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CASE REPORT

Osteochondritis dissecans of the humeral trochlea with cubitus varus deformity. A case report

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Osteochondritis dissecans of the elbow primarily involves the capitellum. We report a rare case of osteochondritis dissecans involving the humeral trochlea in a 19-year-old male with a post-traumatic cubitus varus deformity. Biomechanics suggested that the varus malalignment caused repetitive axial force across the medial elbow, which led to microtrauma to the trochlea during the patient's daily work. In adolescents, post-traumatic cubitus varus can gradually progress to subsequent osteochondritis dissecans of the humeral trochlea.

Keywords : osteochondritis dissecans ; cubitus varus ; humeral trochlea ; elbow.

INTRODUCTION

Osteochondritis dissecans (OCD) of the elbow is common in adolescent baseball players. OCD primarily refers to lesions of the capitellum, although it is also rarely diagnosed in the trochlea. Three reports of OCD of the humeral trochlea have been published to date (*4,7*) (table I). However, the elbow had normal skeletal alignment in all of these (table I). We present a case of OCD involving the humeral trochlea in a 19-year-old male with cubitus varus deformity due to supracondylar fracture in childhood, and infer that OCD of the trochlea can develop in adolescent patients with cubitus varus deformity.

CASE REPORT

A right-handed 19-year-old male with a history of a supracondylar fracture of the left humerus in childhood had been a storekeeper for four years. He had noticed a cubitus varus deformity and had mild discomfort at the medial side of his left elbow during work, but he had not experienced functional disability. While playing on a snowboard at the age of 18 years and 10 months, he suffered a low-energy fall on the snow and sustained a contusion to his left elbow. There was no swelling that would indicate a subcutaneous or intra-articular haematoma, and the range of motion (ROM) of the affected elbow was not restricted. Subtle pain in the medial

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Table I. — Characteristics of previously reported cases of OCD in the trochlea, compared to the present case

Reference	Sex	Age (years)	Side	Skeletal deformity	Localisation #	Sports	Trauma	Treatment
4	male	17	right	no	lateral, anteroinferior	baseball	no	fixation with bone peg
7	male	12	left	no	lateral, anteroinferior	no	no	biopsy,curettage
7	male	14	right	no	lateral, anteroinferior	no	no	conservative
			left	no	lateral, anteroinferior	no	no	conservative
9	female	12	right	no	lateral, unknown	tennis	no	open exploration
our case	male	19	left	yes	medial, central	no	yes	removal, curettage, drilling

Fracture site (#) detected from radiographs (AP/lateral) or CT-scan (coronal/ sagittal views).

region of his left elbow during flexion, first experienced a few days after the trauma, gradually increased in intensity day by day. He presented to our institution, complaining of left elbow pain and having had limited motion for approximately three months. There was slight swelling, erythema and local heat over his left elbow. Pain developed in the medial region of the elbow during flexion motion, and tenderness developed around the humeroulnar joint. The range of motion was 125° of flexion and –5° of extension, 70° of pronation and 100° of supination ; on the contralateral elbow there was 140° of flexion and 0° of extension, 80° of pronation and 90° of supination. The carrying angle of the left elbow was –18°, versus 7° for the contralateral elbow. Radiography demonstrated two findings ; a cubitus varus deformity and a radiolucent lesion in the ulnar area of the humeral trochlea, with condensed borders and a small fragment within the lesion (fig 1). Roentgen tomography showed a

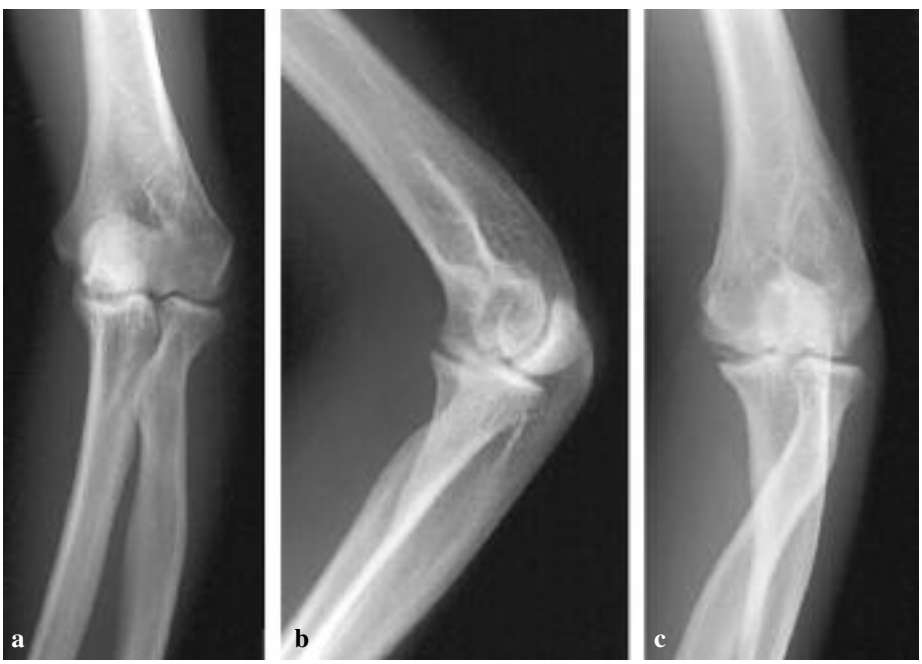

Fig. 1. — Initial radiographs of the elbow. a) AP view, b) lateral view and c) oblique view. The anteroposterior view shows the varus malalignment of the elbow without any epiphyseal dysplasia, and a radiolucent lesion with condensed borders and a small fragment within the lesion in the ulnar area of the humeral trochlea. The lesion is best observed in oblique view.

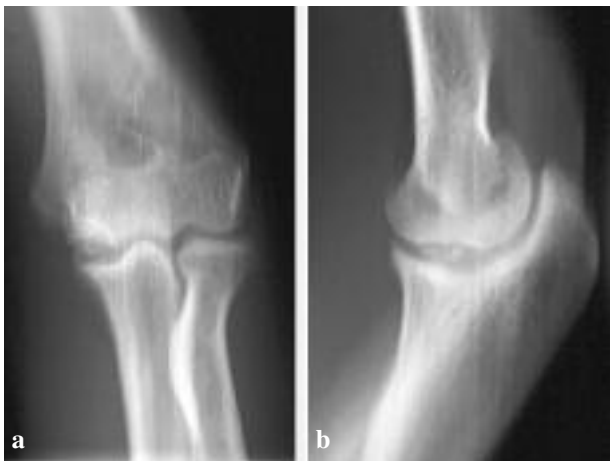

Fig. 2. — Roentgen tomography of the elbow. a) Antero-posterior view and b) lateral view showing a round lytic area with a clear border and a small separated fragment in the central part on the ulnar side of the humeral trochlea.

Fig. 3. — MRI of the elbow before surgery. A coronal view of T2-weighted images demonstrates a low-intensity area on the articular surface (thin arrow) and a heterogeneous area with mixed high- and low-intensity areas surrounded by a low-signal band (thick arrow).

round radiolucent area with a clear border and a small separated fragment in the central part of the ulnar side of the humeral trochlea (fig 2). A coronal view under magnetic resonance imaging (MRI) demonstrated a low-intensity area on the ulnar side of the trochlea on T1-weighted images. At the same site a heterogeneous area mixed with high- and low-intensity areas was found, surrounded by a low-signal band with a low-intensity area on the articular surface that was confirmed on a T2-weighted image (fig 3). Based on radiographic and physical examination findings, we diagnosed the patient's lesion in the trochlea to be OCD corresponding to type IV, according to the classification of the International Cartilage and Repair Society (ICRS) (*3*), the onset of which was associated with recent trauma. Surgery was performed with the aim of repairing the surface of the trochlea and correcting the malalignment of the elbow, which was considered to be a causative factor. The ulnar nerve was subcutaneously transposed anteriorly, via a medial approach. The ulnar side of the trochlea was exposed between the flexor carpi ulnaris and pronator teres muscles. The osteochondral fragment, which was $10 \times 10 \times 10$ mm in size, was almost separated from the trochlea. This fragment had little subchondral bone and its cartilage had transformed into fibrous tissue. After removal of the unstable fragment, the subchondral bone of the lesion was drilled to promote vascularization and healing. For the varus deformity, corrective osteotomy of the humerus was performed (supracondylar laterally-based closing wedge technique) (fig 4). The carrying angle was corrected to 12° valgus. External fixation (Mono tube blue, Stryker, Inc., USA) was used. The elbow joint was immobilized postoperatively with a night brace at 90° of flexion for three weeks. Passive ROM exercise commenced two weeks postoperatively. Eight months post surgery, the patient returned to previous work without any pain. The radiographs two years after surgery showed solid fusion of the osteotomy and resurfacing of the articular defect. T1- and T2-weighted MRI images also demonstrated a decrease in the low-intensity area (fig 5). ROM at the same time was 130° of flexion and 0° of extension, and 90° of pronation and 90° of supination.

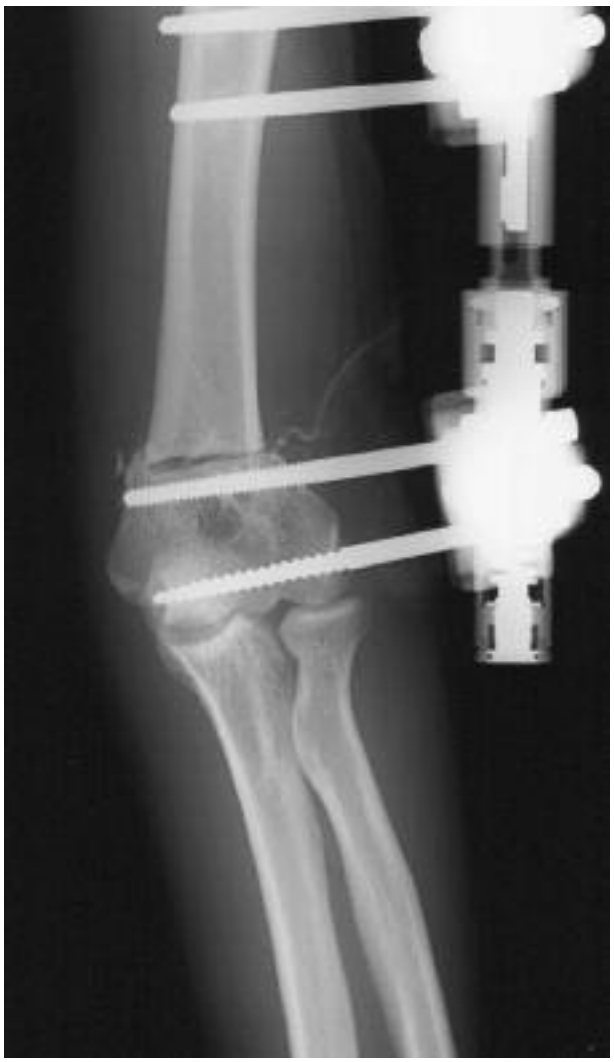

Fig. 4. — Radiograph of the elbow immediately post surgery. The radiograph in AP view shows that corrective osteotomy of the humerus was performed using external fixation (Mono tube blue, Stryker, Inc., USA). The carrying angle was corrected to 12° valgus.

Fig. 5. — MRI of the elbow two years after surgery. Coronal view of T2-weighted images demonstrating the decrease in the low-intensity area indicating resurfacing of the trochlea post surgery.

DISCUSSION

OCD of the humeral trochlea is very rare, and primarily affects the capitellum when the throwing elbow is involved. Three case reports of OCD involving the humeral trochlea have been published in the English language literature to date *(4,7,9)* (table I). However, in these reports, the affected elbows had skeletally normal alignment. Here we present a case of OCD that involved a trochlea with cubitus varus deformity due to supracondylar fracture, and discuss its etiologic factors.

It is necessary to make a differential diagnosis between OCD, osteochondral fracture, and avascular necrosis of the trochlea [Hegemann's disease *(5,8)*] when confronting a chondral lesion in the trochlea. A history of trauma (the fall on snow) was considered to be a slight injury, because there was neither a sign nor symptom of an intra-articular injury that would indicate an osteochondral fracture.

The aetiology of OCD remains controversial but a review of the literature finds that a combination of trauma, repetitive microtrauma and overuse can result in OCD *(6,10)*. The diagnosis of OCD of the trochlea in our patient was based on the facts that : (1) He worked from the age of 16 years at a repetitive manual job that involved lifting goods up and down in a warehouse ; (2) MRI demonstrated a low-intensity area on T1-weighted images and high- and

low-intensity areas surrounding the osteochondral fragment on a T2-weighted image (fig 3) ; Hegemann's disease, a rare idiopathic aseptic necrosis of the trochlea, has been reported as a collapse of the trochlear region from the radiographic perspective, with increased fragmentation and sclerosis (*5,8*). The present OCD case coincides with Category II according to Pappas' classification system (*6*), based on factors of natural history (involving young individuals up to the age of 20), and with type IV according to the ICRS classification (*3*) (defect with a dislocated fragment).

In baseball pitchers, the valgus stresses place a significant compression load on the radiocapitellar joint during the acceleration phase of throwing (*10*). Elbow biomechanics suggest that the radiocapitellar joint acts as a secondary stabilizer for the elbow. It has been shown that up to 60% of the axial compression forces across the elbow at a normal carrying angle are transmitted to the radiocapitellar joint (*2*). It can be easily speculated that, with a varus malalignment, the mechanical axis between the shoulder and wrist shifts from the lateral side to the medial side of the elbow, and that most of the axial force is transferred from the radiocapitellar joint to the ulnohumeral joint. The repetitive axial force across the medial elbow caused by this malalignment might increase the compression load on the trochlea. The fact that the OCD is located at the ulnar side of the trochlea makes the present case different from those of past reports (table I), and it could be caused by a different mechanical load distribution due to varus malalignment.

In medial osteoarthritis in a varus knee, high tibial osteotomy is performed to correct the varus malalignment (*1*). Loading is thus transferred from the diseased area of the joint to an area that is relatively intact. This procedure could also be advantageous in the management of OCD in the humeral trochlea. Further study is necessary to determine the effectiveness of valgus corrective osteotomy of the humerus in this patient population.

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