A Female Patient with Posterior Lateral Right Knee Pain and a Palpable Mass

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Section 2 – Answer

Case description

A 65-year-old female presented with a 2–3-week history of posterior lateral right knee pain with a small mass. There was no recent injury or change in activity. Furthermore, the pain which was initially a dull pain had become severe. The physical examination confirmed an approximately 1–2 cm slightly mobile firm mass, near the area of the fibular head, with pain elicited during flexion.

Musculoskeletal ultrasound (US) confirmed a grouping of multiple shadowing and nonshadowing echogenic foci at the posterior lateral aspect of the right knee, within the heterogenous appearing biceps femoris tendon insertion, at the fibular head [Figure 1]. The largest focus measured approximately 5 mm. There was no associated hyperemia by power Doppler or any significant adjacent subcutaneous edema. No focal fluid collection or solid mass was identified.

The radiographs also demonstrated multiple ill-defined calcific densities adjacent to the fibular head, corresponding with the sonographic findings [Figure 2]. There was no fracture or dislocation. There was also no periosteal reaction or suspicious osseous lesion.

The clinical and imaging findings were consistent with right biceps femoris calcific tendinopathy (CaT), partially within the resorptive phase. The musculoskeletal US confirmed that there was no suspicious mass or any evidence of a ganglion or bursitis. The radiographs confirmed the findings and also excluded any fracture or suspicious osseous changes.

An US-guided needling and lavage (barbotage) was offered for treatment. The patient opted to continue applying ice and using over-the-counter ibuprofen. She was also encouraged to do stretching and strengthening knee exercises. Upon a 2-week follow-up clinical visit, there had been significant improvement in the pain.

Discussion

CaT is a common disorder in which calcium hydroxyapatite deposits in tendons. Although this case involved the biceps femoris tendon, it most commonly affects the rotator cuff tendons and 80% of time involves the supraspinatus tendon.[1-4] The pathogenesis and exact cause remain unclear, but hypotheses include endocrine and metabolic diseases,

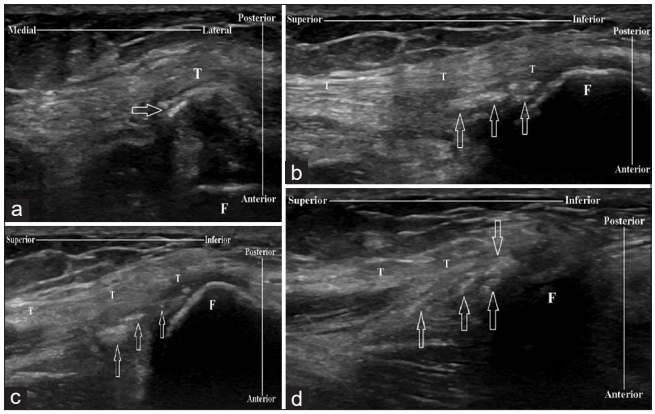

Figure 1: Sonographic images of the posterior lateral right knee. (a) Short-axis image and (b) and (c) long-axis images demonstrate multiple echogenic calcific foci (open arrows), within the heterogenous biceps femoris tendon (T) insertion at the fibular head (F). (d) Long-axis image obtained just posterior to the biceps femoris tendon (T) shows some amorphous echogenicity (open arrows) extending into the soft tissues immediately adjacent to the tendon

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Received: 03-12-2020 **Revised:** 16-12-2020 **Accepted:** 11-03-2021 **Available Online:** 02-07-2021

Access this article online

Quick Response Code:

Website: www.jmuonline.org

DOI: 10.4103/JMU.JMU_169_20

How to cite this article: Soliman SB. A female patient with posterior lateral right knee pain and a palpable mass. J Med Ultrasound 2022;30:71-3.

hormonal factors, and genetic predisposition.[1-3] One theory suggests that decreased oxygen tension within the tendon could result in fibrocartilaginous metaplasia, secondary mineralization, and resultant CaT.[4-6]

As the use of musculoskeletal US has continued to increase over the past few decades, CaT is commonly diagnosed and localized by US.[7] In multiple studies, US has been shown to be more sensitive than MRI in the evaluation of CaT, owing to the superior ability of US to clearly delineate the calcific deposits.[1,8] Furthermore, and contrary to traditional teaching, when compared to MRI, US can also better delineate the specific CaT stages.[1,9,10]

There are three distinct stages of CaT: precalcific, calcific, and postcalcific stages.[1,2,10] The calcific stage is further subdivided into the formative, resting, and resorptive phases [Table 1]. As in this case, patients most commonly seek medical attention during the painful resorptive phase of the calcific stage. During this phase, the calcium hydroxyapatite deposits migrate into the surrounding peritendinous tissues [Figure 1d], for example, in the subacromial-subdeltoid bursa of the shoulder [Figure 3], inciting pain and decreased range of motion.[1,2,10] Similar to our case, the resorptive phase is self-limiting and pain gradually improves over 2–3 weeks.[1,2]

US is also beneficial given its ability to easily perform real-time Doppler interrogation to evaluate for associated hyperemia [Figure 3].[1,4] This is especially important in the resorptive phase for the detection of local hyperemia caused by calcium migration, the presence of which commonly correlates with severity of symptomatology.[1,4] US is also tremendously advantageous and unique for its therapeutic capabilities including the ability to perform an US-guided CaT needling and lavage (barbotage) with corticosteroid and analgesic injection [Figure 4].[6,8]

Figure 2: Anteroposterior (a) and lateral (b) radiographs of the right knee show multiple ill-defined calcific densities (open arrows) adjacent to the fibular head

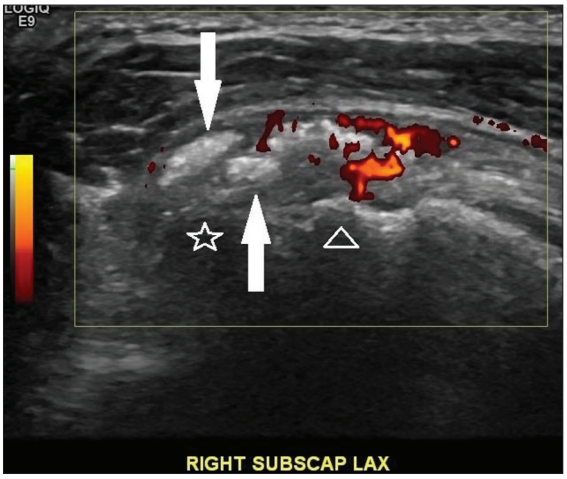

Figure 3: Long-axis power Doppler sonographic image of the right subscapularis (SUBSCAP) tendon in a separate 44-year-old female with shoulder pain. Image at the level of an irregular lesser tuberosity (triangle) shows multiple shadowing echogenic foci (arrows) with associated acoustic shadowing (star) and hyperemia consistent with subscapularis calcific tendinopathy. Notice the calcific tendinopathy is partially in the resorptive phase with hyperemia extending into the adjacent slightly distended subacromial–subdeltoid bursa

Table 1: Summary of the stages and phases of calcific tendinopathy

Stages	Pathophysiologic changes	Symptomatology
Stage I		
Precalcific stage	Cellular changes begin that eventually result in the development of calcifications, resulting in the calcific stage	Traditionally asymptomatic
Stage II		
Calcific stage (3 phases)		
Formative phase	Phase 1 - Formative phase: Calcium hydroxyapatite crystals coalesce to form calcific deposits, resulting in the resting phase	Traditionally asymptomatic
Resting phase	Phase 2 - Resting phase: Calcific deposits are formed, maturing, and enlarging	Asymptomatic or dull pain secondary to large deposits causing impingement during motion
Resorptive phase	Phase 3 - Resorptive Phase: Calcium deposits migrate into the surrounding tissues, initiating a painful inflammatory response (for example, calcific bursitis)	Classically, the most painful or symptomatic phase. This phase is self-limiting and gradually improves over 2-3 weeks
Stage III		
Postcalcific stage	Begins approximately 2-3 weeks following the resorptive phase. Calcific deposits resolve. Healing and remodeling changes in the affected tendon (s) result in the formation of granulation tissue with fibroblasts and collagen	Symptoms improve and can be asymptomatic

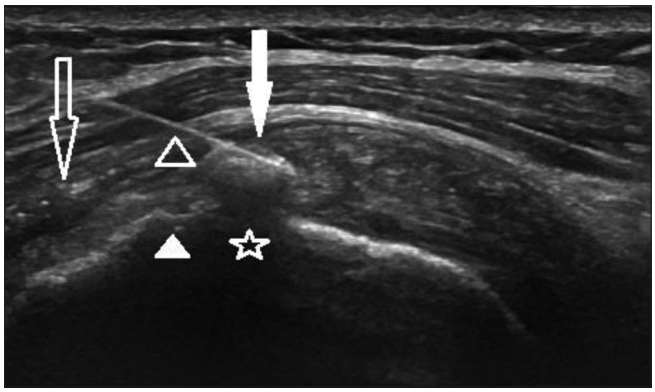

Figure 4: Long-axis sonographic image of the right supraspinatus tendon obtained during an US-guided needling and lavage (barbotage) performed on a different 59-year-old female with shoulder pain related to calcific tendinopathy. The procedure is performed with the needle (empty triangle) entering the shadowing (star) calcific deposit (solid arrow) using a lateral to medial approach with an in-plane technique. Notice the fragmented punctate echogenic debris (empty arrow) extending into the adjacent subacromial–subdeltoid bursa secondary to the needling and lavage of the calcific deposit

Compliance with ethical standards

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards. Informed consent and protocol review were exempt as per our institutional review board policies for this type of study and since these examinations were clinically indicated.

Declaration of patient consent

The author certifies that they have obtained all appropriate patient consent forms. In the form, the patient has given her consent for her figures and other clinical information to be reported in the journal. The patient understands that her name and initials will not be published, and due efforts will be made to conceal her identity, but anonymity cannot be guaranteed.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. Bianchi S, Becciolini M. Ultrasound appearance of the migration of tendon calcifications. J Ultrasound Med 2019;38:2493-506.
2. Kachewar SG, Kulkarni DS. Calcific tendinitis of the rotator cuff: A review. J Clin Diagn Res 2013;7:1482-5.
3. DE Carli A, Pulcinelli F, Rose GD, Pitino D, Ferretti A. Calcific tendinitis of the shoulder. Joints 2014;2:130-6.
4. Jacobson JA. Shoulder ultrasound. In: Jacobson JA, editor. Fundamentals of Musculoskeletal Ultrasound. 3rd ed. Philadelphia, PA: Elsevier; 2018. p. 55-126.
5. Oliva F, Via AG, Maffulli N. Physiopathology of intratendinous calcific deposition. BMC Med 2012;10:95.
6. Serafini G, Sconfienza LM, Lacelli F, Silvestri E, Aliprandi A, Sardanelli F. Rotator cuff calcific tendonitis: Short-term and 10-year outcomes after two-needle us-guided percutaneous treatment – Nonrandomized controlled trial. Radiology 2009;252:157-64.
7. van Holsbeeck M, Soliman S, Van Kerkhove F, Craig J. Advanced musculoskeletal ultrasound techniques: What are the applications? AJR Am J Roentgenol 2021;216:436-45.
8. Lee KS, Rosas HG. Musculoskeletal ultrasound: How to treat calcific tendinitis of the rotator cuff by ultrasound-guided single-needle lavage technique. AJR Am J Roentgenol 2010;195:638.
9. Siegal DS, Wu JS, Newman JS, Del Cura JL, Hochman MG. Calcific tendinitis: A pictorial review. Can Assoc Radiol J 2009;60:263-72.
10. van Holsbeeck MT, Introcaso JH, editors. Musculoskeletal Ultrasound. 3rd ed. Philadelphia, PA: Jaypee Brothers Medical Publishers; 2016.