The Hip Sports Page

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The Role of the Hip in Iliotibial Band Syndrome in Female Runners

By Irene Davis, PhD, PT, FAPTA, FACSM

This month, the article begins on page 2 of the newsletter…

Upcoming Events:

APTA Annual Conference

Boston, MA
June 16-19th 2010

Hynes Convention Center

AOSSM Annual Meeting

Providence, RI
July 15-18th 2010

Rhode Island Convention Center

Back Page News & Notes

The behind the scenes update on the Hip Special Interest Group

CSM Update

Thank you to all of you who came to CSM 2010! Both **Evaluation and Treatment of the Hip**, which was a preconference course with Intercollegiate and Professional Athlete SIG, and **Selected Lower Extremity Injuries and the Female Athlete: The Role of the Hip and Other Epidemiological, Screening, and Treatment Issues**, which was regular programming with Female Athlete SIG were well attended and well reviewed. Thanks to everyone who helped put together those two events.

As for CSM 2011, we are out of the rotation and get the year off. We will pick up where we left off at the 2011 SIG meeting in New Orleans next year.

Authors for the Newsletter

We need three more authors to write clinical articles for ***The Hip Sports Page***. All we need is something short and sweet relating to the hip. It can be a description of a diagnosis, treatment, procedure, or even a case study. If you are interested, send Erik an email.

Mentorship Program

As a SIG we have discussed having our own mentorship program for members who may have questions regarding hip rehabilitation. We are currently compiling a list of mentors who feel confident as a resource for the rest of the SIG. As questions are submitted through the SIG, they will be forwarded to members on the mentor list on a rotating basis. If you are interested in being a mentor, send Erik an email and he'll get you on the list.

If you have any questions or feedback regarding anything in the Back Page News & Notes, email them to the SIG chair at emeira@blackdiamondpt.com. As always, we need and appreciate your input!

This quarterly newsletter is provided for the members of the Hip Special Interest Group of the Sports Section of the APTA. To learn more about the Sports Section or to join the SIG, go to the website at www.spts.org

The Role of the Hip in Iliotibial Band Syndrome in Female Runners

Irene Davis, PhD, PT, FAPTA, FACSM

The Iliotibial band (ITB) is a thick band of tissue that extends from the hip to the knee down the outside of the leg. It originates as fascial connections from the gluteus maximus and the tensor fascial lata, and inserts on Gerty's tubercle (Fairclough et al, 2006). However, there are also attachments at the distal femur and into the lateral patella (Terry et al, 1986). Iliotibial Band Syndrome (ITBS) is an inflammatory condition of this structure. Patients often report a snapping or pain in the lateral hip or knee, or both. ITBS is the second leading cause of knee pain (Noble et al, 1980) and the primary cause of lateral knee pain (Taunton et al, 1991). This injury affects 12% of runners (Richards, 2003) and is twice as common in females compared to males (Taunton et al, 2001).

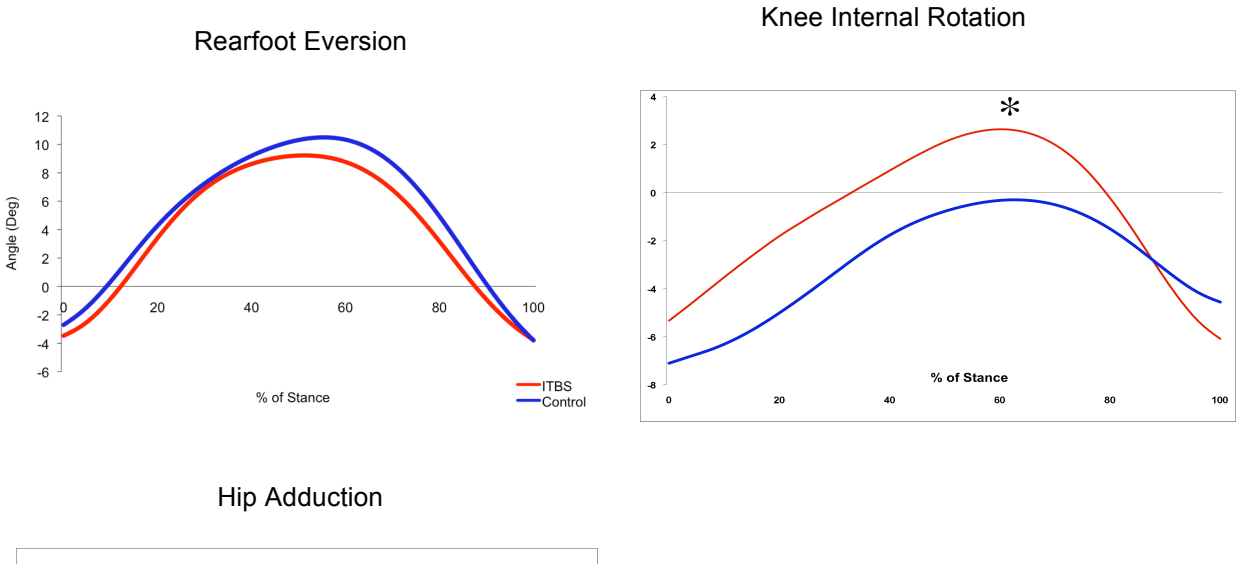
Any movements that increase the strain of the ITB can contribute to its irritation. Distally, rearfoot eversion is coupled with tibial internal rotation (Lundberg et al, 1989), which will increase ITB strain. While Messier et al. (1995) reported slightly greater rearfoot eversion in a group of runners with ITBS, this increase was not significantly different. Knee internal rotation, whether it be associated with tibial internal rotation, femoral external rotation or both, will also result in ITB strain. Miller et al (2007) noted an increased in knee internal rotation velocity in runners with ITBS, however, they did not compare the knee rotation angles between groups.

ITB strain also increases as the tendinous band passes back and forth over the lateral femoral condyle during knee flexion and extension. It has been suggested that maximal impingement occurs between 20–30 deg. of knee flexion. In this range, the distal fibers of the ITB are believed to compress and slide over the lateral femoral condyle (Orchard et al., 1996). This proposed mechanism led Orchard et al. (1996) to examine sagittal plane knee mechanics of runners with ITBS. Interestingly, they found no differences in knee flexion at foot strike, peak knee flexion, or in the percent of time spent in knee flexion in runners with ITBS compared to their non-injured leg (Orchard et al., 1996). Miller et al. (2007) did note greater knee flexion at footstrike in runners with ITBS at the end of an exhaustive run. However this increased knee flexion was not associated with an increase in ITB strain

As a result of the distal femoral attachment, increased hip adduction would also increase the strain in the ITB. Hip kinematics in those with ITBS had not been previously studied. However, Frederickson et al (2000) did report that runners with ITBS exhibited weaker hip abductors, which could lead to an increase in hip adduction. Unfortunately, the retrospective nature of the study limits the ability to determine whether the weakness was a cause or the result of the ITBS.

In order to examine the contribution of rearfoot, knee and hip mechanics to ITBS, we conducted a prospective investigation of female runners (Noehren et al, 2006). 400 healthy female runners between the ages of 18 and 45 yrs underwent a gait analysis to

determine their peak rearfoot eversion, knee internal rotation and hip adduction. They reported their monthly mileage and injuries for a period of 2 yrs. 18 runners developed ITBS and were age and mileage matched to 18 runners without any history of hip or knee injuries. Results can be seen in figure 1.

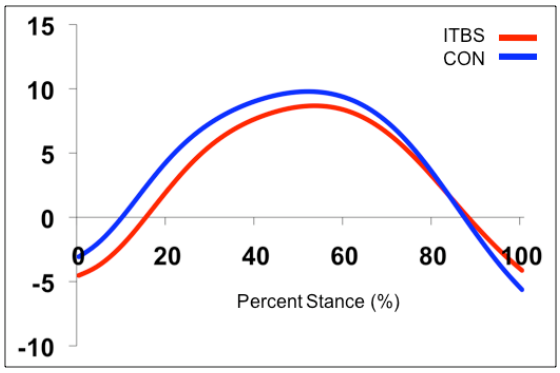


PROSPECTIVE RESULTS

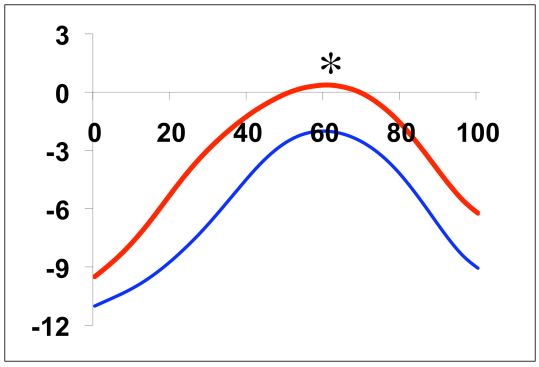
Figure 1. Comparison of variables of interest between the healthy controls (blue) and the runners who went on to develop ITBS (red).

Note that rearfoot eversion was similar between groups. However, knee internal rotation and hip adduction were greater in those runners who went on to develop ITBS. Both of these motions would increase ITB strain, which has been confirmed to be associated with ITBS in a recent modeling study (Hamill et al, 2008).

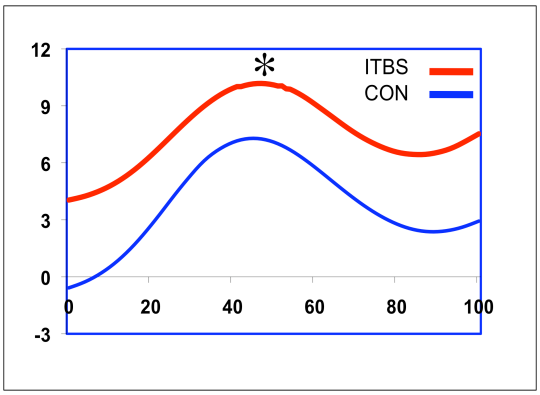
Prospective studies are among the highest level of evidence. However, they require large subject numbers and are expensive to conduct. Therefore, we were interested in determining whether these prospective results could be replicated with a retrospective design. To this end, we recruited 35 female runners with a history of ITBS and 35 age and mileage matched Controls without any history of hip or knee pain (Ferber et al, 2010). Again, an instrumented gait analysis was conducted and the variables of interest were compared. Results are presented in Figure 2.



Rearfoot Eversion



Knee Internal Rotation



Hip Adduction

RETROSPECTIVE RESULTS

Figure 2. Comparison of variables of interest between the healthy controls (blue) and the runners with a history of ITBS (red).

Knee flexion was nearly identical between groups in both the retrospective and prospective studies and does not appear to be a causative factor in ITBS. MRI studies have shown that the ITB compresses into the lateral femoral condyle with knee flexion and internal rotation. In the presence of excessive hip adduction, coupled with a tight ITB, the strain will likely increase significantly.

It is interesting to note that female runners exhibit greater hip adduction than their male counterparts (Ferber et al, 2005), and they are also twice as likely to develop ITBS (Taunton et al, 2001). It is possible that the increased hip adduction that they naturally possess places them closer to the injury threshhold.

The similarity of the results between the prospective and retrospective studies is remarkable, epecially in light of the fact that they involved completely different sets of subjects. This consistency between the prospective and retrospective results suggest that mechanics that led to the injury are not altered by the injury. If this is true, then retrospective studies may be able to replace more costly prospective studies.

Take Home Message

When assessing your patient with ITBS, be sure to assess dynamic hip adduction.

Hip adduction may be associated with other mechanics such as pelvic drop or a cross-over gait pattern as seen in figure 3. Increased hip adduction and contralateral pelvic drop can be addressed with hip abductor strengthening and neuromuscular re-education. Gait retraining using realtime feedback has been shown to be effective in reducing excessive hip adduction during running (Noehren et al, 2010). Cross-over may be associated with a leg length discrepancy, which may be resolved using a heel lift and patient instruction in widening their base of support.

ITB Tighness is very common in individuals with ITBS. This tighness will further increase ITB strain and therefore should be addressed with stretching and soft tissue mobilization.

Figure 3. Hip adduction associated with both pelvic drop and cross-over of the right foot.

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