Imbalances:

Dancing with Scoliosis and the Pilates Journey

Kelli McKee Almos

August 20, 2017

South Pasadena, CA 2017

ATP Specific Training
Abstract

The purpose of this paper is to explore the spine and the imbalances that come along with structural deviations such as scoliosis as well as learned imbalances from years of dancing. I will go in depth about my personal journey from an adolescent receiving a scoliosis diagnosis while trying to hone in on my dance technique, to how Pilates has helped me become a more balanced and stronger adult. Re-learning positive movement patterns, recruiting the proper muscles, and working within the limits of stability are all important to the program created for this case study.


**Table of Contents**

Abstract 1

Table of Contents 2

Anatomy 3

Scoliosis and Dancer Imbalances 4

Case Study 6

BASI Block System 8

Conclusion 12

Bibliography 14
Anatomy

The spine is a multifaceted structure imperative to the most basic of movements like standing up, to the more complex movements of ballet technique. The spine consists of thirty-three vertebrae, also known as the vertebral column, which contain seven cervical vertebrae, twelve thoracic vertebrae, five lumbar vertebrae, five fused sacrum vertebrae, and three – five coccygeal vertebrae, also known as the tailbone. These are arranged from top to bottom, increasing in size from cervical to lumbar regions due to the weight it must bear (Clippinger 2016). Each vertebra is structured with either spinous or transverse processes where ligaments and muscles are connected as well as an inferior/superior articular process connecting vertebra to vertebra (Clippinger 2016). A normal spine consists of natural curves allowing for shock absorption, weight bearing, and functional activity. Intervertebral discs create the formation of these curves. They are cartilaginous joints allowing movement between vertebrae.

Just as important as the bony structures, are the muscles surrounding and involved in supporting and moving the spine. Key muscles for spinal flexion and lateral flexion include the
rectus abdominis, external oblique, and the internal oblique with the latter two assisting in spinal rotation. The transverse abdominis acts as a corset around the lower six ribs and is crucial for spinal stabilization, while the iliopsoas are connected to the lumbar vertebrae and hip resulting in hip flexion and lumbar lateral flexion (Clippinger 2016). The above-mentioned muscles are all anterior muscles supporting spinal movement. The posterior muscles include the erector spinae group that act as the main spinal extensors and the semispinalis, which controls the extension, rotation, and flexion of the head, cervical, and thoracic spine. Also posteriorly, are the deep posterior spinal group, spanning small regions along the spine allowing for localized extension, lateral flexion, and rotation. The quadratus lumborum extends from the twelfth rib to the lumbar region, attaching posteriorly and also contributes to lateral flexion of the spine (Clippinger 2016). All of these muscles work together to create full range of motion for the spine and allow a healthy combination of strength and flexibility in the body.

**Scoliosis and Dancer Imbalances**

The anatomy of the spine allows for curvatures to exist however, any curves that are present and are greater than ten degrees laterally, are considered scoliosis curves. Most curves aren’t physically noticeable until the twenty-degree range (Spine-health, 2017). There is no specific reason why one gets scoliosis but influences include genetics, congenital vertebra abnormalities, and trauma. Additionally, idiopathic (or unknown cause) genetic scoliosis makes up eighty percent of the cases with mostly females being affected in
the adolescent years ("Scoliosis", 2017). Imbalances are seen in moderate to severe cases and consist of changes in gait cycle: compensation for uneven hips, counterbalance unevenness, arm stride differences, decreased spinal range of motion due to tightness, pain causing compensations, and breath pattern changes due to smaller space around the lungs (Spine-health, 2017). Treatment for scoliosis covers observation for mild cases, bracing for moderate cases, and surgery for severe cases. How quickly the curve is growing, location of the curve, how much growing the patient has left to do according to growth plate X-rays, and Cobb angle degree assessments are all taken into consideration when advising treatment.

While there is no concrete evidence, some findings have shown female ballet dancers tend to be prone to scoliosis. According to Dr. Leon Scott of Vanderbilt University and former team physician of the Boston Ballet, “…how ballet students are taught to hold their spines in class is opposite of the spine's natural curves. Starting ballet at a younger age, increased frequency of ballet training and increased duration of ballet are associated with an increased risk for developing the abnormal curvature seen in scoliosis” (dancemagazine.com). Whether it’s because they are always looking at themselves in the mirror and have extreme body awareness or the taxing demands that comes along with taking class, dancers have definite imbalances are created by dancing.

All dancers have a stronger side, a more flexible leg, and even one foot that can point better than the other. For the dance population, these imbalances are functional – maybe you are cast as a swan in Swan Lake and are standing on your right leg for most of the ballet or maybe you always turn to the right in all your performances. However, sometimes learned unevenness can become much more of a problematic structural imbalance. A common spinal alignment imbalance often seen in dancers is hyperlordosis. According to the Rudolf Nureyev Foundation
Medical Website, “When the external rotation of the hip is insufficient, hyperlordosis is static as it allows the anterior hip ligaments to stretch and increases the turn-out. Hyperlordosis is usually dynamic and can be seen when the dancer is turning, jumping or lifting.” This condition can be seen from routine incorrect muscle activation and recruitment patterns. The real imbalances come in the form of tight spinal extensors, tight hip flexors, weak abdominal muscles, and overstretching back extensor muscles (Clippinger 2016). In some dancers with very flexible hip extensors, fatigue posture and forward head may occur. This is often seen when the dancer is on downtime not dancing whether it be in the wings or between exercises in class. Fatigue posture imbalances are due to overly worked and overly tight abdominal muscles in combination with weaker back extensors. Often in dance class, the correction to lift up from your ponytail or bun can be heard. This is a correction for forward head and imbalances that when triggered include shortening of the cervical extensors (Clippinger 2016). Many dancers stick their necks out and produce the forward head in hopes of getting the leg higher, but in reality the leg must come to the body not the other way around. Everyone has imbalances especially dancers with the physical and mental demands dance can have on the body. These are only a few examples of imbalances dancers can experience. Correct muscle recruitment as well as correct movement patterns can lessen the consequences dance has on creating imbalances in the body.

**Case Study: Introduction**

I am a 28-year-old aspiring Pilates instructor with over 18 years of dance background. I’m 5’2”, athletic yet slender build, and strong from all my years of dancing. I was first diagnosed with scoliosis
at age ten with a double curve, or S-curve, with one deviation in the lumbar region and another in the thoracic. The doctors monitored my curve for about a year finally deciding to use a ‘Boston brace’ as part of my treatment. Due to the placement of the curves, the brace only corrected the lumbar curve; the doctors stated that bracing the upper curve would require amputation of my arm! I kept my arm and became very serious about my dance training. I added more dance classes and became more intensely focused on my ballet and jazz education. My doctors insisted I wear my brace all the time with the exception of dancing and bathing (about 21 hours per day). I continued to be monitored until my growth plates closed about two and a half years later and transitioned to wearing the brace only at night for an additional six months. I continued to return to my doctor for routine spine checks and on my most recent in July of 2017, my thoracic curve was 51 degrees and my lumbar curve was 31 degrees.

Since removing my brace I’ve gone on to dance with the Joffrey Ballet Summer School, performed on television, danced in music videos, and took part in many stage performances. I never realized just how imbalanced I was until the FAP/CAP program and I increased my
knowledge of the body and Pilates. During my self analysis of my plum line, standing with no effort, I noticed I have round shoulder syndrome, chin slightly forward, ribs tend to splay out, extreme hyperlordosis, and slight pronation of the arches of the feet. Through watching myself on a recorded roll down, I saw an obvious pronounced raised left side thoracic area near the scapula with scapular movement and instability, difficulty in spinal flexion of the upper thoracic region, tightness and little ability for lumbar articulation, right lumber area more pronounced than the left, anterior pelvis tilt, and flexibility in the hamstrings. While some of these imbalances are a result of structural malformations, others have been developed through learned behaviors in dance class. The following program focuses on challenging spinal articulation and flexion, independently moving limbs, and pelvis correction while correcting negative movement patterns.

**BASI Block Program**

- **Warm Up**
  - Cadillac:
    - Cadillac Warm Up Series:
      - Roll Up with the Roll Up Bar, Spine Twist Supine, Mini Roll-Ups, Mini Roll-Ups with Oblique, Roll-Up Top Loaded

I chose the Cadillac Warm Up Series for the assist the bars provide. Proper engagement of the abdominals can be activated easier with the assist of the Roll Up bar for someone who has trouble with spinal flexion and articulation. The mini Roll-Ups are beneficial in getting to the correct chest lift position all the while recruiting deep abdominal muscles. The Mini Roll-Ups with Oblique are a crucial part in strengthening a scoliosis imbalance. The idea that one side will always be the weaker one can be offset with this exercise by strengthening each side
independently. The Roll-Up top loaded is imperative in helping to stretch the shoulders while engaging the back extensors and closing the ribcage. The challenge for my specific body is to keep my ribs in while going to the maximum shoulder stretch in order to get my torso and legs perpendicular.

• **Footwork**
  
  o Wunda Chair:
    
    ▪ Parallel Heels, Parallel Toes, V Position Toes, Open V Heels, Open V Toes, Calf Raises, Single Leg Heels, Single Leg Toes

  One of the most imperative cues for the footwork on the Wunda Chair is to keep a neutral and stable pelvis, which is why it is a great workout for hyperlordosis. The co-contraction of the abdominals and back extensors along with engagement of the adductors will enable correct movement patterns.

• **Abdominal Work**
  
  o Wunda Chair:
    
    ▪ Cat Stretch Kneeling
    ▪ Torso Press Sit

  The Cat Stretch Kneeling is a good way to test the pelvis stability control while working in deep flexion and flat back. It also exercises scapula stabilization, which was a noticeable correction in my roll down assessment. The Torso Press Sit not only works the abdominals, but the hip flexors as well. The length and strength required for Torso Press Sit is a nice contrast to the Cat Stretch Kneeling exercise where the hip flexors are working rigorously in flexion. The power needed for the hip flexors as well as intense abdominal power, will greatly contribute in correcting hyperlordosis.
• **Hip Work**
  - Cadillac:
    - Single Leg Supine Series:
      - Frog, Circles (Down, Up), Hip Extension, Bicycle (Reverse)

  The difficult task within this series is to keep the pelvis still while working a full range of motion for the movements with the leg in the strap. The advantage of the single leg is that it ensures that the stronger leg isn’t overcompensating for the weaker leg. This is a beneficial series for dancers like myself who have one leg stronger than the other.

• **Spinal Articulation**
  - Cadillac:
    - Tower Prep
    - Tower

  Since my lumbar region is so tight, it’s very difficult for any spinal articulation. The valuable aspect of these exercises is the use of the Cadillac when articulating through the spine. Using both my arms on the poles as well as pushing into the push through bar with my feet as assists, allows for me to really feel each vertebra roll off (and onto) the mat. I get the most out of the movement that would be much harder to initiate without the use of the assists.

• **Stretches**
  - Reformer:
    - Kneeling Lunge

  This stretch is not only uses the hip flexors and hamstrings, but also a slight posterior pelvis tilt. While being able to stretch areas that were just worked out heavily, the pelvis still is training to be in proper alignment.
• Full Body Integration F/I
  o改革者:
    ▪ Round Back
    ▪ Flat Back
    ▪ Down Stretch

  The key in all of these movements is stability and control. The challenge for me is getting into and maintaining a C-curve in Round Back, engaging the abdominals as not to sink into the low back in the Flat Back, and sustain a posterior pelvis and supported torso arc in the Down Stretch.

• Arm Work
  o改革者:
    ▪ Arms Kneeling Series:
      • Chest Expansion, Circles Up, Circles Down, Triceps, Biceps

    This series is not only a hard workout for the arms, but also in trunk stabilization. In order to sustain a still torso, a posterior pelvic tilt (for me and my hyperlordosis) must be maintained. More challenging than the actually arm work for me, is upholding the correct pelvis placement throughout the entire series.

• Full Body Integration A/M (After 20 sessions)
  o改革者:
    ▪ Long Back Stretch

    This advanced movement embodies a full range of motion previously worked on throughout the program such as trunk flexion, flat back, posterior pelvis tilt, and spinal articulation.
• **Leg Work**
  
  o **Reformer**
    
    ▪ **Single Leg Skating**

  Continuing to work sides of the body in isolation from one another whenever possible, this exercise works one leg at a time. The set up, with the hands on the hips, is also a great self-tactile cue to keep the pelvis in neutral and not let it slip into an anterior tilt.

• **Lateral Flexion/Rotation**
  
  o **Wunda Chair**
    
    ▪ **Side Stretch**

  I chose this exercise as it really challenges the working oblique. It is also difficult for me personally to keep my ribs closed while my hand is behind my head. Those two challenges, plus trying to keep between two panes of imaginary glass, allow for the sides to work independently from one another, creating more balance within the body.

• **Back Extension**
  
  o **Wunda Chair**
    
    ▪ **Swan Basic**
    
    ▪ **Back Extension Single Arm**

  These two exercises are advantageous for my conditions. The Swan Basic not only works the back extensors and articulation of the spine, but it also cues for deep abdominal stabilization and bias towards a posterior tilt. The more I move away from a lordotic posture, the easier these movements become. The Back extension Single Arm is a vital exercise in my routine. It challenges each side individually and works on stabilization of the oblique muscles independently.
**Conclusion**

To sum it up, the back is a complex structure made up of vertebrae, intervertebral joints, and muscles both large and small. Natural curves are healthy for a spine and are important for everyday activities. Any spinal curve larger than ten degrees laterally, is considered scoliosis and should be monitored. Due to the severity of my specific case, my form of treatment was bracing although, I think dancing is what truly helped me! Dancers however, deal with their own set of structural and learned imbalances such as hyperlordosis, fatigue posture, and forward head. From my training I developed incorrect recruitment and muscle movement patters as well as unevenness. With the knowledge and awareness I gained going through the BASI training, I was able to construct a program that helped immensely. I am gradually gaining an increased range of motion in spinal flexion, have more control in keeping my ribs from splaying, and am strengthening the side of my body that was weaker due to my scoliosis and dance imbalances. Benefiting from these exercises has given me so much strength, stability, and power, which has resulted in injury prevention and better ease of my functional activities. I plan to continue my program and improve on my pelvic stabilization and correcting my hyperlordosis. I have truly gained a deeper focus and a greater mind-body relationship all correlating to the Pilates principles. I can’t wait to see where this journey takes me!
Bibliography


• Connard, Cc. “Posts about Boston Brace on CC Has Scoliosis.” *CC Has Scoliosis*, 21 June 2015, cchasscoliosis.wordpress.com/tag/boston-brace/. *Photo*

