SUBMITTED 13 AUG 24
REVISION REQ. 25 SEPT 24; REVISION RECD. 29 SEPT 24
ACCEPTED 21 OCT 24
ONLINE-FIRST: OCTOBER 2024
DOI: https://doi.org/10.18295/squmj.10.2024.069

Meniscal ossicle

An unusual finding

***Márcio L. Duarte,[1,2] Mayara O. da Silva[3,4]**

[1]Department of Radiology, Universidade de Ribeirão Preto – Campus Guarujá, Guarujá (SP), Brazil; [2]Department of Radiology, Diagnósticos da América S.A., São Paulo (SP), Brazil; [3]Department of Interdisciplinary Health Sciences, Universidade Federal de São Paulo – Campus Baixada Santista, Santos (SP), Brazil; [4]Department of Biomedicine, Clínica MegaImagem, Santos (SP), Brazil

**Corresponding Author's E-mail: marcioluisduarte@gmail.com*

A 43-year-old man presented with a two-week history of left knee pain following a sprain at a local hospital in Praia Grande, Brazil. He denied any previous surgeries, illnesses, or regular medication use. The patient mentioned that he had been playing soccer weekly for several years. His physical examination was unremarkable, with normal meniscal and ligament tests. However, magnetic resonance imaging (MRI) revealed an ossification in the posterior root of the medial meniscus, measuring 0.5 x 0.8 x 1.1 cm (CC x T x AP), consistent with a meniscal ossicle (MO) (Figure 1). Additionally, the MRI showed a tear in the root of the posterior horn of the medial meniscus near the MO, along with chondral irregularities in the weight-bearing area of the medial femoral condyle (Figure 1). Despite these findings, the patient had no physical signs of a meniscal tear. Given the patient's preference to avoid surgery, he was prescribed analgesics and returned for follow-up one month later, at which point his symptoms had resolved. Ongoing follow-up with muscle strengthening was recommended to address the chondral irregularity in the medial femoral condyle. Patient consent for publication was obtained.

Comment

Meniscal ossicle (MO) was first described by Burrows in 1931, and its estimated prevalence is around 0.15%. MO typically occurs in the posterior horn of the meniscus, particularly near the meniscal root - probably because of its abundant vascularity, with rare cases involving other locations like the anterior horns or the posterior horn of the lateral meniscus. Most ossicles are less than 10 mm in size and predominantly found in young males (84% of the cases).[1,2]

MO is defined as mature bone embedded within the meniscal tissue.[1] The exact etiology of meniscal ossicles remains unclear, with several theories proposed. Possible causes include congenital, degenerative, or post-traumatic factors. Some researchers suggest that MO may be a congenital vestigial structure, similar to those found in certain animals such as rodents. Other hypotheses include mucoid degeneration of the meniscus or mineralization within the meniscus. However, the most widely accepted theory is a post-traumatic origin, where heterotopic ossification occurs within the meniscus following trauma, or as a result of an avulsion injury of the meniscal root from the tibial spine.[3] This theory could explain the presence of MO in our patient, who had been playing soccer for years.

According to Ogassawara et al., there are few reported cases of MO associated with cartilage lesions. It is believed that the chondral damage in this patient could be the result of mechanical erosion from the firm, protruding surface of the MO, aggravated by repetitive microtrauma. Another explanation, described by Marzo and supported by the biomechanical study of Allaire et al., is that significant meniscal root pathology may lead to functional incompetence of the meniscus, potentially causing early cartilage degeneration and osteoarthritis. Contrary to the typically benign nature of asymptomatic MO, our case demonstrated an association between MO and cartilage damage. Therefore, muscle strengthening and regular monitoring with imaging tests were recommended.[2]

Patients with MO are either asymptomatic or present with persistent or increasing knee pain, sometimes accompanied by sensations of catching or clicking. The sudden onset of symptoms in previously asymptomatic patients is not well understood, but one hypothesis suggests that the growth of the ossicle could lead to pain by impacting adjacent innervated structures. Mechanical symptoms like knee locking are rare, though some authors suggest that MO might alter the meniscus's contour, increasing the risk of

meniscal tears or degeneration.[4] Asymptomatic ossicles may become symptomatic due to growth or changes in the meniscus shape, but some cases of rapid enlargement challenge this theory.[5]

The differential diagnosis for MO includes meniscal calcification, osteochondritis dissecans, chondrocalcinosis, and avulsion of the semimembranosus or popliteus tendons. MO is often mistaken for an intra-articular loose body. Histologically, MO consists of cancellous bone with fatty marrow surrounded by a cortex and covered with hyaline cartilage.[3]

MO is usually an incidental finding on radiographs or MRI. Ultrasonography can sometimes detect MO as hyperechoic structures with posterior acoustic shadowing, though this method can be challenging. Computed tomography (CT) can confirm the presence of a calcific structure in the meniscus area, but it might not definitively show whether the ossicle is embedded within the meniscus.[2] MRI is the preferred imaging modality for diagnosing MO, revealing ossification within the meniscal substance and showing MRI signals characteristic of normal bone with fatty marrow.[1] MRI can also detect associated abnormalities such as meniscal tears, ligament injuries, cartilage damage, and synovial effusion.[1] The primary treatment for symptomatic MO is arthroscopic resection, although conservative management is an option for asymptomatic patients.[6]

Authors' Contribution

MOS conceptualized the work, performed the investigation and managed the project. MLD collected and analyzed the data. Both authors contributed equally to the methodology, visualization, validation drafting, editing and revising the manuscript. Both authors approved the final version of the manuscript.

References

1. Vangrinsven G, Vanhoenacker F. Meniscal Ossicle Mimicking a Radial Meniscal Tear. J Belg Soc Radiol. 2020 Jun 26;104(1):33. doi: 10.5334/jbsr.2125. PMID: 32607471; PMCID: PMC7319072.
2. Ogassawara R, Zayni R, Orhant E, Noel E, Fournier Y, Hager JP, Chambat P, Sonnery-Cottet B. Meniscal ossicle in a professional soccer player. Orthop

Traumatol Surg Res. 2011 Jun;97(4):443-6. doi: 10.1016/j.otsr.2011.01.013. PMID: 21514264.

3. Eliasberg CD, Lin KM, Bauer TW, Rodeo SA. Development of a Meniscal Ossicle After a Meniscal Root Repair Augmented with Bone Marrow Aspirate Concentrate: A Case Report. JBJS Case Connect. 2020 Jan-Mar;10(1):e0419. doi: 10.2106/JBJS.CC.19.00419. PMID: 32224660.
4. Kumar P, Dey AK, Mittal K, Sharma R, Hira P. Double Meniscal Ossicle, the First Description: CT and MRI Findings-Different Etiologies. Case Rep Radiol. 2015;2015:737506. doi: 10.1155/2015/737506. PMID: 26788396; PMCID: PMC4693018.
5. Mohankumar, R., Palisch, A., Khan, W., White, L. M., & Morrison, W. B. Meniscal Ossicle: Posttraumatic Origin and Association With Posterior Meniscal Root Tears. American Journal of Roentgenology. 2014 203(5), 1040–1046. doi:10.2214/ajr.13.11821
6. Qalib YO, Tang Y, Lu H. The meniscal ossicle associated with medial meniscus posterior root tear. BJR Case Rep. 2022 Jul 1;8(4):20210243. doi: 10.1259/bjrcr.20210243. PMID: 36451911; PMCID: PMC9668255.

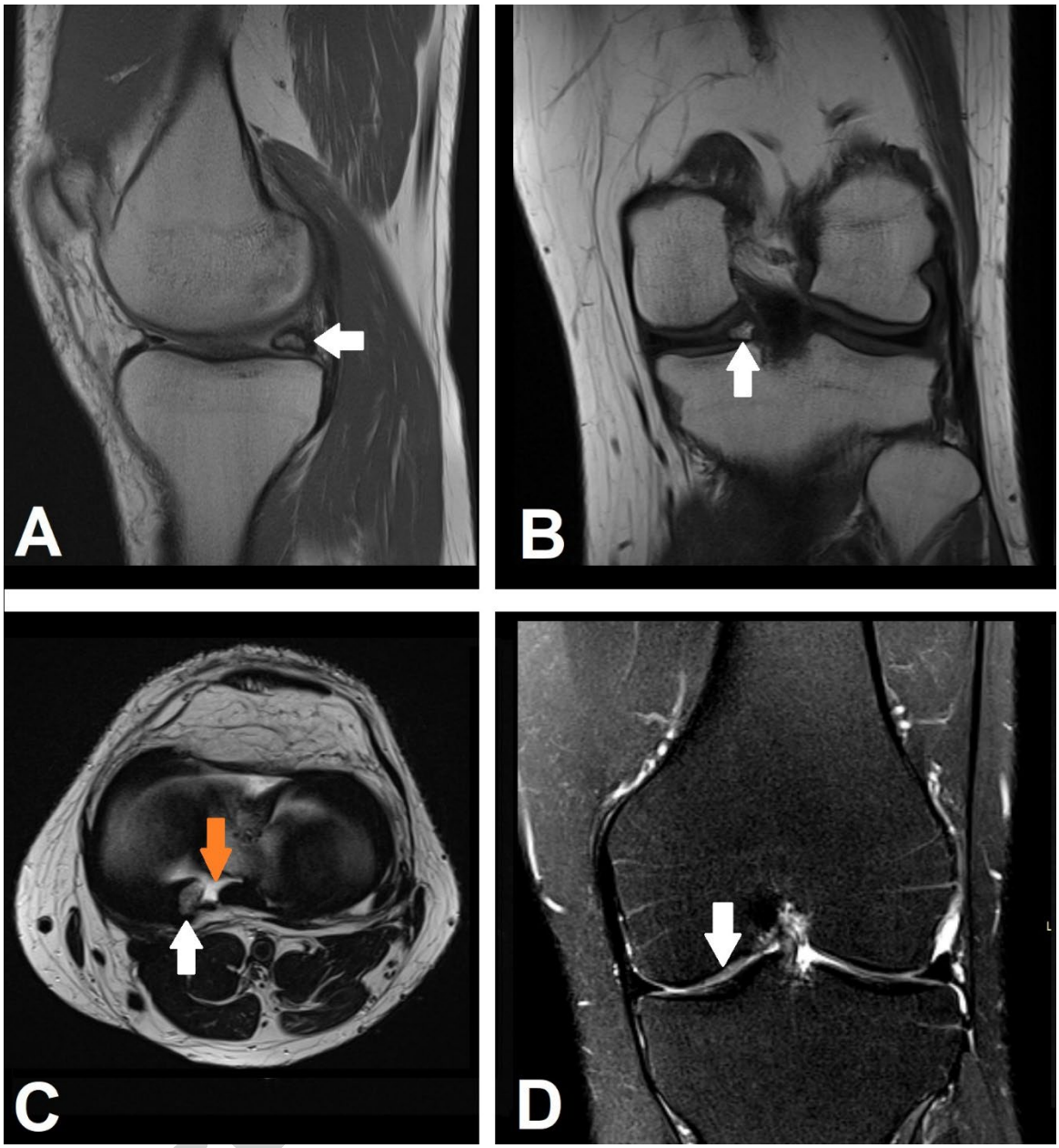

Figure 1: Left knee MRI in sagittal PD sequence (A), coronal T1 sequence (B) and axial T2 sequence (C) demonstrating meniscal ossicle (white arrows) and rupture of the root of the posterior horn of the medial meniscus (orange arrow in C). Left knee MRI In coronal PD FAT SAT sequence (D) detecting chondral irregularity in the weight-bearing zone of the medial femoral condyle (white arrow).