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Osteochondritis Dissecans Involving the Trochlear Groove Treated With Retrograde Drilling

A Case Report

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Abstract: Osteochondritis dissecans (OCD) occurs frequently in the humeral capitellum of the upper extremity, whereas OCD involving the trochlear groove (trochlear groove OCD) is rarely reported. A standard treatment for trochlear groove OCD has therefore not been determined, although several methods have been tried.

The case of a 14-year-old male gymnast with bilateral trochlear groove OCD is presented. Retrograde drilling from the lateral condyle of the humerus was applied for the OCD lesion of the left elbow, since it was larger in size than that in the right elbow and was symptomatic. Conversely, since the right lesion was small and asymptomatic, it was managed conservatively.

After treatment, consolidation of the OCD lesions was observed in both elbows. However, the time to healing was shorter in the left elbow treated surgically than in the right elbow managed conservatively.

In conclusion, retrograde drilling is a very simple and minimally invasive treatment. This case suggests that retrograde drilling for trochlear groove OCD may be a useful procedure that may accelerate the healing process for OCD lesions.

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Abbreviations: MRI = magnetic resonance imaging, OCD = osteochondritis dissecans, trochlear groove OCD = OCD involving the trochlear groove.

INTRODUCTION

Osteochondritis dissecans (OCD) occurs frequently in the humeral capitellum in the upper extremity, whereas only a few cases of OCD involving the trochlear groove (trochlear groove OCD) have been reported.¹⁻⁶

A patient with bilateral trochlear groove OCD who underwent retrograde drilling for one elbow and conservative treatment for the other elbow is reported. This case provides an opportunity to compare the efficacy of retrograde drilling

with the efficacy of conservative treatment for trochlear groove OCD.

CASE REPORT

A 14-year-old male gymnast presented for evaluation of left elbow pain for a duration of about 1 month. There was no history of trauma to the region. He had been involved in artistic gymnastics for 11 years.

Physical examination revealed mild motion pain of the left elbow, while his right elbow was asymptomatic. Ranges of motions of both elbows were normal, and both elbows had no tenderness, swelling, or joint instability.

Roentgenograms of both elbows revealed radiolucent lesions with condensed borders in the trochlear groove (Figures 1A and 2A). The size of the radiolucent lesion of the left elbow was bigger than that of the right elbow. Computed tomography demonstrated a concave defect in the trochlear groove (Figures 1B and 2B). In the left elbow, a small osseous fragment was observed in the defect (Figure 1B). Magnetic resonance imaging (MRI) revealed subchondral defects involving the central aspect of the trochlea in both elbows. Joint fluid invasion into the defects was also observed. However, the joint cartilage layer was preserved (Figures 1C and 2C).

For the symptomatic left elbow, retrograde drilling into the radiolucent lesion from the lateral condyle of the humerus was performed. At the time of drilling, the lateral condyle was exposed via a small longitudinal skin incision, and under an image intensifier, a 1.8-mm pilot Kirschner wire was advanced to the center of the OCD lesion. Correct aiming was verified in anteroposterior and lateral views of the image intensifier. This wire was then used as a guide for subsequent drilling. Additional drilling was performed using another 1.8-mm Kirschner wire. Drilling was performed about 5 times for both lateral and medial aspects of the subchondral sclerotic zones, and penetration of the sclerotic zone was evaluated by the loss of resistance technique (Figure 3A).

After the surgery, the left elbow was immobilized with a long arm plaster splint at 70° of elbow flexion for 3 weeks. After removal of the splint, active assistive range of motion exercises for the elbow joint combined with thermotherapy were administered by a therapist twice a week, and daily active range of motion exercises were also performed by the patient himself. The exercises were performed once a day. Within 3 weeks, full range of motion of the left elbow was obtained, and the exercises were stopped. The size of the radiolucent area was gradually reduced after the surgery, and evidence of consolidation of the trochlear lesion was observed 3 months after surgery (Figure 3B).

For the right elbow, conservative management by prohibiting heavy use of the right elbow was undertaken because the

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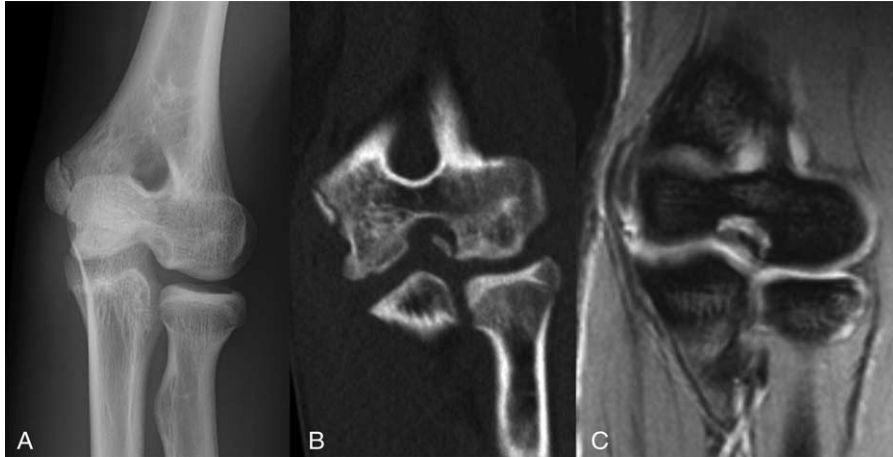


FIGURE 1. (A) Preoperative anteroposterior radiograph of the left elbow with a radiolucent lesion in the trochlear groove. (B) Computed tomography scan of the left elbow showing a concave defect with a small osseous fragment. (C) Magnetic resonance image of the left elbow showing the defect in the trochlear groove. Continuity of articular cartilage is preserved.

size of the radiolucent lesion was smaller than that of the left elbow, and the lesion was asymptomatic. The size of this lesion also gradually decreased after the initiation of conservative treatment, and the lesion disappeared within 5 months (Figure 4). However, the duration of healing was longer compared with the left elbow that had surgery.

At the 2-year follow-up, the patient remained asymptomatic.

Informed consent was obtained from the patient and his parents for publication of this case report and accompanying images.

DISCUSSION

OCD is a subchondral bone lesion resulting in separation of the articular cartilage and subchondral bone, and it is well known that OCD commonly affects the knee, ankle, and elbow joints. In the elbow joint, OCD primarily involves the capitellum of the humerus, and it is common with activities such as baseball or gymnastics.⁷⁻¹⁰ In these activities, repeated valgus

stress is believed to cause microtrauma to the capitellum.^{8,10} On the other hand, trochlear groove OCD has rarely been reported. There are several reports of trochlear groove OCD in the elbows of athletes such as gymnasts, tennis players, baseball pitchers, and basketball players.^{3,5,6} However, the mechanism that causes the trochlear groove OCD is still unclear, because the number of clinical reports of this disease is insufficient to clarify the mechanism. However, Marshall et al³ hypothesized that trochlear groove (lateral trochlea) OCD lesions occur in a characteristic vascular watershed zone resulting from the unique blood supply of the trochlea.

Treatment of trochlear groove OCD is guided by the clinical and radiographic findings, but there is no standard treatment, and several kinds of treatments have been suggested. Patel and Weiner⁴ reported a case of trochlear groove OCD treated conservatively, and 2 years later the patient showed some radiographic evidence of consolidation of the lesion. They also reported a case that was treated with curettage of the

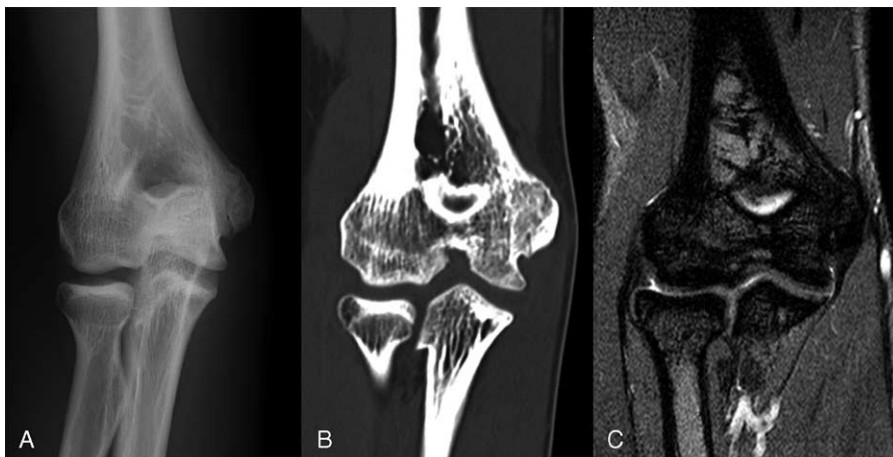


FIGURE 2. (A) Preoperative anteroposterior radiograph of the right elbow, (B) computed tomography scan, and (C) magnetic resonance image of the right elbow. Almost the same findings as those of the left elbow are seen. However, the size of the defect is smaller than that in the left elbow.

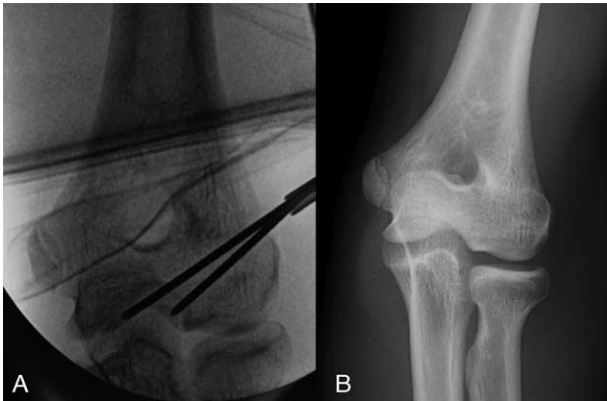


FIGURE 3. (A) Fluoroscopy-guided retrograde drilling from the lateral condyle of the humerus. (B) Anteroposterior radiograph of the left elbow at 3 months after surgery. Evidence of consolidation of the trochlear lesion is observed.

trochlear groove OCD lesion.⁴ In that report, the patient regained full range of motion of the elbow and was asymptomatic for 3 years, but they did not show whether consolidation of the lesion was obtained.

Iwasaki et al² reported an adult case of trochlear groove OCD that was treated with transplantation of tissue-engineered cartilage. In this case, the OCD lesion was covered with cartilage-like tissue 12 months after surgery. This method is expected to be a useful option for treatment, especially for adult cases whose bone remodeling potential has already decreased. However, to apply this method, osteotomy of the olecranon is required to approach the OCD lesion, and the very complicated technique of cell culture is also required.



FIGURE 4. Anteroposterior radiograph of the right elbow 5 months after surgery. Evidence of consolidation of the trochlear lesion is observed.

Horiuchi et al¹ reported a case of bilateral trochlear groove OCD in the Japanese literature that underwent retrograde drilling from the lateral humeral condyle, and consolidation of the OCD lesions was observed after surgery in this patient.

Antegrade drilling (transarticular drilling) is another option for trochlear groove OCD treatment, but there is no report of antegrade drilling for trochlear groove OCD.

Antegrade drilling is a common treatment option for OCD lesions, and the aim of the drilling is decompression to allow for revascularization of the defect. There are many reports of antegrade drilling for the treatment of OCD in the humeral capitellum and knee.^{11–13} In most of these reports, the drilling is performed in a minimally invasive manner using arthroscopy. However, antegrade drilling cannot avoid articular surface violation, and it is difficult to visualize and drill a deeply placed OCD lesion. On the other hand, there are several reports in which retrograde drilling was used for OCD lesions of the knee and ankle,^{14–17} and recent studies demonstrated favorable results for retrograde drilling of stable OCD lesions.^{18–20} Kono et al²¹ also reported that the clinical results of retrograde drilling for OCD of the talar dome were superior to those of antegrade transmalleolar drilling. The advantages of retrograde drilling are that it avoids articular surface violation,²² and it can be combined with retrograde autologous cancellous bone-grafting if it is needed.²³ Furthermore, to perform antegrade drilling, curettage, or transplantation of cartilage for OCD lesions of the talus and trochlea, osteotomies of overlying bone, such as the medial malleolus or olecranon, are sometimes needed to approach the lesions.^{10,24,25} For OCD lesion of these sites, retrograde drilling is a useful treatment option.

In many reports of ante- and retrograde drilling, a 1.5- to 2.0-mm Kirschner wire is usually used for drilling of the OCD lesion.^{1,11,13,19,20,26–28} In accordance with these reports, a 1.8-mm Kirschner wire was used for drilling the OCD lesion in the present case. However, if the patients are younger or the size of the OCD lesions is smaller, a thinner wire may be used.

In the reports of knee and ankle OCD lesions, the authors have used retrograde drilling for stable OCD lesions.^{13,17–20} We think that, for the treatment of elbow OCD lesions, it is also appropriate to use this technique for stable OCD lesions. The treatment will fail if we use this technique for unstable OCD lesions in which the osteochondral fragments have already floated. In addition, the most important advantage of retrograde drilling is that we can avoid articular surface violation. Thus, we should be very careful not to drill the articular surface. To avoid articular surface violation, it is very important to visualize the OCD lesion clearly.

In the present case, an image intensifier was used to visualize the OCD lesion and the tip of the Kirschner wire. In the reports of OCD lesions of the talus, open MRI scanners and navigation systems tend to be used for the retrograde drilling.^{14,15,18,22,29} However, for drilling the OCD lesion of the femoral condyle, an image intensifier is often used even now.^{20,30–32} The reason for this is that it is thought that a clear lateral view of the femoral condyle is more easily obtained compared to the talus, because the femoral condyle is not surrounded by other bones, unlike the talus. The humeral trochlea is also not surrounded by other bones like the femoral condyle. Horiuchi et al¹ used an image intensifier for retrograde drilling of trochlear groove OCD, and they could visualize the OCD lesion. In the present case, it was possible to visualize the OCD lesion and the tip of the Kirschner wire using the image intensifier.

Retrograde drilling was tried for the present trochlear groove OCD patient, and a good result was obtained. Although consolidation of the OCD lesion was also observed in the contralateral elbow (right elbow) that was treated conservatively, in the OCD lesion of the left elbow, which was bigger in size than the lesion of the right elbow, the period for obtaining consolidation was shorter with retrograde drilling (3 months) than in the right elbow (5 months). This fact suggests that there is a possibility that the retrograde drilling accelerated the healing process of the OCD lesion.

There are several limitations to this report. Since this was a single case report, more cases need to be treated before one can assert that retrograde drilling accelerates the healing process of trochlear groove OCD. In addition, a long-arm plaster splint was used after the surgery because of concern that fragility of the bone around the OCD lesion was caused by drilling. Therefore, one cannot exclude the effect of the plaster splint for the healing process, and one cannot claim that this was a simple comparison of retrograde drilling and conservative treatment; in the strict sense, this was a comparison of retrograde drilling plus a long-arm plaster splint and conservative treatment. However, the duration of using the plaster splint was only 3 weeks, and at the time of removal of the splint, the size of the OCD lesion had not changed. Thus, the effect of the splint on healing of the OCD lesion was thought to be minimal.

In conclusion, this case provided an opportunity to compare retrograde drilling and conservative treatment of trochlear groove OCD. Retrograde drilling is a very simple and minimally invasive treatment, and it may accelerate the healing process. Thus, retrograde drilling may be considered one of the first choices of treatment for trochlear groove OCD.

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