PERFORMANCE CYCLING CONDITIONING
A Newsletter Dedicated to Improving Cyclists

The Relationship between Postural Asymmetry and Cycling Injuries

Lori Thomsen, MPT, PRC


Lori Thomsen

Lori completed her Bachelor of Biology degree from Nebraska Wesleyan University in Lincoln, Nebraska and her Master of Physical Therapy from the University of Nebraska Medical Center. Her 11 years of clinical experience has resulted in a strong passion for the Postural Restoration science and patient interventions. Lori has recently moved back to the Lincoln area from North Dakota where she enjoyed providing in-services to physicians, chiropractors, physical therapists, coaches and athletes in the implementation of Postural Restoration in their practices. She currently practices at the Hruska Clinic, Restorative Physical Therapy Services in Lincoln, Nebraska. Lori is a member of the American Physical Therapy Association. Lori has earned the designation of Postural Restoration Certified (PRC) as a result of advanced training, extraordinary interest and devotion to the science of postural adaptations, asymmetrical patterns, and the influence of polyarticular chains of muscles on the human body as defined by the Postural Restoration Institute™.

edges in cleats, adding padding to the right saddle and modifying bike fit are current trends to assist with postural mal-alignment in cyclists. Cycling is a sport that requires a person to maintain a postural position for hours during a normal workout. The average cyclist will perform 80-110 rpms per minute. If you take this coupled with the repetitive position that cyclist's workout in, injuries will result. Common injuries include pain found in the neck, IT band, knee, low back and feet. If the body is not in the right position with normal sitting, standing, and walking activity how will it be in the right position sitting on a bike? This article will assist cyclists in preventing injury by discussing postural symmetry of the body prior to getting on a bike.

Cyclist Patient Example

A regionally competitive 34-year old cyclist who rides 200-350 miles per week came to physical therapy with complaints of pain in his left knee, left TFL, and low back along with reported pain in his right side with difficulty breathing during hard workouts and performances. During pedal stroke he noticed that his hip bones did not sit evenly on his seat and he was "losing power". He also noted that he was pushing off through his right leg only. He also experienced dramatic changes in his running form and wear on the outside soles of his shoes with the right greater than the left. Two years prior to the onset of symptoms, he switched bike positions to extreme forward aft seat position.

Physical therapy assessment of this patient found that he had postural mal-alignment. He demonstrated a forwardly rotated and anteriorly tipped left pelvis along with incorrect mechanics of his upper body which contributed to ineffective "belly" versus diaphragmatic breathing. This will be a three part series. The first part will discuss the physical therapy findings and an explanation of pelvic asymmetry. The second will discuss the importance of diaphragmatic breathing and its vital role with postural restoration along with the physical therapy assessment. In part three the treatment and patient results will be explained.

Upon initial visit the patient demonstrated these objective findings:
1) Adduction Drop Test: positive on the left (Figure 1A) and negative on the right (Figure1B)
2) Extension Drop Test: positive on the left (Figure 2A) and negative on the right (Figure 2B)
3) Straight Leg Raise: 75º on the left with 90º being ideal
4) Leg length: left leg longer than the right by 1/4 inch
5) Inability to stand on his left leg with his pant zipper (pubic bone) going over his left big toe.
6) Wear pattern of his saddle: dramatic wear on the right versus the left.

When considering the above findings, it is common for the injured cyclist to be advised in stretching their IT band, hip flexor, and hamstrings, and to use a heel lift in the right shoe. However, stretching and heel lifts are most effective when considered following an assessment of muscle position as improper position can be an underlying cause of symptoms. Using a Postural Restoration approach, the pelvis is repositioned prior to evaluating the need for a stretching program.

Postural Asymmetry

A common pattern exists in everyone that contributes to pelvic asymmetry. How people compensate for this pattern can vary, however, the underlying dominant pattern exists in all humans. This

asymmetrical pattern has been identified as early as 1914 and has further evolved with the clinical experience of Ron Hruska, MPA, PT through the Postural Restoration Institute™. Everyone favors their right leg. Whether left or right handed our right leg is dominant. We have a liver on the right side of our body that weights approximately three to four pounds and on the opposite side we have a spleen that does not even weigh a pound. We have three lobes of our lung on the right and only two on the left. In our upper trunk, we have a heart that lays more to the left. This organ asymmetry coupled with gravity and environmental factors result in a tendency to stand on our right leg and rotate our upper body to the left. Consider how the world is set up to reinforce this asymmetrical body. When we cycle or run around a track which way do we go? Counterclockwise. When we grab a grocery cart to shop which way do we go? Counterclockwise. When a Checker scans our products at the grocery store which way is it done? Counterclockwise. Always pushing off a right leg and rotating your upper body to the left.

Now take into consideration that the majority of people are right handed. They reach with their right hand for the phone, toothbrush, refrigerator, etc reinforcing the weight shift to the right and upper trunk rotating to the left. Even some left handed people, bat, golf, and throw right handed. The tendency to favor our right leg and rotate our upper trunk to the left with everyday tasks is overwhelming. Organ asymmetry, a counterclockwise world and right handedness reinforce this neuromotor right dominant pattern. The result of this right dominant pattern is a pelvis that is forwardly rotated and anteriorly tipped on the left and a trunk that is rotated to the left.

Do not misunderstand that standing on the right leg and rotating the upper body to the left is wrong. This neuromotor right pattern is half of walking, stair climbing, and cycling. However, the inability to stand on the left leg and rotate your upper body to the right creates imbalance throughout the body. This imbalance affects joints, bones, and muscles. In this right dominant pattern you tend to stand on your right leg, shifting your right hip back with your left hip forward. When the patient in this case study was asked to shift his weight over to his right leg he did so with ease. However, when asked to stand on his left leg, his pelvis still remained forward on the left. He went into a hemi-lordosis (increase back arch) on the left to compensate for his inability to shift into his left hip socket correctly, therefore creating his low back pain. If asked to perform the task correctly he would have shifted back into his left hip letting his right hip come forward. This would have allowed for the head of the hip to position properly into the hip socket (acetabulum). When someone lacks the ability to stand on the left leg correctly, most often they will have a tight posterior hip capsule (ischial-femoral ligament) which visually creates a shorter left leg.

The inability of this patient to shift his left hip back and right hip forward properly had resulted in wearing of the lateral border of the soles of his shoe. This patient had to carry his weight on the outside portion of his right foot. The arch of his right foot was higher from the ground (forefoot varus) compared to the left. The way to have correct biomechanics of the foot is to have the right hip shift forward and the left back. This would allow for the heel to strike and increase weight through the arch of the foot and push off with the big toe for correct propulsion during gait. The patient could not do this, therefore wearing out the lateral soles of his shoes.

This pelvic asymmetry on the left which orients the pelvis and weight bearing to the right now causes rotation at the sacrum (base of the spine) and lower lumbar spine at L4-L5 to the right. The femurs (thigh bones) also compensate for this forwardly rotated and anteriorly tipped pelvis. The left femur bone actively goes out (external rotation) and the right goes in (internal rotation). This is required for the patient to walk or cycle straight ahead. Now if the left femur bone is actively in external rotation the lower shin bone (tibia) is oriented in, the patella (knee cap) will not track correctly and knee pain results as was demonstrated with this patient (Figure 4).

Joint and bone position are affected by pelvic asymmetry, but what about the muscles? Muscles that cross the back, pelvis and hip region can affect movement patterns on each side of the body. If these muscles are balanced they should turn “on” and “off” to allow reciprocal activity in this region. For instance, if the pelvis goes back on one side then it goes forward on the other. If one hip goes “in” then the other goes “out”. This reciprocal movement is needed for correct biomechanics with walking, cycling, running, etc. If this does not occur, as in the case with a forwardly rotated and anterior tipped pelvis on the left, then asymmetrical muscle position occurs. These mal-positioned muscles then cannot work correctly. You now have muscles in the incorrect position that cannot "turn on" to do their job and others that cannot "turn off." This overactive chain of muscle has been described by Hruska and is taught through the Postural Restoration Institute. The left psoas, iliacus, TFL, and piriformis and right adductor magnus, piriformis and vastus lateralis are all muscles that need to be inhibited in a forwardly rotated and anteriorly tipped left pelvis. This patient had left TFL pain due to overactivity; this was a muscle that was “on” all the time. In comparison, the muscles this patient could not turn “on” were his left hamstring, left adductor and left gluteus medius and right gluteus maximus. These muscles are those that support this patient’s ability to move his pelvis back and to shift into his left hip to allow for reciprocal activity with cycling.

The patient who has an asymmetrical pelvis with joints, bones, and muscles not in the appropriate position when he stands and walks now also cycles competitively for hundreds of miles a week. The position up on the feet is going to reflect what happens on the bike. For example, this patient’s saddle was worn down on the right. This reflects a forwardly rotated and anteriorly tipped pelvis on the left causing the weight shift over to the right. The patient also was aware that something was unbalanced as he was using his right leg to power through his workouts versus his left. The patient’s extreme forward aft seat position also affected his forward positioned pelvis. This seat position does not allow the knees to be at the level of the hips, therefore causing the pelvis to go forward and increasing a lumbar lordosis. Muscles discussed earlier are no longer in a position to work and the TFL, quadriceps, hip flexors, and back extensors are overactive. These muscles work with the patient in a repetitive position on his bike contributing to developing mal-adaptive patterns influencing respiration and biomechanics. The result is pain in a multitude of areas and inability to breathe.

Seat position and fit to a bike is rider specific and a science in itself. It is suggested to the cyclist that cleat wedges, added height to the right side of the saddle, and placing your seat back are passive alterations to adjust for the asymmetrical pelvis. A neutral pelvis can be attained using Postural Restoration Institute (PRI) techniques. PRI was developed with the mission of ongoing research, education, and application of treating the asymmetrical body. Article number two will discuss the asymmetry that exists in the upper trunk and how it affects breathing. The last article will discuss Postural Restoration treatment with ideas to assist with injuries and prevention for the cyclist.

More Information Please! To contact Lori and or obtain a list of references, please visit www.posturalrestoration.com.

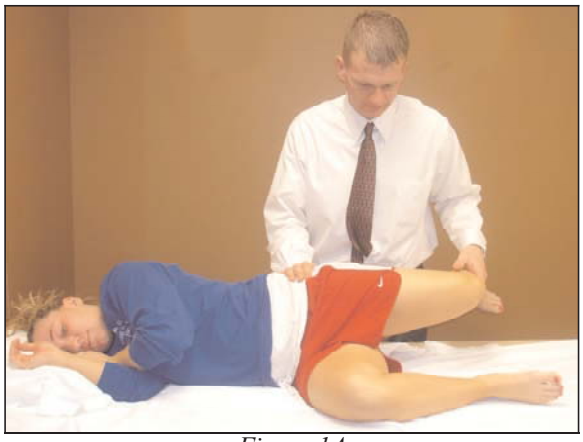

Figure 1A

Figure 1B

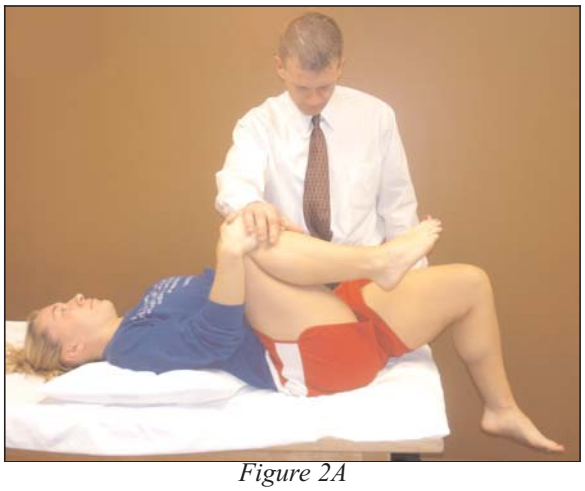

Figure 2A

Figure 2B

Figure 3

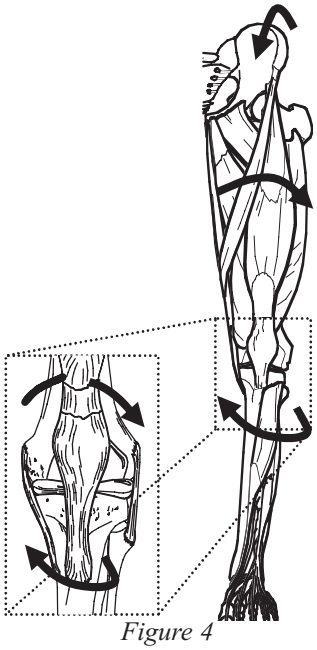

Figure 4