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Short-term clinical results of arthroscopic osteochondral fixation for elbow osteochondritis dissecans in teenaged baseball players

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Background: Reports regarding arthroscopic fixation of the osteochondral fragments for elbow osteochondritis dissecans (OCD) are few. This study assessed the clinical outcomes of arthroscopic fixation of unstable osteochondral fragments by using absorbable pins over a postoperative period of at least 1 year.
Methods: The patients were 13 adolescent baseball players with a mean age of 14 years (range, 12-16 years) who underwent OCD of primary lesions at International Cartilage Repair Society grades III and IV. The patients were evaluated by using validated outcome measures at a mean follow-up period of 24 months (range, 12-50 months).
Results: The mean (standard deviation) score in the disability/symptom section of the Disabilities of the Arm, Shoulder, and Hand improved from 12.4 (6.0) before the surgery to 0.5 (1.2) after the surgery, and the sports section improved from 74.5 (25.4) to 1.4 (5.2). The mean (standard deviation) extension improved from -11° (10.8) to -2° (3.9; $P < .001$). The mean (SD) flexion improved from 129° (11.6) to 137° (5.6; $P = .040$). All patients were able to resume playing baseball, and 9 (69%) resumed playing at the same position as before their injuries.
Conclusions: The clinical results of arthroscopic osteochondral fragment fixation in the teenaged baseball players with elbow OCD, albeit obtained over only a short period, were favorable. This arthroscopic treatment enables repair of lesions and is considered appropriate for unstable OCD during the adolescent growth spurt.
Level of evidence: Level IV, Case Series, Treatment Study.

Keywords: Osteochondritis dissecans (OCD); elbow; arthroscopic surgery; osteochondral fixation; baseball

Elbow osteochondritis dissecans (OCD) frequently occurs in teenaged baseball players and gymnasts as a result of excessive use of the elbow. OCD in baseball is much more common in Japan. Many children play baseball innumerable times from the early years of elementary

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school. In pitchers, in particular, continuously throwing a large number of balls often results in damage to the elbow.[19] The exact etiology, natural history, and optimal treatment of elbow OCD remain controversial.[2,3,26,38] However, if baseball players continue to throw balls while their elbows develop OCD, the condition will deteriorate clinically, resulting in pain and restricted range of motion. In addition, if osteochondral fragments are detached, they separate from the fragment beds, becoming loose bodies and thus leading to difficulties in performing regular daily activities.[30]

Various techniques have been described for the treatment of OCD according to disease stage.[26] In the case of early-stage OCD, with International Cartilage Repair Society (ICRS) grade I, the usual treatment is to ensure that the player stops throwing and to allow rest. Such conservative treatment tends to be effective, and particularly favorable results have been reported in patients with open epiphyses.[22] However, grade II and III pathologies often progress further, and therapy is sometimes just conservative rest treatment. In other cases, it involves surgery with open or arthroscopic techniques.[32] Elbow arthroscopy enables a thorough lesion assessment, evaluation of the entire elbow joint, and less invasive treatment of the lesion.[2] With respect to arthroscopic surgery for elbow OCD,[8,33] methods such as loose body excision and débridement have been frequently reported.[4,5,15,18,25]

Numerous studies have been conducted on arthroscopic treatment of adolescent OCD. A few reports[11,35] have been published regarding clinical results of treatment involving arthroscopic fixation of unstable osteochondral fragments. This study assessed the clinical outcomes over a postoperative period of at least 1 year and evaluated the indication and clinical outcome of arthroscopic fixation of unstable osteochondral fragments using absorbable pins. We hypothesized that arthroscopic osteochondral fragment fixation techniques enable repair of lesions and that the rate of return to baseball and the functional outcome after the arthroscopic treatment are comparable with those reported in the literature.

Materials and methods

This study was performed according to the Declaration of Helsinki. All the patients gave their consent for data from their cases to be submitted for this study.

This is a retrospective case-control study of clinical results of arthroscopic osteochondral fragment fixation for elbow OCD. The study was performed in 13 patients with a mean age of 14 years (range, 12-16 years). Elbow plain radiography revealed radiolucency or fragmentation of the capitellum in all of the patients. Computed tomography (CT) revealed an OCD lesion at the anterior capitellum that had progressed to the separation stage. Magnetic resonance imaging (MRI) of the anterior capitellum revealed a low-intensity area in the T1-weighted image, and the lesion was surrounded by a rim of high signal intensity in the T2-weighted image. Indications for operation are considered to be failure of nonoperative treatments for more than 3 months and positive radiographic, CT, or MRI findings obtained from the anterior capitellum. ICRS-OCD grades were judged intraoperatively and were defined as grade I, stable lesions with a continuous but softened area covered by intact cartilage; grade II, lesions with partial discontinuity that are stable when probed; grade III, lesions that have complete discontinuity but are not yet detached; grade IV, empty defects, and also defects with a detached or loose fragment within the bed.

The principal appropriate indications for this technique are considered to be (1) OCD at ICRS grade III (detached phase), with instability demonstrated by intraoperative probing; and (2) OCD at ICRS grade IV (loose-body phase), with small loose bone fragments present, but with the osteochondral fragments that make up the principal lesions remaining in position in the bed without displacement.

Microfracture was performed where a residual bone defect was present after fixation of the osteochondral fragment. In cases where the entire osteochondral fragment had degenerated, the osteochondral fragment was débrided, and microfracture was performed at the site of the bone defect.

Postoperative evaluations were performed by using plain radiography, CT, and MRI. Postoperative healing of lesions was evaluated to decide whether the patients could resume playing sport. The disability/symptom and sports sections of Disabilities of the Arm, Shoulder, and Hand (DASH) outcome questionnaire were used to assess each patient's reported outcome. Questions were used to evaluate other injuries to the elbow and the patient's ability to resume sports activities.[27]

Surgical technique

The patients were placed in a lateral position, under general anesthesia, and arthroscopy was performed on the shoulder and elbow at a flexion angle of 90°. In most cases, the arthroscope used was 30° and 2.5 mm in diameter. The direct lateral[7] and posterolateral portals were generally used. The medial portal was used for the observation of the anterior joint space. When synovial proliferation or fringes were observed on the lateral joint area, removal was performed by using an electric shaver. To examine the anterior part of the humeral capitellum, the elbow was flexed by more than 90°. Loose bodies were removed. Probing was performed, and stability of the lesion was confirmed by applying pressure to the osteochondral lesion.

Fixation of the osteochondral lesion was performed if the fragment was determined to be unstable. The osteochondral lesion and underlying subchondral bone were drilled with a smooth Kirschner wire with a diameter of 1.6 mm to a depth of 20 mm through a drill guide. The lesion was drilled as perpendicular as possible to the articular surface through the arthroscope. Fixation was performed by using poly-L-lactide (Gunze Bone Fixation Device; Stryker, Tokyo, Japan) or hydroxyapatite (Osteotrans Plus; Takiron Co Ltd, Tokyo, Japan) absorbable pins that were 1.5 mm in diameter and 15 mm in length (Fig. 1).