

Iliotibial Band Syndrome

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The authors present two case studies and clinical and literature reviews of the iliotibial band syndrome. The etiology of this lower extremity sports-related syndrome that shows a direct correlation to foot function is described.

Since many lower extremity sports injuries relate to abnormal foot function, podiatrists are treating more athletes. The practitioner, therefore, must understand the biomechanics of the knee and hip as they relate to the foot. This relationship can be seen in the iliotibial band syndrome when it is associated with excessive pronatory motion of the foot.

Anatomy

The iliotibial band is a thick fascial extension of the tensor fascia latae muscle.¹ The fibers of the muscle descend to an area around the greater trochanter and blend into the fascia latae and deep surface of the iliotibial band.² It extends from the muscle to the knee and acts as a tendon of insertion into the lateral tubercle of the tibia, the tubercle of Gerdy² (Fig. 1). Expansions from the anterior border of the iliotibial tract at the knee join expansions from the quadriceps muscle to form the lateral patellar retinaculum, while the posterior part of the tract blends with the more lateral part of the capsule of the knee³ (Figs. 1 and 2). The iliotibial band functions as a stabilizer at the lateral aspect of the knee during flexion and extension. It lies anterior to the lateral femoral epicondyle when the knee is extended and passes posterior to it with knee flex-

ion. The band passes directly over the lateral femoral epicondyle at 30° of knee flexion.⁴

Literature Review

Renne⁵ originally defined the iliotibial band syndrome as pain at the lateral aspect of the knee joint usually causing a patient to limp while walking or running. Symptom onset was usually noted during the running of 2 miles or more. The pain was made worse by running on hilly surfaces and climbing stairs. Relief was obtained by walking with the affected knee in full extension.

Noble⁶ describes the syndrome as an overuse injury found in long-distance runners with presentation of pain on the outer aspect of the knee in close relation to the lateral femoral epicondyle and occasionally associated with swelling and thickening at the site. There may be bursal inflammation, and "wet-leather" crepitus may be palpated. The pain is often poorly localized, aggravated by running long distances or excessive striding, and is more severe in running downhill. Varus stressing of the knee does not elicit pain.

The most common cause of pain on the lateral aspect of the knee and on the outside of a runner's hip, according to Subotnick,⁷ is due to the snapping motion of the iliotibial band over the lateral knee joint or over the greater trochanter at the hip. An associated bursitis of the greater trochanter can develop. Subotnick also states that in association with the hip involvement, the runner feels like his "hip is going out of joint" or that something is seriously wrong with the joint.

Sutker et al⁸ also present the iliotibial band syn-

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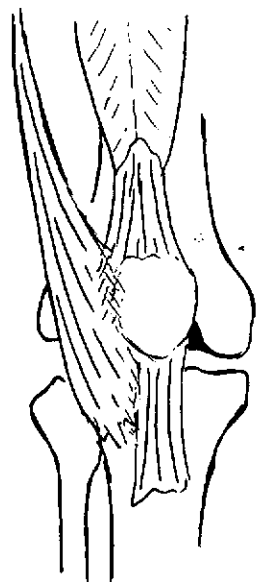


Figure 1. The insertion of the iliotibial band into Gerdy's tubercle demonstrates the joined expansion from the lateral patellar retinaculum. Illustrations by Carl Ganio.

drome as an overuse injury seen primarily in distance runners. In 48 case studies, they noted the syndrome was most often seen in males who ran at least 20 to 40 miles a week for more than 1 year. In most of the cases in the study, there was a significant change in running schedules before the onset of symptoms, ie, increasing mileage, speed, or interval workouts. Changing from hard to soft running surfaces was also implicated. Pain was aggravated by repetitive movement of the knee during running and usually became limiting at a constant distance. Foot structure was not a contributing factor, but varus knee alignment, structural or functional, was most likely involved in the development of symptoms.

Orava⁹ reports that cavus foot may result in more pronounced varus stress on the knee leading to the iliotibial band friction syndrome. Noble⁴ states that the pain of iliotibial band syndrome is due to inflammation caused by excessive friction between the band and the bony prominence of the lateral femoral epicondyle. Excessive tightness of the iliotibial band has also been implicated in abnormally increasing the pressure along with excessive internal rotation of the tibia or the femur, which may be found with in-toeing or with abnormal pronation of the foot during the stance phase of running.

McNicol¹⁰ found that 5% of the total overuse running injuries were the result of the iliotibial band syndrome. Of these patients, 98% had functional overpronation and required some form of orthotic control. He also discovered that patients

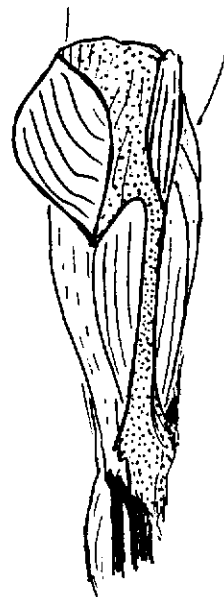


Figure 2. The course of the iliotibial band demonstrates its congruency with the lateral capsule of the knee.

with limb length discrepancies developed the syndrome on the longer leg. Blake and Denton¹¹ reported that out of five patients treated for the syndrome, four showed improvement with orthoses. Newell and Bramwell¹² reported that 14% of patients with overuse injuries of the knee had the iliotibial band syndrome. They found that these patients were especially symptomatic when going downhill or up and down stairs.

Lutter¹³ found the iliotibial band syndrome to be the most recalcitrant problem associated with cavus configuration. He found that the average time of recovery from the condition was 89 days. Rubin and Collins¹⁴ described the syndrome in runners with genu varum, with or without internal tibial torsion and significant pronation on weightbearing.

Smillie¹⁵ described a snapping of the iliotibial band that resulted from an abnormal attachment to the patella. Hendryson¹⁶ described a bursitis in relation to the fibular collateral ligament presenting as localized tenderness at the joint level. Mayfield¹⁷ described popliteus tendon tenosynovitis as causing pain localized to the lateral aspect of the knee on weightbearing with the knee slightly flexed.

Etiology

The authors believe that the iliotibial band syndrome is directly related to internal rotation of the tibia secondary to pronatory deformities, including soft tissue abnormalities, such as ligamentous laxity, and bony abnormalities, such as rearfoot varus

and forefoot varus. The varus deformities are more significant when not fully compensated.

Two important factors have to be considered in the etiology of iliotibial band syndrome. The first considerations are the anatomic landmarks of the iliotibial band, such as its insertion into the tibia, and its position as it passes over the lateral femoral epicondyle and the greater trochanter of the hip (Fig. 3). The second consideration is excessive pronation that results in increased internal rotation at the tibia, which causes a relative shortening or stretching of the iliotibial band. These factors can then cause the friction-related symptomatology over the lateral femoral epicondyle and/or greater trochanter.

Diagnosis

The diagnosis of iliotibial band syndrome is based upon an accurate patient history and associated physical findings. The most common presenting symptoms are pain and tenderness along the lateral aspect of the knee joint. The patient is often a long-distance runner who states that the pain is aggravated by running on hills and may be relieved by walking with the knee held straight. Less frequently, pain and tenderness may be located around the greater trochanter of the femur. Symptoms may occasionally be present at both the knee and the hip level.

The following tests may be performed on the patient for diagnosis of iliotibial band syndrome if the patient presents with acute symptomatology. The compression test is performed with the patient supine and the knee flexed to 90°. As the examiner



Figure 3. The effect of internal tibial rotation on the iliotibial band at the level of the lateral femoral condyle.

applies pressure to the lateral femoral epicondyle and gradually extends the knee, at 30° of knee flexion, the patient will complain of pain over the lateral femoral epicondyle.⁶ The pain may also be produced by having the patient stand at 30° of knee flexion with pressure applied over the lateral femoral epicondyle.¹⁸

McNicol¹⁰ diagnosed iliotibial band syndrome by using the varus stress provocation test. This test causes sharp radiating pain along the iliotibial band, with fast extension of the knee from 45° of flexion. If the patient presents with acute hip symptomatology, Ober's test may be performed. The patient is placed directly on his or her side with the unaffected side next to the table. The examiner places one hand over the greater trochanter of the femur and takes hold of the patient's ankle with the other hand, holding the knee flexed at a right angle. The thigh is then adducted and extended in the coronal plane of the body. Pain will then be elicited over the great trochanter of the femur if the iliotibial band syndrome is present.¹⁹

Past Treatments

Previous treatments of iliotibial band syndrome have been directed mainly at symptomatology. They have consisted of reducing the mileage run by the patient, the avoiding of hills when running, or running only until pain develops. Other measures have included iliotibial band stretching, local heat application, anti-inflammatory medication, topical vasodilatory agents, and local steroid injections.⁸ For resistant cases, Noble⁶ described a surgical technique where he transversely split the posterior 2 cm of the iliotibial band at the area of the lateral femoral epicondyle.

Case 1

A 24-year-old well developed, well nourished Caucasian male presented to the Dr. William M. Scholl College of Podiatric Medicine Sports Medicine Clinic on February 22, 1984, complaining of pain at the lateral aspect of his right knee. He stated that the pain had been present for 8 weeks, and only occurred when he was playing basketball, which he played twice a week. He reported that the onset of pain was 30 minutes into playing, and worsened as he continued to play. The pain was alleviated somewhat by rest. The patient also stated that the pain never occurred when he was walking. The onset of pain had begun to occur more rapidly and had increased in intensity.

On clinical examination, the patient presented with a flexible pronated foot bilateral, secondary to general ligamentous laxity. He also had a 4° partially compensated rearfoot varus. During the examination of the knee, no pain was elicited on direct palpation of the lateral femoral epicondyle. Upon flexion and internal rotation of the tibia, no symptomatology was elicited.

The patient was asked to return after playing basketball. He returned 2 days later after having played for 1 hour. Direct palpation of the lateral femoral epicondyle caused pain as the knee was brought from flexion to extension with the tibia internally rotated. The diagnosis of iliotibial band syndrome was made.

A low Dye strap and ¼-inch felt longitudinal and metatarsal padding were applied, and ¼-inch korex varus heel wedges were placed bilaterally. The patient returned 1 week later and stated that he had played basketball three times during the week without pain. The foot was not retaped at this time in order to determine if the pain would recur. The patient was asked to return in 2 weeks.

After 2 weeks, the patient returned and stated that the pain had returned when he played basketball the night after the taping had been removed. Casts of the patient's foot were made for orthoses. At 1½ years follow-up, the patient had not had any recurrent symptoms.

Case 2

A 26-year-old long-distance runner presented on April 4, 1983, complaining of lateral knee pain on the left leg, which had been treated for the previous 6 weeks by an orthopedic surgeon. The patient stated that he ran 6 miles daily and that the pain began at the 2-mile mark each time he ran. The orthopedist diagnosed his condition as lateral compartment syndrome, and treated him with three steroid injections at the level of the lateral femoral epicondyle at 2-week intervals. The patient stated he had a 10% improvement after the first injection, and that subsequent injections provided no improvement, and his condition actually worsened. Pain still began at the 2-mile mark and was persistently getting worse.

Low Dye straps with ¼-inch felt longitudinal and metatarsal padding were applied, and ¼-inch korex varus heel wedges were dispensed. The patient returned 1 week later and stated he had not experienced any pain since the strapping and padding

had been applied. Casts were made for orthotic devices. While the devices were being made, the patient experienced an increase in symptomatology when he was not wearing the strapping and padding. The devices were dispensed 2 weeks later. After the initial break-in period, the patient began wearing the devices daily, and has remained symptom free for 2 years.

Conclusion

The authors have presented one symptom complex that occurs at the knee and hip secondary to a foot deformity. Although pronation has been previously mentioned as a cause of iliotibial band syndrome^{8, 10}, the authors discuss the improvement that may occur with biomechanical control of the foot.

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