



Case report

# Osteochondral lesion of the tibial plafond treated with a retrograde osteochondral autograft: a report of two cases

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## Abstract

**Background:** Osteochondral lesions (OCLs) of the tibial plafond (OLTPs) are rare, and few studies provide treatment recommendations. We describe two cases of an OLTP that were treated with retrograde osteochondral autograft.

**Case Reports:** The first case was a 27-year-old basketball player and the second case was a 38-year-old soccer player. We harvested osteochondral autografts from the nonweight-bearing area of the lateral femoral condyle of the patient's ipsilateral knees. The grafts were reversed and inserted into the bone tunnel reaching the OLTPs starting proximally and moving distally. The first patient was able to play professional basketball 14 months after the procedure and continues to play 5 years and 6 months later. The second patient was able to play recreational soccer 9 months after the procedure and continues to play 4 years later.

**Conclusion:** Use of the retrograde osteochondral autograft produced satisfactory results including the return to sports. The retrograde osteochondral autograft can be considered recommendable for treating OLTPs.

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**Keywords:** osteochondral autograft; osteochondral lesion; retrograde; tibial plafond

## Introduction

The first description of an osteochondral lesion (OCL) of the ankle was published by Kappis<sup>1</sup> in 1922. OCLs of the ankle account for approximately 4% of all OCLs.<sup>2</sup> Most OCLs of the ankle joint occur in the talar dome, while OCLs of the tibial plafond (OLTPs) are far less common.<sup>3–7</sup> There are only a few references to OLTPs in the orthopaedic literature<sup>3–20</sup> and guidelines for providing appropriate treatment recommendations have not been established. The aim of this report is to present new treatment strategy for OLTPs. We report two cases of OLTPs treated with the retrograde osteochondral autograft transfer system (OATS; Arthrex, Naples, FL, USA).

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## Case Reports

### Case 1

A 27-year-old male (height 198 cm, weight 105 kg) professional basketball player for Japan's National Basketball League had repeatedly sprained his left ankle since his teens. The pain in his left ankle had been worsening, resulting in a slow degradation of his performance and exclusion from membership in Japan's National Basketball League. Although two prior ankle arthroscopies with synovectomy and removal of loose bodies were performed elsewhere, they were unable to relieve his ankle pain. He was referred to our department 1 year and 2 months after the last arthroscopy.

The patient presented with swelling, tenderness, and plantar flexion and dorsiflexion limitation in the left ankle. The condition of the patient's left ankle was rated at 65 points

according to the Japanese Society of Surgery of the Foot (JSSF) ankle-hindfoot scale.<sup>21,22</sup> Upon X-ray imaging, anteroposterior and lateral views showed narrowing of the medial and anterior talocrural joint space, respectively. Stress radiography showed that the talar tilt was 17 degrees on the anteroposterior view. This meant lateral instability of the left ankle. Computed tomography (CT) detected an OCL with a cystic lesion opening to it in the anterolateral tibial plafond (Figure 1). The size of the OLTP was 6.0 mm × 6.0 mm and the cyst measured 6.0 mm in diameter and 12 mm in depth. We carried out a retrograde osteochondral autograft 1 month after his first consultation with us.

### Surgical technique

Standard anteromedial and anterolateral portals were used for arthroscopic access and noninvasive ankle distraction was applied as needed. Debridement of fibrotic cartilaginous tissue and synovectomy were performed as needed. The subchondral bone surfaces were exposed widely in the tibial plafond and the talus dome. Microfracture was performed within these areas. It was recognized that the cystic lesion opened to the OLTP. The diameter and the length of an osteochondral graft were 8.0 mm and 15 mm, respectively, to fill both the cystic lesion and the OLTP.

The anterolateral portal was extended proximally to expose the anterior aspect of the tibia. The guide pin was inserted from the incision toward the OLTP by way of the cystic lesion. A 10 mm × 10-mm cortical bone window at the insert point of the guide pin was cut by a micro bone saw. A bone tunnel was made using a 7.5-mm reamer that followed the guide pin. Open harvesting of an osteochondral autograft was performed from the nonweight-bearing area of the lateral femoral condyle of the ipsilateral knee. The harvesting angle was decided to correspond to the reaming angle. The graft was reversed and inserted into the donor tube. The donor tube was set up on the cortical bone window and the graft was delivered starting proximally and moving distally (Figure 2). The procedure was completed under scopic view to ensure that the articular surface of the graft made an adaptation for the surface of the tibial plafond. Both the graft and the cortical bone roof

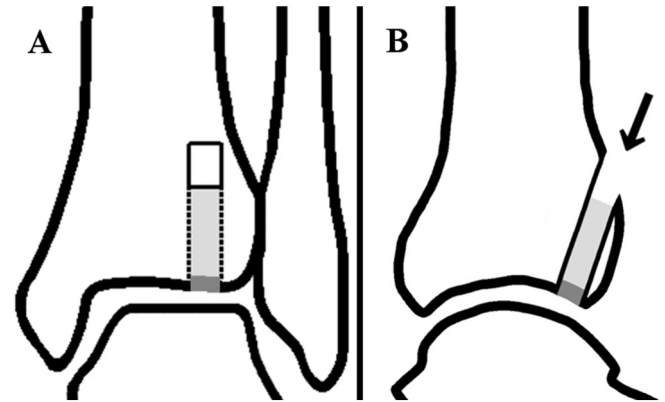


Figure 2. (A) Coronal and (B) sagittal schemas of the retrograde osteochondral autografting and its grafting route (arrow).

were eventually fixed by a 1.8-mm diameter Kirschner wire that penetrated the tibia from the front.

Another skin incision was made along the anterior edge of the lateral malleolus. The anterior talofibular ligament (ATFL) was thickened remarkably and the calcaneofibular ligament was loosened around the attachment point on the lateral malleolus. Excision of os subfibulare was performed, and then the ATFL was reconstructed with the inferior extensor retinaculum sutured by PANALOK Anchors (DePuy Mitek, Westwood, MA, USA). The calcaneofibular ligament was plicated and sutured to the lateral malleolus with 1 Surgilon (Covidien, Mansfield, MA, USA).

### Postoperative management

The operated ankle was immobilized in a short leg cast for 3 weeks postoperatively, followed by a patellar tendon-bearing brace for 9 weeks. Passive and active ankle range-of-motion training began sequentially after the cast was removed. The patient was only able to perform nonweight-bearing activity using crutches for 2 months. The patient was allowed to progress from partial to full weight bearing over 4 weeks. Three months postoperatively, he was allowed to perform not only full weight-bearing activity, but also standing calf raises and squats. After 4 months, jogging was allowed. Seven months after the procedure, the operation to extract the K-wire was performed. After 9 months, T2-weighted magnetic resonance imaging (MRI) with fat saturation was performed and showed a signal pattern of bone marrow oedema in the distal end of the tibia. We considered that the patient may be training too hard and advised him to reduce his training intensity. When 14 months passed, he was able to return as an official member and play professional basketball. Around the same time, the boundary between the graft and the normal osteochondral tissue became unclear on CT and MRI (Figure 3). We judged the graft survival from this observation. Although the ankle range-of-motion of plantar flexion and dorsiflexion remained limited, the ankle condition was rated at 83 points according to the JSSF ankle-hindfoot scale.<sup>21,22</sup> He continues to play professional basketball 5 years and 6 months after the operation.



Figure 1. Preoperative (A) coronal and (B) sagittal computed tomography (CT) images of Case 1 demonstrate an osteochondral lesion of the tibial plafond (OLTP) with a cystic lesion.

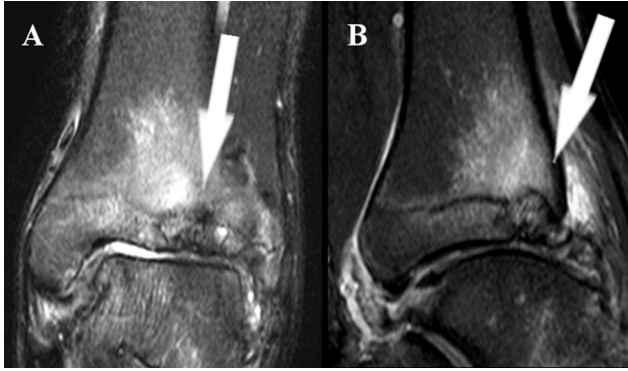


Figure 3. Postoperative (A) coronal and (B) sagittal T2-weighted magnetic resonance imaging (MRI) with fat saturation images of Case 1 show that the boundary between the graft (arrows) and the normal osteochondral tissue become unclear.

### Case 2

A 38-year-old male (height 176 cm, weight 60 kg) recreational soccer player sprained both ankles repeatedly starting around age 24 years. One day, an inversion sprain of his left ankle occurred during a soccer competition. Following that, swelling and pain of the left ankle prevented him from playing soccer. The symptoms did not improve after 7 months and affected his daily activities. He was referred to our department for intensive examination and treatment.

The patient presented with swelling, plantar flexion, and dorsiflexion limitation in the left ankle. The left ankle condition was rated at 60 points according to the JSSF ankle-hindfoot scale.<sup>21,22</sup> Lateral views from X-ray imaging showed osteophytes in the anterior tibial plafond. Stress radiography showed that the talar tilt was 14 degrees on the anteroposterior view and that the anterior translation of the talus was 9.0 mm greater than that of the contralateral side by 6.0 mm on the lateral view. These meant anterior and lateral instability of the left ankle. CT detected osteophytes and two OCLs in the anterior tibial plafond and the anterior talus dome (Figure 4). MRI showed two OCLs in the anterior tibial

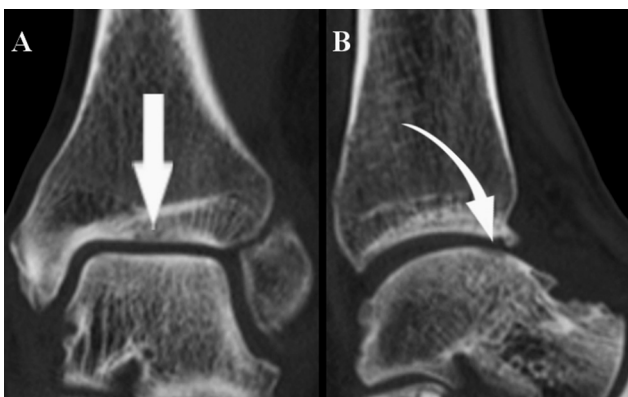


Figure 4. Preoperative (A) coronal and (B) sagittal computed tomography (CT) images of Case 2 demonstrate osteophytes and two osteochondral lesions (OCLs) in the anterior tibial plafond (arrow) and the anterior talus dome (curved arrow).

plafond and the anterior talus dome (Figure 5). The size of the OCLs was 6.0 mm × 6.0 mm in the anterior tibial plafond and 6.0 mm × 8.0 mm in the anterior talus dome. We suggested by dorsiflexion motion of the ankle that the OCLs contacted with each other (called kissing lesions).

### Surgical technique

We performed arthroscopic access and noninvasive ankle distraction in the same way as in Case 1. Synovectomy and removal of the osteophytes were performed as needed. We found overhanging cartilage in the anterior tibial plafond. When it was removed, the damaged subchondral bone appeared. We also found exposed subchondral bone in the anterior talus dome. They were recognized as the OCLs, the kissing lesions. The diameter and the length of the osteochondral graft for the anterior tibial plafond were 6.0 mm and 10 mm, respectively, and for the anterior talus dome were 8.0 mm and 10 mm, respectively.

For the tibial OCL, we harvested the osteochondral autograft and performed retrograde grafting as described in Case 1. The anterolateral portal was then extended distally to expose the talus dome. A bone tunnel was made in the OCL in the anterior talus dome using a 7.5-mm reamer. Open harvesting of the osteochondral autograft was performed in the same area of the ipsilateral knee. The graft in the donor tube was delivered to the OCL antegradely. The placement was examined under direct view to determine whether the articular surface of the graft made an adaptation for the surface of the talus dome.

Another skin incision was placed along the anterior edge of the lateral malleolus. The ATFL was partially scarred. The ATFL was sutured to the lateral malleolus with Panalok Anchors (DePuy Mitek, Westwood, MA, USA).

### Postoperative management

We followed similar postoperative protocols in Case 2 as were described in Case 1. After 6 months, we confirmed the absence of graft necrosis with MRI. Nine months postoperatively, the patient was able to play recreational soccer

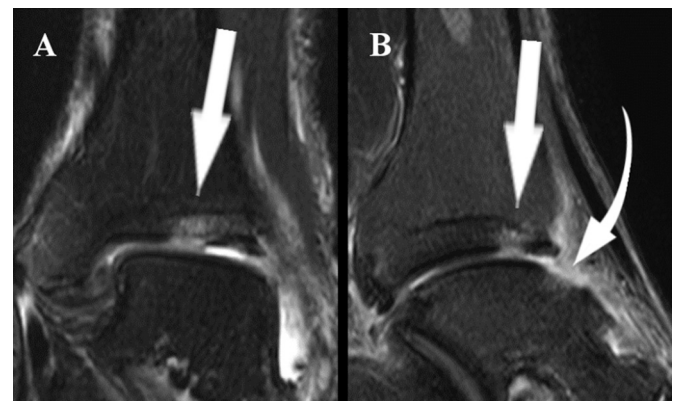


Figure 5. Preoperative (A) coronal and (B) sagittal T2-weighted magnetic resonance imaging (MRI) with fat saturation images of Case 2 show two OCLs in the anterior tibial plafond (arrow) and the anterior talus dome (curved arrow).



with left knee pain from the location where the graft had been harvested. After 1 year, CT and MRI were performed and we recognized the graft survival, and that the bone tunnel of the talus remained as a partial cavity (Figure 6). After 2 years, the patient could use his left ankle without any trouble during his daily life. According to the JSSF ankle-hindfoot scale,<sup>21,22</sup> the ankle condition was rated at 91 points. He continues to play soccer without suffering from left ankle pain 4 years after the operation. However, he has pain at the donor site and his left knee gives way while ascending or descending stairs.

Written informed consent was obtained from all participating patients in this treatment. Ethical approval for this report was obtained from the Institutional Review Boards of Nara Prefecture General Medical Center.

## Discussion

In the ankle joint, the most common location for an OCL is the talus. Most of the orthopaedic literature discusses the evaluation and treatment of OCLs of the talar dome while OLTPs are rarely described. According to one review, the frequency of OLTPs was 2.6% in the 880 patients who had ankle arthroscopies.<sup>3</sup> In other reviews, only one OLTP is reported for every 14–20 OCLs of the talar dome.<sup>5–7</sup> This infrequency is likely related to the characteristics that the articular cartilage of the tibial plafond is thicker and stiffer than that of the talar dome<sup>3,23</sup> and the tibial plafond may be exposed to less stress due to its concave shape.<sup>7</sup>

If an OCL is left untreated, it can further degrade and potentially lead to osteoarthritis,<sup>24</sup> however, there are few studies that provide treatment recommendations for OLTPs based on clinical outcomes. Although the optimal treatment strategy for OLTPs remains unclear, arthroscopic surgery such as debridement, curettage, abrasion arthroplasty, trans-malleolar drilling, microfracture, iliac crest bone grafting, or osteochondral grafting is performed in a manner similar to that described for an OCL of the talar dome.<sup>3,4,6–18</sup> For example, six reported cases of OLTPs in Japan underwent arthroscopic surgery.<sup>9–13</sup> Specifically, these patients underwent loose body

removal, drilling, or bone grafting, with additional synovectomy and debridement. Each report described that surgery resulted in functional and symptomatic improvement. Mologne and Ferkel<sup>3</sup> reported clinical outcomes for 17 cases. All cases were treated with excision, curettage, and abrasion arthroplasty. In addition, five of these cases were treated with trans-malleolar drilling, two with microfracture, and two with iliac crest bone grafting of subchondral cystic cavities. Mologne and Ferkel<sup>3</sup> reported that the median American Orthopaedic Foot and Ankle Society ankle-hindfoot scores significantly increased from 52 preoperatively to 87 postoperatively on average. Cuttica et al<sup>4</sup> reported that the average American Orthopaedic Foot and Ankle Society ankle-hindfoot scores before and after microfracture for OLTPs in 11 patients improved significantly from a score of 35.2 to 50.4.

Although there are few treatment recommendations regarding OLTPs, Mologne and Ferkel<sup>3</sup> suggested that bone grafting of the defect should be performed if large cystic cavities and unsupported articular cartilage were present. The reason for this recommendation is that a case with a cystic lesion required a bone grafting after the first arthroscopy, such as excision or trans-malleolar drilling. Additionally, Cuttica et al<sup>4</sup>, Elias et al<sup>7</sup> and Ross et al<sup>8</sup> reported that when patients with an uncommon talar OCL opposite to the tibial OCL (a kissing lesion) were treated with microfracture, their Magnetic Resonance Observation of Cartilage Repair Tissue (MOCART) scores were lower than those of patients with isolated lesions.<sup>8</sup> We recommend the osteochondral autograft to OLTPs with cystic lesions and we expect it to achieve better results in high activity cases that have kissing lesions.

We could find only four cases in which the retrograde osteochondral autograft was performed in the orthopaedic literature.<sup>19,20</sup> We believe that the grafting route is one of the most important factors of osteochondral autografting. When we insert the graft from the anterior aspect of the tibia to the tibial plafond, we can reduce the damage by incision and osteotomy. This can contribute to a return to sports or other activities.

There are some disadvantages to this operation. The first is that the harvesting device is only available in two diameter sizes for the retrograde OATS at the present time. Therefore, we use the device for antegrade OATS. Second, some technical ability is required to make a bone tunnel to the OLTPs. Carreira and Scranton<sup>19</sup> advised that the anterior cruciate ligament guide could help the operator to insert the guide pin. The location of the OLTPs may also cause a problem. When the OLTP is located in the posterior tibial plafond, grafting is performed from the posterior aspect of the tibia and the operator must be more careful not to damage nerves or vasculature. In addition, there is the risk that postoperative complications arise such as the pain of the donor site, the femoral condyle.

The limitations of this report include small sample size and short follow-up periods. The follow-up periods should be extended in parallel with adding cases. This should lead to a concrete result in terms of the effectiveness of a treatment method.

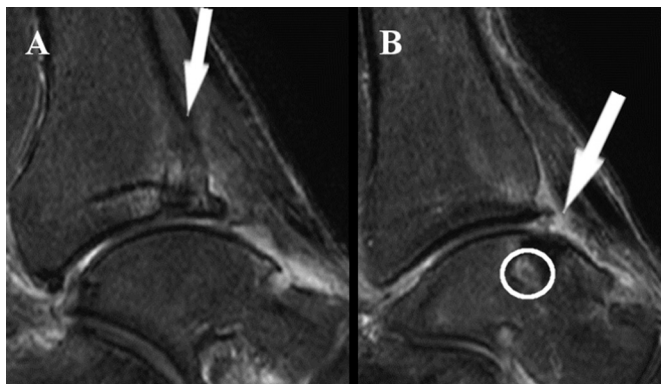


Figure 6. Postoperative (A) coronal and (B) sagittal T2-weighted magnetic resonance imaging (MRI) with fat saturation images of Case 2 show that the boundary between the graft (arrows) and the normal osteochondral tissue become unclear and that the bone tunnel of the talus remained as a cavity partially (circle).

We treated two patients with OLTPs with retrograde osteochondral autograft. This operation provided satisfactory results and contributed to their return to their respective sports. We can suggest that this operation is a recommendable treatment for OLTPs despite the existence of cystic lesions, deep lesions, or kissing lesions.

### Conflicts of interest

The authors have no conflicts of interest relevant to this article.

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