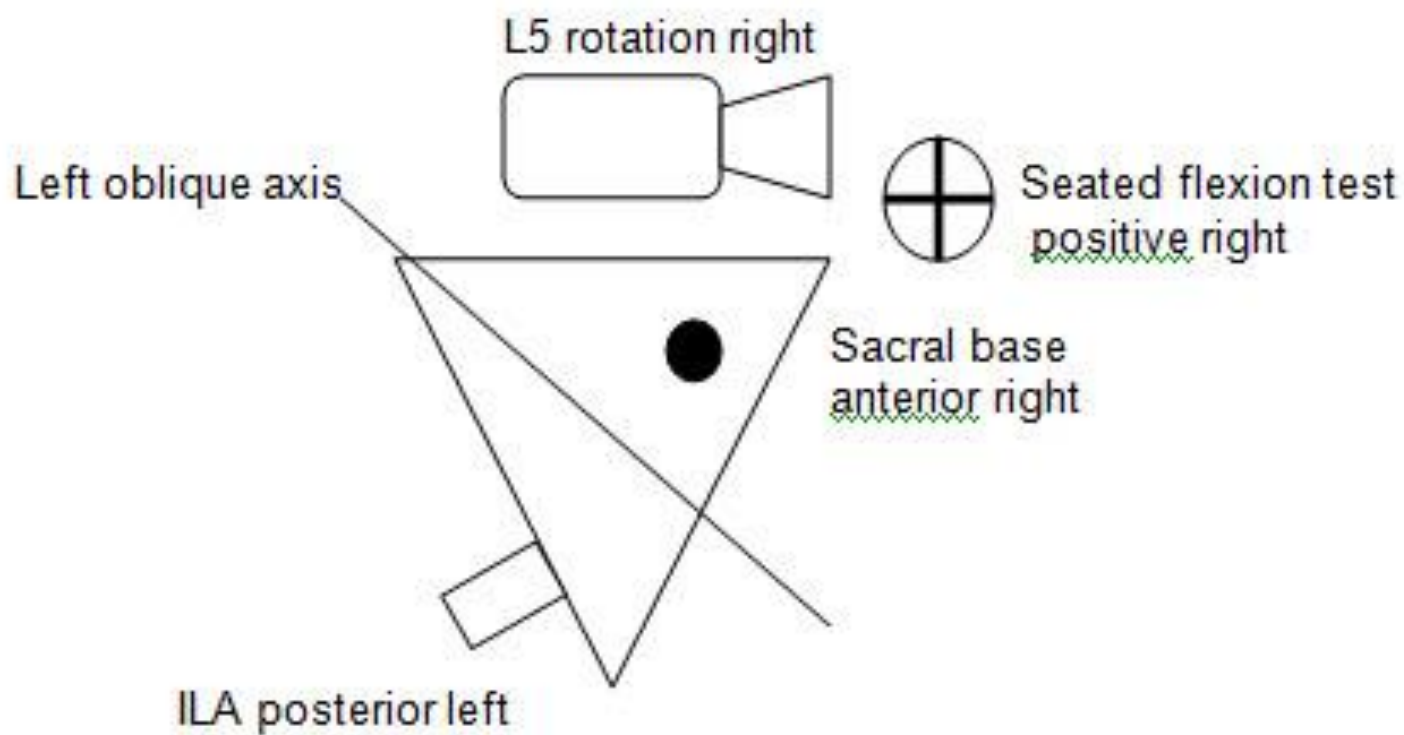
The seated flexion test is the hallmark objective exam to determine your torsion diagnosis side and thus what edge to treat

Sacral Torsion Rules

- L5 will be Convex to deep sulcus which
- = anterior edge
- Long leg on deep sulcus = anterior edge
- Forward lesions no + spring test ; back ward lesions do have + spring test

- **FORWARD TORSIONS**

KEY TO FIGURE: Findings for a left on left sacral torsion



Neutral - Left Oblique Axis Findings

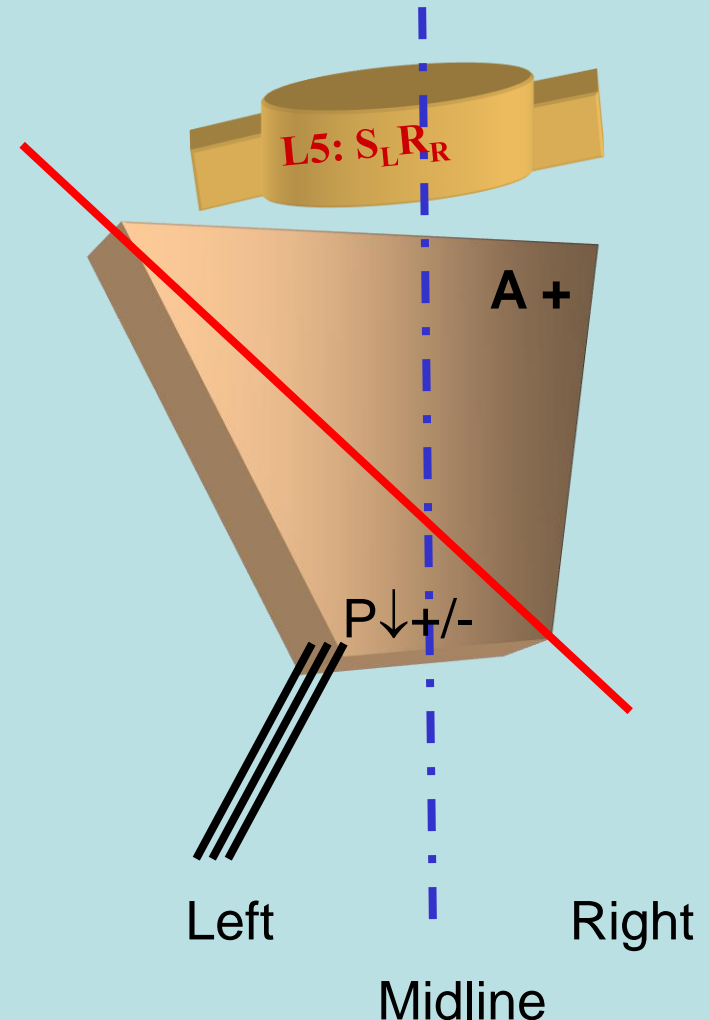
Name: L on LOA, R_L on LOA,

Landmarks – Static:

Sacral Base:	L posterior
Sacral Sulcus:	L shallow
ILA:	L Post/ Inf.
STL:	L Tight

Motion Testing:

Spring:	- (neg)
L5:	S _L R _R
Sacral Base	L - R +
ILA:	L +/- R +/-



Neutral - Right Oblique Axis Findings:

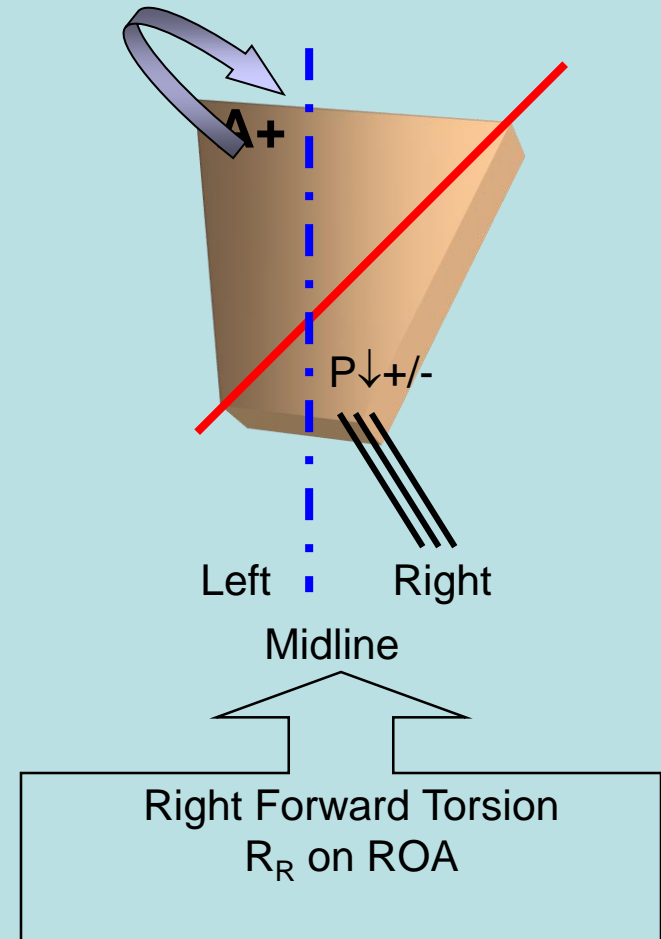
Name: R on ROA, R_R on ROA,

Landmarks – Static:

Sacral Base:	R posterior
Sacral Sulcus:	R shallow
ILA:	R Post/Inf.
STL:	R tight

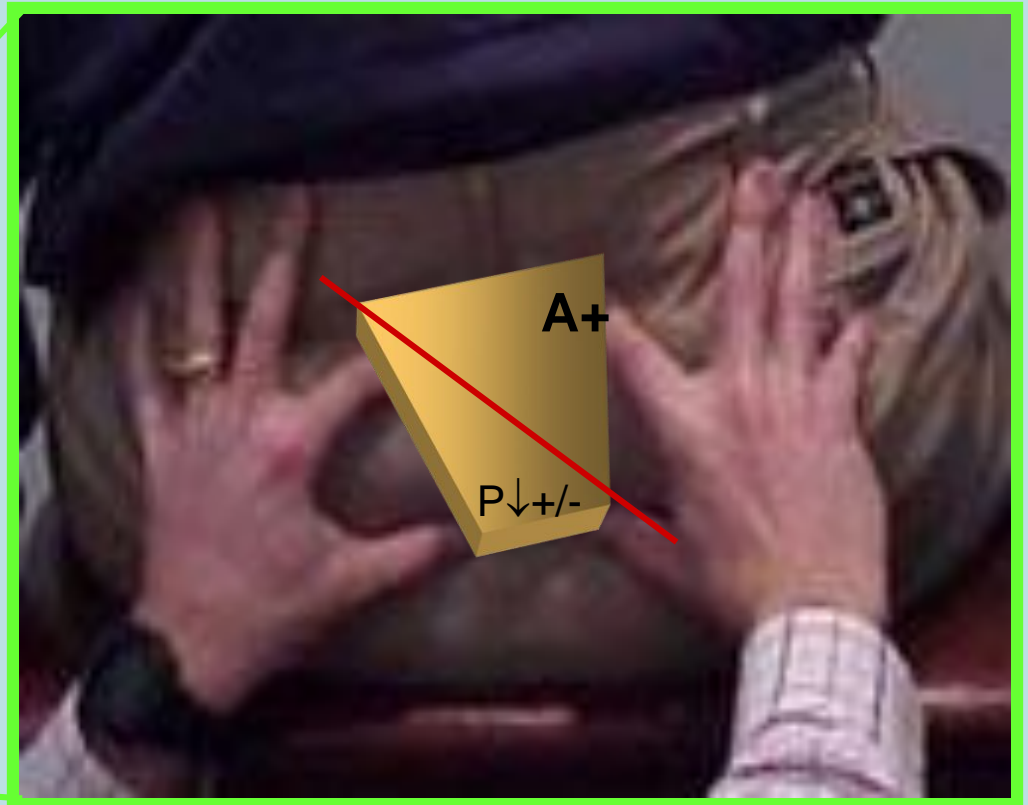
Motion Testing:

Spring:	- (neg)
L5:	$S_R R_L$
Sacral Base: L +	R -
ILA:	L +/- R +/-



Palpatory Experience

We can induce these **Neutral** diagnoses using the mechanics of the sacrum and spine... $SB_L \rightarrow L$ on **LOA**



SACRAL ROTATION ON THE SAME OBLIQUE AXIS

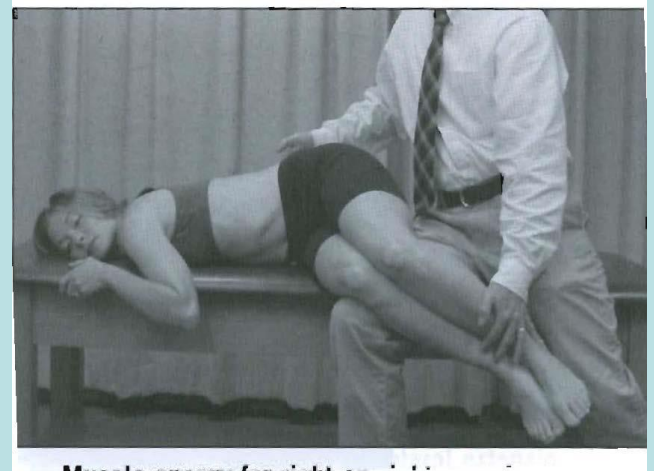
Diagnostic findings: (Sacrum rotated left on a left oblique axis, left on left, as an illustration)

- Tissue texture changes over the sacroiliac joints or in related musculature
- Right base anterior
- Right sulcus deep
- Left inferolateral angle is posterior and slightly inferior
- Left sacrotuberous ligament tight
- Motion of the right base is present
- Motion of the left ILA is restricted
- Motion at poles forming the left oblique axis (left base and right ILA) restricted
- Left rotation around the left oblique axis is present
- Right rotation around the left oblique axis is restricted
- Associated pelvic findings:
 - Right innominate is carried anterior by the sacrum
 - Right PSIS is superior
 - Left innominate is carried posterior by the sacrum
 - Left PSIS is inferior
 - Right medial malleolus may be inferior
 - L5 may be sidebent left and rotated right (left pelvic torsion)
- Tenderness to palpation over the sacroiliac joints

- Treatment Options for
- Forward Sacral Torsions

Forward Sacral Torsion ME (a right on right sacral torsion)

1. Axis side down; chest on the table
2. Monitor at the lumbo-sacral junction
3. Flex the knees and hips until motion is felt at the lumbo-sacral junction
4. Support legs/knees with thigh or pillow
5. Apply pressure downward on lower legs/ankles
6. Ask patient to try to raise feet towards the ceiling while you resist
7. Rest
8. Re-engage barrier by repositioning ankles downward
9. Repeat 6, 7, 8
10. Recheck



Relative contra-indications-acute sacroiliac sprain, acute sacrum fracture, severe knee arthritis, deep venous thrombosis, or premature labor

HVLA FOR ANTERIOR SACRUM

Anterior Sacrum Leg Pull – HVLA (**SDOFM 118 – 9.6**)

Associated with forward sacral torsions, eg. L on L

1. Patient supine, physician stands at foot of table
2. Grasp patient's right ankle just Above malleoli with both hands.
3. Instruct patient to relax all muscles in low back and leg
4. Internally rotate leg to accumulate forces at Right Sacroiliac Joint (Gaps the SI joint)
5. Keep leg and thigh at level of table
6. Apply quick pull on leg, carrying right innominate anteriorly to meet sacrum (correcting the somatic dysfunction)
7. Recheck



FIGURE 9.6 HVLA leg pull for anterior sacrum.

Contraindicated in knee instability

Posterior Sacrum Leg Pull – HVLA (**SDOFM 119 – 9.7**) Eg. Right Posterior Sacrum = Sacrum rotated Right on the Left Oblique Axis.

1. Patient supine, physician stands at foot of table
2. Grasp patient's right ankle just Above malleoli with both hands.
3. Instruct patient to relax all muscles in low back and leg
4. Internally rotate leg to accumulate forces at Right Sacroiliac Joint (Gaps the SI joint)
5. Keep the knee extended and flex hip until tension is felt on hamstrings
6. Apply final corrective force (quick pull on leg), carrying right innominate posteriorly to meet sacrum.
7. Recheck

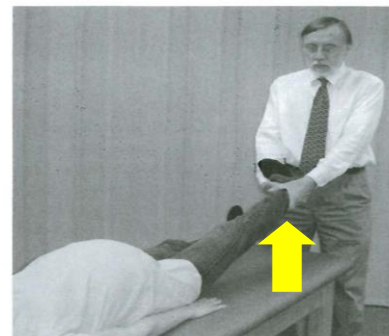


FIGURE 9.7 HVLA leg pull for a posterior sacrum.

Contraindicated in knee instability

POSTERIOR SACRAL TORSIONS

SACRAL ROTATION ON THE OPPOSITE OBLIQUE AXIS

Diagnostic findings: (Sacrum rotated right on a left oblique axis, right on left, as an illustration)

- Tissue texture changes over the sacroiliac joints or in related musculature
- Right base posterior
- Right sulcus shallow
- Left inferolateral angle is anterior and slightly superior
- Left sacrotuberous ligament loose
- Motion of the left ILA is present
- Motion of the right base is restricted
- Motion at the poles forming the left oblique axis (left base and right ILA) is restricted
- Right rotation around the left oblique axis is present
- Left rotation around the left oblique axis is restricted
- Associated pelvic findings:
 - Right innominate is carried posterior by the sacrum
 - Right PSIS is inferior
 - Left innominate is carried anterior by the sacrum
 - Left PSIS is superior
 - Right medial malleolus may be superior
- Tenderness to palpation over the sacroiliac joints

Non-Neutral: Left Oblique Axis Findings (right on left sacral torsion)

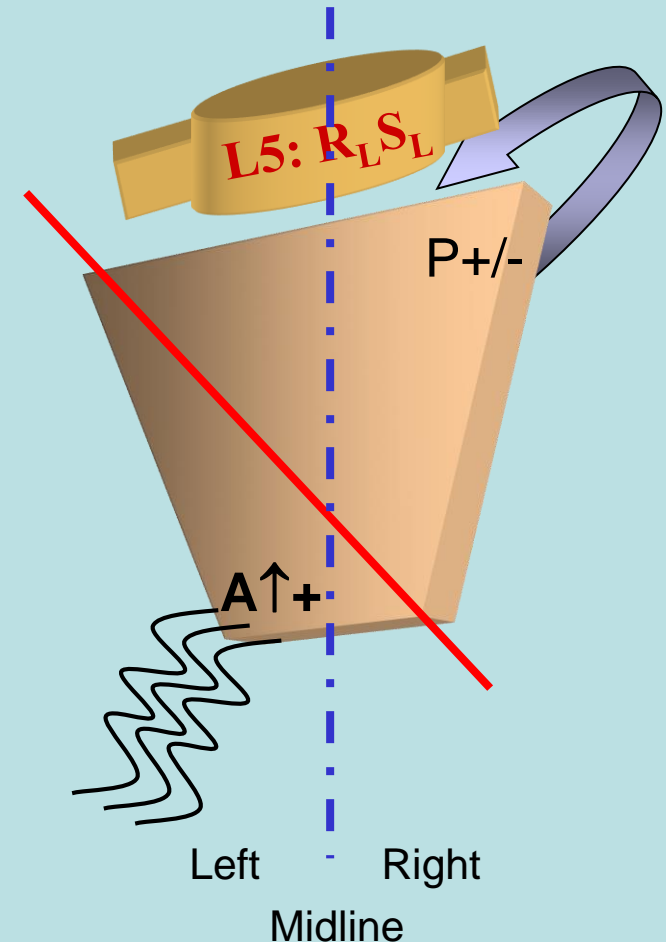
Name: R on LOA, R_R on LOA,

Landmarks – Static:

Sacral Base:	L Anterior
Sacral Sulcus:	L Deep
ILA:	L Ant/ Sup
STL:	L Loose

Motion Testing:

Spring:	+ (positive)
L5:	$R_L S_L$
Sacral Base	L - R +/-
ILA:	L + R +/-



Non-Neutral: Right Oblique Axis Findings (left on right sacral torsion)

Name: L on ROA, R_L on
ROA,

Landmarks:

Sacral Base: R Anterior

Sacral Sulcus: R Deep

ILA: R Ant./Sup.

STL: R loose

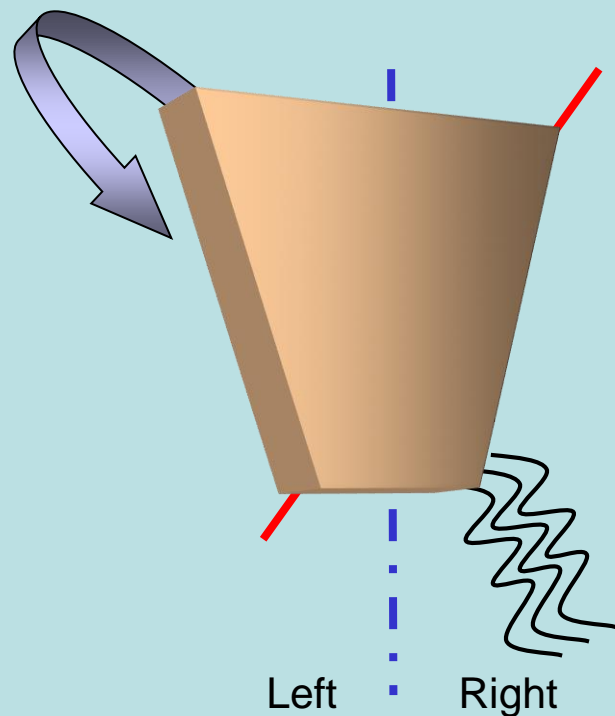
Motion Testing:

Spring: +

L5: R_RS_R

Sacral Base: L +/- R -

ILA: L +/- R +



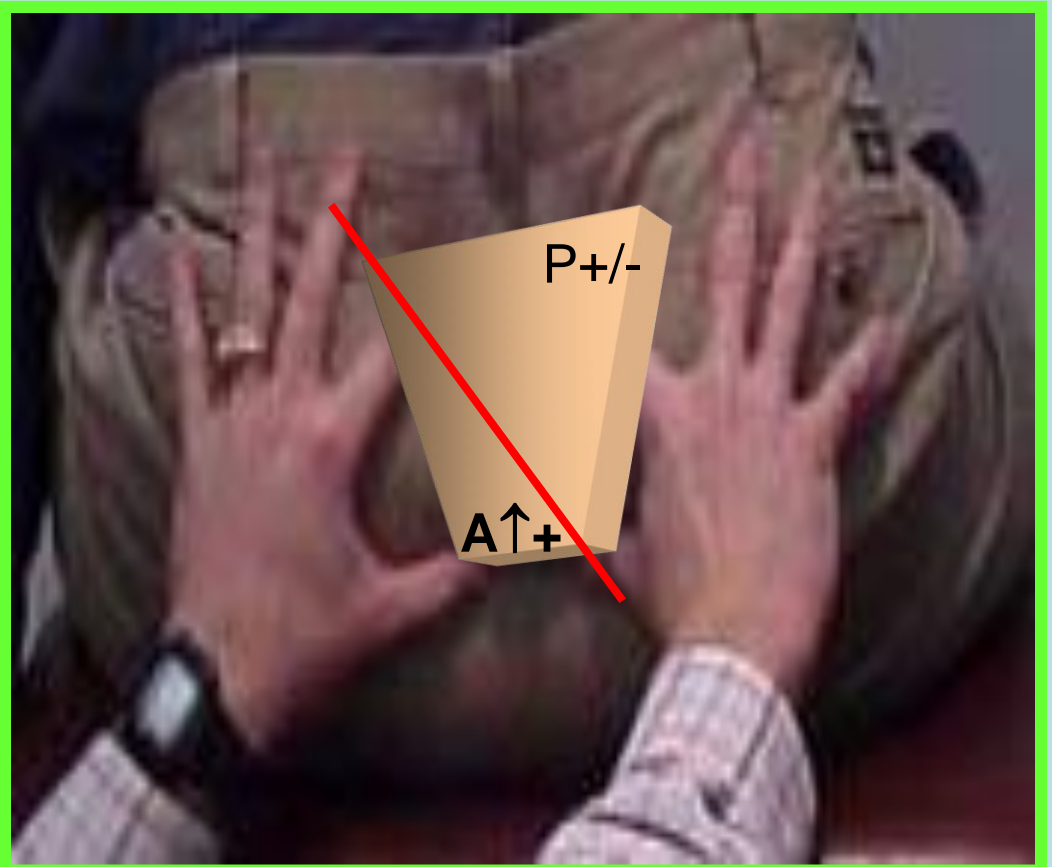
Left Right

Midline

Right Backward Torsion
R_L on ROA

Palpatory Experience

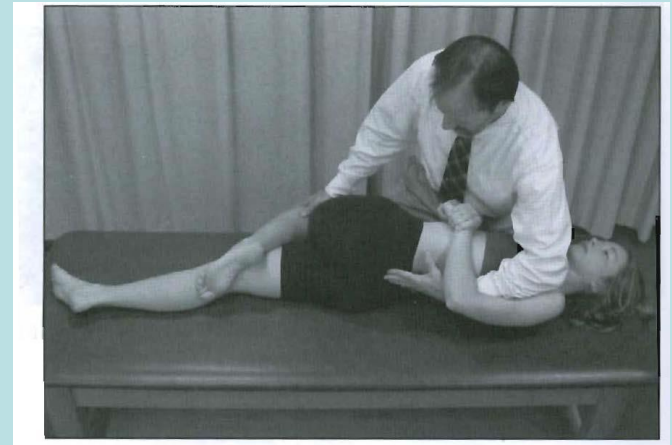
We can induce these **Non-Neutral** diagnoses using the mechanics of the sacrum and spine... $SB_L \rightarrow R$



Posterior Sacral Torsion Treatment

Backward Sacral Torsion Muscle Energy (left on right torsion)

1. Have the patient lie on the table axis side down
2. Monitor at the lumbosacral junction
3. Rotate the upper torso posteriorly until motion is felt at the lumbosacral junction
4. Hold the position of torso rotation
5. Flex the top leg until motion is felt at the lumbosacral junction; bend the knee and adduct the hip until motion is felt
6. Ask the patient to push their knee up towards the ceiling while you resist
7. Rest
8. Re-engage the barrier by adducting the knee/hip until motion is felt at the lumbosacral junction
9. Repeat 6, 7, 8
10. Recheck



Relative contraindications: acute sacroiliac sprain, acute sacrum fracture, severe hip arthritis, deep venous thrombosis, or premature labor

HVLA FOR POSTERIOR SACRUM

Anterior Sacrum Leg Pull – HVLA (**SDOFM 118 – 9.6**)

Associated with forward sacral torsions, eg. L on L

1. Patient supine, physician stands at foot of table
2. Grasp patient's right ankle just Above malleoli with both hands.
3. Instruct patient to relax all muscles in low back and leg
4. Internally rotate leg to accumulate forces at Right Sacroiliac Joint (Gaps the SI joint)
5. Keep leg and thigh at level of table
6. Apply quick pull on leg, carrying right innominate anteriorly to meet sacrum (correcting the somatic dysfunction)
7. Recheck



FIGURE 9.6 HVLA leg pull for anterior sacrum.

Contraindicated in knee instability

Posterior Sacrum Leg Pull – HVLA (**SDOFM 119 – 9.7**) Eg. Right Posterior Sacrum = Sacrum rotated Right on the Left Oblique Axis.

1. Patient supine, physician stands at foot of table
2. Grasp patient's right ankle just Above malleoli with both hands.
3. Instruct patient to relax all muscles in low back and leg
4. Internally rotate leg to accumulate forces at Right Sacroiliac Joint (Gaps the SI joint)
5. Keep the knee extended and flex hip until tension is felt on hamstrings
6. Apply final corrective force (quick pull on leg), carrying right innominate posteriorly to meet sacrum.
7. Recheck

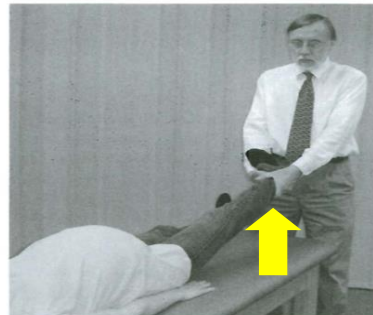


FIGURE 9.7 HVLA leg pull for a posterior sacrum.

Contraindicated in knee instability

Posterior Innominate

- Muscle Energy and HVLA

Posterior Innominate

Diagnostic findings: (Right innominate posterior as an illustration)

- Tissue texture changes over the sacroiliac joint
- Right ASIS superior
- Right PSIS inferior
- Right sulcus deep
- Right sacrotuberous ligament tight
- Right medial malleolus may be superior
- ASIS compression test positive on the right
- Sitting flexion test is positive on the right
- Passive motion of the sacrum on the middle transverse axis is usually restricted
- Gapping of sacroiliac joint with internal rotation of the femur is restricted
- Tenderness to palpation over the sacroiliac joint

Treatment Options

Muscle Energy Posteriorly Rotated Ilium



1. Monitor at the PSIS and posterior iliac crest
2. Extend the leg (anteriorly rotating the ilium) until motion is felt at the PSIS
3. Have the patient attempt to pull leg down towards table against resistance
4. Relax
5. Reposition
6. Repeat 2, 3, 4, 5
7. Recheck

POSTERIOR INNOMINATE THRUST—SUPINE

INDICATIONS: Posterior innominate rotation or superior innominate shear associated with back pain, pelvis pain, hip pain, and other problems.

RELATIVE CONTRAINDICATIONS: Acute sacroiliac sprain, sacroiliac joint hypermobility, or hip or knee instability.

TECHNIQUE:

1. Stand at the foot of the table and grasp above the ankle with both hands above the malleoli;
2. Slightly abduct and internally rotate the leg;
3. Ask the patient to take a deep breath and during exhalation apply a firm and quick caudad tug down the leg;
4. Retest sacroiliac motion or pelvis symmetry; if successful, consider prescribing SACROILIAC SELF-MOBILIZATION on p. 110 (in Chapter 5).



Traction tug for left posterior innominate rotation or superior innominate shear

Anterior Innominate

- Standing Flexion will be +on the side of:
- ASIS will be inferior
- PSIS will be superior
- Leg will be Long - so opposite leg will appear SHORT

Anterior Innominate

B. Supine—direct method—ME (isometric) (4528.11B)

Diagnosis: Innominate Anterior

1. Patient is supine and the physician stands on the side of the dysfunction
2. Patient's lower extremity on the side of the dysfunction is flexed at the knee and hip to bring the knee over the patient's abdomen
3. Physician holds the flexed knee in that position with his/her shoulder against the leg while cupping the anterior superior iliac spine with the cephalad hand. The fingers of the other hand grasp the posterior aspect of the ischial tuberosity
4. Tension is increased at all contact points and the innominate is rotated posteriorly to the restrictive barrier
5. Patient is instructed, "Push your knee against my chest" while the physician offers isometric counterforce
6. Physician has the patient maintain the force long enough to sense that the patient's contractile force is localized at the sacroiliac joint (typically 3-5 seconds)
7. Patient is instructed to gently cease the directive force and the physician simultaneously ceases his/her counterforce
8. The physician waits for the tissues to relax completely (about 2 seconds) and then flexes the hip and rotates the innominate posteriorly to the new restrictive barrier
9. Steps 5-8 are repeated until the best motion is obtained (average is 3 times)
10. Recheck

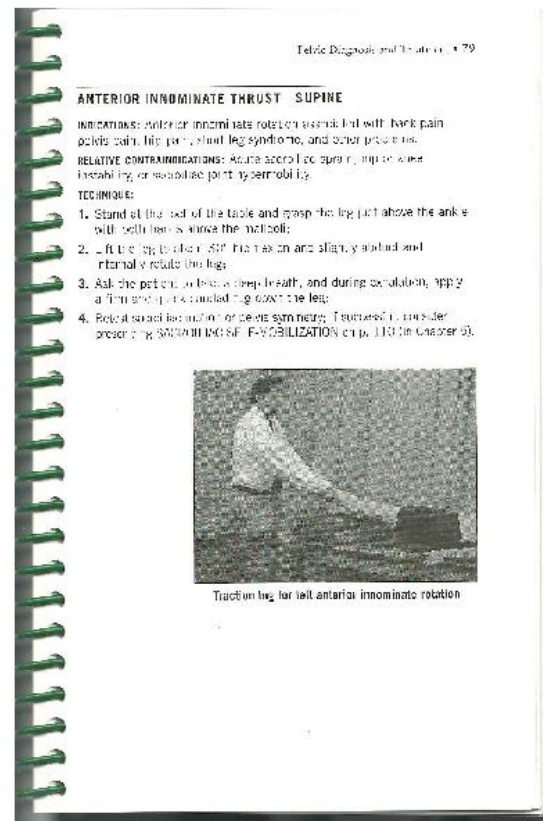


Anterior Innominate

Muscle Energy Anteriorly Rotated Ilium



HVLA for Anterior Innominate



NOTE : THIS IS THE SAME TECHNIQUE USED FOR POSTERIOR SACRUM -THE DIFFERENCE HERE IS THIS IS THE LONG LEG AND THERE IT WOULD BE THE SHORT LEG

Upslip Innominate

Diagnose: L iliac crest superior

- **L ischial tuberosity is superior**
- **L medial malleolus is superior**
- **L base is anterior so sulcus may be Deep**
- **L ILA may be posterior but ILAs are =**
- **Seated flexion + L**
- **ASIS compression is + L**
- **Motion restricted at L base and ILA**
- **Tender at S/I joint**

Upslipped Innominate

SUPERIOR INNOMINATE SHEAR (UPSLIPPED INNOMINATE)

Diagnostic findings: (Left superior innominate shear as an illustration)

- Tissue texture changes over the sacroiliac joint if acute and over the opposite sacroiliac joint if chronic
- Left iliac crest substantially superior
- Left ischial tuberosity superior
- Left medial malleolus superior
- Left base may be anterior
- Left ILA may be posterior
- ILA's are level
- Sacrotuberous ligament is loose on the left
- Sulci are equal or the left may be deeper
- Sitting flexion test is positive on the left
- ASIS compression test is positive on the left
- Motion of the left base is restricted
- Motion of the left ILA is restricted
- Motion of the right base and ILA may be altered
- Tenderness to palpation over the sacroiliac joints

Treatment procedure:

A. Supine--direct method—HVLA tug (4529.11A)

Diagnosis: Left Superior Innominate Shear

1. Patient is supine and the physician stands at the foot of the table
2. Physician places a pressure pad (wallet or small rolled towel) just inferior to the left inferolateral angle to restrict the inferior movement of the sacrum
3. Physician grasps the left leg just above the ankle with both hands, abducts the leg slightly and internally rotates the hip to gap the sacroiliac joint
4. Patient is instructed, "Take a very deep breath and hold it." This respiratory force encourages the sacral base to move posteriorly
5. A high velocity, low amplitude tug is applied to the leg to gap the sacroiliac joint and glide the innominate inferiorly
6. Recheck



VERTICAL AXES DYSFUNCTIONS

May or may not have short leg but need to know

Left Sacral Margin Posterior:

For Landmarks:

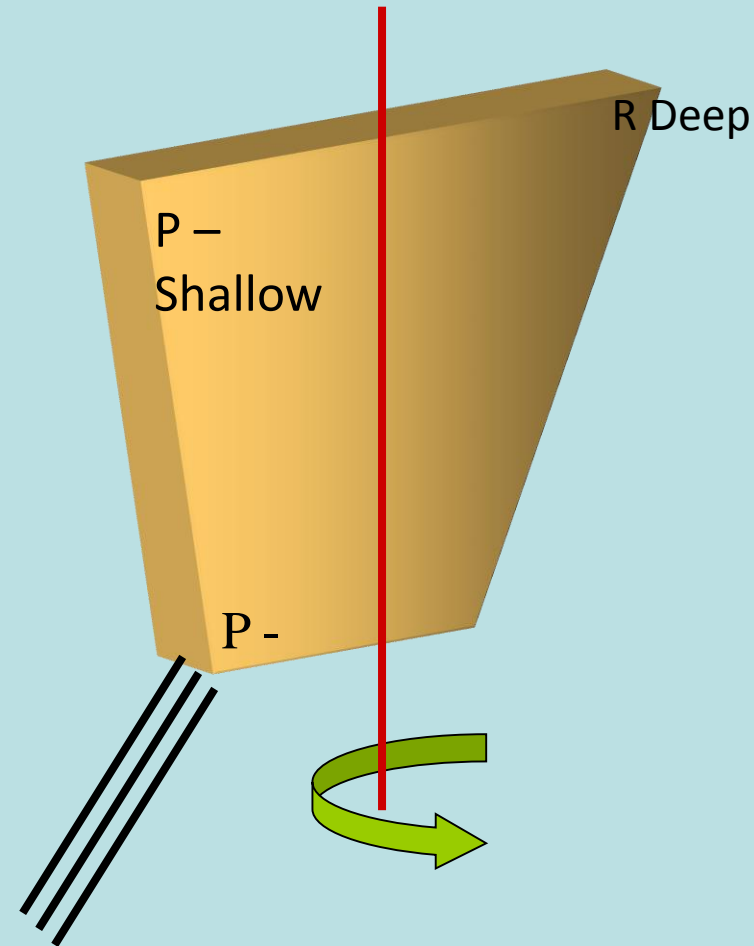
Sacral Base:	L Posterior
Sacral Sulcus:	R Deep/L Shallow
ILA:	L Post. & = Sup/Inf
STL:	L Tight

Left side resists springing

Motion:

Sacral Base:	R base rotates Left around vertical axis
ILA:	R ILA rotates Left around vertical axis.

Same findings (deep sulcus & post. ILA) as Lon L but motion is around vertical not oblique axis.



Sacral Posterior Margin

ACRAL MARGIN POSTERIOR (HORIZONTAL PLANE - VERTICAL AXIS)

Diagnostic findings:

- Tissue texture changes over the sacroiliac joints and related musculature
- PSIS's are level
- ILA's are level superiorly/inferiorly
- Tenderness to palpation over the sacroiliac joints and related musculature

Sacrum, rotated around a midline vertical axis

- On the posterior side
 - entire sacral margin is posterior
 - base is posterior
 - ILA is posterior
 - sulcus is shallow
 - sacrotuberous ligament is tight
 - anterior springing at the superior and inferior poles is restricted
- On the anterior side
 - entire sacral margin is anterior
 - base is anterior
 - ILA is anterior
 - sulcus is deep
 - sacrotuberous ligament is relaxed
 - anterior springing at the superior and inferior poles is present

Sacrum, rotated around a parasagittal vertical axis

- On the posterior side
 - entire sacral margin is posterior
 - base is posterior
 - ILA is posterior
 - sulcus is shallow
 - sacrotuberous ligament is tight
 - anterior springing at the superior and inferior poles is restricted
- On the "normal" side
 - entire sacral margin appears to be more anterior (but is "normal")
 - base appears to be more anterior (but is "normal")
 - ILA appears to be more anterior (but is "normal")
 - sulcus appears to be deeper (but is "normal")
 - sacrotuberous ligament tension seems relaxed (but is "normal")
 - anterior springing at the superior and inferior poles is present

Treatment procedures:

A. Supine--direct method—HVLA (4523.11A)

Diagnosis: Sacral Margin Posterior

1. Patient is supine and the physician stands on the side opposite the dysfunction
2. Physician pulls the patient's hips toward him/her to the edge of table. Physician then pushes the patient's legs and shoulders away from him/her creating sidebending with concavity on the side of the posterior sacral margin



3. Patient's hands are clasped behind his/her neck
4. Physician bends over the patient, reaches across and inserts his/her cephalad hand and forearm, from lateral to medial, into the space between the patient's arm and forearm, resting the dorsum of the hand on the patient's chest
5. Physician's other hand cups the patient's anterior superior iliac spine on the side of the posterior margin
6. Physician rotates the patient's torso toward him/her, inducing right rotation of the spine and sacrum sufficiently to lift the innominate off the table
7. The innominate is carried posteriorly to the restrictive barrier
8. A high velocity, low amplitude thrust is applied posteriorly through the ASIS
9. Recheck

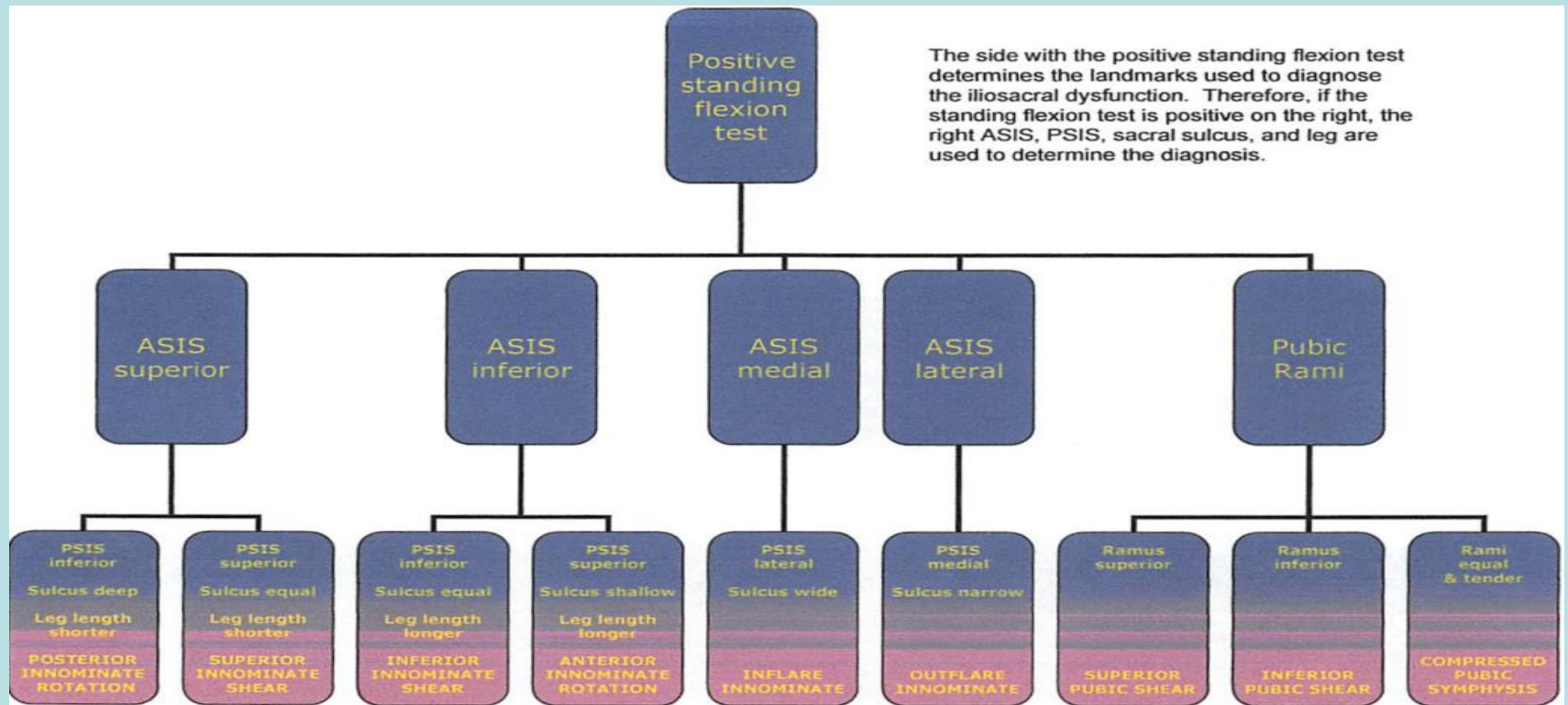


- Who has a shear?
- Who has a torsion?
- Who has a post/ant innominate
- Who has a upslip?
- Who is not sure?









- We will gather around as each diagnosis is treated until ours is done
- Then
- We are done !

- Some tables for your enjoyment !!

Iliosacral Dysfunction Algorithm



SACRUM SOMATIC DYSFUNCTION DIAGNOSIS

DIAGNOSIS	Seated flexion test ¹	Sacral base levelness ⁴	ILA levelness	L5 rotation ³	Sacral motion testing ⁴
Left on left torsion ⁵ 	right	anterior right	posterior left	right	extension restriction
Left on right torsion ⁵ 	left	anterior right	posterior left	right	flexion restriction
Right on right torsion ⁵ 	left	anterior left	posterior right	left	extension restriction
Right on left torsion ⁵ 	right	anterior left	posterior right	left	flexion restriction
Left unilateral flexion ⁶ 	left	anterior left	posterior left	-	extension restriction
Left unilateral extension ⁶ 	left	anterior right	posterior right	-	flexion restriction
Right unilateral flexion ⁶ 	right	anterior right	posterior right	-	extension restriction
Right unilateral extension ⁶ 	right	anterior left	posterior left	-	flexion restriction

¹ With a sacral torsion the seated flexion test is positive on the opposite side of the involved oblique axis.

² With a sacral torsion the sacrum is rotated to the opposite side of the anterior sacral base.

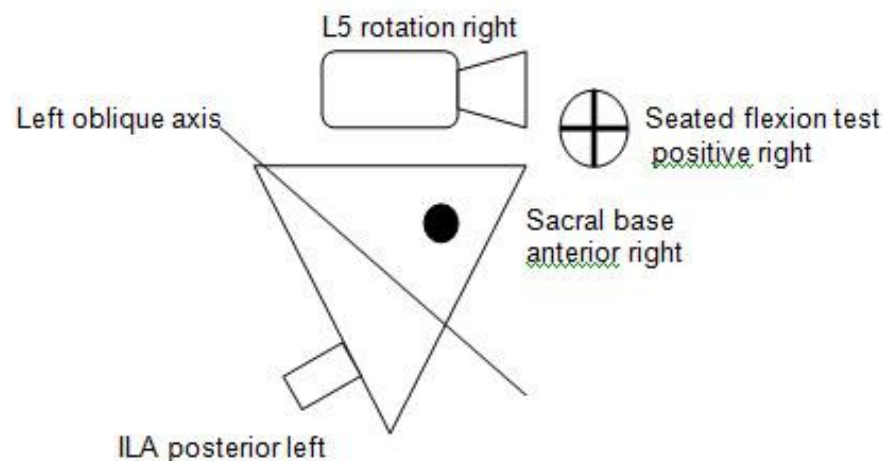
³ With a sacral torsion L5 is rotated to the opposite side of sacral rotation. If L5 is rotated to the same side as the sacrum the dysfunction is termed a sacral rotation.

⁴ Motion testing can be done with the lumbosacral spring test, backward bending test (lumbosacral flexion test), respiratory motion testing, or axis motion testing.

⁵ Torsions are named for the direction on the axis: Left on left torsion = rotation left on a left oblique axis.

⁶ Also known as sacral shear.

KEY TO FIGURE: Findings for a left on left sacral torsion



SACRAL DIAGNOSIS

Diagnosis	Seated Flexion Test	Sacral Base/Sulci	ILA levelness	L5 Rot	Spring Test	LS Flexion Asymmtry
Left on left	Right	Anterior right	Posterior left	Right	Negative	Decreased
Left on Right	Left	Anterior right	Posterior left	Right	Positive	Increased
Right on right	Left	Anterior left	Posterior Right	Left	Negative	Decreased
Right on Left	Right	Anterior Left	Posterior Right	Left	Positive	Increased
Left Unilat Fiex	Left	Anterior Left	Posterior Left		Negative	Decreased
Left Unilat Ext	Left	Anterior Right	Posterior Right		Positive	Increased
Right Unilat Flex	Right	Anterior Right	Posterior right		Negative	Decreased
Right Unilat Ext	Right	Anterior Right	Posterior left		Positive	Increased
Ant Margin - R	Right	Anterior Right	Anterior Right	Left	Negative	Decreased
Ant Margin-L	Left	Anterior Left	Anterior Left	Right	Negative	Decreased
Post Margin-R	Right	Shallow R	Posterior Right	Right	Positive	Increased
Post Margin-L	Left	Shallow L	Posterior Left	Left	Positive	Increased
Bilateral Flexion	N/A	Deep Bilateral	Shallow Bilateral		Negative	N/A
Bilateral Extnsn	N/A	Shallow Bilateral	Deep Bilateral		Positive	N/A

Table 17.2
Sacroiliac Dysfunctions

Diagnosis		Seated Flexion Test Positive	Base of Sacrum	Inferior Lateral Angle Position	Inferior Lateral Angle Motion	Lumbar Scoliosis	Lumbar Lordosis	Medial Malleolus Prone
Unilateral flexed (flexion)	Right	Right	Anterior right	Inferior right		Convex right	Normal to increased	Long right
	Left	Left	Anterior left	Inferior left		Convex left	Normal to increased	Long left
Unilateral extended (extension)	Right	Right	Posterior right	Superior right		Convex left	Decreased	Short right
	Left	Left	Posterior left	Superior left		Convex right	Decreased	Short left
Anterior torsion	Left on left	Right	Anterior right	Posterior left	Left, increased on forward-bending	Convex right	Increased	Short left
	Right on right	Left	Anterior left	Posterior right	Right, increased on forward-bending	Convex left	Increased	Short right
Backward torsion	Right on left	Right	Posterior right	Posterior right	Right, increased on backward-bending	Convex left	Reduced	Short right
	Left on right	Left	Posterior left	Posterior left	Left, increased on backward-bending	Convex right	Reduced	Short left
Bilateral flexed		Bilateral	Anterior	Posterior			Increased	Even
Bilateral extended		Bilateral	Posterior	Anterior			Reduced	Even

PELVIC SOMATIC DYSFUNCTION

POSITIONAL DIAGNOSIS	ASIS	PSIS	Pubic symphysis	Pubic tubercle
Anterior innominate	inferior	superior	-	-
Posterior innominate	superior	inferior	-	-
Superior innominate shear	superior	superior	-	-
Inferior innominate shear	inferior	inferior	-	-
Pubic compression	-	-	tender	symmetrical
Superior pubic shear	-	-	tender	superior
Inferior pubic shear			tender	inferior

SOURCES AND RESOURCES

- KIMBERLY MANUAL-2006 EDITION
- POCKET MANUAL OF OMT-2ND EDITION
- PRINCIPLES OF MANUAL MEDICINE-GREENMAN
- OMT REVIEW-SAVARESE-3RD EDITION
- LECTURES FROM OMM FACULTY – A.T.STILL UNIVERSITY-
PHOENIX AZ- WITH PERMISSION
- LECTURES FROM DR.HARMON MYERS
- JAOA Vol 91 No 3 March 1991
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