Sonography of the iliobibial band: spectrum of findings*

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INTRODUCTION

The iliobibial band is a dense fibrotic structure that is found exclusively in the human species, originating in the iliac tubercle, extending to the outer aspect of the thigh, where the fascia latae tensor, gluteus maximus and gluteus medius muscles insert(1), and contributing to the postural control and monopodal equilibrium(2). Its distal perigenicular insertion is complex and includes fibers which extend toward the tibial tubercle, as described by Gerdy(2).

The incidence of iliobibial band syndromes is unknown, considering the high number of patients with subclinical lesions. The most frequent presentation is iliobibial band syndrome that is accepted as the most common cause of lateral gonalgia in long-distance athletes(3,4). However, several other less common alterations may also be observed in such structure, both proximally and distally in relation to the usual affected site in cases of distal iliobibial band syndrome. The present study is aimed at reviewing the different sonographic findings of iliobibial band syndrome.

THE ROLE OF ULTRASONOGRAPHY

Ultrasoundography is recognized as a first-line imaging method in the investigation of iliobibial band injuries because of its excellent diagnostic capability, low cost and wide availability(5). Additionally, 10 MHz linear transducers utilized as standard devices in many imaging diagnosis centers, allow for an investigation with an immense wealth of details, achieving axial resolution of 150 µm(6). For the purposes of comparison, such an axial resolution is three times better than the 469 µm obtained with commercially available 1.5 T magnetic resonance imaging apparatuses(7). Theoretically, transducers with frequencies above 10 MHz can generate a much better imaging resolution with less depth penetration. However, as this method is operator-dependent and based on subjective criteria, the emphasis for the sonographic diagnosis should not be put on the transducer frequency, but on the education of the sonographer to recognize the signs of the disease(8).

SCAN TECHNIQUE

In the authors’ routines, the scan is performed with a 5–13 MHz linear transducer, utilizing only one focal zone adjusted for the tract depth. The positioning of the patient varies according to the region of interest. In the assessment of the proximal iliobibial band, the patient is positioned in lateral decubitus over the symptomatic side, with semi-flexed knee; in the assessment of the distal band, dorsal decubitus with extend knee is preferable. The longitudinal plane allows for a more intuitive interpretation as compared with transverse images, except for snapping hip syndrome investigation, and the agreement with the anatomic alteration with the site of greatest pain sensitivity reported by the patient greatly increases the diagnostic reliability. Contrary to what many patients believe, the contralateral assessment is not mandatory for the diagnosis, although it may be useful in dubious cases or in scans performed with educational purposes(5).

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SPECTRUM OF SONOGRAPHIC FINDINGS

Iliotibial band syndrome manifestations liable to be documented by ultrasonography shall be individually described in the present article. Generally, there is a resistance to consider hypoechogenicity alone as a criterion of disease due to the ubiquitous anisotropy. Most frequently the diagnosis requires a combination of thickening and hypoechogenicity or, eventually, alterations at dynamic scan.

Proximal iliotibial band syndrome

Proximal iliotibial band syndrome is an uncommon entity caused either by aging or overuse. Thus, it is most common in women because they present with wider pelvic girdle and shorter femur as compared with men, which leads to a greater mechanical overload on the iliotibial band as a stabilizer element during ambulation\(^9\). Clinically, the discomfort tends to be restricted to the iliac tubercle area, worsening with physical activity. At sonographic evaluation focused on the site of pain reported by the patient, the process is detected as a thickening and hypoechogenicity of the structure (Figure 1).

Snapping hip syndrome

The abnormal anterior motion of the iliotibial tract over the greater trochanter of the femur is a common cause of snapping hip syndrome. Reliable statistics on the prevalence of such a condition in the general population are not available, but it is known that it is most common in women at the age range between 15 and 40 years\(^8\). Although usually such snaps do not trigger any symptom, in some cases such abnormality generates disabling pain and a specific diagnosis allows for appropriate treatment and greater chances of resolution of the clinical complaints. At ultrasonography, the patient is assessed with the thigh extended, in lateral decubitus lying on the asymptomatic side, with the transducer transversely positioned over the greater trochanter. In this position, the posterior edge of the iliotibial band and the anterior edge of the gluteus maximus muscle are located posteriorly located in relation to the greater trochanter and slightly displace anteriorly during progressive flexion of the thigh, even in healthy individuals. The diagnostic criterion of such abnormality is not the displacement itself, but the snapping of the structure over the greater trochanter. Pain caused by thigh flexion is the most frequent reason for clinical complaints (Figure 2).
rotation, hip abductor muscle weakness and foot pronation may also contribute to increase the tension over the iliotibial band, predisposing to the syndrome onset\(^{(13,14)}\). In older descriptions, the injury was attributed to a cyclic antero-posterior movement of the band over the lateral condyle\(^{(15,16)}\), in a mechanism that has, most recently, been questioned. In fact, the iliotibial tract is a distinctive anatomical structure but rather a region of the fascia latae connected with the rough line of the femur by the intermuscular septum, which prevents its anteroposterior motion\(^{(17)}\). Thus, currently the most accepted etiopathogenesis of this syndrome is compressive and not frictional\(^{(12,17)}\). The typical clinical sign is pain in the region of the lateral femoral condyle, particularly acute at 30° flexion and exacerbated during the physical examination at local knee motion palpation\(^{(18)}\). The compression of the iliotibial band over the fat layer occurs with genicular flexion of approximately 30°, corresponding to the angle at the moment the foot touches the ground and justifies the maximum pain in most patients at that very instant\(^{(17)}\).

At imaging, it is easier to start the scan with the transducer longitudinally positioned over the tibial tubercle, where the band insertion can be readily identified. Then, the structure can be proximally followed up to the region of the lateral femoral condyle, where the disease manifestations are concentrated. At its early stage, iliotibial band syndrome manifests as heterogeneity and increased echogenicity of the fat tissue interposed between the band and the femur (Figure 3), which evolves with development of contiguous bursa adventitious caused by the chronic compression (Figure 4). The assessment must be performed with mere apposition of the transducer and extended knee, considering that both genicular flexion and the untimely compression of the transducer against the skin surface tend to displace the fluid, making the diagnosis less intuitive (Figure 5). At more advanced stages, thickening and heterogeneity of the iliotibial band itself are observed in the region of the lateral femoral condyle (Figure 6).

**Insertional iliotibial band tendinosis**

Insertional iliotibial band tendinosis is considered as a separate entity, located distally to the lateral femoral condyle and with no relation with chronic compression. The physio-
pathogenesis of such a condition involves aging and overuse, the latter common in unstable joints due to osteoarthrosis. Innumerable orthopedic misalignments may also increase the tension over the iliotibial band and catalyze the degenerative process over the years. From the clinical point of view, the discomfort epicenter tends to be more distal as compared with the above described iliotibial band syndrome, with eventual proximal irradiation along the lateral aspect of the thigh. The population at risk includes elderly and mid-aged individuals usually sedentary due to the associated genicular osteoarthrosis. At ultrasonography focused on the site of highest sensitivity to pain reported by the patient, insertional tendinosis is seen as thickening and hypoechoogenicity of the iliotibial band in the region of the tibia (Figure 7).

The iliotibial band as a catalyst of peritrochanteric syndrome

Peritrochanteric syndrome is a term utilized to describe a clinical condition characterized by chronic and persistent pain in the region of the greater trochanter of the femur that may be exacerbated by decubitus over the symptomatic side, prolonged orthostatism, high-impact activities, or actions like running, climbing stairs and crossing legs. Pain is more common in women between their fourth and sixth decades of life than in men\(^{19}\), at a 4:1 ratio\(^{20–22}\). In about 50% of patients, the pain irradiates over the lateral aspect of the thigh, rarely surpassing the knee\(^{23}\). Populational studies estimate its prevalence around 10–25% in industrialized countries\(^{24–26}\). In individuals with lumbar pain, the syndrome prevalence increases to 20–35%\(^{27,28}\). In the context of primary health care, its incidence is approximately 1.8:1,000 patients/year\(^{25}\). Causes are innumerable and include tendon and bursal conditions, and triggering points, only to mention some examples. Additionally, the clinical complaint may be, in truth, a reported pain originating from coxofemoral disease and/or spinal condition. Anamnesis and clinical examination do not allow a safe differentiation amongst the different etiologies, so imaging evaluation is usually indicated to guide the therapy, particularly in cases refractory to the initial management. Historically, iliotibial band syndrome has been preponderantly attributed to a bursal inflammatory process, recognized as trochanteric bursitis. However, with the popularization of imaging methods, the medical professionals have progressively perceived that the main anatomical trigger of symptoms seems to be tendinous rather than bursal, affecting the insertion of the gluteus medius and minimus muscles that are abductors of the lower limb. Because of its anatomical proximity, the iliotibial band may play a significant role in the genesis of the tendon or bursal lesion causing the syndrome due to the chronic friction during ambulation (Figure 8).

CONCLUSION

Ultrasonography is a rapid, accurate and widely available method capable of demonstrating a wide spectrum of iliotibial band alterations.
REFERENCES