ORIGINAL ARTICLE

Results of arthroscopic debridement for osteochondritis dissecans of the elbow

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Br J Sports Med 2006;40:966-969. doi: 10.1136/bjsm.2006.030056

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Accepted 22 August 2006
Published Online First
15 September 2006

Objective: To determine the clinical outcome of arthroscopic debridement for osteochondritis dissecans of the elbow.

Methods: A prospective cohort study was started in 2000; between 2000 and 2005, 15 patients (six male, nine female, mean age 28 years (range 16-49)) were treated for osteochondritis dissecans of the elbow with arthroscopic debridement. The lesion was graded during surgery using the classification of Baumgarten. The dominant side was operated on in seven of 15 patients, and all patients were involved in a sport in which the elbow is used extensively. Elbow function was assessed before and after surgery using the modified Andrews elbow scoring system (MAESS); pain was scored on a visual analogue scale (0, no pain; 10, severe pain). Evaluation was performed an average of 45 (range 18-59) months after surgery. Statistical analysis (Student's *t* test) was carried out using SPSS statistical software. $p < 0.005$ was considered significant.

Results: There were no complications. The range of motion did not improve significantly. The mean MAESS score improved from 65.5 (poor) before surgery to 90.8 (excellent) after ($p < 0.001$). The mean level of pain at rest decreased from 3 to 1, and the level of pain after provocation decreased from 7 to 2 ($p < 0.001$). All patients were able to return to work 3 months after surgery, and 80% were able to resume their pre-injury level of sport activity.

Conclusion: The clinical outcome after arthroscopic debridement for osteochondritis dissecans of the elbow shows good results, with pain relief during activities of daily living and sport. The function of the elbow, as reflected by the MAESS score, improved from poor to excellent. All patients in this series will be reviewed after 5 years to determine long-term results.

Osteochondritis dissecans of the elbow is an uncommon disorder in the general population. It is usually seen in patients that overuse their elbow during specific sporting activities in which the elbow is extended forcefully or is axially loaded.¹⁻⁴ In children, osteochondritis dissecans has been reported between the ages of 10 and 17, mostly those engaged in sporting activities.³ The aetiology of the condition is unknown. There are several possible mechanisms such as an ischaemic event or repetitive micro trauma to the subchondral bone. In athletes, the compressive load on the radiohumeral joint can become as high as 500 N, resulting in (osteo)chondral defects.⁵ Symptoms of osteochondritis dissecans are pain, effusion, crepitus, locking and clicking, varying with the degree of loss of articular surface.⁶ Athletes mostly complain of a dull and aching pain in and around the elbow shortly after sporting activities. Findings during physical examination can be swelling, tenderness over the radiohumeral joint, and limitations in motion, especially loss of extension.⁷⁻⁸ Standard radiography reveals no changes, as the sensitivity of osteochondritis dissecans in the early stages is low.⁹⁻¹¹ In long-standing disease, flattening of the capitellum and non-displaced fragmentation of the subchondral bone or even focal defects of the capitellum with loose bodies can be seen on an anteroposterior *x* ray of the elbow (fig 1). Magnetic resonance imaging, preferably with arthrography, is the first choice for evaluating osteochondritis dissecans. Sensitivities up to 95% have been reported.⁹ Treatment depends on the severity, size and location of the lesion. Age of onset also plays an important role.¹² Baumgarten *et al*¹³ have developed an arthroscopic classification to determine what treatment should be used for which severity of the disease. There are five grades of the lesion: grade 1, smooth but soft, ballotable articular cartilage; grade 2,

fibrillations or fissuring of the cartilage; grade 3, exposed bone with a fixed osteochondral fragment; grade 4, a loose but undisplaced fragment; grade 5, a displaced fragment with resultant loose body. Recent studies have shown that early capitellar lesions can resolve with activity modification and rest if the defect is diagnosed early on in its development.⁴ On the other hand, Takahara *et al*¹⁴⁻¹⁵ showed fair to poor results in conservatively treated osteochondritis dissecans of the elbow. Twenty four patients, aged 11-16, were treated by activity modification for a period of 6 months. After 5 years, 83% had fair to poor results, and the authors concluded that the capitellum has poor healing potential with conservative management. The role of physiotherapy and non-steroidal anti-inflammatory drugs remains unclear. No randomised trials on this subject are available. If conservative treatment of osteochondritis dissecans is not successful, surgical treatment is an option. Possible surgical procedures are open debridement, subchondral drilling, bone grafting, refixation, chondral transplantation and osteotomy.¹⁰⁻¹⁸ Refixation is recommended in the case of large fragments. If refixation is not possible, debridement is an option as in the case of smaller fragments.¹⁹ The goal of this study was to examine the results of arthroscopic treatment of osteochondritis dissecans in 15 elbows.

PATIENTS AND METHODS

Between 2000 and 2005, 15 patients (six male, nine female, average age 28 years (range 18-49)) were treated for osteochondritis dissecans of the elbow by arthroscopic debridement. The dominant side was operated on in seven

Abbreviations: MAESS, modified Andrews elbow scoring system; VAS, visual analogue scale

Figure 1 Anteroposterior radiograph showing osteochondral lesion. Permission to publish this figure has been received.

of 15 patients, and 14 of 15 patients were involved in a sport in which the elbow is used extensively. All operations were performed by one surgeon using a standard arthroscopic technique. The lesion was graded according to the classification devised by Baumgarten *et al.*¹³ Elbow function was assessed before and after surgery using the modified Andrews elbow scoring system (MAESS); pain was scored on a visual analogue scale (VAS; 0, no pain; 10, severe pain). Evaluation was performed a mean of 45 (18–59) months after the operation. Statistical analysis (Student's *t* test) was carried out using SPSS statistical software. $p < 0.05$ was considered significant.

SURGICAL TECHNIQUE

Before surgery the elbow was tested for stability under general or regional anaesthesia. With the patient in the lateral decubitus position and with a tourniquet inflated around the upper arm, an arthroscopy was performed through four standard portals, two placed anteriorly and two posteriorly. Before placement of the portals, the ulnar nerve was marked and the joint distended with 10–20 ml

saline by a posterior injection into the fossa olecrani. The radiohumeral compartment of the elbow was visualised through standard portals, and osteochondral lesions of the capitellum and the radial head could be assessed. Figures 2 and 3 show a grade 4 and 5 lesion. Loose bodies were removed using a grasper. Debridement was performed using a 3.5 MM shaver; all loose fragments and loose cartilage were removed until subchondral bone was seen. Postoperative treatment consisted of 24 hours of immobilisation in a collar and cuff, followed by an active mobilisation programme under the supervision of a physiotherapist.

RESULTS

In this series there were no grade 1 or 2 lesions. There were six grade 3 lesions, five grade 4 lesions, and four grade 5 lesions with subsequent loose bodies. All grade 3 lesions were probed, and the soft osteochondral lesions were debrided with a high speed burr. Grade 4 and 5 lesions were also debrided until subchondral bone was seen. There were no complications. The range of motion did not improve significantly. The average MAESS score improved from 65.5 (poor) before surgery to 90.8 (excellent) after ($p < 0.001$). The average level of pain at rest decreased from 3 to 1, and the level of pain after provocation decreased from 7 to 2 ($p < 0.001$). All patients resumed work within 3 months of surgery, and 80% were able to resume their pre-injury level of sport activities (table 1).

DISCUSSION

After tendinopathies and posterior impingement, osteochondritis dissecans is the most common injury of the elbow in athletes.²⁰ Accurate diagnosis depends on understanding the anatomy and sports biomechanics of the athlete's elbow, as athletes often complain of pain during sporting activity but are asymptomatic during daily life.^{21–23} As osteochondritis dissecans can also be associated with ligamentous instability of the elbow, the elbow must always be evaluated for valgus instability preferably under general anaesthesia.^{1 2 21–23} Radiographs may be helpful for ruling out other causes of elbow pain such as osteocystes on the olecranon or the borders of the posterior fossa. In grade 1–4 lesions, radiographs will not show pathology. Only grade 5 lesions will show flattening of the capitellum. If conservative treatment fails, arthroscopic or open debridement is the primary treatment option for osteochondritis dissecans of the elbow.²⁴ Controversy exists about when to treat and what treatment is best.^{14 15} Ruch *et al.*²⁵ treated 12 elbows with arthroscopic debridement after failure of conservative management. Good short-term results were obtained after 2–5 years. Byrd and Jones⁷ treated 10

Figure 2 Osteochondral lesion of the capitellum (grade 4 lesion). Permission to publish this figure has been received.

Figure 3 Osteochondral lesion of the radial head (grade 5 lesion). Permission to publish this figure has been received.

Table 1 Details of 15 cases of osteochondritis dissecans treated by arthroscopic debridement

Sex	Age (years)	FU (months)	Side	Sports activity	Pain pre-op rest/act pre-op	Pain post-op rest/act post-op	Flex pre/post-op	Ext pre/post-op*	Pro pre/post-op	Sup pre/post-op	MAESS pre-op	MAESS post-op	Grade
F	49	55	L/-	Tennis	3/7	1/3	150/140	-5/0	80/80	80/70	A	E	3
F	24	47	L/+	Judo	2/7	1/2	140/140	0/0	80/80	70/70	P	E	4
M	16	49	R/+	Fitness	3/6	0/3	140/140	-5/-5	80/80	70/70	A	E	4
M	24	31	R/+	Tennis	6/7	0/2	140/140	0/0	80/80	80/80	A	E	5
F	27	50	R/-	Gymnastics	4/7	0/3	150/140	-5/-5	90/80	90/70	G	G	5
F	25	55	L/-	Volleyball	2/2	7/7	150/140	0/-5	80/80	80/70	A	G	5
F	29	59	L/-	Judo	3/7	0/0	150/140	0/0	80/80	80/80	A	E	5
M	44	59	R/+	Judo	1/6	0/2	160/160	0/0	80/80	90/70	A	E	4
F	40	52	R/+	Athletics	4/7	2/0	160/140	-30/-20	80/80	80/80	G	E	3
F	16	41	R/+	Gymnastics	5/7	0/2	150/150	0/0	80/80	70/70	A	E	3
M	22	42	L/-	Tennis	0/10	0/1	130/140	0/0	90/80	80/80	G	E	4
F	24	42	L/-	Gymnastics	7/9	0/1	140/130	-5/0	90/80	70/70	P	G	3
F	29	44	L/-	Horseshoeing	3/7	2/4	140/140	0/-20	80/80	80/80	P	A	4
M	20	18	L/-	Tennis	3/7	0/1	140/140	0/0	80/80	80/80	P	E	3
M	24	30	R/+	Tennis	7/9	0/2	140/140	0/0	80/80	80/80	P	G	5

Pain was assessed on a visual analogue scale.

*Extension pre-op/post-op: negative value indicates an extension deficit.

FU, follow-up; R, right; L, left; +, operation on dominant arm; pre-op, post-op, before and after the operation; rest, resting; act, active; VAS, visual analogue scale; MAESS, modified Andrews scoring system; P, poor (<60); A, average (60-79); G, good (80-89); E, excellent (90-100); Flex and Ext, flexion and extension of elbow; Pro and Sup, pronation and supination of elbow.

elbows. All patients had good outcome on a 200-point objective and subjective rating scale, but only four of 10 patients returned to their previous level of sport. Shimada *et al*¹⁷ reviewed the literature in 2003. Using an autograft for advanced osteochondritis dissecans of the elbow, he concluded that there was a favourable outcome. He also concluded that there are several options for the operative treatment of different severities of osteochondritis dissecans. Simple abrasion of advanced lesions is popular, but not indicated if there is a large lesion. Refixation of the lesion is a reasonable treatment option, but only when a bony union can be expected. Some authors have reported good outcome.⁸⁻²⁶ Shimada *et al*¹⁷ reported that recurrence of loose bodies and progression of osteoarthritis will occur in patients with advanced osteochondritis dissecans. These unfavourable results occurred with lesions larger than 10 mm in diameter. There are few publications on pure arthroscopic treatment of osteochondritis dissecans of the elbow. Several series of treatment with an open surgical approach are available, all with variable outcome and all with short-term results. Previous studies of different techniques have shown varying results.¹³ Yadao *et al*⁴ and Cain *et al*²⁷, however, described a

relation between osteochondritis dissecans and osteoarthritis in the long term regardless of the technique used.⁴⁻²⁷ They both concluded that an untreated osteochondritis dissecans lesion will eventually lead to loose bodies and subsequently osteoarthritis, and thus early treatment, whether conservative or operative, is imperative.

The short-term results of this study show that arthroscopic debridement of the chondral defect of the elbow in athletes is an effective procedure, as reflected by the improvement in the MAESS and VAS scores. However, improvement in MAESS and VAS scores did not result in return to previous level of sports in all patients (80%). There were no complications, and it can therefore be recommended as a safe treatment option for osteochondritis dissecans. These patients will be evaluated after 5 years to assess if the good outcome of debridement persists. In conclusion, arthroscopic debridement of osteochondritis dissecans of the elbow in athletes has a satisfactory short-term outcome, but not all athletes are able to return to their previous level of sports activity.

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Competing interests: None declared.

Permission to publish figs 1-3 has been received.

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What is already known on this topic

- Osteochondritis dissecans of the elbow is an overuse injury most often found in athletes
- Treatment depends on the severity and location of the lesion; if conservative management is unsuccessful, there are several surgical options, of which arthroscopic debridement shows reliable results without the potential complications of open surgery around the elbow

What this study adds

- Arthroscopic debridement of an osteochondral defect of the elbow in athletes shows good short-term results, with pain relief during activities of daily living and sport

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COMMENTARY

In this article a relatively old group of patients with osteochondrosis dissecans of the elbow is described. Arthroscopic debridement has more benefits for the older patient than for the younger patient, in whom it is more important to preserve the cartilage.¹ I think that this is not emphasised enough by the authors of the present article.

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