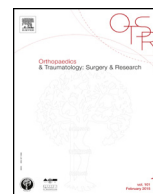




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Original article

# Arthroscopic elbow joint release with radial head resection arthroplasty: 12 cases



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## ABSTRACT

**Background:** Elbow arthritis typically affects manual labourers aged 40 to 50 years and usually starts in the lateral compartment. The objective of this study was to evaluate the medium-term clinical, functional, and radiological outcomes in 12 patients after arthroscopic elbow joint release and radial head resection arthroplasty.

**Hypothesis:** Our main hypothesis was that pre-operative damage to the radio-capitellar joint was associated with poorer clinical outcomes after elbow joint release.

**Material and method:** Consecutive patients treated by a single surgeon at a single centre between July 2006 and May 2014 were studied retrospectively. The 12 patients – 10 males and 2 females with a mean age of  $54.5 \pm 9.3$  years (33–69 years) – had osteoarthritis confined to the radio-capitellar compartment with elbow stiffness and pain and underwent arthroscopic elbow joint release with radial head resection arthroplasty. Among them, 9 had a history of trauma or micro-trauma and 3 had rheumatoid arthritis. The Broberg and Morrey osteoarthritis grade on the pre-operative radiographs was 1 in 4 patients, 2 in 6 patients, and 3 in 2 patients.

**Results:** Mean follow-up was  $38.1 \pm 33.7$  months (5–97). One patient required total elbow arthroplasty. Mean arc of motion was  $79.6^\circ \pm 20.5^\circ$  (30–110) pre-operatively,  $123.6 \pm 18^\circ$  (90–140) immediately after surgery, and  $109^\circ \pm 11.7^\circ$  (90–120) at last follow-up. At last follow-up, mean values were  $81.4 \pm 12.5$  (65–100) for the Mayo Elbow Score,  $11.1 \pm 11.1$  (2.3–31.8) for the Quick DASH score, and  $1.1 \pm 1.6$  (0–4) for the visual analogue scale pain score. The radiological assessment at last follow-up showed no evidence of osteoarthritis progression.

**Conclusion:** In our case-series, arthroscopic elbow joint release with radial head resection arthroplasty produced good outcomes with a motion arc greater than  $100^\circ$  and little or no pain after a mean follow-up of 3.1 years.

**Level of evidence:** IV, retrospective study.

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## 1. Introduction

Elbow osteoarthritis is uncommon (2%–3% of the general population) [1]. The symptoms consist of pain and progressive loss of motion range in all planes that rapidly induce functional impairment. The main causes of elbow osteoarthritis are trauma and repetitive micro-trauma. The typical patient is therefore a manual labourer aged 40 to 50 years [1]. The degenerative process usually starts in the lateral compartment before extending to the remainder of the joint. Thus, the cartilage damage occurs earlier and is more severe at the radio-capitellar than at the ulno-trochlear joint [2–4]. Patients in whom non-operative treatment fails can be

offered a surgical procedure such as arthroscopic release [5]. This procedure is currently under evaluation. The role for radial head excision in addition to joint release is a major issue.

Our main hypothesis was that pre-operative damage to the radio-capitellar joint is associated with poorer clinical outcomes after elbow joint release. The objective of this study was to evaluate the medium-term clinical, functional, and radiological outcomes of arthroscopic elbow joint release with radial head resection arthroplasty.

## 2. Material and method

### 2.1. Ethical considerations

This non-interventional clinical research study was approved by the appropriate ethics committee. The establishment of an

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anonymised database for the study was reported to the French Data Protection Authority (CNIL).

## 2.2. Patients

Consecutive patients who underwent surgery between July 2006 and May 2014 at a single centre and by a single surgeon were evaluated retrospectively. Patients were eligible if they underwent arthroscopic elbow joint release to treat stiffness related to osteoarthritis affecting only the radio-capitellar joint. During the study period, these eligibility criteria were met by 12 patients, 10 males and 2 females with a mean age of  $54.5 \pm 9.3$  years (33–69). Among them, 10 were manual workers. The left elbow was affected in 7 patients and the right elbow in 5 patients; 10 patients were right-handed and 2 left-handed and, in 6 (50%) patients, the operated elbow was on the dominant side. A history of trauma or repetitive micro-trauma was noted in 9 (75%) patients, including 5 with trauma due to a work-related accident or occupational disease. The remaining 3 patients had rheumatoid arthritis. The main presenting symptoms were pain and stiffness. Locking of the joint or hyarthrosis were present also in some patients.

The pre-operative radiological evaluation according to Broberg and Morrey [6] showed osteoarthritis grade 1 in 4 patients, grade 2 in 6 patients, and grade 3 in 2 patients.

## 2.3. Operative technique

The patient was positioned on the side with the upper limb hanging down on an arm board and the elbow free. A tourniquet was inflated and the skin landmarks delineated using a dermatographic pen. The first step of the arthroscopic elbow release procedure consisted in injecting 30 mL of normal saline to distend the joint cavity. An antero-lateral portal was created to allow assessment of the joint. The medial portal was established using the outside-in technique under visual guidance. The anterior compartment was debrided and the anterior capsule excised. Then, the two portals were inverted to allow gradual radial head excision using a power burr. The head was resected until a uniform space of about 8 mm was obtained. The remaining steps consisted in debriding the posterior compartment, resecting the osteophytes, removing foreign bodies, and releasing the coronoid and olecranon fossae, depending on the lesions. An intensive rehabilitation program was started immediately to preserve the motion-range gains achieved during surgery.

## 2.4. Outcomes assessment

Outcomes data were obtained for 11 patients, of whom 10 were examined in person by an independent observer and 1 completed a questionnaire and sent new radiographs. At last follow-up, the clinical outcome was evaluated by measuring the motion ranges and looking for instability in the coronal plane. The functional outcome measures were the Mayo Elbow Performance Score (MEPS) [7] and the Quick DASH Score [8]. Also recorded were patient satisfaction (on a 4-grade scale: very dissatisfied, dissatisfied, satisfied, very satisfied) and pain intensity (on a 0–10 point visual analogue scale [VAS]). Antero-posterior and lateral radiographs of the elbow were obtained, with valgus/varus stress views.

## 3. Results

After a mean follow-up of  $38.1 \pm 33.7$  months (5–97), 10 patients were examined in person and 1 was interviewed by telephone. The remaining patient was lost to follow-up. Total elbow replacement surgery was required in 1 patient, who had rheumatoid arthritis.

Wrist pain during pronation-supination was reported by 1 patient, in the absence of distal radio-carpal or radio-ulnar

osteoarthritis. This patient had no evidence of infection or injury to nerves or blood vessels.

At the pre-operative physical examination, extension lag was  $26.3^\circ \pm 18^\circ$  (10–60), flexion was  $105.8^\circ \pm 15.6^\circ$  (90–140), pronation was  $68.8^\circ \pm 24.3^\circ$  (0–80), and supination was  $60.8^\circ \pm 34.4^\circ$  (0–85). Thus, the motion arc was  $79.6^\circ \pm 20.5^\circ$  (30–110) (Fig. 1).

Immediately after surgery, the physical examination showed the following: extension lag,  $6.4^\circ \pm 9.2^\circ$  (0–30); flexion,  $130^\circ \pm 14.1^\circ$  (100–140); pronation,  $80^\circ$  (in all patients); and supination,  $81.4^\circ \pm 10.5^\circ$  (50–85). Motion arc was  $123.6^\circ \pm 18^\circ$  (90–140) (Fig. 1). Surgery was performed on a day-hospital basis in 2 patients, and mean hospital stay length was  $2.4 \pm 1.4$  days (1–5).

At last follow-up, the results of the physical examination were as follows: extension lag,  $13^\circ \pm 9.2^\circ$  (0–30); flexion,  $122^\circ \pm 15.5^\circ$  (90–140); pronation,  $75.6^\circ \pm 10.1^\circ$  (50–85); and supination,  $80^\circ \pm 11.5^\circ$  (50–85). The motion arc was  $109^\circ \pm 11.7^\circ$  (90–120) (Fig. 1).

At last follow-up, the MEPS was  $81.4 \pm 12.5$  (65–100) and the Quick DASH converted to a score on 100 points was  $11.1 \pm 11.1$  (2.3–31.8). The VAS pain score was  $1.1 \pm 1.6$  (0–4). Of the 11 patients, 10 were satisfied or very satisfied with the outcome and 1 was dissatisfied. Furthermore, 6 patients were able to return to their previous job, 1 was retrained to a non-manual job, 3 were retired, and 1 was on disability.

The radiological evaluation at last follow-up (Fig. 2) showed no valgus or varus deformity of the forearm, even on stress views. Neither was there any evidence of further damage to the capitellar cartilage or of secondary degeneration of the ulno-trochlear joint.

## 4. Discussion

The treatment goal in middle-aged (50 years) manual workers is to achieve an appropriate and sustained improvement consistent with the social and occupational needs that characterise this population. The typical patient presents with elbow pain and stiffness related to major cartilage damage, usually in the radio-capitellar compartment. The therapeutic challenge consists in offering an alternative to joint replacement in patients with advanced radio-capitellar osteoarthritis. Joint replacement is not indicated as it cannot simultaneously ensure recovery of the functional motion arc ( $>100^\circ$ ), absence of pain, and sufficient strength. The role for arthroscopy has increased in this situation. Thus, in patients with radio-capitellar or global elbow osteoarthritis, radial head resection combined with joint release holds considerable promise [9].

Arthroscopic radial head excision was first reported by Lo and King in 1984 [10]. In a case-series study of 12 patients, Menth-Chiari et al. [11] showed that resection of the radial head did not necessarily have to be complete to improve elbow function while significantly alleviating the pain. Similar findings were obtained by McLaughlin et al. in a case-series study of 36 patients reported in 2006 [12].

Radial head excision concomitantly with arthroscopic release is currently an alternative to joint replacement, since radio-capitellar osteoarthritis predicts poorer clinical outcomes after joint release [5]. Cha et al. [9] demonstrated that radio-capitellar osteoarthritis was also of adverse prognostic significance in joint release using the Outerbridge-Kashiwagi procedure.

A comparison of the outcomes reported by McLaughlin et al. [12] to those obtained by Morrey [13] and Kashiwagi [14] suggests better motion range recovery after arthroscopic release than after open release. The mean increase in flexion/extension range after open radial head excision was only  $20^\circ$  in a study by Taylor et al. [15]. In contrast, McLaughlin et al. [12] reported a mean  $62^\circ$  increase, a significant improvement compared to the result of open surgery. In keeping with these findings, a case-series study [5] reported at a French Society for Arthroscopy (SFA) symposium showed better

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