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Treatment Of A Patient With Thoracolumbar Scoliosis Utilizing A Regional Interdependence Approach Including Components Of The Schroth Method: A Case Report

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The patient signed an informed consent allowing the use of medical information and the photographs for this report and received information on the institution's policies regarding the Health Insurance Portability and Accountability Act (HIPPA).

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Abstract

Background and Purpose

Spinal deformity is a challenging spinal disorder in adults.[1] A scoliotic curve of >10 degrees exists in up to 12% of the population and while surgery is the definitive measure, there is limited evidence to guide non-surgical treatment.[2,3,4] This case investigated traditional physical therapy (PT) treatment utilizing a Regional Interdependence Approach (RIA) and components of the Schroth method for a patient with chronic low back pain (CLBP).

Case Description

A 66 year old male presented with CLBP, worst upon rising in the AM with (6/10 NPRS). Imaging demonstrated thoracolumbar dextroscoliosis, bilateral foraminal narrowing and associated spondylolisthesis of the fifth lumbar vertebrae. A RIA exam revealed mobility deficits of thoracolumbar spine, instability of L5-S1, and a 1.38" leg length discrepancy. A comprehensive treatment approach was used including lumbar stabilization exercises and postural therapy, including components of the Schroth method.

Outcomes

Following 12 weeks, pain improved from 6/10 to 4/10[5], with the patient reporting no pain when arising from bed. 30-second sit to stand[6] improved from five to eight. Following implementation of a shoe lift visible changes were noted in pelvic symmetry. However, the degree of scoliosis appeared unchanged and no subjective improvements were noted on the Roland-Morris Low Back Pain Questionnaire (RMLBPQ).[7]

Discussion

The intent of the RIA is to identify remote areas of the body contributing to pain.[8] RIA revealed a true leg length discrepancy, addressed with a shoe-lift, which may have redistributed the amount of stress imposed on the spine resulting in decreased pain, while Schroth[9] exercises may have helped improve thoracolumbar mobility. Additionally, stabilization exercises may have been beneficial for the diagnosed spondylolisthesis. A similar comprehensive approach may benefit future patients.

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Background and Purpose

Adult spinal deformity is one of the most challenging spinal disorders to treat and by definition describes an array of spinal diseases that present in adulthood.[1] As of 2013, a scoliotic curve of >10 degrees exists in up to 12% of the population. The prevalence of both preexisting idiopathic scoliosis and degenerative scoliosis is ~6% in adults over the age of 50.[1] Aebi et al.[10] classified adult scoliosis into three major types: Type I scoliosis is the primary degenerative scoliosis, which develops after skeletal maturity and is characterized by minimal structural vertebral deformities, advanced degenerative changes, and an increase of lower lumbar curves. Type II scoliosis is the progressive idiopathic deformity that develops before skeletal maturity, but becomes symptomatic in adult life.[10] Type III secondary degenerative adult scoliosis is scoliosis following idiopathic or other forms of scoliosis, and is predominantly seen in the thoraco-lumbar, lumbar, or lumbo-sacral region.[10] This can be a result of a pelvic obliquity due to a leg-length discrepancy, hip pathology, or a lumbo-sacral transitional anomaly.[10] In addition, it is estimated that greater than 85 percent of individuals presenting in primary care have non-

specific low back pain and of these individuals, those over the age of 40 are more at risk of developing degenerative spondylolisthesis.[11]

Management of spinal deformity includes identification and treatment of scoliotic, kyphotic, and spondylolisthetic conditions. A regional-interdependence model can be applied to a patient referred to PT for CLBP when the causative diagnosis of degenerative scoliosis is unclear. The regional-interdependence model focuses on physical impairments in proximal or distal segments distinct from the referred location of pain.[8] Screening above and below the primary area of dysfunction targets other anatomical areas that may be contributing to patient symptoms.[8] The Schroth method is also a conservative three dimensional exercise treatment approach that includes reducing pain, managing curve progression, correcting muscle imbalances, and increasing lung function that may pose benefits in individuals with scoliotic conditions.[9]

There is little data regarding the indications and treatment options for elderly individuals with adult scoliosis. Gang et al.[2] compared operative treatment to conservative care for patients 65 years of age and older with adult scoliosis. The majority of these patients presented with a thoracolumbar curvature of the spine. Patients who underwent surgical intervention had improved functional ability and decreased use of analgesics. The study results favored surgical intervention, but complication rates were higher with advanced age.[2] In a prospective cohort study done by Glassman et al.,[4] more extensive use of exercise therapy, chiropractic, and pain management in mid to high symptomatic patients was more beneficial than surgical correction.

This case details the use of components of the Schroth method, in addition to conservative physical therapy treatment for a patient referred for treatment of CLBP with a history of thoracolumbar scoliosis and deconditioning.

Case Description

Patient History and Systems Review

The patient, who will be referred to as "JH", gave his consent to participate in this case report. JH, a 66 year-old male Air Force veteran, was referred to PT for evaluation and treatment of CLBP and deconditioning. JH reported CLBP for over 20 years without known precipitating event. JH also had radiological findings of spinal stenosis and bilateral foraminal compromise at L5-S1 associated a bilateral pars defect and spondylolisthesis (Figures 1 and 2). His medical history consisted of the following conditions: chronic rhinitis, glaucoma, varicose veins, left leg vasculitis, obstructive sleep apnea, degenerative joint disease of lower right leg, hyperlipidemia, hypertension, neuropathy, and sensorineural hearing loss. JH reported that he fractured his right tibia from a bicycle accident when he was 44 years old. JH also had a congenital hemangioma of the left lower extremity (LE) affecting venous blood flow that limited his standing tolerance and walking ability. Surgical history included a right distal tibial Open Reduction Internal Fixation (ORIF) and Intermedullary (IM) rod in 1993. A self-report of four brain surgeries in 2011, including removal of an olfactory neuroblastoma creating a medial strabismus of his left eye. The brain surgeries were not documented in the patient's medical records, and it was unclear where the surgeries were performed.

JH's chief complaints were constant low back pain (LBP) that would worsen with any prolonged static posturing, lying, sitting, or standing. He described the pain as a constant ache across low back with intermittent twinges. However, his pain would transiently improve by any change in position. During initial evaluation, JH reported decreased standing tolerance to 15' and limited walking distance of two blocks (½ mile). JH reported decreased activity tolerance and limited ability for bicycling over the last couple of years due to reported brain surgeries, leg pain from venous anomaly, and back pain.

JH's goals were to decrease pain especially upon rising in the AM, decrease the amount time to get out of bed in the morning, increase his standing and walking tolerance, and improve bilateral (b/l) lower extremity (LE) strength in order to be able to ride his bicycle again.

Clinical Impression One

Following the systems review, it was evident that JH had LBP, decreased lumbar active range of motion (AROM), poor postural alignment, muscle weakness, a 1.38" leg length discrepancy, and a notable gait disturbance (Table 1). JH's primary problems consisted of pain, deconditioning, and decreased functional mobility as a result of CLBP. JH presented with a history of moderate thoracolumbar dextroscoliosis, spinal stenosis and multilevel b/l foraminal compromise at L5-S1 associated with spondylolisthesis and a bilateral pars defect (Figure 1 and 2).There is no certainty as to whether JH's scoliosis was congenital, idiopathic, or secondary to his right distal tibia fracture status post ORIF. In addition to MRI findings, potential differential diagnosis included: congenital disease of severe scoliosis, multilevel degenerative process of discs and facets, spinal stenosis, and possibly Ankylosing spondylitis.[12]

Following the history and systems review, it was evident that JH would benefit from a RIA and further examination through specific test and measures. The following special tests were performed: postural assessment, gait analysis, leg length, lumbar AROM, manual muscle testing (MMT) of b/l LEs, low back specific special tests, LE dermatomes, LE deep tendon reflexes (DTRs), and the 30-second sit to stand test to confirm pre-diagnosis. The RMLBPQ was used to help determine improvements in functional abilities from baseline throughout his plan of care (POC). Overall, he would benefit from PT to decrease pain, improve functional ability, and increase reported standing and walking tolerance.

Examination- Test and Measures

An examination was performed which consisted of palpation, postural/gait analysis, lumbar AROM, MMT, and special tests specific to the low back. The following outcome measures were performed, NPRS[5], 30-second sit to stand test[6], and the RMLBPQ[7]. These were administered at initial evaluation and before his discharge from PT to determine improvements in functional ability.

A postural assessment was performed with JH in static standing with shoes off in order to confirm the severity of his dextroscoliosis and visible pelvic obliquity. The following pelvic landmarks were elevated on the left: Anterior Superior Illiac Spine (ASIS), Posterior Superior Illiac Spine (PSIS), Illiac Crest (IC), Greater Trochanter (GT). Palpation of pelvic landmarks has shown to have limited inter-examiner reliability (0.11 (SE=0.12) to 0.17 (SE=0.10)).[13] His gait was assessed to determine the impact of LE mechanics and note any compensatory movements contributing to his low back pain. In order to determine the severity of decreased lumbar AROM, an inclinometer provided by the facility was used to assess lumbar flexion and extension. A goniometer was used to measure b/l lumbar rotation and a medical tape measure was used to measure b/l lateral trunk flexion. JH demonstrated five out of five right LE strength upon MMT testing and four minus out five strength of the left LE. JH was able to rise to partial plantarflexion AROM bilaterally against gravity. Cuthbert and Goodheart[14] found that MMT has good inter-examiner reliability (82-97%) and test-retest reliability (96-98%) when accepting plus/minus one grades. He demonstrated diminished sensation upon light touch in a stocking distribution over left LE. Normal b/l Patellar tendon reflexes and absent b/l Achilles tendon reflexes were also noted.

Specific low back tests were chosen to aid in developing a PT diagnosis: Lumbar Slump Test, Supine to Sit, Passive Straight Leg Raise (PSLR), 90/90 Active Knee Extension (AKE)

Hamstring Flexibility Test, Flexion Abduction External Rotation (FABER), Prone Extension (repeated motions), and Dynamic Abdominal Endurance Test[15] (Table 2).

Clinical Impression Two

Findings were consistent with initial impression of the JH's low back pain being multifactorial. The patient demonstrated the following: moderate to severe right thoracolumbar scoliosis, decreased lumbar AROM, pain with left and right lateral trunk flexion, poor postural alignment, an up slip of the left innominate of the pelvis, a 1.38" leg length discrepancy with the right leg remaining shorter compared to the left upon supine to long sit, decreased popliteal angle of the knee due to decreased b/l hamstring flexibility, and pain reported in the lumbar region with passive straight leg raise at 45 degrees respectively. In addition, to multiple co-morbidities, these impairments all affected JH's functional status for activities such as getting out of bed in the morning, standing and walking, and his ability to participate as an active member in society.

JHs PT diagnosis was Pattern 4F (Impaired Joint Mobility, Motor Function, Muscle Performance, Range of Motion, and Reflex Integrity Associated With Spinal Disorders).[16] Since JH had never received PT for his back, he was a good candidate for rehabilitation and each session he demonstrated compliance with his home exercise program (HEP). His rehabilitation potential; however, was limited based on the structural moderate thoracolumbar dextroscoliosis and other medical complications.

The final decision was made to have JH attend one to two PT sessions per week for a total of 12 weeks. His POC included lumbar stabilization exercises, overcorrection exercises, LE strengthening, manual therapy, and modalities to reduce LBP. JH was referred to the prosthetic department to be fitted for a shoe-lift to adjust for his leg length discrepancy. Re-evaluation was performed during the sixth week of PT.

Interventions

Coordination, Communication, and Documentation

We coordinated and communicated with the prosthetic department within the hospital via the facility specific Electronic Medical Record (EMR). JH was informed and provided with contact information to set up an appointment with the prosthetic department to be fitted for a shoe-lift to accommodate for his leg length discrepancy. JH's radiological findings of his thoracic and lumbar spine were printed and verbally explained to him, since he was unaware of the severity of his scoliosis. Documentation of all initial evaluation, progress notes, and final evaluation at discharge were all completed on the EMR.

Patient/Client Related Instructions

JH was educated on disease pathology of his lumbar spine, including presence of spondylolisthesis at L5-S1, and the impacts of his leg length discrepancy on his postural alignment. JH was also educated on use and precautions of a moist heat pack for pain management. JH was advised to contact his primary care physician (PCP) if there were any changes in his functional status while attending PT. Throughout his POC, JH was instructed on how to perform therapeutic exercises with proper technique, was educated on the rationale behind the selection or alteration of interventions, and the importance of continued compliance with his HEP was discussed.

Procedural Interventions

Following initial evaluation, JH was seen once a week, 30'per session for a total of 12 weeks. Pain was addressed with interferential current electrical stimulation and a moist heat pad applied over the lumbar paraspinals for 15' at the start of each treatment session. There is a lack

of evidence regarding the effectiveness of electrical stimulation on patients with CLBP, but the patient reported benefits of reduced pain.[17] Low back stretches were prescribed to reduce increased myofascial tone of his lumbar paraspinals. On the second visit manual therapy (MT) was performed based on the Schroth method with JH lying on his right side and the therapist applying downward pressure over left innominate and upward pressure over lateral left thorax for 8' at the end of therapy session (Table 3).

Once pain was controlled (4/10 NPRS), low level lumbar stabilization exercises to focus on restoring motor control and activating muscles that stabilize the pelvis and spine were prescribed. Moon et al.[18] reported that lumbar stabilization exercises are effective for strengthening the lumbar extensors and improving functional disability in patients' with CLBP. The transversus abdominis, multifidus, and internal oblique muscles help to increase the intra-abdominal pressure, thereby contributing to the spinal and pelvic stability.[19] The multifidus muscle is commonly inhibited in patients with LBP and retraining of the muscle to contract may be the major importance during stabilization training[19] (Appendix 1).Therapy for lumbar instability must also address surrounding anatomical structures such as muscles of the lower extremities, so lower extremity exercises were also performed. [20] Hodges and Richardson[20] had previously demonstrated that the abdominal and multifidus musculature are activated in an anticipatory manner as a result of active lower limb movements (Table 3).

JH was further progressed using the Scientific Exercise Approach to Scoliosis (SEAS) and components of the Schroth method. Negrini et al.[21] stated that SEAS should be considered a first line of treatment for patients with scoliosis, especially when the patient is not a surgical candidate. [20] SEAS can be effective in obtaining stability and in some cases reducing asymmetric

degeneration. Schroth[9] emphasized overcorrection exercises, deep breathing while stretching, and mirror monitoring to allow the patient to synchronize the corrective movements and postural perception while receiving visual input (Table 3 and Appendix 1). Visual perception via a mirror is used to create awareness, as well as use of a therapist providing tactile cues of the new posture and alignment through position, repetitions and breathing.[9] With JH only being seen once a week, emphasis was placed on compliance with a HEP outside of the clinic (Table 3 and Appendix 1).

Outcomes

JH initially responded well to his plan of care (POC) with immediate pain relief upon completing lumbar stabilization exercises and stretches before getting out of bed in the AM. Following JH's appointment with the prosthetic department, leg length discrepancy was corrected, pelvic anatomical landmarks appeared level, pain was decreased, and he reported a feeling of "normalcy".

The discharge examination showed that JH's pain decreased by two points at its worst, left LE strength improved by one grade or more, popliteal angle of knee increased by ten degrees due to increased b/l hamstring flexibility, JH reported being able to stand for 30' sessions, being able to ambulate for 20' with a single point cane, and increased the number of sit to stands by three. No subjective improvements from initial to final evaluation were noted in regards to the RMLBPQ (Table 2).

Discussion

There is little evidence regarding indications for PT treatment in the elderly individuals with adult scoliosis. Current study results favor surgical intervention, but not all elderly

individuals are surgical candidates.[2,3,4] A RIA was applied which helped to identify a 1.38" true leg length discrepancy that could have likely been contributing to his LBP. A combination of lumbar stabilization exercises and postural therapy through the use of components of the Schroth method allowed him to get out of bed in the AM with minimal to no pain.

It is unknown whether JH's scoliosis or acquired leg length discrepancy post tibial ORIF resulted in pelvic asymmetry; however this approach addressed both in order to guide the patient's POC. With implementation of a shoe-lift, all pelvic landmarks appeared level and he reported 'normalcy'. Pelvic asymmetry can arise from distortions in other planes that can mask or alter landmark asymmetry. Levangie[22] concluded that there is not a positive correlation between pelvic asymmetry and low back pain.[22] It cannot be determined that there was a direct correlation of JH's LBP to his noted pelvic landmark asymmetry. Every patient case is individualized, but a using a RIA along with components of the Schroth method may benefit future patients that present similarly.

Throughout his POC, JH demonstrated eagerness and compliance with progression of HEP. A patient like JH may respond well to manual therapy incorporating deep breathing while stretching the shortened muscles affected by the concavity of the scoliotic curvature. Considering a shoe-lift for a patient CLBP who presents with a true leg length discrepancy may redistribute the amount of stress imposed on the spine resulting in decreased pain. Implementation of a shoe-lift resulted in visible and palpable pelvic symmetry, which may benefit his standing and walking tolerance. The severity of JH's degenerative scoliosis and notable co-morbidities may have limited JH's prognosis, but overall his subjective report of function improved. JH's pain decreased by half from initial evaluation to discharge. Even though there were no improvements in score on the RMLBPQ, he reported increased function and no pain when getting out of bed in

the morning. Seeing no change in the self-reported score on the RMLBPQ could be attributed to the nature of CLBP. Due to limited attendance this case did not reveal the long-term benefits that SEAS and the Schroth method may provide. Future research should investigate treating a patient with moderate-severe thoracolumbar dextroscoliosis utilizing manual therapy and SEAS. In addition, components of the Schroth method performed more frequently for patients with scoliotic conditions may reduce pain, correct muscle imbalances, and improve lung function. Last, it would be interesting to see the long-term benefits of a shoe-lift on standing and walking tolerance with someone with moderate-severe dextroscoliosis.

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Tables and Figures

Table 1: Results of Systems Review

Cardiovascular/Pulmonary	
Not Impaired	
Integumentary	
Impaired	Erythema of distal legs b/l
Musculoskeletal System	
Impaired AROM	Decreased lumbar AROM
Impaired Strength	Decreased strength in L hip flexors, extensors, internal and external rotators, knee flexors and extensors, ankle dorsiflexors, and R hip extensors
Impaired Posture	Fwd. head, upper thoracic kyphosis, R thoracic rib hump upon forward flexion, protracted and IR shoulders b/l. R thoracolumbar curvature and L lateral hip shift were noted
Impaired Gait Pattern	WBOS and shuffling gait pattern with increased ER of the R foot
Neuromuscular	
Impaired LE Dermatomes	Diminished sensation presenting with stocking distribution over L leg
Impaired DTRs	Absent Achilles DTRs b/l
Communication, Affect, Cognition, and Learning Style	
Not Impaired	

b/l= bilateral, **AROM=** active range of motion, **L=**left, **R=** right, **WNL=** within normal limits, **Fwd.=** forward, **IR=** internal Rotation, **ER=** external Rotation, **WBOS=** wide base of support, **DTRs**= deep tendon reflexes

Table 2: Examination (Test and Measures)

Tests and Outcome Measures	**Initial Evaluation**		**Final Evaluation**		**Psychometrics**
Leg length: (measured from ASIS to medial malleolus)	R leg 1.38" shorter than L leg		1.38" shoe-lift to correct for leg length discrepancy.		Validity Relationship w/ radiographical measurements ICC= 0.64[20]
Lumbar AROM (degrees) *= indicates pain	**Flexion**	50	**Flexion**	85	Compared w/ and w/o radiographs= r = 0.93; P < 0.001[21]
	Extension	10	**Extension**	30	
	L Rot	28	**L Rot**	30	
	R Rot	30	**R Rot**	35	
	L SB	45.7 cm*	**L SB**	43 cm	
	R SB	41.9 cm*	**R SB**	43.7 cm	
Special Tests	L	R	L	R	
Slump Test (Lumbar)	(-) for adverse neural tension		(-) for adverse neural tension		Reliability: Interrater ICC= 0.92[13] Test Retest= 0.80[20]
Supine to Long Sit	R leg remained shorter than L in supine to long sit		R leg remained shorter than L in supine to long sit		Reliability: Test Retest= k=0.69[20]
FABER	(-)	(-)	(-)	(-)	Test-retest reliability ICC- 0.93[20]
PSLR	(+) pain w/ DF, at 45 degrees	(+) pain w/ DF, at 45 degrees	30 degrees w/ hamstring pain	45 degrees w/ hamstring pain	Sensitivity= 33% [20] Specificity= 87%[20]
AKE Hamstring Flexibility Test	121 degrees	122 degrees	130 degrees	142 degrees	Interrater reliability ICC= 0.87[23]
Prone Extension (repetitive motions x 5 reps)	Increased pain into R buttock		No change in pain		N/A[20]
NPRS (0-10)	Least= 3-4 w/ pain medication Worst= 6 Best= 3		Least= 1-2 w/ pain medication Worst= 4 Best= 3		MCID: 1.7 points or a reduction of 27.9%[5]
30-Second Sit to Stand Test	5 w/ b/l armrests		8 w/ b/l armrests		MCID= > 5 number of sit to stands[6]
Roland-Morris Low Back Pain Questionnaire	Total score= 19/24		Total Score= 20/24		Test-retest Reliability = 0.92[7] MCID=5 points[7]

ICs= iliac crests, **ASISs=** anterior superior iliac spine, **PSISs=**posterior superior iliac spine, **GTs=** greater trochanters, **L=** left, **R=** right, **AROM=** active range of motion, **DF=** dorsiflexion, **L/R SB=** left /right side bending, **L/R rot=** left/right rotation, (-) = negative, (+) = positive, **FABER=** flexion, abduction, external rotation, **PSLR=** passive straight leg raise, **AKE=** active knee

extension, **FABER=** flexion, abduction, external rotation, **LE=** lower extremity, **DTRs=** Deep Tendon Reflexes, **NPRS=**numeric pain rating scale, **MCID=** minimal clinically important difference, **ICC=** intraclass correlation coefficients, **N/A=** not applicable

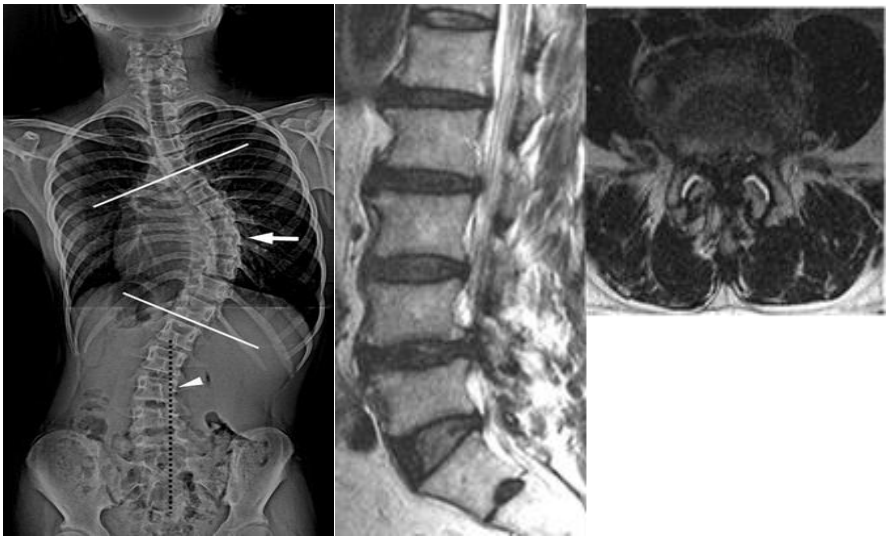
Table 3: Interventions

Interventions	**Rx Day 1**	**Rx Day 2**	**Rx Day 3-5**	**Rx Day 6-12**
	Ther Ex 15’	Ther Ex x 20’	Ther Ex x 20’	Ther Ex x 20’
Lumbar stretches	Supine single knees to chest 4x 30 sec.	Supine single knees to chest 4x 30 sec.	Supine single knees to chest 4x 30 sec.	Supine single knees to chest 4x 30 sec.
	Supine double knees to chest 4x 30 sec.	Supine double knees to chest 4x 30 sec.	Supine double knees to chest 4x 30 sec.	Supine double knees to chest 4x 30 sec.
Lumbar Stabilization Exercises[16]	Supine TVA (flattening lumbar spine into treatment table) 3x10	Supine TVA (flattening lumbar spine into treatment table) 3x10	Supine TVA (flattening lumbar spine into treatment table) 3x10	Supine TVA (flattening lumbar spine into treatment table) 3x10
	Supine posterior pelvic tilts 3x10	Supine posterior pelvic tilts 3x10	Supine posterior pelvic tilts 3x10	Supine posterior pelvic tilts 3x10
LE Strengthening		Side-lying hip abduction red Thera-band (equivalent to 3.7-5.5 lbs.) 3x10	Side-lying hip abduction red Thera-band (equivalent to 3.7-5.5 lbs.) 3x10	Side-lying hip abduction red Thera-band (equivalent to 3.7-5.5 lbs.) 3x10
		Supine hip adduction w/ small rubber pool ball 3x10	Supine hip adduction w/ small rubber pool ball 3x10	Supine hip adduction w/ small rubber pool ball 3x10
		Supine b/l hip bridges 3x10	Supine b/l hip bridges 3x10	Supine b/l hip bridges 3x10
		Seated Long arc quads w/ 2 lb. cuff weight 3x10	Seated Long arc quads w/ 3 lb. cuff weight 3x10	Seated Long arc quads w/ 3 lb. cuff weight 3x10

Ther Ex= therapeutic exercise, **TVA**= Transverse abdominis, **b/l=** bilateral, **LE=** lower extremity

Figure 1: Degenerative Adult Scoliosis

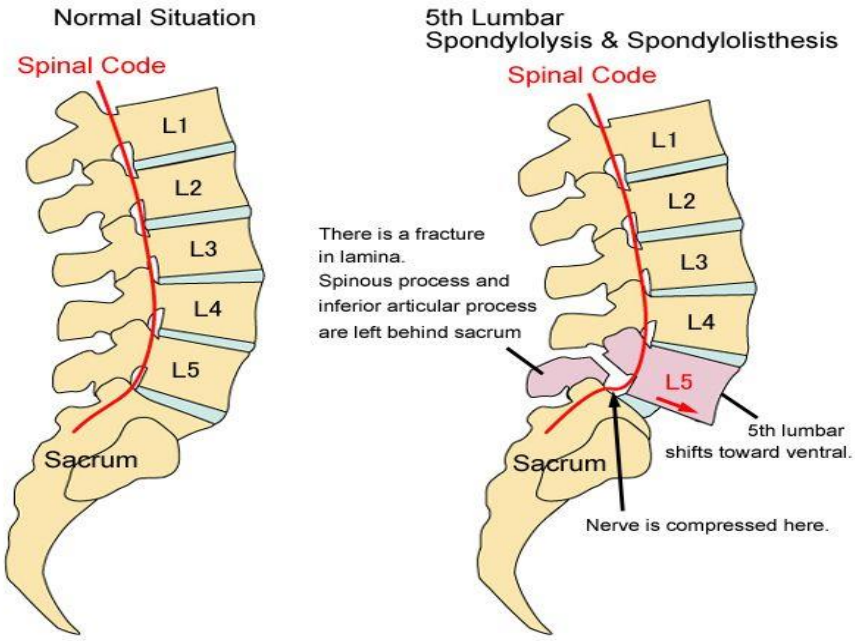
Image 1: Adult Scoliosis **Image 2:** Foraminal Narrowing



http://www.greatriverspineclinic.com/wp-content/uploads/2011/02/lumbar-spondylolystthesis.jpg

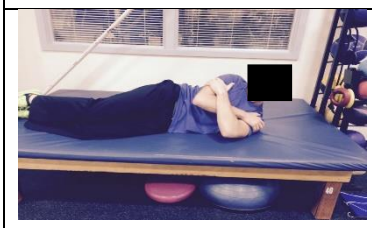
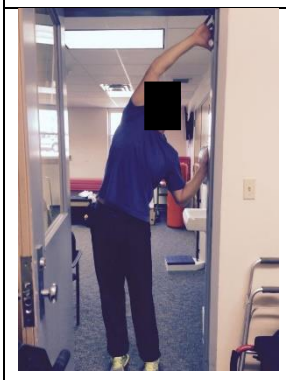
http://www.spineindia.com/2-uncategorised

Figure 2: Spondylolysis and Spondylolisthesis



https://s-media-cache-ak0.pinimg.com/736x/60/7d/18/607d180089d997a188658fe64157e810.jpg

Appendix 1:

Visual Demonstration	Interventions	Reasoning
	**SEAS[19]:** R side-lying w/ deep breathing (3x1') Standard pillow placed under convexity of curve	Elongate musculature c/l to dextroscoliosis, while expanding rib cage
	**SEAS[19]:** R side-lying w/ L rotation w/ deep breathing (3x1') Standard pillow under convexity of curve	Elongate musculature c/l to dextroscoliosis, while expanding rib cage
	**SEAS[19]:** L side-lying, R oblique activation (3x10)	Strengthening of obliques due to muscle imbalance from curvature
	**Schroth Method[9]:** Standing Thoracic side bending stretch to L w/ R hip shift w/ deep breathing (3x1')	Reduce pain, decrease curve progression, and improve posture
	**Multifidi strengthening b/l[19]** (3x15)	Improve activation of Multifidus, which is a key lumbar stabilizer.