

Evaluation and Treatment of Unilateral (Subluxed) Sacrums with Concurrent Iliac and Coccygeal Dysfunctions

V10.12

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The goal of this paper is to continue documenting observations, evaluations and treatments of a complex set of dysfunction patterns involving the sacroiliac and sacrococcygeal joints. This project investigates creative combinations of osteopathic biomechanical principles of evaluation and treatment, advanced palpatory and mobilization skills and specific home exercises. The specific topic 'Evaluation and Treatment of Unilateral (Subluxed) Sacrums with Concurrent Iliac and Coccygeal Dysfunctions' attempts to address dysfunctions that are the result of the natural progression from the simple, acute and unitary to the complex, chronic and multiple caused by time and lack of early resolution. The information in this paper as well as in the respective core courses needs to be continuously reviewed for further clues to the development of a thorough clinical algorithm which will address the complexities of this group of patients.

Kent Keyser, PT, FFCMT in 2002 remarked that the unilaterals may comprise up to 25% of his most difficult patients. It is my experience that 70 to 80% of the most problematic and previously recidivistic lumbosacral patient population has some combination of unilateral sacrums, along with iliac, coccygeal and hip muscle dysfunction.

Unilateral sacral dysfunctions are especially problematic due to their 'off-axis' or I term 'subluxed' nature, which is clearer terminology than 'non-physiological'. The worst cases appear to be combined with iliac and coccygeal dysfunctions, which complicates the clinical picture by apparently dictating not only the comprehensiveness of evaluation and even the order of treatment to avoid recidivism or outright failure to meet clinical and patient goals. A key component of this evaluation is differentiating between the more benign forward and backward sacral torsions and unilateral sacral dysfunctions.

The soft tissue involvement of hip flexors, extensors, abductors and notably the two obturator external rotators and ischiorectal fossa require specific soft tissue mobilization, stretching, strengthening on a treatment and home exercise basis.

The sacroiliac material is from the Lumbo-Pelvic Integration course, written by the late Jeff Ellis, PT, FFCMT, based in part on the work of Phillip Greenman, DO of Michigan State University. The coccyx material is a derivation FOII and FMLQ courses material, written by Gregg Johnson, PT, FFCMT. Most of the soft tissue components are based in Johnson's FOI course work. Special soft tissue tools and exercises are by Dr. Ando. Certain treatments have been modified and combined by Dr. Ando to address the 3-dimensional nature of the typical complex lumbosacral patient. Whether this represents a new class of treatment, time will tell.

The 'NOTES' are the clinically derived opinions of Dr. Ando and do not necessarily represent the opinions of either the IPA or the IMTS, their instructors, Dr. Phillip Greenman or their respective course materials.

I. Evaluation Flow Sheet

- a. Standing
 - i. Marcher's test
 - ii. Forward bending in standing test
 - iii. Trunk (core) strength (Lumbar Protective Mechanism) (F.O. I)
- b. Sitting
 - i. Forward bending in sitting test
 - ii. Sit-slump
- c. Supine
 - i. ASIS's, symphysis pubis for asymmetry
 - ii. Special tests (SLR, Thomas, etc)
 - iii. Hip ROM
 - iv. Soft tissue (psoas, tensor fascia lata, obturator externus, pyramidalis etc)
- d. Prone
 - i. Iliac crest heights, ischial tuberosities for asymmetry
 - ii. Sacrum (frontal, transverse plane)
 - iii. Coccyx (frontal, transverse plane)
 - iv. Soft tissue (lumbar, quadrates lumborum, sciatic notch, sciatic nerve tract to foot, pelvic floor, ischiorectal fossa, obturator internus origin etc.)
- e. Lumbar Evaluation done AFTER treatment of coccyx and sacroiliac to get clean data
 - i. Type II lesions (primary positional fault)
 - ii. Type I lesions (compensatory scoliosis curves)

II. Mechanics, Evaluation and Patterns

SACRAL LESION

MOTION LOSS

Right Unilateral Extension (RUE) Right sacral base moving into flexion, right side bending about a non-physiological, mid-transverse axis.

NOTE #1: Very common, typically associated with right ilial lesion of anterior torsion, motion loss of posterior rotation. Difficult to correct in that simple correction of the sacral motion loss exacerbates the ilial motion loss and vice-versa. Evaluate L5 for motion loss of ERSR (positional fault of ERSR).

NOTE #2 Use of the term 'ERSR' in strict osteopathic terminology means a positional fault of 'extended, rotated, sidebent to the right' or as I would put it, the contracted position. However the insertion of the words 'motion loss' before the 'ERSR' says we are dealing with the motion loss, not the positional fault, which in this case you would read it 'motion loss of extension, rotation, sidebending to the right' associated with the positional fault of FRSL (stuck in the opposite diagonal). We feel physicians, most physical therapists without osteopathic training and lay reviewers will understand motion loss versus

positional fault nomenclature, and therefore we chart that way on paper and in EMR formats.

Left Unilateral Extension (LUE) Left sacral base moving into flexion, left side bending about a non-physiological, mid-transverse axis.

NOTE: Very rare, no observed association with ilial dysfunctions.

Right Unilateral Flexion (RUF) Right sacral base moving into extension, left side bending about a non-physiological, mid-transverse axis.

NOTE: Common, typically associated with right ilial lesion of anterior torsion, motion loss of posterior rotation. More easily corrected than the RUE in that the ilial correction helps with the sacral correction. Evaluate L5 for motion loss of FRSL.

Left Unilateral Flexion (LUF) Left sacral base moving into extension, right side bending about a non-physiological, mid-transverse axis.

NOTE: Very common, typically associated with ilial lesion of posterior torsion, motion loss of anterior rotation. Difficult to correct in that simple correction of the sacral motion loss exacerbates the ilial motion loss and vice-versa. Evaluate L5 for motion loss of FRSR.

SPECIAL NOTE: It should be noted that the static, faulted position of the RUE looks exactly like the static, faulted position of the same as the LUF, and the RUF looks the same as the LUE. It is the results of a series of motion testing described below that will differentiate these problems from each other (as well as from the simple sacral torsions).

TEST

FINDING

Stork (Marcher's) Test

Positive bilaterally.

NOTE #1: Palpate PSIS and S2 while patient lifts knee to level with waist. A negative test is that the PSIS moves in relationship to S2. This motion is normally inferior. A positive test is if the PSIS does not move in relationship to S2, this will result in a hip hiking motion, and the PSIS will elevate in relationship to S2.

NOTE #2: The Stork test is a test of ilium on sacrum movement. With a simple ilial dysfunction the Stork is a valid test for side of dysfunction. However, when an unilateral sacral dysfunction is co-present this test reliably presents as positive bilaterally, i.e. does not provide side of dysfunction information but does imply that this a unilateral sacrum with ilial involvement. In addition if the motion loss is treated successfully, the Stork Test will present as negative bilaterally.

NOTE #3: Repetitive testing until 3 sequential findings of either positive or negative is achieved for each side helps to clarify this often confusing test.

NOTE #4: A typical testing error (confound) is to allow the tested knee to flex as the hip flexes, as evidenced by the foot staying in approximately the same frontal plane as the 'down' knee. Use more of a 'goosestep' type of marching step.

NOTE #5: Do require the patient to touch the wall during testing to avoid balance confounds.

NOTE #6: Use 'Ice tong' thumb and long finger grip. Firm grip to bone must be maintained.

Forward Bend Test (Standing) Tests for side of ilium on sacral dysfunction. Positive on side of ilial dysfunction which typically is the same side as the unilateral (not side of axis) of RUE, LUE. RUF & LUF dysfunctions.

NOTE #1: Palpate PSIS bilaterally while patient bends forward. Positive for side that moves first or furthest. Valid test with ilial dysfunctions with or without unilateral sacral involvement.

NOTE #2: be aware of soft tissue restrictions that may create a positive finding. Will look like a 'wiggle' versus a true left or right first or furthest positive finding.

Seated Flexion Test Tests for side of sacral on ilium dysfunction. Positive on side of unilateral (not side of axis) of RUE, LUE. RUF & LUF dysfunctions.

See NOTES for Forward Bend Test in Standing

ILA Sit/Slump Test This test is critical in identifying and distinguishing between a sacral torsion (forward/backward) and unilateral flex/extension lesion. Palpate sacral bases bilaterally while patient bends forward.

NOTE #1: With either a forward sacral torsion or unilateral flexion lesion, asymmetry will exist in the ILA's and in both types of lesions the asymmetry will become worse (exaggerated) with the seated ILA flexion test. The (trunk) extension component of this test differentiates the torsion lesion from the more serious unilateral lesion. With trunk extension the sacral rotation will become completely symmetrical with a forward sacral torsion lesion, however will only get partially symmetrical with the unilateral flexion lesion

NOTE #2: With either a backward sacral torsion or unilateral extension lesion, sacral rotation will become worse (exaggerated) with the seated ILA extension test, and become slightly better (unilateral extension lesion) or completely symmetrical (backward sacral torsion lesion) with the (trunk) flexion component of this test. (LPI course notes)

Sacral Springing (prone) For sacral torsions springing about the oblique axis using a dummy thumb will return hard end feel information in the motion loss direction.

RUE: diminished right sacral base on MTA
LUE: diminished left sacral base on MTA
RUF: diminished right ILA on MTA
LUF: diminished left ILA on MTA

NOTE: With unilateral sacral dysfunction, the axis of motion is disrupted, leading to polluted data from any sacral spring test. Therefore sacral springing may be reasonably omitted from the analysis.

STATIC SACRAL PALPATION POSITION FINDING

Sacral base for rotation (transverse plane)

RUE: right shallow
LUE: left shallow
RUF: right deep
LUF: left deep

NOTE: Sacral base palpation is often confounded with soft tissue dysfunction of the multifidus etc., always correlate with ILA palpation, if results do not agree with the ILA data appears to be more reliable.

Inferior Lateral Angle (ILA) for rotation (transverse plane)

RUE: right shallow
LUE: left shallow
RUF: right deep
LUF: left deep

NOTE: Should provide the same information as the sacral base above. First find the sacral hiatus with the side of one thumb (palpated as a 'gun sight' along the lower central 1/5 of sacrum), then moving thumbs one at a time laterally to the ILA.

Inferior Lateral Angle (ILA) for side bending (frontal plane)

RUE: right up
LUE: left up
RUF: right down
LUF: left down

NOTE: Palpate by moving thumbs one at a time off the face of the ILA to the inferior aspect of the ILA.

SPECIAL NOTE #1: In the LPI course notes the ‘deep, deep down’ (sacral base, contralateral ‘ILA’ and ipsilateral ILA) terminology for unilateral flexions and the ‘shallow, shallow, up’ terminology for unilateral extensions does not agree with the ILA for rotation (transverse plane) I have described above. According to Jeff Ellis PT, with unilaterals the palpation of the rotational (transverse plane) component at the ILA is confounded by the sidebending (frontal plane) component. With unilaterals there is a marked, i.e. palpable sidebending component (as opposed to the non-palpable sidebending in sacral torsions) that moves the ILAs out of their typical horizontal plane, and the deep, DEEP, down finding is actually the palpation of a DEEP space adjacent to the ILA.

SPECIAL NOTE #2: To avoid confusion in assessing unilateral sacrum, my suggestion is to carefully follow the following palpation order:

- 1. Palpate the inferior aspect of the ILAs (pads of thumbs should face superior),*
- 2. Observe if a line between your thumbs is perpendicular to the long axis of the spine (normal orientation) or not perpendicular (frontal plane defect), indicating a sidebent sacrum,*
- 3. Now bring thumbs (pads of thumbs moving to face anterior), one at time onto the posterior aspect of the ILAs to assess for transverse plane defects. In the case of a sidebent sacrum, make sure you respect the frontal plane defect you have found above. The line between your thumbs on the ILA should have the same angle as in the frontal plane assessment above.*

SPECIAL NOTE #3: In that the critical clinical decision is to differentiate between sacral torsions and unilateral sacral lesions, the following are your options in data gathering to be used in critical analysis in their differentiation.

- 1. The presence of a bilateral Stork (not necessarily equal in degree) is a strong indicator of a unilateral sacral lesion. On sacral torsions the Stork would be positive unilaterally*
- 2. Positive ILA sit slump test (trunk flexion component) with results of:*
 - a. Slightly better (unilateral extension lesion) or*
 - b. Completely symmetrical (backward sacral torsion lesion).*
 - c. Worse with flexion (unilateral flexion)*
- 3. Positive ILA sit slump test (trunk extension component) with results of:*
 - a. Slightly better (unilateral flexion lesion) or*
 - b. Completely symmetrical (forward sacral torsion lesion).*
 - c. Worse with extension (unilateral extension)*
- 4. Static sacral positioning of either :*
 - a. ‘Deep, deep down’ (sacral base, contralateral ‘ILA’ and ipsilateral ILA) terminology for unilateral flexions and the ‘shallow, shallow, superior for unilateral extension lesions.*
 - b. Palpation of the true ILA of which there are two options:*

- i. *Palpation of the more superior portion of the ILA (next to sacral hiatus) that will not be confounded by sidebending*
 - ii. *Palpation of the sidebending component (inferior aspect of the ILA), with correction of palpation of the ILA's to accommodate for the sidebending component. This has been the most reliable method to date.*
- 5. *Positive spring test about the oblique axis in the in the case of sacral torsions, and highly erratic spring data from unilateral sacral lesions.*
- 6. Subjective: Have patient report which position- sitting or standing they felt worse.
 - a. *Worse with sitting (unilateral flexion): with sitting lumbar spine is flexed so sacrum should be extended but it is stuck in flexion.*
 - b. *Worse with standing (unilateral extension: with standing lumbar spine is extended so sacrum should be flexed but it is stuck in extension.*

COCCYX LESION

Right Sidebent Coccyx

NOTE: Very rare.

Left Sidebent Coccyx

NOTE: Very common, especially with left rotated dysfunction.

Right Rotated Coccyx

NOTE: Very rare.

Left Rotated Coccyx

NOTE: Very common, especially with left sidebent dysfunction.

MOTION LOSS

Left Sidebending

Right Sidebending

Left Rotation

Right Rotation

COCCYX SPRINGING

Left Rotated Coccyx

NOTE: Very common finding.

Right Rotated Coccyx

FINDING

Right rotation diminished end feel

Left rotation diminished end feel

STATIC COCCYX PALPATION

Body of Coccyx for Rotation

POSITION FINDING

Left Rotated: Shallow left, deep right.

Right Rotated: Shallow right, deep left.

NOTE #1: Performed in prone. First find the inferior aspect of the ILA bilaterally, then move one thumb width, one thumb tip at a time, onto the

proximal posterior body of the coccyx, then site along the coccyx for rotation findings.

NOTE: #2: Palpate lightly, especially when positioning tips of thumbs (pointed anterior) to palpate for rotation asymmetries.

NOTE: #3: This 2-finger method requires less palpation experience than the 'standard' 1-finger method.

Sides of coccyx for sidebending Right Sidebent: Wide left, narrow right
Left Sidebent: Narrow left, wide right

NOTE #1: Orient thumbs in the same plane as the coccyx, one on either side, slide tips of thumbs up into 'V' formed by coccyx and sacrotuberous ligament. The thumb that can move deeper (more superiorly) into the 'V' is in the 'wide' space. The coccyx is then described as being sidebent to the 'narrow' side.

NOTE: #2: This 2-finger method requires less palpation experience than the 'standard' 1-finger method.

NOTE #3: Rotation and sidebending positional faults are to the same side with few exceptions.

INNOMINATE LESION

Right Anterior Torsion

NOTE: Very common, especially in combination with right unilateral sacral extension, and less commonly with right unilateral sacral flexion.

Right Posterior Torsion

NOTE: Very rare.

Left Anterior Torsion

NOTE: Very rare.

Left Posterior Torsion

NOTE: Very common, especially in combination with left unilateral sacral flexion.

SOFT TISSUE LESION

MOTION LOSS

Right posterior torsion about the right symphysis pubis

Right anterior torsion about the right symphysis pubis

Left posterior torsion about the left symphysis pubis

Left anterior torsion about the left symphysis pubis

FINDINGS (typically painful, hypertonic, Hypomobile for all contractile tissues, hypomobile and painful for neurological tissues)

Psoas, iliacus, gluteals, external rotators

SPECIAL NOTE #1: 'Left more than right soft tissue rule'. Hip and pelvis muscle dysfunctions of hypertonicity and hypomobility are much, much more prevalent on the left side than the right with few exceptions. If you see right-sided soft tissue problems, look for chronic but currently less symptomatic left-sided soft tissue problems that should be assessed and treated.

SPECIAL NOTE #2: One of the few exceptions to the 'left more than right soft tissue rule' is the obturator internus. In controlled environments, this muscle is evaluated and treated using an internal approach. While an external, fully clothed approach may not be as effective, the external approach may be preferred by clinician and/or patient. Either in prone or partial prone with one foot on the floor, begin by palpating (with permission) the medial aspect of the ischial tuberosity, then progress along the medial aspect of the ischial ramus, onto the contiguous pubic ramus, and when anterior enough, move palpating finger(s) laterally onto the soft tissues covering the obturator foramen. Resisted external rotation of the hip can be used to confirm to clinician and patient that the correct structure is being palpated. Resistance is highly valuable for tone inhibition (post-activation relaxation response) allowing subsequent elongation and strengthening.

Pelvic muscles including ischiorectal fossa, pelvic floor, pyramidalis

NOTE: The pudendal nerve in Alcock's canal in the lateral ischiorectal fossa is implicated in pain and weakness of the pelvic floor, giving vulvadynia and incontinence. Coccyx and/or sacral asymmetry may change the biomechanics of these soft tissues. Like the obturator internus the pudendal nerve may be best assessed and treated using an internal approach, but an external approach may be preferred. In prone, with permission, palpate the medial aspect of the ischial tuberosity, then onto the sacrotuberous ligament, follow medially and superiorly onto its attachment to the sacrum. Then move off the sacrum medially (into space next to coccyx, then palpate deeper (anteriorly), once past the plane of the sacrum, move laterally and superiorly into the lateral aspect of the ischial fossa. The pudendal nerve is in this area. You may push the inferior external rotators anteriorly to stabilize the deeper fossa contents to allow easier palpation of the ischiorectal fossa.

Path of sciatic and tibial nerves through hip, thigh, calf, above medial malleolus

III. TREATMENT

NOTE: The order presented here is important, and differs from the typical manual therapy order defined as soft tissue then joint then neuromuscular reeducation then motor control sequence. Coccyx treatment is always first (F.O. II), then the combined sacrum and ilial correction, then lumbar, then soft tissue.

1. Coccyx Manipulation (Ando). HVLA to lateral aspect of proximal coccyx body with prop e.g. small 'Kong' struck lightly with 2# weight. Manipulate on side to which coccyx has rotated (posterior side). This technique is to increase sacrococcygeal joint play. Increased play can then be used to gain sidebending and/or rotation motion using mobilization techniques below. Test retest with spring testing and palpation previously covered

NOTE #1: The 'Kong' (Denver, CO) is a dog toy shaped like a beehive. I use the red, 4" size (approximate). Gregg Johnson uses his finger in the hole at the base of the Kong and strikes the Kong with his hand. I prefer inserting a solid ½ inch metal dowel into the base and tapping the end of this dowel with a light dumbbell to save my fingers and hands and increase the velocity without increasing the force. This combination of tools and techniques allows diamond cutting-like precision to a very small bone.

NOTE #2: The manipulation technique above is very efficient, and leads to less recidivism than using the mobilization techniques alone.

2. Ischiorectal Fossa Soft Tissue Mobilization.
In the frontal plane, ischiorectal fossa is shaped in triangle with obturator internus as the lateral edge and levator ani as the medial edge. The apex is pointing cranially at the line where obturator internus muscle joining levator ani muscle, and the base is formed by fascia lunata and the subcutaneous fat and skin. The pudendal nerve, artery and vein course through the Alcock's canal on the lateral side of ischiorectal fossa in doubling of the obturator fascia.
3. Sacroiliac Combination Treatment (i.e. perform correction of ilium and sacrum simultaneously) (Ando) treatment of:
 - a. Ilium
 - i. For motion loss posterior rotation (typically right) right leg off table in prone. Isometric command is to ask for patient to push their foot into the floor and/or left hip abductors with patient pushing their foot laterally against table.
 - ii. For motion loss anterior torsion (typically left) lift left thigh with PT right hand. Isometric command is to ask for active right hip extension (straight knee).
 - b. Sacrum (3 most common dysfunctions covered)
 - i. For motion loss right sacral base flexion and sacral right sidebending, PT right hand applies direct PA pressure (thumb/index PIP) to the right sacral base (transverse and saggital plane correction) while the PT left hand (hypothenar eminence) pushes superiorly on the left ILA (frontal plane correction). Isometric command is for the ilial component. For facilitation of more sacral base flexion, ask patient to put hands on chin (trunk extension).

- ii. For motion loss right sacral base extension and sacral left sidebending, PT left elbow simultaneously applies direct PA pressure to the left ILA (transverse and saggital plane correction) and inferior force (frontal plane correction) on the left ILA. Isometric command is for the ilial component.
- iii. For motion loss left sacral base extension and sacral right sidebending, PT left elbow simultaneously applies direct PA pressure to the right ILA (transverse plane correction) and inferior force (frontal plane correction).on the right ILA. Isometric command is for the ilial component.

4. Soft tissue mobilization

- a. Cascade of techniques to atypical soft tissue suspects such as obturator internus, externus, pyramidalis as well as typical lumbar, hip, leg soft tissues (F.O.I syllabus)
- b. HVLA with prop to external rotators as they exit from beneath the sacral on their way to the hip with 'pinky ball with handle' with 3# weight either in prone or in standing bilateral knee extension.

NOTE #1: Sustained pressure with and without associated oscillations and functional movement patterns (FMP's) are less irritating than direct oscillations, strumming techniques (Functional Orthopedics I and II syllabi)

NOTE #2: I make the 'pinky ball with handle' with a 1-1 ¼" diameter dowels, 5 inches long. The ball itself is struck with the weight versus the shaft in the 'Kong'

5. Lumbar Treatment. Always reassess lumbar spine to confirm previously identified Type II and Type I dysfunctions after treatment of coccyx and sacroiliac asymmetries. For example, in a case of right unilateral flexion, L5 is likely to have motion loss of FRSL (positional fault of ERSR, stuck in the opposite diagonal of sacrum dysfunction) and may be corrected after treating sacroiliac asymmetry.

Treatment of identified type II and then compensatory scoliotic Type I's.

6. Neurotension.

- a. Treatment of identified dural dysfunction using STM and flossing.
- b. HVLA with prop to sciatic nerve in post thigh (and tract below PRN) with 'pinky ball with handle' with 3# weight either in prone or in standing bilateral knee extension.

IV. Home Exercises (Ando)

1. Soft tissue mobilization

- c. Pericoccygeal STM home exercise with a prop fabricated from three 15" long sections of ½" PVC or similar taped into a pyramid. Moderate

- pressure, with combinations of leaning back, leaning to the side or roll back, breathing.
- d. Massage ball to hip external rotators, flexors and extensors, TFL etc
 - e. Foam roller. STM in patients with tougher soft tissue (e.g. ITB of mesomorphic males)
 - f. ‘Pinky ball-on-a-stick’ to:
 - i. Tibial nerve above malleolus with ‘sit back’ technique.
 - ii. Pelvic floor. Sit directly over ball with breathing to relax.
 - iii. Obturator externus. Lift thigh, place ball lean forward and ipsilaterally to access lateral aspect of obturator foramen.
 - iv. Pyramidalus, especially to side of elevated pubic bone (typically left, given the typical ilial rotation position fault).
 - g. Body Gliders to:
 - i. Obturator internus. Sit directly on 38mm glider ball, shear pelvis laterally to access medial aspect of obturator foramen.
 - ii. Sciatic nerve in the posterior thigh
 - iii. Tibial nerve in popliteal fossa with knee flexion with large body glider. Use opposite knee to help flexion or sit back technique.
 - iv. Tibial nerve and superficial peroneal nerve in leg

NOTE#1: The PVC pipe HEP utilizes easily obtained, inexpensive materials. I tape firmly to avoid the pipes from twisting, using either stranded packing tape (3M) or a colored duct tape.

NOTE #2: I use Yamuna balls (yamunabodyrolling.com) the black balls are a good fit for the gluteals in the iliac fossa, excellent for psoas.

NOTE #3: The ‘Pinky ball-on-a-stick’ is credited to Peter Edgelow PT for use in neurotension treatment. I make mine with ½” diameter dowels, 20” long.

2. Stretching

- a. Given the ilial rotation dysfunction, unilateral hamstring stretches are inherently risky in that they rotate the ilium. Replace with bilateral hamstring stretches to avoid iatrogenic recidivism.
 - i. ‘Bottoms down’ hamstring stretch. Maintaining lumbar flexion while fully extending bilateral knees to facilitate sacral extension in corrected unilateral sacral flexion cases.
 - ii. ‘Bottoms up’ hamstring stretch. Maintaining lumbar extension while fully extending bilateral knees to facilitate sacral flexion in corrected unilateral sacral extension cases.
- b. Foam roller used to decrease trunk sidebending rigidity.
 - i. Slow ironing – sidebending
 - ii. Slow ironing- 90/90 position
 - iii. Slow ironing- pivot prone position

3. Core strengthening.

- a. Foam roller. Core and lower extremity strengthening (static and dynamic ‘table-top’, feet on roll bridges etc)
 - b. BET, Pilates etc.
- 4. Nerve glides. ‘Slump flossing’.
- 5. Functional retraining.
 - a. Static and dynamic sitting, standing, walking, lifting etc identified through observation as well as customized outcome tool (Function and Pain Inventory by Ando & Aston PT)
 - b. Gait training to correct typical loss of trunk rotation

Addendum A

Visceral Pathology and Disease Mimicking Pain in the Lumbosacral region

The Uterus and uterine ligaments	T10-L1, S2-4
The Ovaries	T10-T11
Endometriosis	Exacerbated menses, painful intercourse/ infertility
Pelvic Inflammatory Disease	Pelvic pain/ painful prolonged menses, etc.
The kidney	T10-L1
The ureter/ upper urinary tract	T11-L2, S2-4
The urinary bladder	T11-L1, S2-4
The pancreas	T6-T10
The large intestine	T11-L1
The sigmoid colon	T11-T12
The diaphragm	T6-T12
Malignant retroperitoneal lymphadenopathy	Severe pain/ L.E. radiating/ supine exacerbates
Herpes zoster/ post herpetic neuralgia	Constant pain with no relief at rest
Primary bone cancer A) Multiple myeloma	Spine pain
Metastatic tumor of the spine	Deep, dull ache/ possible cord compression
Diskitis	Constant pain
Metabolic bone disease a) Osteoporosis b) Osteomalacia	Constant backache/ pelvic pressure, etc.
Rheumatological a) Reiter's syndrome b) Ankylosing spondylitis c) Psoriatic spondylitis	Back pain
Sheuermann's disease	Dull/ often asymptomatic
Diabetic radiculopathy (amyotrophy)	Sudden onset without trauma/ back pain with L.E.
Psoas abscess	Insidious onset of unilateral low back pain and local tenderness/ fever
Herniation of fat	Painful mass often with referred L.E. pain
Peripheral vascular disorder	Low back pain

Source: Ken Keiser PT 2008

Addendum B

See Ando & Aston instruction sheet for Body Gliders instructions, use rules and FAQ's.