

# Meniscal Ossicle

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Meniscal ossicle of the knee, an ossified tissue formed within the meniscus, is rare in humans. We experienced a case of a 48-year-old male with no history of trauma, who presented with intermittent locking symptoms and knee pain upon standing. The patient was diagnosed with meniscal ossicle and cartilage lesion in the medial femoral condyle accompanied by a medial meniscus posterior horn radial tear and treated with arthroscopic resection and microfracture. Therefore, we report on this case with relevant literature.

**Key words:** ossicle, meniscus, articular cartilage lesion

Since the description of meniscal ossicle was introduced by Watson-Jones and Roberts<sup>1)</sup> in 1934, a number of authors have reported this rare abnormality. The prevalence of meniscal ossicle was found to be 0.15% among 1,287 consecutive knee magnetic resonance imaging (MRI) examinations.<sup>2)</sup> The most common site of meniscal ossicle is in the posterior horn of the medial meniscus.<sup>3)</sup> Traditionally, arthroscopic resection of the ossicle is recommended for symptomatic cases.<sup>4)</sup> However, some articles recommend arthroscopic resection and meniscal repair as adequate treatments.<sup>5,6)</sup> We performed arthroscopic meniscal resection including the ossicle and microfracture to treat meniscal ossicle and the cartilage lesion in the medial femoral condyle accompanied by medial meniscus posterior horn radial tear. This patient was diagnosed with meniscal ossicle of the knee based on the results of a histopathological biopsy.

## CASE REPORT

A 48-year-old male was referred to our hospital for pain and intermittent locking symptoms in the right knee that had begun 6 months before. He was treated conservatively at a local clinic, but his symptoms did not improve. Physical examination at our hospital revealed direct tenderness along the right posteromedial joint line

and limitation of full flexion because of the pain. The McMurray test was positive. A plain radiograph of the knee revealed a solitary and well-defined oval-shaped bony structure in the posteromedial compartment of the knee (Fig. 1A, 1B). Subsequent MRI revealed that an ossicle with an isointensity cortical rim was embedded within the posterior horn of the medial meniscus and that the posterior horn was detached from its tibial insertion (Fig. 1C, 1D). Arthroscopy was performed with 90-degree flexion of the right knee. Probing in the arthroscopic view revealed a tear in the posterior horn of the medial meniscus at the tibial insertion. Integrity was partially maintained, but it was loose and unstable because of the degenerative changes in the soft tissue (Fig. 2A). Meanwhile, although the normal meniscus lateral to the tear displayed swelling and a palpable solid mass inside, there were no lesions that suggested an avulsion fracture of the tibial insertion (Fig. 2B). In the meantime, the outerbridge classification grade IV cartilage defect on the medial femoral condyle was observed, likely caused by repeated contact with the enlarged hard posterior horn (Fig. 2C). Meniscectomy was performed accordingly for the posterior horn radial tear, and the mass embedded inside the meniscus was resected along with normal tissue because separate resection was impossible. Suture was not performed because probing after resection showed that reattachment of the residual meniscus to its normal anatomical location was impossible. Meanwhile, marrow stimulation by microfracture was performed for the cartilage lesion in the medial femoral condyle. The resected mass was sized 10×5×10 mm macroscopically and was surrounded by smooth, white cartilage (Fig. 3A). A histo-

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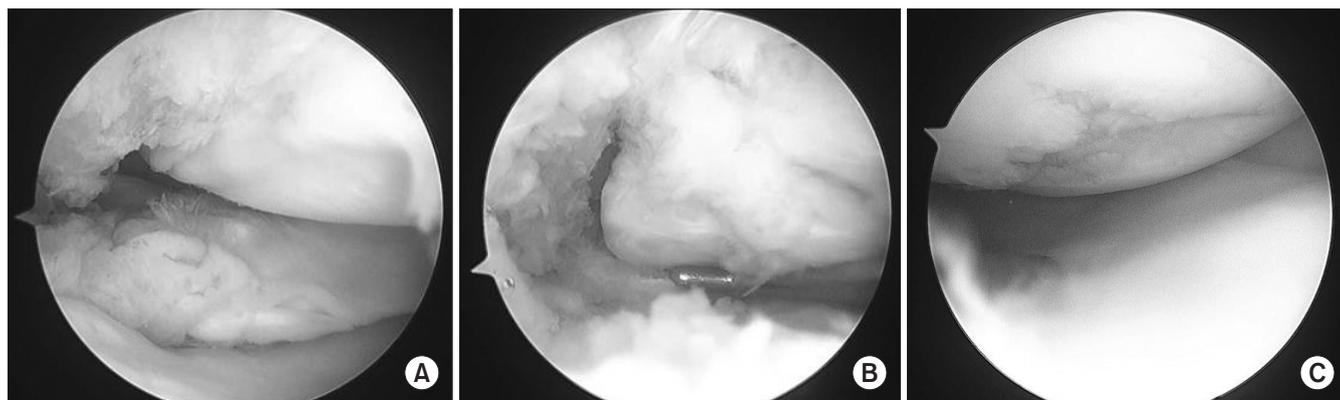
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**Figure 1.** (A, B) On anteroposterior and lateral radiographs off the right knee, a solitary and well-defined oval-shaped bony structure is observed in the posteromedial compartment of the knee. White arrows indicate the ossicle. (C, D) Magnetic resonance imaging showing the mass embedded in the meniscus with detachment of the posterior horn of the medial meniscus. Coronal T2-weighted image (C) and sagittal T2-weighted image (D) at the ossicle level. White arrows indicate the ossicle.

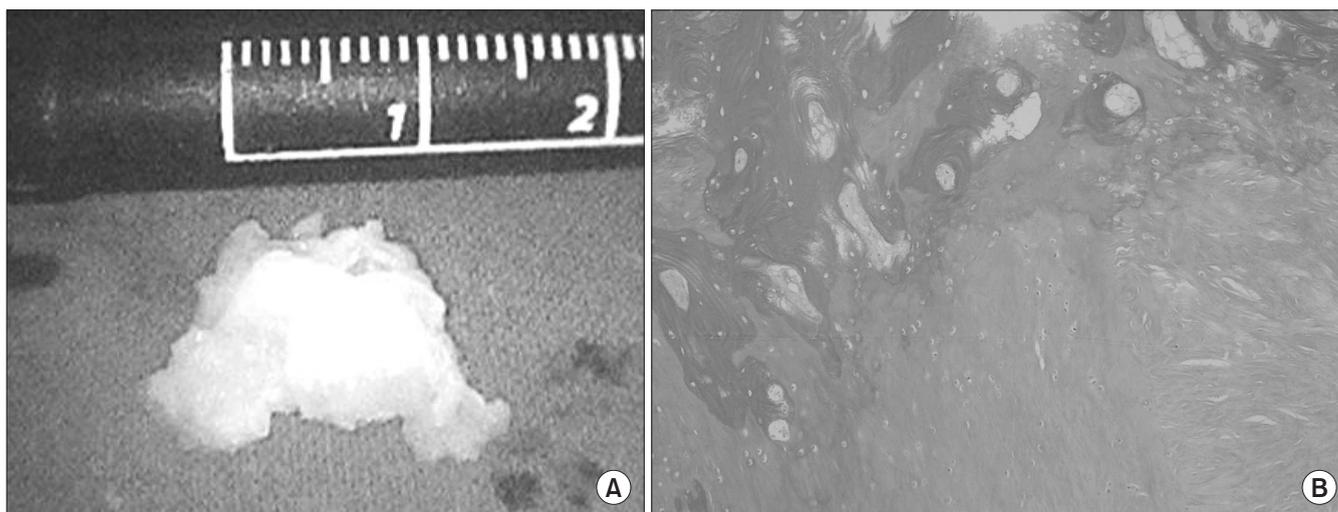


**Figure 2.** (A, B) An arthroscopic view through the intercondylar notch from the anterolateral portal shows that the posterior horn was garlic-shaped, enlarged, and detached from its tibial insertion with a radial tear that was highly mobile with probing. (C) On an arthroscopic view through the anterolateral portal, a groove-line cartilage defect on the medial femoral condyle was noted.

logical examination revealed mature cancellous bone surrounded by a fibrocartilage layer. There were no signs of mucoid degeneration, revascularization, fibroblastic proliferation or metaplasia (Fig. 3B). Joint rehabilitation exercises were performed starting one day after the surgery, and weight-bearing ambulation was allowed 6 weeks after the surgery. At 12-month follow-up, no abnormalities were observed in the knee, including symptoms that had been present before the surgery, and normal range of motion was confirmed (Fig. 4).

## DISCUSSION

Ossicles in the meniscus of the knee are very rare in humans. Although the etiology of meniscal ossicle is still controversial, mucoid degeneration,<sup>3,7)</sup> traumatic<sup>8)</sup> and phylogenetic theories<sup>3,7,9)</sup> have been proposed in the literature. In this case, preoperative MRI and arthroscopic examination during surgery did not reveal any bony defect or irregular surface that would have suggested avulsion fracture near the tibial insertion, and the ossicle was completely embedded in the posterior horn with no bone marrow exposure from the surface



**Figure 3.** (A) The resected mass measured 10×5×10 mm in size macroscopically and was surrounded by smooth, white cartilage. (B) Histologic examination showed mature cancellous bone surrounded by a thin layer of calcified cartilage contiguous to the fibrocartilage compatible with endochondral bone formation. No signs of mucoid degeneration, revascularization, fibroblastic proliferation, or metaplasia were observed (H&E, ×200).



**Figure 4.** On anteroposterior and lateral radiographs taken 12-month after the operation, an oval-shaped bony structure was observed in the posteromedial compartment of the knee before the operation was completely resected.

of the posterior horn. In addition, there were no signs of mucoid degeneration, revascularization, fibroblastic proliferation, or metaplasia according to the histological findings. We believed it would be appropriate to assume that the ossicle existed asymptotically and was found after the meniscal tear and the cartilage injury to the medial femoral condyle rather than assuming that it occurred as a result of degeneration or dysplasia caused by trauma.

Meniscal ossicle usually occurs in the posterior horn of the medial meniscus in young men, and it can be diagnosed by plain radiogra-

phy and MRI. On the MRI, it is located inside or along the meniscus, has well-defined margins, and displays characteristics of parenchyma tissue with high signal intensity on T1-weighted MRI and low signal intensity in T2-weighted and fat-saturated T2-weighted MRI.<sup>2</sup> Moreover, because MRI allows for differential diagnosis of loose body, popliteus tendon avulsion, tibial avulsion of a meniscal posterior horn, osteochondritis dissecans lesion, and chondral-cinosis of the knee, it is reported to provide very useful treatment guidelines and also it allows for the accurate detection of the location of a meniscal tear as well as accurate diagnosis.<sup>10</sup> Histological analysis confirmed the diagnosis of meniscal ossicle, which consisted of normal trabecular bone in the middle and hyaline cartilage in the marginal layer.

When the clinical symptoms are unapparent or minimal, meniscal ossicle can be managed by improving the symptoms with activity restrictions and physical therapy.<sup>8-10</sup> If the meniscal ossicle causes symptoms, they can be improved through resection of the ossicle including the cartilage that appears normal.<sup>4</sup> However, Ohishi et al.<sup>5</sup> mentioned the loss of hoop tension and meniscal function following resection of the medial meniscus root and the consequent danger of extrusion of meniscus; these authors recommended repairing the meniscus following an ossicle resection. In cases of tear or avulsion fracture in the meniscus root portion, we generally attempt to repair the medial meniscus as well by a pullout suture to maintain meniscal function. However, pullout suture was not performed in this case because reattachment of the residual meniscus to the original site of the posterior horn insertion was impossible after the removal of

the meniscus root portion including the ossicle. Meanwhile, marrow stimulation by microfracture was performed for the medial femoral chondral lesion, which was likely the result of mechanical erosion by the firm bulging surface of the meniscal ossicle caused by repetitive microtrauma.

Meniscal ossicle of the knee is a very rare disease with a high risk of meniscal tear and associated injury in the surrounding cartilage even from a small trauma to the knee. In cases with symptoms, performing arthroscopic resection is believed to improve symptoms and decrease the risk of future tears, and if possible, pulling out the remaining posterior segment after the posterior horn with the ossicle is resected may be an alternative to meniscectomy in the treatment of meniscal ossicle.

## CONFLICTS OF INTEREST

The authors have nothing to disclose.

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슬관절의 반월상 연골내 소골은 반월상 연골조직 내에 발생한 골조직으로, 사람에게서는 매우 드문 것으로 보고되고 있다. 저자들은 특별한 외상의 병력 없이 기립 시 발생하는 슬관절통과 간헐적인 잠김증상을 보이는 48세 남자에서 관절경상 내측 반월상 연골 후방 경골 부착부 파열을 동반한 반월상 연골내 소골과 대퇴내과 연골손상으로 관절경적 절제술 및 미세천공술을 시행한 1예를 경험하였기에 문헌고찰과 함께 보고하는 바이다.

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