Idiopathic Scoliosis:
A Case Study of Rotational and Lateral Deviations in Lumbar and Thoracic Segments

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Abstract

Scoliosis is a medical condition in which a person’s spinal axis has a three dimensional deviation. There are many treatments and techniques for evaluating and treating scoliosis. This paper outlines the anatomical deviations of idiopathic scoliosis, and describes a pilates centered program for identifying, educating, and managing scoliosis. Although there is no long term “fix” for the medical condition of scoliosis, a carefully thought out and client-specific pilates program can help to manage the symptoms and abnormal structural positions associated with idiopathic scoliosis.
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What is Idiopathic Scoliosis?

Scoliosis is defined as an abnormal, side-to-side curvature of the spine that radiographically measures greater than 10 degrees and usually is associated with rotation of individual vertebrae. Scoliosis occurs in all types of people and in all countries. It can be present at birth, develop during childhood or occur in adult-hood as a result of degenerative changes in the spine.

Idiopathic Scoliosis is a type of structural scoliosis. Structural scoliosis occurs when the spine not only has a lateral curve, but also has a rotational element to the vertebrae. Structural scoliosis directly involves the structural aspect of the spine and does not go away when the patient lies down or sits upright. The onset of idiopathic scoliosis can occur at any age, although it is more prevalent in adolescents. Almost 80% of idiopathic scoliosis cases are diagnosed between the ages of 10-16 years. Adult idiopathic scoliosis is usually a continuation of adolescent idiopathic scoliosis (AIS). There is no cure for idiopathic scoliosis, although certain treatment options do exist. Bracing and surgical intervention (vertebral fusion) are more extreme treatment options, only used in those patients with 25-40 degrees of deviated curvature.¹

This paper will discuss the management of idiopathic scoliosis utilizing a corrective exercise pilates program specifically designed for the type of curvature and rotation exhibited in idiopathic scoliosis.
What Happens in a Body with Idiopathic Scoliosis?

Scoliosis is a three-dimensional distortion of the spine. A healthy spine, when viewed anatomically, should exhibit a straight vertical line, from the 5 cervical vertebrae all the way through the thoracic and lumbar vertebrae, and connecting into the pelvis at the sacrum and coccyx.

In a patient with an idiopathic scoliosis of the thoracic spine, the vertebrae are axially rotated along the longitudinal axis and laterally shifted along the coronal plane. Through the axial rotation, the vertebral bodies rotate toward the rotated side, and the spinous processes toward the side of concavity. The lateral shift draws the transverse processes of the vertebrae toward the convex side. This results in an abnormal position of the ribcage, or “rib hump”.

This abnormal shift in the spine affects the biomechanics of the muscles and connective tissues, as well as the mobility of joints in the areas surrounding the deviation. The rotational shifting of the vertebrae cause the intercostal muscles of the concave side lose their elasticity and become weak. Furthermore, lack of rib mobility can compromise breathing efficiency. The lateral shifting of the thoracic vertebrae also causes weakness on the posterolateral oblique of on the convex side, and shortness of the upper anterior portion of the concave side.²
The lumbar spine and pelvic position also shift as a result of idiopathic scoliosis. A lateral and rotational deviation in the thoracic or lumbar segments will experience a shift in the segments above or below as a result. This often takes form by way of lateral and/or rotational shifts in the lumbar spine, which in turn creates a slight torsion and/or lateral shift in pelvic position. These pelvic shifts are dependent on the nature of the torsion and shifting in the vertebral segments in a patient with idiopathic scoliosis.
Case Study and Assessment

Elin V. is 26 years old. She was diagnosed with idiopathic scoliosis in her adolescent years. Elin’s scoliosis is a result of structural distortion of vertebral segments T2-T4. T3 exhibits the most pronounced deviation, with right lateral shift and right axial rotational deviation. This right side concavity has lengthened and weakened her posterolateral oblique muscles on the left and shortened her oblique muscles on the right side. Furthermore, she exhibits a downwardly rotated left scapula, and slightly winged right scapula. Mobility of the first rib on the right side is lacking and likely affects her breathing efficiency.

There are also slight deviations in pelvic position as a result of her scoliosis. Her pelvis is laterally shifted and axially rotated left. As a result, she experiences weakness in tone and strength in her right leg muscles, and overcompensation of the muscles in her left lower extremity.

Source: http://www.chiro.org/ACAPress/Scoliosis
Considerations for Construction of Elin’s Pilates Program

Working from the top down, I realized there are two significant movements I can focus on in order to help manage her structural scoliosis adaptations and retrain her body to embrace new movement patterns. First, we must work only in planes that opposite to the deviations which the scoliosis shifts her into. Because she is laterally shifted right and axially rotated left with regard to her thoracic spine, we need to mobilize her thoracic spine laterally left, and rotationally right. After establishing mobilization and movement within these planes, we can begin to strengthen the left side obliques in a rotational and lateral plane in order to increase tone and balance. Furthermore, we need to stretch the muscles through the right thoracic spine and shoulders, as they have become shortened and weak as a result of the right lateral shift.

Secondly, we must address the lateral shift and rotational deviation of the pelvis. The rotation of her pelvis left indicates an axial rotation shift of her lumbar segments to the right. In order to correct this deviation, we must work to primarily facilitate rotation of the lumbar spine to the left and lateral flexion of her lumbar spine to the right. This will create mobility of the left side of the pelvis forward and also increase the lateral flexion of her lumbar spine to the right. After establishing mobilization through these movement patterns, we can begin to strengthen the right lower extremity and stretch the right back extensors, in order to achieve more balance biomechanics and increased tone.
Pilates Program

Warm Up:

Rolldown

Spine Twist with pole

*Client will perform only to the right in order to facilitate de-rotation of the thoracic vertebrae.*

Side Stretch with pole

*Client will perform only to the left in order to facilitate lateral flexion mobility in the direction counter to her curvature.*

Pelvic Curl

Supine Spine Twist

*Client will perform only to the right, to facilitate de-rotation of the lumbar segments as with respect to the abnormal pelvic rotation.*

Chest Lift with Rotation

*Client will perform only to the left to increase tone and strengthen left-side obliques.*

Step Barrel:

Side Lift

*Client will perform only on right side in order to strengthen left side obliques as well as increase lateral flexion away from curvature.*

Reach
Overhead Stretch

Corkscrew

*Client will perform only to the left in order to increase mobilization in lumbar segments with respect to abnormal pelvic position. Modification might involve staggering left leg anteriorly with regard to right leg in order to facilitate more left-side rotation throughout the movement.*

Shoulder Stretch

*Client will perform only on the left side in order to facilitate lateral flexion mobility on stiff/weak side. This will also stretch right thoracic/shoulder girdle.*

Cadillac:

Footwork

*Client will work a few more reps on the right side, as this will be her weaker side due to the pelvic shift. Prancing performed on the right side only while the left leg is bent will assist with more balanced standing position.*

Hip Opener

Hip Work - Single Leg

*Again, client will work to elongate and strengthen right side in order to manage imbalances due to pelvic shift.*

Shoulder stretch

*Client will perform a few more reps on the right side than the left, in order to facilitate more lateral flexion of thoracic spine (during the ER portion) and mobilize and stretch the shoulder through an increased range.*
Shoulder Adduction Single Arm

Client will perform with the left arm only, while in slight left lateral flexion. Now that we have increased flexibility, to the left we need to increase the strength while in that plane in order to maintain the correction.

Sitting Side

Client will perform only to the left in order to increase lateral flexion away from scoliosis curvature. This also achieves proper positioning and mobilization of left scapula while moving with increased lateral flexibility.

Wunda Chair:

Leg Press Standing

Client will perform with bent knee while standing on left leg, and perform a few more reps while standing on straight right leg. This will help correct the left-lateral pelvic tilt and remind client to stand balanced when performing everyday activities.

Side Kneeling Stretch

Client will perform only to the left in order to correct lateral deviation, stretch right thoracic/obliques, and increase control and strength of weak left side obliques.

Swan on Floor

Client will bias right arm extended longer than the left arm for a couple of these extensions. This will facilitate a back extension in slight-left lateral flexion.
Conclusion

Idiopathic Scoliosis is a condition of the spine that is quite complex in nature. The extensive repertoire and diversity of the many movements of the BASI Pilates methodology alone provide a wealth of modifications to assist a scoliosis client such as Elin in managing her condition and beginning to move with more mobility, strength, and overall balance. This holistic approach to rehabilitation and recovery addresses all the key factors in managing idiopathic scoliosis. From breath to balance, from awareness to control - the BASI methodology of pilates truly offers a return to life.
Bibliography

