

PERFORMANCE VOLLEYBALL CONDITIONING

A NEWSLETTER DEDICATED TO IMPROVING VOLLEYBALL PLAYERS

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Postural Restoration Institute® Presents the New Off-Season: Balanced Regeneration Series #5 AF ER - Right Gluteus Maximus Facilitation

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Lisa was a member of the University of Nebraska volleyball team from 1995-1997. She was introduced to the science of Postural Restoration as a patient under the care of Ron Hruska. She had suffered from long-standing injuries sustained during her collegiate volleyball career and found success with the treatment techniques she learned at the Hruska Clinic and later received from the Postural Restoration Institute. Lisa returned to practice physical therapy at the Hruska Clinic Restorative Physical Therapy Services in Lincoln, Nebraska after completing her Doctorate of Physical Therapy from the University of Nebraska Medical Center in Omaha. Lisa is a member of the American Physical Therapy Association.



Lisa Bartels

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elcome to the new off-season: Balanced Regeneration- a series of articles dedicated to creating balanced athletes participating in a side dominate sport. A side dominate sport is defined as a sport in which skills are performed utilizing a "preferred" side of the body on a repeated basis. Each issue of this publication will present a new installment that develops a progressive step-by-step plan, based on Postural Restoration concepts and methodology. This plan is designed to create a balanced athlete who can manage asymmetrical sports demands without pain and injury.

The first article installments introduced the concept of AF IR and why this triplanar ability is lost on the left side of the body and how you restore AF IR with specific training of the left hamstrings, left ischio-condylar adductor, and the left gluteus medius in that order. The purpose of this installment is to introduce the concept of AF ER and explain why this triplanar activity is typically lost on the right side and how you restore it via right gluteus maximus facilitation.

Net Link: Want more information on the new off-season? Get Lisa's overview introductory article click [HERE](#)

The Problem-Anatomy of Imbalance

If the members of an athletic team were instructed to stand shoulder to shoulder in a straight line with their arms at their sides, it would appear that the pelvis and trunk of all players was neutral, facing straight ahead. Despite appearances, the pelvis may not be in a neutral resting position in several of those athletes. If you casually observed all members walking from a front and back view it may appear that the right and left sides move symmetrically, but with closer observation you will likely see differences in stance time, leg swing, trunk rotation, arm swing, shoulder height, and hip rotation. The Postural Restoration Institute® (PRI) assumes that all right side dominant athletes have at least some postural instability because of their asymmetric sport demands. Most competitive athletes that are evaluated with Postural Restoration methodology initially present with significant left side versus right side differences; differences in bony position, differences in muscle length, strength, and function, and differences in the integrity of various joint sockets. The reason for these differences is due to right sided dominance and repetitive right extremity demands which can over time generate an unlevelled pelvis. Specifically, the left side of the pelvis will commonly rotate forward relative to the right side, a left pelvic torsion. This is significant because athletes will compensate in one or more areas of the lower extremities, trunk, and upper extremities to remain balanced over the unlevelled pelvis. Thus they acquire faulty movement and muscle strategies that can result in various pain patterns as they continue to train and compete.

Acetabular (socket) Femoral (ball) Internal Rotation (AF IR) and Acetabular Femoral External Rotation (AF ER) are terms PRI has coined as an individual's ability to correctly shift into and out of their hips. AF IR and AF ER are basically myokinematic descriptors of gait. Myokinematics was defined in article 2 as the study of muscle function and force in the three cardinal planes

of the body; sagittal, frontal, and transverse. Most muscles function in at least 2 if not all 3 planes because of their oblique orientation between their bony attachments. AF IR and AF ER could be thought of as both a bony position and a triplanar muscle action. During swing and stance phases of gait both the femur and pelvis should be rotating on each other simultaneously. Some of this rotation is AF IR and some is AF ER. For simplicity sake we are going to ignore the biomechanics of swing phase and focus on stance phase which can be divided into two halves. The first half begins just after heel contact as the body's center of mass is moving forward, upward, and toward the foot that just contacted the ground. The body is essentially climbing and shifting its mass over the supporting lower extremity as the pelvis, femur, and tibia are all rotating internally in the horizontal plane. This is AF IR; the acetabulum is rotating internally over the femur (Figure 1). Tibia internal rotation occurs in conjunction with AF IR. AF IR motion continues until midstance where the hemi pelvis is in a maximum amount of AFIR position. After midstance the pelvis, femur, and tibia reverse their direction and begin to externally rotate as the center of mass starts moving in a downward direction toward the other leg which is still in swing phase. External rotation occurs until toe off. This is AF ER (Figure 2).

Athletes who have acquired a resting position of left pelvic torsion lose the ability to perform active AF IR on the left and active AF ER on the right. The left hemi pelvis has become stuck anteriorly in the sagittal plane, abducted in the frontal plane, and externally rotated in the transverse plane. Left lumbo-pelvic musculature such as the hamstrings, left gluteus medius, and left ischio-condylar adductor have lost their optimal mechanical advantage/leverage to correctly function. The reverse is true on the right. The right hemi pelvis has become stuck internally rotated, adducted, and posteriorly rotated (Figure 3). Right lumbo-pelvic musculature such as the gluteus maximus has lost its optimal mechanical leverage to correctly function.

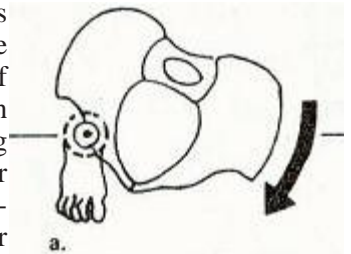
The Solution

Conditioning programs need to have a built in counter mechanism that significantly reduces an athlete's tendency towards left pelvic torsion. The first four article installments have emphasized the facilitation of left lumbo-pelvic musculature only. Now that AF ER has been introduced and integrated with AF IR into a reciprocal gait discussion we can also introduce specific muscle retraining on the right side of the pelvis, specifically facilitation of the right gluteus maximus.

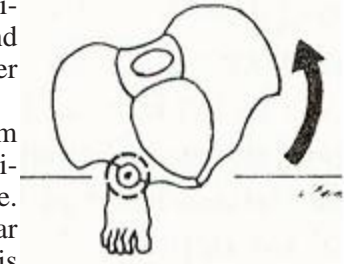
Most kinesiology texts site three muscle groups as playing a critical role during gait; hip extensors, hip flexors, and hip abductors. Less well documented is the role of the hip adductors and rotators. The authors of these kinesiology texts admit that the information currently available about lower extremity kinematics in the horizontal plane is provided by a limited number of studies. The same kinesiology texts site muscle activation studies that show the gluteus maximus as most active during early stance and terminal swing. They are emphasizing the eccentric activation of gluteus maximus to control the internal rotation of the lower limb in early stance.

Because of the limited number of studies investigating the role of hip rotators in the horizontal (transverse) plane during gait, it is fair to question whether the role of the gluteus maximus during gait is underestimated. The Postural Restoration Institute (PRI) does not discount the eccentric role the glute max has in early stance, but suggests that glute max has a significant concentric role from midstance to toe off. PRI describes glut max as a triosseous muscle whose main activity is to push the weight of the body to the other leg. A triosseous muscle is one that attaches to three separate bones (Figure 4). Gluteus maximus possesses fibers that attach to the sacrum, innominate, and femur. In addition this muscle also has attachments to the sacroiliac ligaments and the iliotibial band. Its role in maintaining the pelvis congruently aligned with the femoral head, and keeping the sacrum congruently aligned with the pelvis is profound. The sheer size of this muscle and its massive amount of bony and ligamentous attachment suggests significant function that is not limited to eccentric control. PRI has proposed that the gluteus maximus functions as the primary concentric hip external rotator from midstance to toe off to enable weight shift to the other leg.

Traditionally the gluteus maximus has not received much emphasis in training/rehabilitation circles in terms of functioning in a triplanar manner. The gluteus maximus is generally understood to function by actively extending the hip during stance phase of gait. Rarely do athletes knowingly train the right glute max by performing external rotation activity. It has been my clinical observation that most athletes dealing with chronic anterior knee pain on the right have developed significant weakness and dysfunction in the right glute max. Right glu-



a. Left forward rotation
Figure 1



c. Left backward rotation
Figure 2



Figure 3

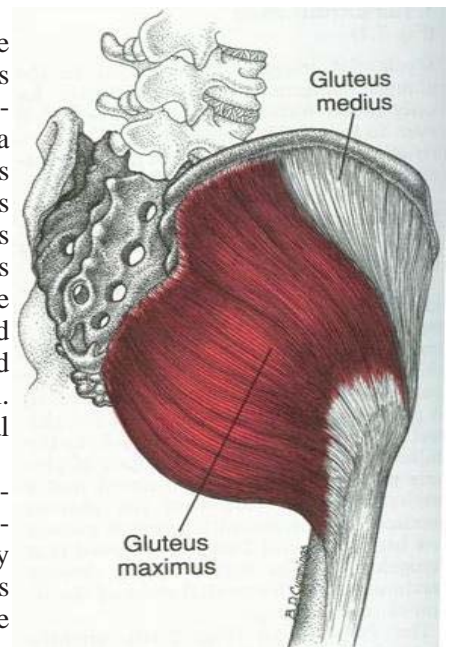


Figure 4

teus maximus dysfunction is also frequently an underlying factor in recurrent left and right hamstring strains.

The Postural Restoration Institute® has developed numerous activities that incorporate the right gluteus maximus. Many of these also incorporate the left ischio-condylar adductor and left gluteus medius, but you can't start with many of these, they are too difficult. There is one exercise in particular that isolates the right gluteus maximus; Left Sidelying Right Glute Max. This is the exercise you need to start your athletes with. You can attempt this activity immediately after hamstring repositioning and Right Sidelying Left Adductor Pullbacks. You do not have to perform upright left gluteus medius activity prior.

The left side lying right glute max is essentially a precursor for all of the upright dynamic activities that are in PRI's integration and squat programs (Figure 5 on next page). This activity is a gravity assisted position that allows people to feel pure right AF ER as they shift the right knee in front of the left. The athlete then externally rotates and abducts the hip by lifting the right knee. I frequently tell my clients while they are performing this activity that they are basically performing stance phase of gait, midstance to toe off on their right side. This concept really hits home after they feel how easy this activity is on the other side. If this muscle is being appropriately recruited, the athlete should feel the entire bottom half of the gluteal region engage. The most common mistake athletes make is allowing the pelvis to rotate back as the right knee is lifted. The pelvis must remain motionless as the knee is lifted. Tell your athletes to keep their right hand on their right hip until they are familiar with the motion. The rotation point of the right thigh should be visible to your observing eye just below the athlete's hand. The other situation you need to watch for is over activity of the right quad and/or right hip flexor. If your athletes report feeling the anterior thigh significantly, tell them to keep their right heel pushed into the wall. Five to ten sets of this activity should be performed after hamstring repositioning and Right Sidelying Left Adductor Pullbacks every training session for 1-2 weeks. You can add a resistance loop after several days. After 2 weeks you can try advancing to other sidelying activities that will be introduced later in the series, but I would never discontinue this activity all together.

The next step is to engage the right glute max in an upright standing position; the Right Squat with Left Hip Approximation activity is ideal because you can integrate it into the weight room later (Figure 6 on next page). I would recommend waiting to begin this activity until after an athlete has successfully engaged the left glute med with the Retro Stairs activity. Have your athlete begin by standing with 90% of their weight on the left side with the right knee very bent and the right foot on a two inch block. Instruct them to pull or hike the left hip straight up as the right knee straightens and their weight shifts to the right. At this point the left foot should be off the ground and higher than the right foot, and they should technically feel the left inner thigh. They are now in right single leg support, therefore, some muscle has to turn on to hold the weight of their body up. If they keep the left hip hiked the right glute max should engage because they are in a position of right AF ER which places the right glute max at optimal mechanical advantage. They may feel some right quad working which is fine, but make sure they have not locked the right knee. If you tell them to push gently through the right heel as they keep the left hip hiked, the right glute max will engage. To further increase right glute max facilitation have the athlete push through the right heel and pull the right knee forward into more flexion or bend. Technically they just squatted, but the pelvis and trunk position should not have changed. Have them hold the position for 20-30 seconds making sure they don't lose the left hip hike. Repeat this activity several times. You could use theraband to enable further recruitment of the gluteus maximus. If you anchor theraband around the back of the knee so it is essentially pulling the knee forward (placing flexion torque via the knee joint), the glute max will engage to oppose forward translation of the knee. Use this activity daily if possible for 1-2 weeks, in conjunction with the Retro Stairs activity that was described in article #4. Later you can integrate this single leg dynamic activity with more traditional power lifts in the weight room.

Single leg dynamic retraining utilizing left AF IR and right AF ER principles and how they can be integrated into the weight room with power lifting will be the topic of the 6th article installment. 

Figure 1 credit: Taken from Norkin, C and Levangie, P: *Joint Structure and Function: A Comprehensive Analysis, Ed 2, FA Davis, Philadelphia, p 314.*

Figure 2 credit: Taken from Norkin, C and Levangie, P: *Joint Structure and Function: A Comprehensive Analysis, Ed 2, FA Davis, Philadelphia, p 314.*

Figure 3 credit: Postural Restoration Institute®

Figure 4 credit: *Myofascial pain and dysfunction, the trigger point manual, the lower extremities, Volume 2, Travell and Simons, 1992, by permission of the publisher Williams & Wilkins.*

Please note that techniques provided in Figures 5 and 6 are only examples of the many non-manual Postural Restoration Institute® techniques that could be considered appropriate for addressing the underlying biomechanical deficit described. For more information and references, please visit www.posturalrestoration.com.

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Figure 5

Left Sidelying Right Glute Max

1. Lie on your left side with your hips and knees bent at a 60-90-degree angle.
2. Place your ankles on top of a 3-5 inch bolster and place your feet firmly on a wall.
3. Place tubing around both thighs slightly above your knees.
4. Shift your right hip forward until you feel a slight stretch or pull in your left outside hip.
5. Keeping your toes on the wall, raise your right knee keeping it shifted forward. You should feel your right outside hip engage.
6. Hold this position while you take 4-5 deep breaths in through your nose and out through your mouth.
7. Relax and repeat 4 more times.



Figure 6

Standing Supported Right Squat with Left Hip Approximation

1. Stand against a desk or counter and place your right foot on a 2-inch block.
2. Place your hands on the surface in front of you and round your back.
3. Maintaining contact with your right arch, begin to straighten your right knee as you raise your left foot off the floor.
4. Keeping your left leg straight, hike your left hip up above the level of your right as you sidebend your trunk to the left. Your left foot will be higher than your right.
5. Keeping your left hip hiked, slowly begin to lower your left foot toward the floor by bending your right knee.
6. Continue lowering your left foot until it is about an inch from the floor. You should feel the muscles on the front of your right thigh engage.
7. Hold this position while you take 4-5 deep breaths in through your nose and out through your mouth.
8. Relax and repeat 4 more times.