

## The Soccer Players' Tug of War A Simple Understanding of Athletic Pubalgia and Sports Hernias

*by Mike Cantrell, MPT, PRC*

Many athletes complain of pain around the pubic bone with powerful symptoms along the inguinal line to the pubic symphysis. These symptoms are usually located along the inferior surface of the pubic ramus or on the superior surface or both. When the symptoms are present on the inferior surface of the pubic bone the resulting diagnosis is "adductor strain", which also has a variety of other diagnostic names like athletic pubalgia, groin pull or osteitis pubis. Most of these are descriptors of a similar problem: injury to the adductor group. Interestingly, many of these athletes have an accompanying history of lower abdominal pain (pain on the superior surface of the pubic ramus) and can be diagnosed with a "sports hernia" or injury to the attachment site of the Internal Obliques (IO's) and Transversus Abdominis (TA's) or even Rectus Abdominis (RA's). There are reasons why many times these diagnoses occur together. There are reasons why they (anecdotally) seem to occur more on the right side than on the left. These reasons must be understood in order to successfully treat this athlete with any conservative approach.

The PRI-trained clinician understands that the L AIC, R BC-patterned athlete has a tendency to shift the Center Of Gravity (COG) over the Right Lower Extremity (RLE). During gait, when the COG is over the R foot, the R foot supinates more than the L and the L pronates more than the R. The R femur is adducted and internally rotated. The pubic symphysis is shifted toward the R LE. The R side of the symphysis is "shearing" superiorly and the L side is "shearing" inferiorly. The adducted R femur and pubic symphysis position increases activity of the R adductor magnus group by placing it in a mechanically advantaged position. With the COG over the RLE, the pelvis and lower lumbar vertebrae are oriented to the R in all three planes of motion. With the pelvis and lower lumbar vertebrae oriented to the R, the torso must counter-rotate back toward the L. L torso rotation is accomplished in part, through concentric activation of the R IO's and TA's, which draws the R anterior ribcage into internal rotation down toward the pubic ramus with simultaneous external rotation of the L anterior ribcage and inhibition of the L IO's and TA's. The further superiorly the R pubic symphysis migrates the shorter and more concentric the R RA's become as well.

A 22 year-old Major League Soccer (MLS) player was referred to me for treatment of R "groin pull". He described pain in the infra-pubic region and pointed to his anterior femoral triangle region and noted tenderness to palpation of R inferior pubic ramus. His pain had been ongoing for approximately 11 months. He also noted some suprapubic pain that seemed to be indicative of an early sports hernia. He also mentioned that the infra-pubic pain seemed to be increasing over the months prior to his appointment with me. He felt pain with stance on either foot during running or walking and with kicking the ball with either foot. He had been

through a variety of programs (including strengthening of the R adductor group), all of which increased his symptoms.

After some careful evaluation and consideration of the fact that I had received two other professional soccer players with nearly identical histories, I began an explanation to the patient that I felt might be worth sharing with those interested in this sort of clinical disorder:

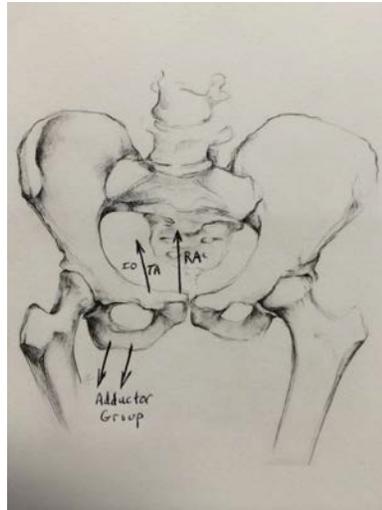
I explained to the patient that the primary problem was not a strength deficit of the R Adductor group but an inability to inhibit the group due to his obligatory R stance positioning. Likewise he was experiencing R lower abdominal pain as a result of the same type of inability applied to the R abdominal group. Difficulty with abduction of the RLE away from midline, while a problem, is secondary to his inability to move the pubic ramus (his midline) away from the RLE. Likewise, movement of his pubic ramus away from his lower ribs, while a problem, is secondary to his inability to move his lower ribs away from the pubic ramus. If the obligatory R stance phenomena is not integrated then the stage is set for a tug of war!

There is an ongoing upward vector of pull on the superior pubic ramus resulting from unyielding R IO and TA as well as RA activity. To be specific, the unyielding activity could be more accurately defined as continuous, concentric muscle activity as described above in paragraph two. Likewise there is an ongoing downward vector of pull on the inferior pubic ramus resulting from unyielding adductor activity. These vectors are graphically represented in the illustration below.

*The arrows on the R side of the skeleton are indicative of continuous, concentric activity of the R adductor group and R IO's and TA's which pull significantly on their respective pubic ramus attachments. On the L the pull is eccentric and therefore appears to be less intense on the pubic ramus.*



*Close-up view of pelvis influenced by L AIC pattern with arrows depicting superior vectors of pull of Rectus Abdominis (RA), Internal Obliques (IO) and Transversus Abdominis (TA) as well as inferior pull of adductor group*



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Depending on the level of activity and susceptibility to injury of a specific muscle group (abdominal or adductor), one will experience adductor pain with possible muscle damage, abdominal pain with possible muscle damage or both. Anecdotally, it appears that the abdominal group (sports hernia) is the weaker opponent in the “tug of war” illustrated above; that is, if “weaker” is defined by failure and subsequent need for repair of muscle that has been damaged. Many patient/athletes end-up receiving hernia repair surgery to reinforce the abdominal wall. In some instances when the repair is completed, the adductor pain increases because, in my opinion, the R abdominal wall received “reinforcements” in the form of surgical mesh. Now the weaker opponent appears to be the R adductor group. This can result in increased symptoms of pubalgia/groin strain. Solution? Have the tug of war opponents “please put down the rope” (pubic bone). In other words, begin an inhibition process involving the two opponents (adductor and abdominal muscle groups)

However the only way to “put down the rope” as it were, is to consider that both the adductor and the abdominal groups involved are tonically active, concentrically engaged muscles seeking to maintain an obligatory R stance in *any* phase of gait and in *any* stance position (L or R stance). As we already know, the L AIC and R BC patterns are dominant and tend to drive the concentric activity of the R Adductors, RA’s, IO’s and TA’s. A program designed to alter this dynamic must begin with inhibition of these polyarticular chains of muscle. This can be accomplished many times through simple but effective pelvis and ribcage repositioning activities. Following repositioning activities, the player will many times report some mild

reduction in symptoms but this is only the beginning. One must keep in mind that the Hruska Adduction Lift Test (HAdLT) scores are usually poor with R being less than 2/5.

HAdLT scores are a primary indicator of just how well the player can reduce his or her dependence on the R adductors, IO's and TA's. Even though a player may reduce their pain and assume a neutral position following repositioning it should be understood that neutrality is only that: neutrality. In some instances a patient can achieve neutrality and carry on without issue, but by and large the soccer player must be able to do much more than that. With a neutral pelvis the player may be able to lightly jog or lightly exercise but cutting and kicking require much more Frontal Plane (FP) control. The HAdLT indicates just how much FP control of the IO's and TA's as well as adductors the player actually possesses.

In order to increase the R HAdLT to 3/5 or better, there is a need for simultaneous recruitment of R adductor magnus and L IO's and TA's. Players with athletic pubalgia may not be able to achieve a 3/5 score because what they are doing is "hyper-recruiting" the R adductor group with minimal activation of the L abdominal wall during the 3/5 "attempt" or they may not be able to inhibit the R abdominal group during the attempt. Over-recruitment of the adductor group may be painful to the patient. So it is important to begin a program designed to increase abdominal wall activity on the L side so that the 3/5 score is one achieved with FP control of L abdominal wall and R adductors in appropriate proportion. Increasing L abdominal wall activity would immediately reverse the abdominal wall arrows in the illustration thus reducing demands on the R adductor group for concentric activity.

In order to reduce concentric demands on the described muscle groups, movement of the pubic symphysis away from the RLE must occur while FA and L thoracic abduction are simultaneously occurring. Achievement of this milestone is initiated in early rehab through activation of the L abdominal wall for L thoracic abduction. If thoracic abduction occurs with simultaneous activation of the R gluteus medius then true RLE abduction (FA Abduction) can take place as well. Immediate reduction of concentric FP adductor activity will ensue and the arrows in the image above will reverse from R to L.

In order to maintain (or even initiate) reduced concentric activity of the R IO's and TA's and R adductors one should also create a pronation moment of the R foot and ankle. During R stance the R foot is supinating with concentric activity of invertors and, as noted above, the R adductor group. Logically then, one must consider that successful pronation of the ankle can only occur during the above-described "shift" of the pubic symphysis. Without that shift and inhibition of the RLE adductor group the "drive" for continued supination will continue unabated and likewise as supination continues, so will the "drive" for concentric activity of the R abdominal wall and R adductor group (feed-forward activity).

A “Phase 1” suggested program designed to alter the concentric activity to eccentric is as follows. It should be noted though that these are only suggestions and the “theme” as outlined above is the primary issue. When a PRI-trained clinician is writing a prescription for Non-Manual Techniques (NMT’s) then all the potential concerns regarding that client should be considered since some techniques may be totally inconsistent with that individuals abilities or needs:

## 1. L SL L Flexed Adduction with R Extended Abduction and L Abdominal Co-Activation

R

Stability Integration (47)

**Left Sidelying Left Flexed FA Adduction with Right Extended FA Abduction and Left Abdominal Co-Activation**



1. Lie on your left side and place a 2-3 inch bolster under your left abdominal wall and 1-2 pillows under your head so that your neck is slightly adducted to the right.
2. Place a crate or a stool that is about 13 inches in height under your right ankle and bend your left knee. Your right ankle, hip and shoulder will be lined up.
3. Inhale through your nose and as you exhale through your mouth, reach down toward the wall with your right leg.
4. Push your left hip down firmly into the mat and try to arch your left abdominal wall. You should feel your left abdominal wall engage as you lift up away from the towel roll.
5. With your left abdominal wall engaged and your right leg reaching down, push the outside border of your left foot down into the mat and “turn” your left knee up. You should feel your left inner thigh and left outer hip (thoracic) engage.
6. With your left inner thigh engaged, attempt to pick your right foot off of the stool with your foot turned out to the side. You should feel your right outer hip (thoracic) 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.

*Reference Content: Left abdominal, Right arch*  
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## 2. L SL Foot Toward Foot

R

Stability Integration (28)

**Left Sidelying Foot Toward Foot**



1. Lie on your left side and place a 2-3 inch bolster under your left abdominal wall. Place a pillow under your head and keep your back and neck relaxed.
2. Place your right foot on a stool about 13 inches in height and your left foot underneath it.
3. Your shoulder, hip, knee and ankle should all be lined up.
4. Reach your right leg down toward the wall and press your left hip down into the mat. You should feel your left abdominal wall engage as you pull up away from the towel roll.
5. While keeping your abdominals engaged, turn your left leg in so that your toes are towards the ceiling and raise your left leg off of the mat. You should feel your left inner thigh 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.

*Reference Content: Left abdominal, Right arch*  
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These two suggestions are designed to increase and HAdLT to 2/5. In other words, with appropriate support (the table) the subject can inhibit R Adductors and R Abdominal Wall while simultaneously engaging L Adductors and L Abdominals. Logically, the next step would be to progress the individual to a lift score of 3/5

which is a challenge because demands have shifted to recruitment of R Adductors in concert with L Abdominals. The dominant player will obviously be the R Adductor group and this may be painful. The pain can be altered via increasing L Abdominal wall activity (which was the focus of the previous steps of the program). So, to recap: first learn to inhibit R Adductors and activate L Abdominals then learn to crossover and activate R Adductors with activation of L Abdominals. “Phase 2” suggestions to get the lift score to 3/5 would be as follows

## 1. Sidelying Trunk Lift

R

Stabilizing Integration (87)

**Sidelying Trunk Lift**



1. Lie on your left side with your hips and knees bent at a 90-degree angle.
2. Prop your trunk up on your left forearm, keeping your elbow directly below your shoulder.
3. Tighten up your abdominal wall and press your right knee down into your left.
4. Keeping your left shoulder blade down and back, slowly raise your hip up and off the mat. Your left abdominal wall, back of your left shoulder and right inner thigh should begin to engage.
5. Raise your right hand up over your head and take 4 deep breaths, in through your nose and out through your mouth.
6. Slowly lower yourself back down to the mat and repeat 4 more times.



1. Lie on your right side with your hips and knees bent at a 90-degree angle.
2. Prop your trunk up on your right forearm keeping your elbow directly below your shoulder.
3. Tighten up your abdominal wall and press your left knee down into your right.
4. Keeping your right shoulder blade down and back, slowly raise your hip up and off the mat. Your right abdominal wall, back of your right shoulder and left inner thigh should begin to engage.
5. Raise your left hand up over your head and take 4 deep breaths, in through your nose and out through your mouth.
6. Slowly lower yourself back down to the mat and repeat 4 more times.

*Reference Center: Left abdominal, Right arch*  
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## 2. L Sidelying Swiss Ball Hip Lift

R

Stabilizing Integration (90)

**Left Sidelying Swiss Ball Hip Lift**



1. Place an appropriate size ball in the corner of a room.
2. Lie on your left side and place your right ankle on top of the ball, your left leg bent on the floor, your left arm under your head and your right hand on the floor in front of you.
3. Begin by pushing your left hip down into the floor and arching your left abdominal wall up. You should feel your left abdominal wall engage.
4. With your left abdominal wall engaged, push your right ankle down into the ball. You should feel your left abdominals and right inner thigh.
5. Raise your left leg off the ground as you begin to raise your whole hip up into the air. You should feel your left inner thigh, left outer hip (buttock) and left abdominal wall 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.

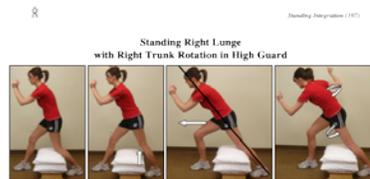
*Reference Center: Left abdominal, Right arch*  
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The danger with these types of movements is that the client may reproduce their pain. If that happens then it is obvious that they are unable to recruit abdominals adequately enough to sync with the R Adductor so the R Adductor gets over-played. Remember that level 3 of the HAdLT requires abdominals and if the patient can't recruit abs well in the FP then it is logical that they could possibly have difficulty with the above activities and that they would likewise score poorly on the HAdLT. It can also be an indicator of a chronic injury. If the patient has a chronic pubalgia the mechanism of injury may have been resolved through your program however the injury itself may be far from resolved. If so then take them back down a phase and implement treatment to the adductor. Treatment can consist of any modality of choice. But treatment should now have a better outcome since the mechanism of injury is resolved. Previous treatment may not have been beneficial since the cause of the injury had not been addressed.

Once a level 3/5 is achieved then consider upright activities designed to balance alternating activity and/or further inhibit overuse of the R Abdominal Wall and R Adductor, since it is a lack of alternating activity that feeds the dysfunction in the first place.

These are examples of activities done in standing:

### 1. Standing R Lunge w R Trunk Rotation in High Guard



1. Place your left knee on a 6-10 inch block and your right leg in front of the block with your knee and hip bent and your foot flat.
2. Round your back and raise both arms slightly below shoulder level with your elbows bent at a 90-degree angle and your forearms together.
3. Maintaining contact with your right shoe arch, bring your left heel to the floor as you lift your knee off the block.
4. Attempting to keep your left heel down, shift your body weight forward onto your right leg as you bring your left knee toward the block. Maintain contact with your right shoe arch as you move your body weight onto your right leg.
5. Keeping your back rounded, rotate your trunk to the right by moving your right arm away from your left. You should feel the muscles on the front of your right thigh and right outside hip (thelack) 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.

- Options:**
1. Perform steps 1-5.
  2. Swing your right arm back to your left.
  3. Slowly shift back as your left knee moves away from the block.
  4. Continue lunging forward and back 10 times.
  5. Relax and repeat 2 more times.

## 2. PRI L AIC Single Leg Horizontal Stance



*Reference Criteria: Left abducts, Right arch*  
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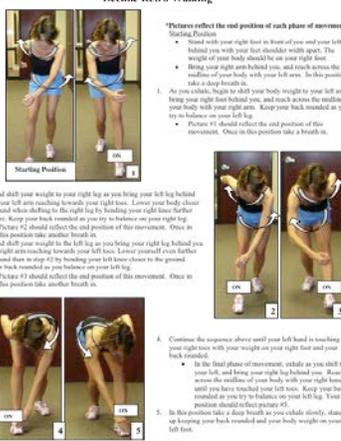
## PRI L AIC Single Leg Horizontal Stance R Thoracic Abduct (bad) L Thoracic Abduct (good)



### 3. Decline Retro Walk

8 Standing Posture (11)

**Decline Retro Walking**



**\*Phases reflect the end position of each phase of movement**

**Starting Position**

- Stand with your right foot in front of you and your left foot behind you with your feet shoulder width apart. The weight of your body should be on your right foot.
- Bring your right arm behind you, and reach across the midline of your body with your left arm. In this position take a deep breath in.

- As you exhale, begin to shift your body weight to your left as you bring your right foot behind you, and reach across the midline of your body with your right arm. Keep your back rounded as you try to balance on your left leg.
  - Phase #1 should reflect the end position of this movement. Once in this position take a breath in.
- Exhale and shift your weight to your right leg as you bring your left leg behind you and your left arm reaching towards your right foot. Lower your body closer to the ground when shifting to the right leg by reaching your right foot further than before. Keep your back rounded as you try to balance on your right leg.
  - Phase #2 should reflect the end position of this movement. Once in this position take another breath in.
- Exhale and shift your weight to the left leg as you bring your right leg behind you and your right arm reaching towards your left foot. Lower yourself even further to the ground than in step #2 by bringing your left knee closer to the ground. Keep your back rounded as you balance on your left leg.
  - Phase #3 should reflect the end position of this movement. Once in this position take another breath in.
- Continue the sequence above until your left hand is touching your right knee with your weight on your right foot and your back straight.
  - In the final phase of movement, exhale as you shift to your left and bring your right leg behind you. Reach across the midline of your body with your right hand until you have touched your left knee. Keep your back rounded as you try to balance on your left leg. Your position should reflect picture #5.
- In this position take a deep breath as you exhale slowly, stand up keeping your back rounded and your body weight on your left foot.

**Reference Camera(s): Left abdominal, Left heel, Right ankle**

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An active soccer player should be able to achieve at the very least a 4/5 HADLT. Once 4/5 is accomplished and gait training has taken place the athlete should be able to maintain the new status without difficulty or with minor effort.