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Arthroscopically-assisted reduction and fixation of an old osteochondral fracture of the lateral femoral condyle

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Summary

Background:

Osteochondral fracture (OCF) of the lateral femoral condyle has a low incidence and old OCF is even more rarely seen; it is difficult to differentiate from late osteochondritis dissecans (OCD).

Case Report:

In this report, we present the case of a 20-year-old male patient with an old OCF of the lateral femoral condyle. The possible etiology of OCF is discussed, along with its clinical manifestation, diagnosis, and treatment. He underwent arthroscopically-assisted reduction and fixation with cannulated screws. Four months after the surgery, arthroscopy showed good osteochondral healing, and screws were removed. He had achieved good functional recovery by the follow-up visit.

Conclusions:

Old OCF should be distinguished from OCD in clinical practice, and osteochondral bodies should be preserved as much as possible. Osteochondral reduction and fixation under arthroscopy was minimal and the clinical effect was good.

key words:

osteochondral fracture (OCF) • arthroscopy • femoral condyle

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BACKGROUND

Osteochondral fracture (OCF) of the lateral femoral condyle is an uncommon injury that predominantly occurs in young adults. Patients with acute OCF generally have a definitive trauma history and present as arthrocele, severe pain, and motion limitation. Acute OCF is easily diagnosed in clinical practice. However, occult old OCF of the lateral femoral condyle has no acute swelling and pain, and consequently is difficult to differentiate from late osteochondritis dissecans (OCD). OCF in the knee continues to be a challenging problem, especially in younger patients. Giffin [1] set surgical guidelines and treatment principles for the extraction of osteochondral bodies or reduction and fixation for treatment of various osteochondral injuries and exfoliation in different sites. Most published studies [1–5] used open reduction and internal fixation for treatment of OCF of the knee joint. However, the conventional approach greatly damages the function of the knee joint. With the arthroscopically-assisted approach, the injury is minimal, but surgeons must be highly skilled due to the injured sites and patient position. Here, we report the case of a young patient with an old OCF of the lateral femoral condyle, who underwent arthroscopically-assisted reduction and fixation with cannulated screws. Four months following the surgery, arthroscopy showed good osteochondral healing, and the screws were removed. The surgical trauma was minimal and the clinical result was favorable.

CASE REPORT

A 20-year-old male patient, a mechanic, had to work with knees bent for a long time. Half a year ago he developed recurrent pain in the left knee pain without a significant trauma history, which was more significant when walking on stairs, and had no previous knee joint interlocking. Physical examinations were tenderness and slight swelling in the lateral left knee joint space, normal activity of knee joints, negative McMurray sign, and negative drawer test result. Radiographs showed a small loose body in the lateral space of the knee joint and arthroscopy was performed to identify it. Arthroscopy through the conventional anteromedial and anterolateral approaches found osteochondral injuries and exfoliation of the lateral femoral condyle, with a loose body sized 1.5×2.0×3.0 cm, which was slightly displaced. Moreover, the cancellous bone of the injured site of the lateral femoral condyle was exposed and was covered by fibrous and scar tissues. The meniscus, cruciate ligament, and joint synovium had no significant abnormalities. Articular cartilages of other sites were smooth. The old injured surface was cleaned with a planing tool and low temperature radiofrequency. The separated osteochondral body was reduced, and then fixed with 2 cannulated 3.5mm diameter screws (Synthes Company) (Figure 1). After the surgery, the loose body was fixed with a hinge brace. The patient did not bear weight on that leg during the first month after surgery and gradually began to bear weight in the following months. At 4 months after surgery, arthroscopy showed healing of the osteochondral body and no osteochondral injuries or exfoliation in other sites. The screws were removed. He was followed up for half a year, during which time the pain of the joint knee diminished, his activity returned to normal, and the extension and flexion degree was 0–130°.

DISCUSSION

OCF commonly has a definitive trauma history and is sometimes accompanied with patellar dislocation [3,5]; the dislocated patella impacts the lateral femoral condyle, causing the fracture. OCF also may occur independently [2], which is induced by acute shearing force on the lateral femoral condyle. Occult old OCF is rarely seen with the unclear mechanism, is easily missed, and should be distinguished from late osteochondritis dissecans (OCD). OCD, by definition, is a disorder of 1 or more ossification centers, characterized by sequential degeneration or aseptic necrosis and recalcification. The etiology of these lesions is multifactorial, including trauma, ischemia, abnormal ossification centers, genetic predisposition, or some combination of these factors [6]. The osteochondral body exfoliated in OCD has degenerated and generally cannot be reduced; even in cases of reduction and fixation, the healing is poor. This patient had no definitive trauma history, and had no acute pain and swelling of the knee joint. Considering his occupation as a mechanic working over a long period of time with knees bent, the osteochondral injury and exfoliation may be related to fatigue fracture or repeated slight injury. Radiographs demonstrated the donor site for these fragments, but underestimated the actual size of the osteocartilaginous piece. CT or MRI is beneficial to determine the sites and degrees of osteochondral injuries [7], but arthroscopy is more visual and allows for treatment. Bradley [8] investigated 5000 patients by arthroscopy and found that various types of osteochondral injuries could be identified through presence of loose osteochondral bodies. Patients were diagnosed as having had an old osteochondral fracture if there was a loose body with 1 flat surface and 1 convex surface, similar in shape to the fragment of a recent osteochondral fracture, and a site of origin identifiable as a flattened area. Late OCD was diagnosed in patients with loose bodies that came from a concave defect on the femoral condyle, with steeply sloping edges. The shape of these defects distinguished them from the flat sites of origin of osteochondral fractures. Both the fragment and the base of the condylar lesion were corticated with no exposed cancellous bone; cartilages in other sites also had various degrees of degeneration. During the surgery, we found that the cancellous bone of the lateral femoral condyle was exposed at the injured site, with a flat surface; the convex chondral surface of loose body was smooth and cancellous surface was flat; and the articular surfaces of other sites were smooth. Therefore, old OCF is diagnosed.

For osteochondral injuries of the knee joint, the loose body was preferentially reduced and fixed. If it could not be reduced and fixed, then the osteochondral defect of the articular surface was formed, which various methods were carried out for treatment according to different situations, including: osteochondral body extraction, debridement under arthroscopy, chondroplasty, microfracture, subchondral drilling, periosteum or perichondrium transplantation, and autogenic or xenogenic cartilage transplantation. In our patient, the injured site was the lateral femoral condyle and the injured articular surface was large. Therefore, surgical repair, rather than simple extraction, was chosen to prevent large articular cartilage defect and late osteoarthritis; moreover, local osteochondral defect is apt to induce larger osteochondral exfoliation. Compared to the conventional open

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Figure 1. (A) Preoperative radiography displayed a small loose body in the lateral space of the knee joint. (B) Arthroscopy showed osteochondral injuries and exfoliation of the lateral femoral condyle, the loose osteochondral piece was around $1.5 \times 2.0 \times 3.0$ cm, the chondral surface was smooth and convex, the osteal surface was not flat and the cancellous bone of the injured lateral femoral condyle exposed and was covered by the fibrous and scar tissues. The chondral surfaces of other sites were smooth. The meniscus, cruciate ligament and joint synovium had no significant abnormalities. (C) Radiography and CT image following reduction and fixation. (D) Second arthroscopy showed that the osteochondral piece healed well before removing screws.

surgery, arthroscopically-assisted surgery reduces the invasion, bleeding, and postoperative joint adhesion, which aid in maximal recovery of knee joint function. Arthroscopically-assisted reduction and fixation of the osteochondral body is restrained by the patient position and requires a highly skilled surgeon. Since the defect site in this patients is the weight-bearing area of the lateral femoral condyle upper the lateral meniscus, the knee joint should be placed in a “4” inversion position. Noticeably, the wound surface should be fully debrided and the fibrous tissue on the surface of the cancellous bone should be removed before reducing and fixing osteochondral bodies to promote the osteochondral healing following reduction. We used absorbable cannulated screws [4,9] to fix the osteochondral body. Additionally, Herbert screws [2] also can produce an

excellent effect. However, open surgery is necessary if exposure of the injured site or reduction of the bone body is difficult to perform.

The patient was immobilized and did not bear weight on the affected leg during the first month after surgery and gradually increased exercise subsequently. The functional recovery was good. Four months later, arthroscopic exploration demonstrated that the osteochondral body was well healed, and the screws were removed. Healing of osteochondral injuries and exfoliation is strongly related with the bone body size. The healing rate of the OCF is significantly faster than that of OCD. After the osteochondroma is healed, screws should be removed as early as possible to reduce their effect on the articular surface and the incidence of osteoarthritis.

CONCLUSIONS

Old OCF should be distinguished from OCD in clinical practice, and osteochondral bodies should be preserved as much as possible. Osteochondral reduction and fixation under arthroscopy have some advantages, such as minimal incision, good functional recovery, and clinical efficacy. However, it is limited by the patient position and requires a highly skilled surgeon. Arthroscopy succeeds only if the indications are mastered.

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