



Images

A Visualization of the Greater Trochanter and Peritrochanteric Soft Tissues

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Introduction and Anatomic Considerations

The greater trochanter of the femur is a bony protuberance arising at the femoral neck and shaft interface. The greater trochanter has 4 distinct facets (anterior, superoposterior, lateral, and posterior) that serve for attachments of the abductor tendons and/or sites for bursae [1] (Figures 1 and 2).

The gluteus minimus and medius muscles arise from the external iliac fossa and their corresponding tendons insert onto the greater trochanter (Figures 1-3). The gluteus medius muscle almost completely covers the gluteus minimus muscle. The gluteus minimus tendon attaches to the anterior facet (main insertion) (Figures 1-3) and to the anterior and superior hip joint capsule. From posterior to anterior, the gluteus medius tendon attaches to the superoposterior facet (main tendinous attachment), the inferior aspect of the lateral facet, and more anteriorly to the gluteus minimus tendon [2]. The posterior facet is devoid of tendon attachments (Figures 1-3).

A variety of bursae have been described in the vicinity of the greater trochanter [3]. The 3 most consistently identified bursae are the subgluteus minimus, subgluteus medius, and subgluteus maximus bursae. The subgluteus minimus bursa lies deep to the gluteus minimus tendon. The subgluteus medius bursa is located between the lateral insertion of the gluteus medius tendon and the superior part of the lateral facet (this portion of the lateral facet is devoid of tendon insertion and is known as the trochanteric bald spot) [4] (Figure 1). The largest bursa is the subgluteus maximus. This bursa covers the posterior facet and lies deep to the gluteus maximus muscle (Figure 4).

Clinical Background

Greater trochanteric pain syndrome (GTPS) refers to chronic pain and tenderness over the lateral

aspect of the hip. GTPS can occur in any age group, but is most prevalent in middle-aged (40-60 years) women [5]. Differential considerations include intra-articular and periarticular pathologies, in addition to lumbar radicular pain [6]. GTPS most commonly is the result of gluteus minimus or medius tendinosis or tears [7]. Trochanteric bursitis is no longer the preferred terminology for this condition, given that this entity is rarely present [7]. GTPS usually is managed conservatively, with surgery reserved for refractory cases.

Gluteus minimus or medius abnormalities most commonly occur near the tendon insertions and include tendinosis and partial or full-thickness tendon tears (tendinopathy). These abnormalities more commonly affect the gluteus medius tendon [7]. Tendinosis may develop from repetitive microtrauma, degeneration, or weakening from systemic conditions such as gout, diabetes mellitus, or collagen vascular disease [8]. Involvement of the gluteal tendons also may occur in the context of hydroxyapatite deposition disease or seronegative spondyloarthritides and will be discussed subsequently.

Imaging

Ultrasound (US)

For imaging the lateral hip, the patient lies on the asymptomatic side, with the symptomatic side up either in an oblique lateral or true lateral decubitus position. The choice of transducer depends on the patient's body habitus, with the goal of obtaining adequate penetration.

Awareness of the layered anatomy of the iliotibial tract, gluteus medius muscle/tendon, and gluteus minimus muscle/tendon is helpful for orientation as one moves the transducer from anterior to posterior [9,10]. To better understand this layered anatomy,

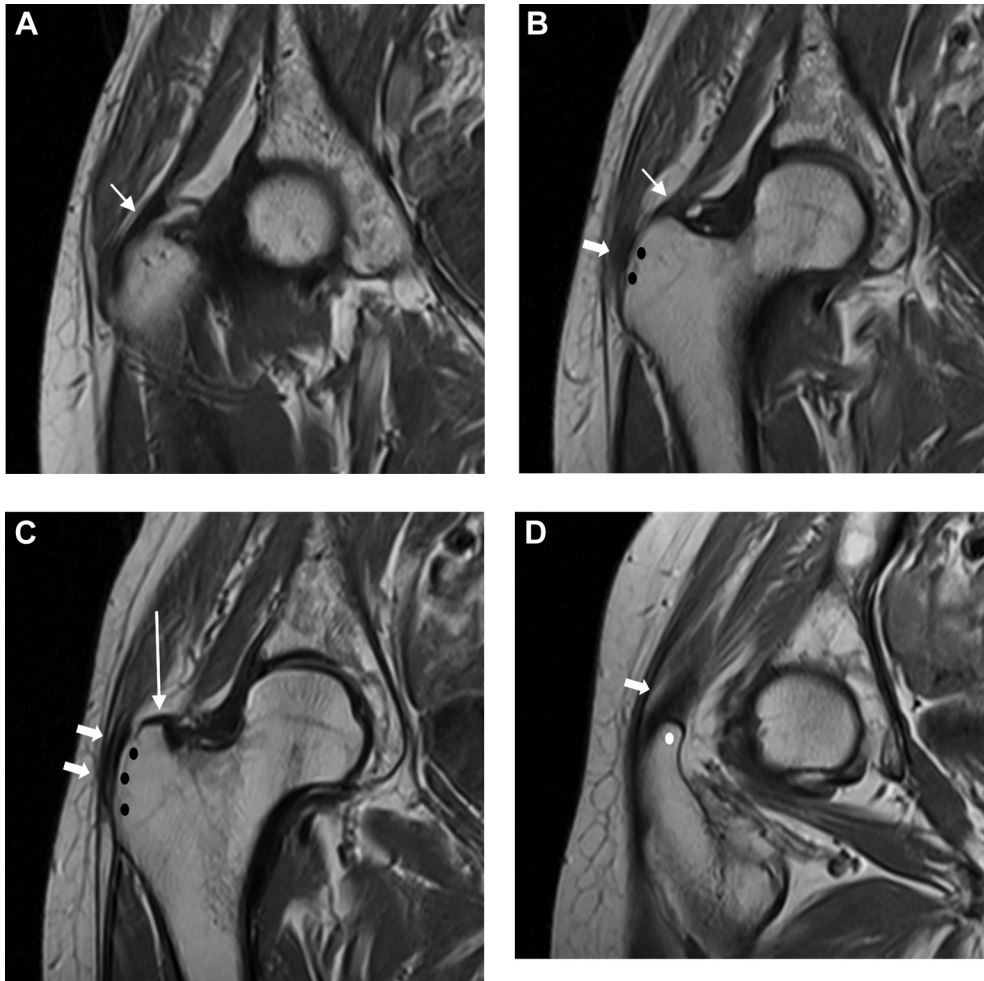


Figure 1. Nonconsecutive coronal T1-weighted magnetic resonance images from anterior to posterior. (A-D) The normal gluteus minimus tendon (short white arrows) is seen inserting at the anterior facet of the greater trochanter. The normal gluteus medius tendon (block arrows) is seen inserting at the inferior aspect of the lateral facet (black dots) and the superoposterior facet (white dot) of the greater trochanter. Long arrow = trochanteric bald spot.

a coronal computed tomography image positioned in a lateral orientation has been provided (Figure 5) to simulate the acoustic window that the sonographer will visualize. Anteriorly, the gluteus minimus tendon attaches to the anterior facet of the greater trochanter and is covered by the gluteus medius muscle. More posteriorly, the gluteus medius tendon attaches to the lateral and superoposterior facets and is covered by the iliotibial tract (Figure 6).

On US, tendinosis is manifest as decreased tendon echogenicity, heterogeneous tendon echogenicity, tendon thickening, or combinations thereof (Figures 7 and 8). Calcific tendon deposits may be an associated finding. Cortical irregularities in the greater trochanteric facets (Figure 8) may be encountered and may direct the examiner to more carefully evaluate the overlying tendons. Tendinosis may be associated with increased vascularity on color or power Doppler imaging. Simple bursal fluid may be anechoic, whereas

complicated bursal fluid demonstrates mixed echogenicity. Muscle wasting is seen as decreased muscle bulk and increased echogenicity of the involved muscle [3]. Tendon tears may result in tendon thinning, partial- or full-thickness anechoic defects within the tendon (Figure 8), or a bald facet. In addition to diagnostic applications, US may be used in guiding interventions for treatment of hip abductor pathologies.

Magnetic Resonance Imaging (MRI)

MRI is useful for assessment of the abductor tendons as well as exclusion of other causes of lateral hip pain. On MRI, normal gluteus minimus and medius tendons typically demonstrate low signal intensity on all pulse sequence. The gluteus minimus tendon and lateral insertion of the gluteus medius tendon are best assessed on axial and coronal images (Figures 1 and 2), whereas the superoposterior

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