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ORIGINAL STUDY

The Outerbridge-Kashiwaghi procedure in elbow arthroscopy

Ilse DEGREEF, Nicolaas SAMORJAI, Luc DE SMET

From Leuven University Hospitals, Pellenberg, Belgium

We evaluated the results of the arthroscopic Outerbridge-Kashiwaghi procedure in a retrospective review of 20 elbows in 19 patients with a mean follow-up of 2 years (range : 6 months - 4 years). Range of motion improved from 94° (range : 15°-140°) to 123° (range : 110°-140°). Visual analogue scales for pain improved from 5.8 (range : 2 -8) to 1.8 (range : 0-8). The Mayo Performance Index increased from 54 (range : 15-85) to 88 (range : 45-100). The results were good to excellent in 16 elbows, fair in two and poor in two. Seventeen patients were better (85%), 3patients remained unchanged (15%). In elbows with severe arthritis, pain relief was minimal. The arthroscopic Outerbridge-Kashiwaghi procedure appeared in this study as a good surgical option in mild to moderate elbow arthritis, with significant pain relief and increased elbow mobility and function.

Key words : elbow arthritis ; arthroscopy ; ulnohumeral arthroplasty ; Outerbridge-Kashiwaghi.

INTRODUCTION

In mild to moderate elbow osteoarthritis, the Outerbridge-Kashiwaghi (O-K) debridement arthroplasty offers a good improvement modality with respect to pain relief and even enhanced mobility (*1,4,6,7,10*). Since elbow arthroscopy has become a routine procedure, a similar procedure is now performed with keyhole surgery (*2,8,9*). The distal humeral fenestration was found to reduce locking and impingement, leading to pain relief with a possible dynamic decompressing effect in the anterior and posterior elbow compartments (*3,5*).

This study evaluated the outcome of the arthroscopic O-K procedure.

PATIENTS AND METHODS

Between January 2006 and July 2009, 19 patients underwent an arthroscopic O-K procedure in 20 elbows at our Orthopaedic Department in Leuven University Hospitals. All procedures were performed by the first author. The patients were reviewed after a mean follow-up of 2 years (range : 6 months - 4 years). There were 4 women and 17 men with a mean age of 44 years (range : 21-67) (Demographic data, table I). Primary osteoarthritis was diagnosed in 11 elbows, secondary osteoarthritis in 9 (5 post trauma, of which 1 elbow dislocation, 1 with coronoid fracture and 1 with radial head fracture, 1 patient with polio, 1 with arthrofibrosis, 1 with chondromatosis and 1 who suffered polio) (table II). There was a history of previous elbow surgery on the operated side in three patients.

■ Ilse Degreef, MD, PhD, Assistant-Surgeon-in-chief.
■ Luc De Smet, MD, PhD, Surgeon-in-chief.
■ Nicolaas Samorjai, MD, Resident.
Department of Orthopaedic Surgery, Upper Limb Surgery, University Hospitals of Leuven, Pellenberg Campus, Pellenberg, Belgium.
Correspondence : Ilse Degreef, Department of Orthopaedic Surgery, University Hospital Pellenberg, Weligerveld 1, B-3212 Pellenberg, Belgium.
E-mail : Ilse.degreef@uz.kuleuven.ac.be

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Table I. — Demographic data of the patients with the arthroscopic OK procedure (y = years).

Mean age (range)	44 y (21-67 y)
Sex distribution (M/F)	17/3
Employment	
- manual worker	7
- office worker	6
- athlete	2
- unemployed	4

Table II. — Preoperative details on the patients' clinical and radiological history (OA = osteoarthritis).

Symptoms	
- locking	12
Previous operations	
- arthroscopy	1
- posterior arthrotomy	1
- resection RA nodules + partial thickness graft	1
Radiographic grade of OA	4
- mild	14
- moderate	2
- severe	
Osteoarthritis	
- primary	11
- secondary	9
Operative procedures	
- anterior capsulectomy	1
- anterior capsular release	2
- anterior loose body removal	10
- posterior loose body removal	5

Fig. 1. — Intraoperative views showing the distal humeral perforation (a), the hole enlargement with a punch forceps (b) and an arthroscopic burr (c).

Indications for surgery were pain, locking and limitation of motion not responding to conservative treatment and radiographic evidence of spur formation and bony ridges, or loose bodies in the joint. The radiological degree of osteoarthritis was categorized into 4 grades : none, mild (including patients with only loose bodies) (N = 4), moderate (N = 14) and severe (N = 2) (fig 1) (*12*).

Table III. — Details of the results in gain in range of motion (ROM), visual analogue scale for pain (VAS), Mayo performance index (MPI).

	Preoperative	Postoperative	P Wilcoxon
Flexion	117° (40°-140°)	134° (120°-140°)	0.001
Extension deficit	28° (0°-85°)	10° (0°-25°)	0.000008
Arc of motion	94° (15°-140°)	123° (110°-140°)	0.0007
Pain (VAS)	5.8 (2-8)	1.8 (0-8)	0.000008
MPI	54 (15-85)	88 (45-100)	0.000002

Fig. 2. — Plain radiographs with preoperative (a) and postoperative (b) images of the elbow arthritis with the distal humeral perforation.

Elbow pain and mobility were evaluated preoperatively and at the time of follow-up, using a 10 point visual analogue scale for pain (VAS) and goniometric measurement of the range of motion (ROM). The Mayo elbow Performance Index (MPI) was calculated to assess pain, motion, stability and function. A score of 90 to 100 is defined as an excellent result, 75 to 89 points as a good result, 60 to 74 as a fair result and < 60 points as a poor result (*12*). Patient satisfaction was assessed by asking the patients how they felt at the time of follow-up compared with how they felt before the operation, and was graded as much better, better, unchanged or worse. The surgical technique as reported earlier was used (fig 1) (*3*). Loose bodies were removed from the anterior compartment in 10 elbows and from the posterior compartment in 5 elbows. In 3 patients an anterior capsulectomy

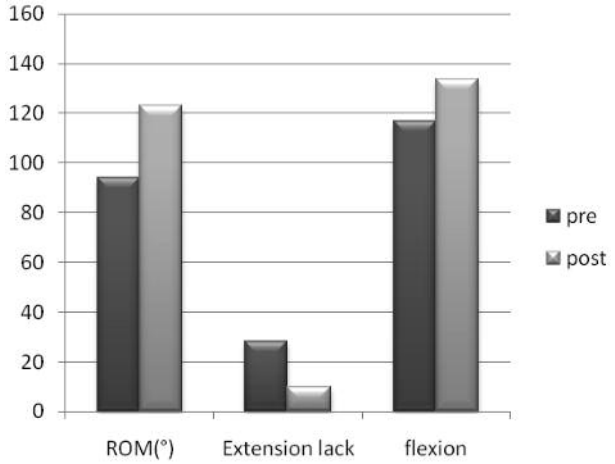

Fig. 3. — Illustration of the gain in range of motion (ROM) with the preoperative (pre) and postoperative (post) goniometric values of the extension lack and maximal flexion. Details in table III.

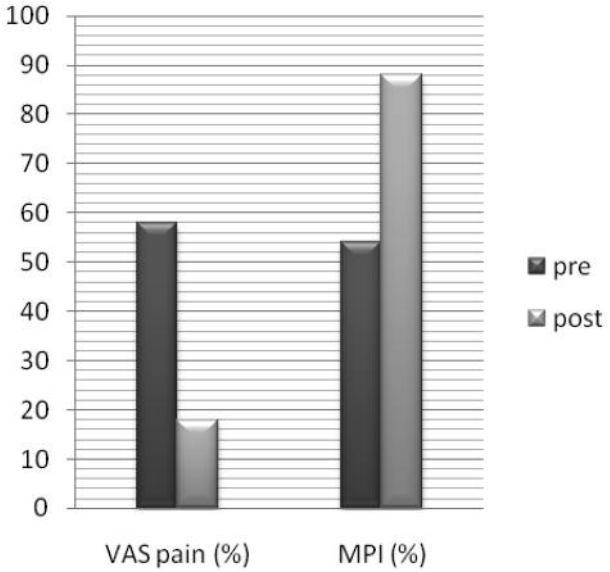

Figure 4. — Preoperative (pre) and postoperative (post) values of the visual analogues scales for pain (VAS) and the Mayo Performance Index (MPI) in percentages (%).

was done because of an important flexion contracture. Portals were left open and a compressive bandage was left for 5 days, after which a full range of motion active rehabilitation was commenced.

Statistical analysis

The Wilcoxon test (paired) was used to compare the preoperative values with those at follow-up for the arc of motion, VAS and MPI. Also, the radiological staging was compared with the VAS. Significance was set at $p < 0.05$.

RESULTS

At follow-up the mean flexion increased from 117° (range : 40°-140°) preoperatively to 134° (range : 120°-140°) ($p = 0.000008$), the average loss of extension decreased from 28° (range : 0°-85°) to 10° (0°-25°) ($p = 0.001$) (table III). The mean ROM improved from 94° (range : 15 -140°) preoperatively to 123° (range : 110°-140°) at the time of follow-up ($p = 0.0007$) (fig 3). At the latest follow-up evaluation the mean MPI improved from 54 (range 15-85) to 88 (range 45-100) ($p = 0.000002$). The VAS improved from 5.8 (range 2-8) to 1.8 (range 0-8) ($p = 0.000008$) (fig 4). Ten elbows (50%) had no pain, 7 (35%) mild pain, 2 moderate pain, and 1 severe pain. The result was excellent in 12 elbows (60%), good in four (20%), fair in two and poor in two. The patients' satisfaction questionnaire demonstrated that 17 (85%) were much better or better and 3 (15%) did not improve after surgery. There were no intra-operative complications. In the patient with RA, a preoperative fistula persisted and was successfully removed with a bursectomy. The radiological staging correlated statistically significantly with the improvement in VAS, with minimal pain relief in severe arthritis ($p = 0.003$).

DISCUSSION

The purpose of this study was to evaluate the results of the arthroscopic O-K procedure. The main advantages of arthroscopy are a good visualization of both the anterior and posterior compartments, and a less invasive procedure which makes revalidation easier. In 1993, Redden and Stanley first reported satisfactory results with the arthroscopic O-K procedure *(9)*. O'Driscoll recommended

arthroscopy to treat milder cases of osteoarthritis, reserving open debridement for more advanced cases (*7*). In a series of 24 patients, of whom 75% underwent an additional radial head resection, Savoie and Nunley reported overall good-to-excellent results in pain control and improved motion (*11*). Krishnan reported good to excellent results in 11 elbows in younger patients under fifty, which somewhat elaborated the indications for the procedure (*3,5*).

The only true comparison of the arthroscopic technique (26 elbows) with the open technique (18 elbows) was made by Cohen *et al* (*2*). They reported an increased flexion of 15° on average in 67% of the elbows after open surgery, while only 31% improved after arthroscopy with a mean 4° increase. However, significant pain improvement was achieved in all 26 elbows in the arthroscopic group. The authors concluded that although both procedures are effective, the arthroscopic procedure achieved better results in pain relief, whereas the open procedure achieved superior results in gaining ROM, possibly due to a more extensive debridement of the posterior compartment.

Comparing our results with our previous work on the open O-K procedure performed earlier in our institution, the gain in ROM was similar or even somewhat better (20° versus 29° after arthroscopy) (*12*). Likewise, the MPI improved by 25 points with the open procedure versus 34 points after arthroscopy. Thus, comparable or even somewhat better results can be achieved with the arthroscopic technique for both pain relief and functional improvement. However, in severe arthritis as was seen in two patients in this study, pain relief appeared to be minimal.

Strengths of this study are the standardized surgical methods with a single surgeon and the consistent follow-up. Weaknesses are its retrospective nature and the heterogeneous patient population.

In conclusion, this study suggests that the arthroscopic O-K is a viable treatment option in mild to moderate osteoarthritis of the elbow, with high patient satisfaction and a very low complication rate.

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