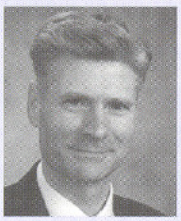
Parallel use of acupuncture and physiotherapy in the treatment of Iliotibial band syndrome



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Iliotibial band (ITB) syndrome is a common cause of lateral knee pain in sport. It is seen particularly in running, where the incidence is as high as 12% (Barber and Sutker 1992), and also encountered in cycling (Holmes et al 1993). The condition occurs when the tight ITB repeatedly rubs over the lateral femoral epicondyle, and the bursa covering it, causing friction and tissue irritation. A similar condition may occur in the upper part of the ITB where the band rubs over the greater trochanter. In this case the condition is one form of "clicking hip" and may result in irritation or trochanteric bursitis. Although common in athletes, both conditions may occur in the general population. ITB syndrome at the hip is a common cause of hip pain in middle age, with pain presenting at night when lying on the unaffected side. This position (adduction and medial rotation of the affected upper hip) places a stretch over the ITB and lengthens the posterior portion of the gluteus medius muscle. Pain is also often noticed with functional squatting actions (hip flexion) such as sitting on the toilet or sitting down into a low chair.

ITB syndrome is often paralleled by an altered muscle balance in the lower limb (Norris 1995, 2000). The most common imbalance presenting as lengthening of the gluteus medius muscle and tightening of the iliotibial band and tensor fascia lata muscle (ITB-TFL, see below).

STRUCTURE

The fascia of the lower limb is in two types, superficial and deep (Palastanga et al 1998). The superficial fascia acts as a base for the skin enabling the skin to move freely over the underlying tissues. The deep fascia is tougher and more fibrous, and tends to be laid down in the direction of stress. It becomes attached to bony prominences as it passes over them. The under surface of the deep fascia travels between muscle layers becoming the inter-muscular septa. The deep fascia of the lower limb attaches to the outer lip of the iliac crest between the anterior superior iliac spine (ASIS) and the posterior superior iliac spine (PSIS) . In addition it throws branches to the sacrotuberous ligament, the ischial tuberosity, and the pubis, effectively surrounding the upper thigh.

On the lateral aspect of the thigh, the fascia is fashioned into two distinct layers forming a non-elastic collagen cord, the ITB. The gluteus maximus and gluteus medius muscles both insert into the ITB posteriorly and the TFL anteriorly, with contractile fibres travelling

one third of the way down the band.

As the ITB travels down the lateral side of the thigh its deep fibres attach to the linea aspera of the femur. The superficial fibres continue downwards to attach to the lateral femoral condyle, lateral patellar retinaculum and anterolateral aspect of the tibial condyle (Gerdy's tubercle). A large amount of the lateral retinaculum of the patella actually arises from the ITB to form the iliopatellar band (Terry et al 1986) having a direct effect on patellar tracking (Zachazewski et al 1996).

BIOMECHANICS

In standing, the ITB lies posterior to the hip axis and anterior to the knee axis and therefore helps to maintain hip and knee extension, reducing the muscle work required to sustain an upright stance. As the knee flexes to 30° the ITB passes posterior to the knee joint axis, and in so doing it glides over the lateral femoral condyle. In running, during the swing phase the ITB lies anterior to the greater trochanter and hip flexion/extension axis, reducing the workload required for hip flexion.

The contraction of the gluteus medius and the TFL is transmitted by the ITB to control and decelerate adduction of the thigh (Fredericson et al 2000). Where the gluteus medius shows poor endurance and control, gait alteration may occur leading to ITB pain. In a study of distance runners (14 male, 10 female) with ITB syndrome significant weakness of the gluteus medius was found on the symptomatic side. Strengthening the muscle over a 6-week period resulted in 92% of the runners being pain free (Fredericson et al 1997).

Muscle balance tests for the lower limb (Norris 1995) often show a reduction in abduction endurance by the gluteus medius (side lying hip abduction test, fig 1) and compensation by over activity of the tightening of the TFL-ITB, (Ober test, fig 2). Although both the gluteus medius and the TFL are able to abduct the femur, the TFL will also medially rotate the hip while the postural posterior portion of the gluteus medius is a lateral rotator (Sahrmann 2002). As a consequence, dependence on the TFL alone for abduction power during gait causes excessive medial rotation and adduction of the hip increasing the valgus stress on the limb and therefore increasing passive tension in the ITB. For more information on muscle balance of the lower limb see Norris (1995).

Figure 1: Hip Abduction test

Figure 2: Ober test

PAIN TO PALPATION

As with many overuse conditions, the patient may not have pain when they initially present for treatment. Pain may be elicited to palpation with the patient in the side lying Ober test position, but with the knee flexed to 30°. Pain is commonly located approximately 2cms above the knee joint line within the distal portion of the ITB. The sensation which the patient feels on activity may often be reproduced by asking

them to flex and extend the knee while palpation pressure is maintained (fig 3). This will cause the ITB to flick over the epicondyle.

The same test may be performed in both standing and supine lying. In standing the patient takes weight through the affected leg alone, knee flexed to 30°. The palpating finger is placed over the epicondyle once more and the patient performs a series of mini squats to reproduce his/her symptoms (Renne's test) (Renne 1975). In lying the hip and knee are flexed to 90° and the epicondyle palpation is maintained as the knee is extended (Noble's test) (Noble, 1979).

Palpation of the greater trochanter is similarly achieved in side lying with the upper leg allowed to fall into adduction and medial rotation. Again palpation pressure is maintained over the ITB as the hip is moved.

Figure 3: Pain provocation tests
a) ITB test position

Figure 3b: Noble's test

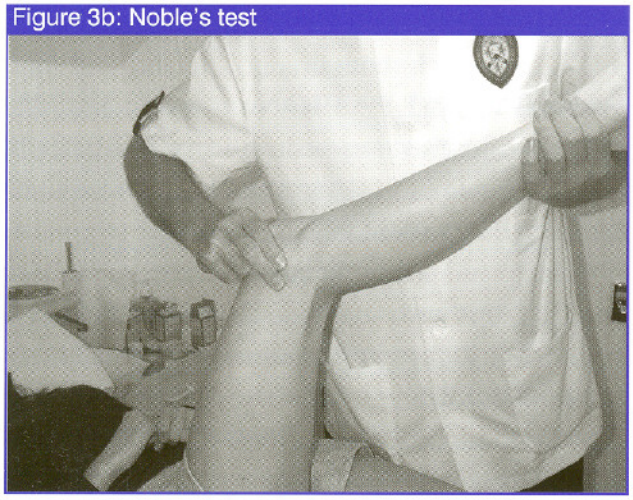


Figure 3c: Renne's test

TRIGGER POINTS

Myofascial trigger points (TrP) are highly sensitive local areas lying within a tight band of the muscle fibres (Baldry 1998, Gunn 1996). TrP's are painful to palpation and often appear as nodules or tight bands within the muscle itself. Sudden pressure or flicking of the band can cause the muscle to jump, a reaction known as the 'twitch response' or 'jump sign' (Janda 1993). A TrP may either be active or latent. A latent TrP does not cause pain at rest, but only to palpation. An active TrP causes both pain and tenderness at rest or when the muscle is stretched during daily activities. Palpation of an active TrP causes pain and referral of the pain in a pattern which mimics the patient's main symptoms.

Table 1: Trigger points of muscles attached to the ITB, and their relation to classical acupuncture points.

Muscle	Trigger point	Acupuncture point
Tensor fascia lata (TFL)	3 finger breadths anterior to the greater trochanter of the femur	ST-31. At the meeting of a line drawn vertically down from the ASIS and horizontally across from greater trochanter
Gluteus medius	2 finger breadths below the midpoint of the outer sufrace of thr iliac crest	GB-29. At the midpoint of a line joining the ASIS and the prominence of the greater trochanter
Gluteus minimus	Midway between the midpoint of the iliac crest and the greater trochanter of the femur	GB-29. At the midpoint of a line joining the ASIS and the prominence of the greater trochanter

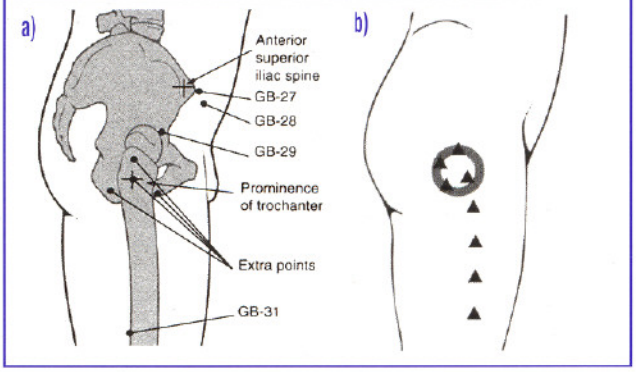
(ASIS – anterior superior iliac spine. ST – Stomach. GB – Gallbladder.)

TrP's may be located within the belly of a muscle (central TrP) or at the muscle attachment (attachment TrP). In the case of the

latter, a TrP may be found at both the teno-osseous and musculo-tendinous junctions where the muscle attaches to bone, tendon or aponeurosis (Simons et al 1999).

TrP's associated with ITB syndrome are commonly found in the TFL, the gluteus medius and minimus. Table 1 shows the position of theses TrP's and their relationship to classical acupuncture points, and figure 4 contrasts trigger points, acupuncture points and periosteal points in the region.

Figure 4: Trigger points, acupuncture points and periostial points in relation to the ITB



a) Classical acupuncture points and periostial points
b) Trigger points

PERIOSTEAL ACUPUNCTURE POINTS

Periosteal acupuncture is a technique where the periosteum covering the bone is needled directly by continuing the needle insertion depth until bone contact is made (Mann 1992). The aim is to stimulate the richly innervated periosteum with either a single needle strike or multiple strikes using a peppering technique often referred to as 'periosteal pecking'. The technique may be used to stimulate the periosteum of both the greater trochanter where pain is experienced in the lateral thigh, and the ASIS where pain is both anterior or anterolateral. Interestingly, stimulating the periosteum of the greater trochanter (3 needles, 3 times per week) has been shown to be more effective than the use of intra-articular steroid injection for pain relief in patients with chronic hip pain (McIndoe et al 1995).

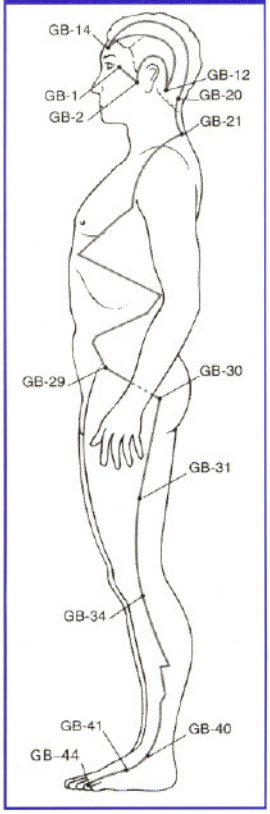
ACUPUNCTURE ANATOMY

The acupuncture meridians on the outer aspect of the leg are the three yang channels, Stomach (ST), Bladder (BL) and Gallbladder (GB). The bladder channel passes over the posterior aspect of the thigh, while the stomach channel passes over the anterior aspect. It is the gallbladder channel which is placed laterally, running over the length of the ITB (fig 5). Descending from the outer canthus of the eye (GB-1) the meridian passes forwards to the temporal region and then back curving twice around the ear to descend to the trapezius muscle (GB-21) and then across the lateral aspect of the chest down to the 12th rib (GB-25).

At the level of the pelvis the meridian lies in front of the anterior superior iliac spine (GB-27 and GB-28 just below). The meridian passes to the midpoint of a line joining the ASIS and the greater trochanter (GB-29) back to the buttock (GB-30) and then along the ITB. GB-31 lies 7 cun (note 1) superior to the knee joint, GB-32 lies 2 cun below this, GB-33 is in the depression above the lateral epicondyle of the femur, and GB-34 lies 1cun anterior and inferior to the head of the fibula.

Several extra points are described, one just below the greater trochanter and three points superior, anterior and posterior to the trochanter.

Figure 5: The Gallbladder Meridian



ACUPUNCTURE MANAGEMENT

Any of the gallbladder points may be used in the treatment of ITB syndrome. Some, have traditional uses in Chinese medicine (table 2), while others correspond more closely to trigger points. If painful (so called ahshi points in Chinese medicine) the points should be needled. GB-31 is a major point in the management of ITB syndrome, and is often painful to palpation. The point is traditionally said to lie at the tip of the patients 3rd finger when they stand upright and hold their arm by their side. Another method of locating the point is to divide the distance between the greater trochanter and the knee joint line into thirds. GB-31 lies 1 fingerbreadth proximal to the meeting of the upper 2/3 and lower 1/3 (Deadman et al 1998). Palpate for tenderness in this region and needle the tender point. Tender trigger points may be used at the lower insertion of the ITB corresponding to GB-33, again palpate for tenderness and choose the painful point. Extra points in the region of the greater trochanter should again be palpated for tenderness and needled if tender.

The trigger points of the gluteus medius and tensor fascia lata should be palpated and may be needled. In addition manual therapy may be used to deactivate the point(s).

Table 2: Classical use of ITB related points.

Point	Classical use
GB-29	The meeting point of the gallbladder channel with the yang motility vessel, an extra meridian used in the treatment of pain/weakness in the lateral side of the body. GB-29 is used where pain radiates from the hip to the groin and lower abdomen.
GB-30	Meeting point of the gallbladder and bladder points, and one of eleven of the "heavenly star points" said to be the most important acupuncture points available. The point is traditionally used for hip pain radiating into the leg, and for "cold wind and damp painful obstruction", – arthritic pain in western terms.
GB-31	Called "wind market" this point is again used for the treatment of wind-damp which gives painful obstruction. Additionally wind conditions include skin diseases with symptoms of rapid onset and itching, and hemiplegia which is also called "windstroke" in Chinese medicine.
GB-34	Again a heavenly star point, GB-34 is also said to "benefit the sinews and joints" and is used in the treatment of joint and soft tissue pain in general.

MANUAL THERAPY AND EXERCISE THERAPY

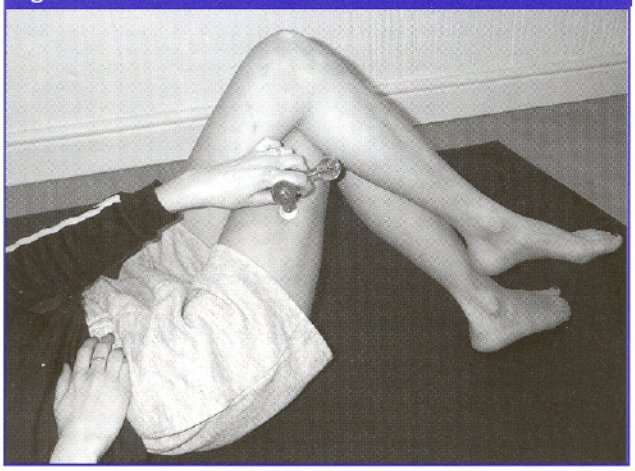
Trigger point deactivation may be achieved using an ischaemic compression technique. In this technique, pressure is applied slowly and progressively to the TrP (sudden pressure can stimulate the TrP). The pressure is maintained until the tenderness to palpation has reduced and the end feel of the tissue changes from a hard elastic recoil to a softer resistance. As this occurs, a slow continuous stretch may be placed on the muscle to lengthen it into adduction.

The starting position is in supine lying with the affected leg flexed at the knee and hip and crossed over the unaffected side (fig 6a). The action is the draw the knee across into adduction whilst stabilising the pelvis and avoiding spinal rotation. The patient can perform this stretch themselves by crossing the unaffected leg over the affected one and using the weight of the top leg to press the underneath one into adduction (fig 6b) they may then compress a tender trigger point with their hands, or use a tool such as the "back knobbler" (Physiomed, Glossop, UK).

Figure 6: Manual therapy for ITB syndrome
a) therapist technique

In parallel with muscle stretching for the tight TFL-ITB, the gluteus medius should be redeveloped, using an inner range holding technique (Norris 2000). For this exercise the abduction test position is used (fig 1). The practitioner lifts the leg into the inner range

Figure 6b: self treatment



position and the patient attempts to hold this position. Initially holding time may be poor (1 or 2 seconds only) and this should be built up to 20-30 seconds to build muscle endurance. Once holding time has been enhanced in the lying position using leg weight alone, the mini dip exercise (fig 7) is used to develop holding time is standing, taking full bodyweight. While performing a hip hitch action with the affected leg weight bearing, holding time is again built up.

An analyses of activity should be performed

Figure 7: The mini dip exercise

to identify lower limb alignment faults which may exacerbate the condition. Activities in sport or activities of daily living (ADL) which involve repeated adduction and medial rotation (for example when descending stairs) should be re-trained. Consideration should also be given to foot biomechanics as both excessive pronation and leg length discrepancy have been linked to ITB syndrome (Linderburg et al 1984, Schellnus 1993).

Note 1

Cun is the Chinese measurement of distance over the body surface. The width of the interphalangeal (IP) joint of the thumb is 1 cun, and the width of the four fingers at the proximal IP joint of the middle finger is 3 cun.

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