The case:

A 33-year-old woman presented with persistent right knee pain after an injury. Radiographs and magnetic resonance images were obtained.

Figure: Anteroposterior (A) and lateral (B) radiographs and T1-weighted (C) and T2-weighted (D) fat-suppressed magnetic resonance images of the right knee.

Your diagnosis?

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Diagnosis:
Medial Meniscal Ossicle

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Answer to Radiologic Case Study
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A 33-year-old woman presented with persistent right knee pain that had lasted for 2 years. The patient reported that the pain had started after she fell while ice skating. Radiographs of the right knee (Figure 1) showed a well-corticated small ossified density in the knee joint postero-medially. On magnetic resonance imaging, a triangular ossification that conformed to the shape of the medial meniscus about the root and posterior horn (Figure 2) showed fatty marrow signal. No meniscal tear was detected on magnetic resonance imaging, although this evaluation was limited by the presence of an ossicle. Because of the patient’s symptoms, a decision was made to proceed with surgical intervention.

During the arthroscopic surgery, a meniscal ossicle was found at the root of the posterior horn of the medial meniscus. In addition, there was a radial tear adjacent to the meniscal root. The torn medial meniscal root was repaired arthroscopically with debridement of the meniscal ossicle. The patient’s symptoms improved after surgery.

Discussion
Initial reports of meniscal ossicles date back to the early 19th century. Burrows\(^1\) described the first case: a 25-year-old man who was found to have an ossicle in the medial meniscus.\(^2,3\) The estimated prevalence of meniscal ossicles in the general population has been reported to be 0.15%.\(^4\) Meniscal ossicles are typically found in the posterior horn, at or near the meniscal root; it is extremely unusual to see ossicles in other locations.\(^5,6\)

The etiology of meniscal ossicles has not been clearly defined. One theory suggests that meniscal ossicles are vestigial structures. This theory is supported by the presence of meniscal ossicles in animals such as rodents.\(^7,9\) Other theories for the etiology of meniscal ossicles include mucoid degeneration secondary to ossification\(^8\) and trauma resulting in heterotopic ossification.\(^10\) The current authors’ patient had a history of knee trauma and was found to have a meniscal tear during arthroscopic surgery.

Mohankumar et al.\(^11\) recently suggested that the most
likely etiology of meniscal ossicles is the occurrence of remote single or multiple injuries resulting in metaplasia of fibrocartilage and secondary heterotopic ossification. Similar to the findings in the current case, Mohankumar et al\textsuperscript{11} also observed an association between meniscal ossicles and meniscal tears, particularly posterior root tears.

No specific symptoms are associated with meniscal ossicles.\textsuperscript{12} Most patients with meniscal ossicles present with pain. Mechanical symptoms, such as locking of the knee, are rarely seen.\textsuperscript{13} Apart from knee pain, there was no other prominent symptom in the current case.

The differential diagnosis for meniscal ossicles includes meniscal calcification, osteochondritis dissecans, chondrocalcinosis, loose body, and avulsion of the semimembranosus or popliteus tendons.\textsuperscript{2,5} On histological examination, meniscal ossicles are seen as cancellous bone structures with fatty bone marrow surrounded by a cortex covered with hyaline cartilage.\textsuperscript{14} On radiographs, meniscal ossicles appear as triangular or rectangular calcified lesions.\textsuperscript{5} On magnetic resonance imaging, demonstration of ossification within the meniscal substance confirms the diagnosis of a meniscal ossicle. A fatty bone marrow signal is typically seen in meniscal ossicles on T1-weighted images,\textsuperscript{13} and homogeneous suppression of signal on fat-suppressed images is also expected.

**CONCLUSION**

Characteristic imaging findings and typical location of meniscal ossicles permit a straightforward diagnosis of this condition on imaging. Further interventions such as arthroscopy should be guided by clinical symptoms and may reveal additional findings, such as the meniscal tear seen in this case.

**REFERENCES**