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ORIGINAL ARTICLE

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Long-term results of open elbow synovectomy for rheumatoid arthritis

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Abstract Long-term results of open synovectomy of the elbow with rheumatoid arthritis (RA) were reviewed in 15 elbows. The subjects were evaluated at two time points with average follow-up periods of 4 and 8.7 years, and the results were compared between the two follow-ups. The Mayo Clinic performance score showed significant improvement in pain, motion, and daily function from the intermediate to the long-term follow-up. Overall results were satisfactory with little time-dependent deterioration in radiological grading, confirming the long-term effectiveness of this procedure.

Key words Long term results · Open synovectomy · Rheumatoid elbow

Introduction

Rheumatoid arthritis (RA) is known to involve the elbow joint in 20%–50% of patients[1,2] and to be the most common cause of elbow arthritis.[3] As in other joints, persistent inflammation can lead to substantial joint dysfunction associated with pain, deformity, loss of function, and instability.

Although the principal management of choice is conservative treatment consisting of medication and rehabilitation, joint problems can sometimes remain difficult to manage despite conservative treatment, necessitating surgical intervention. In surgical management of rheumatoid elbow, synovectomy is a common procedure, while total elbow arthroplasty is reserved for patients with severe destructive changes.

There have been several studies examining the outcome of synovectomy of the elbow, and the majority of these have reported reasonably satisfactory results. However, the suitability of this procedure over arthroscopic synovectomy, particularly for cases with advanced-stage RA, and sequential time-dependent long-term results have not been clearly explained. In addition, the relative merit of resecting versus preserving the radial head is still controversial.

In the present study, RA subjects who underwent synovectomy of the elbow while preserving the radial head were evaluated with a mean follow-up period of 8.7 years. Moreover, the same cohort of patients had an identical assessment at an intermediate time point of 4 years on average. Thus, it was expected that sequential time-dependent changes in the clinical outcome could be revealed by comparing the results at these two follow-ups.

Patients and methods

Indications for surgery

Surgery was indicated when the following two findings were confirmed: (1) continued pain and swelling caused by the synovitis of the elbow joint that was not responding to conservative management; (2) loss of elbow motion leading to limitation of activity in daily living. When the elbow had severe destructive change or painful instability, total elbow arthroplasty was indicated.

Patient profile

From 1988 to 1995, 21 elbow joints in 18 patients with symptoms caused by RA underwent open synovectomy at the first author's institution. Among those 18 patients, we reviewed 15 elbow joints in 12 patients both clinically and radiographically. Six patients who had relocated were not

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included in the study, although we were able to contact four of the six patients in telephone interviews and confirmed they had little pain and no limitation in activities of daily living. The patient population comprised two men and 10 women (mean age, 51.5 years; range, 38–66 years). The mean time from operation to the most recent follow-up was 8.7 years (range, 5.8–12.6 years) (Table 1).

Operative technique

The elbow was approached by a posterolateral incision starting about 7 or 8 cm proximal to the lateral epicondyle, curving toward the proximal tip of the olecranon, and extending distally along the ridge of the ulna. The dissection was carried out between the brachioradialis and the triceps muscles in the upper arm and between the anconeus and the triceps muscles in the forearm. A wide exposure of the joint was obtained by reflecting these muscles. The radial head was preserved in all cases. A thorough synovectomy was performed, while the osteophyte or the protruding bone limiting the range of motion was removed. After completion of the intraarticular debridement, the triceps tendon was sutured back to the olecranon, and the fascia and skin were closed.

Postoperative management

Postoperatively, a long arm splint and compression dressing were applied for a few days. Following removal of the splint, active and gradual passive range of motion exercises were started with optional use of a continuous passive motion device.

Evaluation

Mayo Clinic elbow performance score was used in the clinical assessment with a maximum score of 100 points. Pain (maximum, 45 points), daily function (25 points), motion (20 points), and stability (10 points) were evaluated and scored accordingly in face-to-face interviews by one of the authors (H.K.) at the intermediate follow-up and by the first author (N.N.) at the latest follow-up. For radiological examination, the Larsen grade was used.[4]

Wilcoxon's signed-rank test was used for statistical analysis to compare the results before surgery and at each of the two follow-ups. A value of $P < 0.05$ was considered significant.

Results

There were no complications throughout the course of the study.

Mayo Clinic elbow performance score

In the pain category, preoperative scores averaged 5.0, and postoperative scores at the intermediate and the latest follow-ups averaged 33.0 and 33.0, respectively, demonstrating pain had decreased significantly after surgery. In terms of daily function, average preoperative score was 18.3, while scores at the intermediate and latest follow-ups were 21.6 and 22.3, retrospectively, indicating that function also significantly improved after surgery. Sequential change in range of motion is summarized in Table 3. Although extension and pronation angles showed no significant change after surgery, flexion as well as supination angle was significantly improved and maintained at the long-term follow-up. In the assessment for stability, the average scores before surgery and at the follow-up examinations were similar.

Overall, the average total Mayo Clinic elbow performance score before surgery was 46.0, while those at the intermediate and latest follow-up examinations were 78.6 and 80.3, respectively, with significant improvement maintained in the long-term results (Table 2).

Table 1. Patient profile

Sex (male : female)	2 : 10
Average age at surgery (years)	51.5 (range: 38–66)
Average follow-up period (years)	8.7 (range: 5.8–12.6)

Table 2. Pre- and postoperative Mayo Clinic elbow performance score

	Preop.	First follow-up (1997)	Latest follow-up (2000)
Pain	5.0	33.0*	33.0*
Function	18.3	21.6	22.3
ROM	17.1	18.3	19.0
Stability	5.6	5.7	6.0
Total	46.0	78.6*	80.3*

* Significant improvement compared to preoperative value ($P < 0.05$)

Table 3. Pre- and postoperative range of motion (degrees)

	Preop.	First follow-up (1997)	Latest follow-up (2000)
Flexion	124 ± 8	134 ± 9*	132 ± 5*
Extension	–33 ± 15	–27 ± 13	–26 ± 13
Pronation	53 ± 19	45 ± 29	46 ± 23
Supination	61 ± 22	76 ± 15*	78 ± 8*

Mean ± SD
* Significant improvement compared to preoperative value ($P < 0.05$)

Table 4. Results of radiological evaluation ($n = 15$)

	Preop.	First follow-up (1997)	Latest follow-up (2000)
Grade 2	1	3	3
Grade 3	8	3	3
Grade 4	6	8	8
Grade 5	0	1	1

Radiological examination

Based on Larsen Grade, preoperatively one joint was classified as grade 2, eight as grade 3, and six as grade 4. During the course of the follow-up, radiological progression was not observed in many cases (Fig. 1). At both of the follow-up examinations, three joints were classified as grade 2, three as grade 3, eight as grade 4, and one as grade 5 (Table 4).

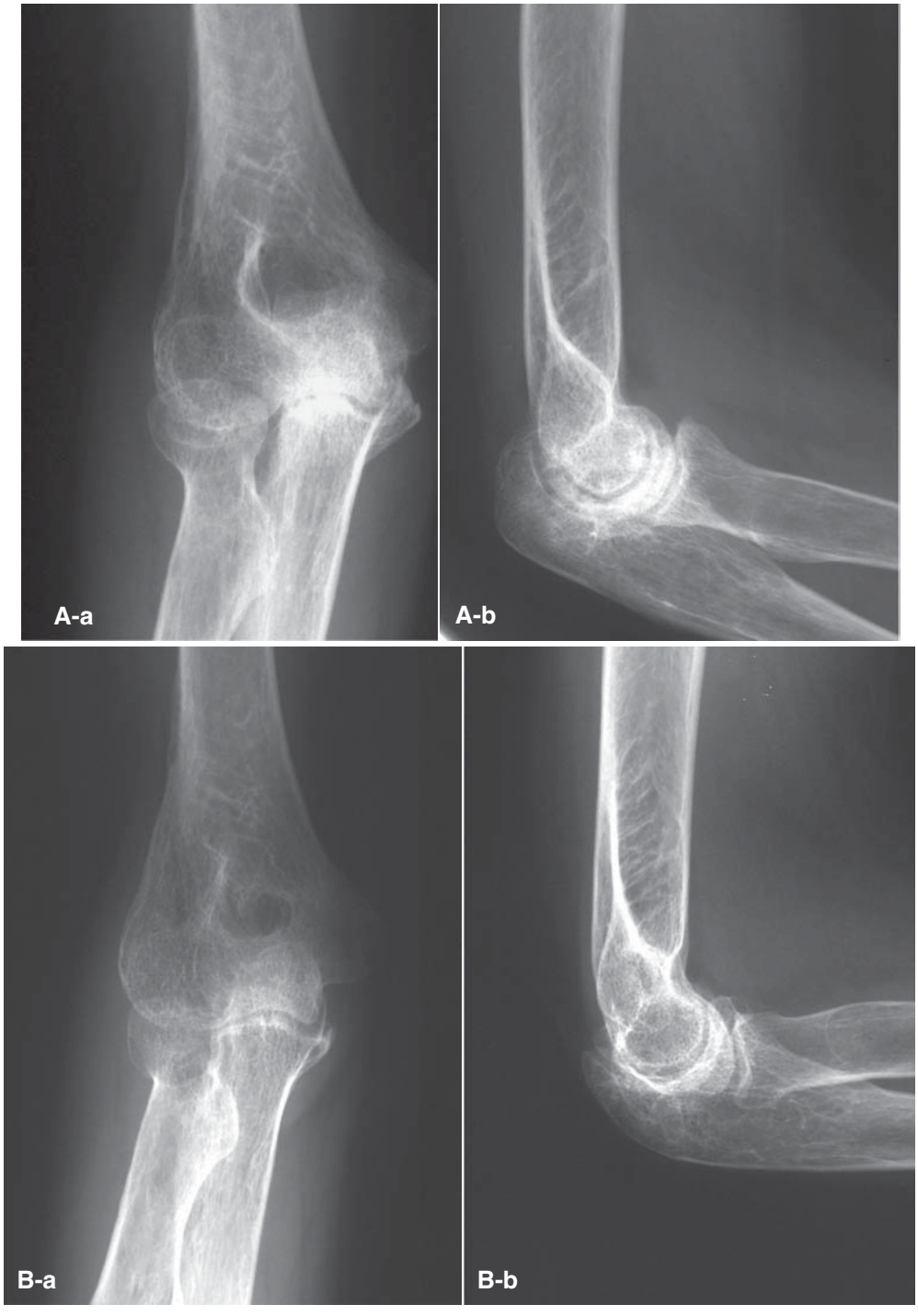

Fig. 1. **A** Preoperative anteroposterior (**A-a**) and lateral (**A-b**) radiographs of a 45-year-old woman who underwent elbow synovectomy showing stage 2 rheumatoid change. **B** Radiographs at the latest follow-up in the same patient (10 years after surgery) showing remodeled appearance with no radiological progression (anteroposterior: **B-a**; lateral: **B-b**)

Although progressive bone absorption was observed in a few cases, this has had only a small negative influence on activities of daily living.

Discussion

Synovectomy of the elbow has been established as a standard surgical procedure to relieve the symptoms of damaged rheumatoid elbows. In the past, long-term follow-ups for this procedure have been reported with generally satisfactory results. In 1982, Eichenblat et al. reported the results of a follow-up study ranging from 2 to 11 years, demonstrating clinical improvements in all examined cases.[5] Subsequently, several authors have reported favorable long-term results with a follow-up period of more than 5 years.[1,6,7] However, there are still some controversial issues such as optimization of the procedure and long-term effectiveness of this surgical intervention for the elbow with advanced destruction.[8] Surgical considerations include open versus arthroscopic procedure, and whether to resect the radial head. Moreover, suitability of this procedure for cases with

advanced-stage RA and sequential time-dependent long-term results have not been clearly explained.

In terms of the surgical approach, arthroscopic synovectomy is an area of growing interest,[9] while open procedure has been the surgical procedure of choice at our institution to date. The advantages of arthroscopic synovectomy over open synovectomy have long been recognized in the knee, with patients experiencing less pain postoperatively, an earlier return of motion, and an overall quicker recovery.[9] Arthroscopic synovectomy in the elbow, however, is technically more demanding as the neurovascular structures are closer to the operative field and require special consideration.[10] Some investigators have reported the risk of damaging neurovascular structures, such as the ulnar nerve, radial nerve, and brachial artery.[11,12] Thus, one concern is that arthroscopic intervention may result in inadequate removal of the inflammatory tissue. Horiuchi et al.[10] examined the intermediate and long-term results of arthroscopic intervention and observed excellent or good results in 71% of the patients at 2 years and 43% at the final follow-up (mean duration: 97 months). They concluded that favorable outcomes could be expected in cases with early-stage RA. Lee and Morrey[11] also reported that deterioration of surgical outcome after arthroscopic procedure was more rapid than after open synovectomy. Thus, there have as yet been few data confirming the long-term effectiveness of this procedure. In contrast, the clinical results of open elbow synovectomy for RA patients have generally been favorable in terms of relief of pain and swelling, with 70%–90% of the patients experiencing pain relief.[1,5,7,13,14] Some surgeons have argued that the open procedure is associated with increased surgical invasion to the surrounding structures such as muscles, tendons, and ligaments.[7] However, soft tissue damage to these structures does not appear to substantially affect the postoperative return of motion or functional recovery, and advantages of improved visualization and accessibility in the open procedure appear to outweigh the potential shortcomings.[8]

Whether to resect the radial head in association with synovectomy is another issue of argument. A number of surgeons have advocated routine resection of the radial head for better exposure;[1,3,5,13] however, others have reported no difference in the results between patients with or without radial head excision.[6,10] Remaszewski et al. documented the long-term effect of this procedure on late instability[13] and questioned the necessity of routine resection of the radial head except for the cases with significant radiocapitellar arthritis. Taylor and O'Connor also showed that resection of the radial head could cause excessive loading to the ulnar compartment, leading to an increased rate of symptoms at the ulnar head.[15] As the effectiveness of excision is yet to be confirmed, the radial head was preserved in all cases in the present study, and exposure could be facilitated by a posterolateral approach without the radial head excision in our experience.

As for the effectiveness of this procedure in advanced RA cases, most of the examined subjects in the present study exhibited advanced RA categorized as stage 3 in 14 of the 15 elbows. Although there is some concern about the long-term effectiveness of this procedure in the presence of stage 3 or 4 rheumatoid disease,[3] our results can be favorably compared with those of the previous studies including early-stage RA. Moreover, observation of time-dependent results after surgery in the present study demonstrated maintenance of clinical improvement continuing through the final follow-up period of 8.7 years on average. It was demonstrated that flexion and supination angles increased after surgery and were maintained for more than 5 years. In addition, the Mayo Clinic elbow performance score had significantly improved while the progression of joint instability and deformity were prevented.

Conclusions

The clinical results of our study demonstrated that open elbow synovectomy without resection of the radial head is satisfactory both in providing pain relief and functional improvement even for advanced-stage rheumatoid elbows. In addition, little time-dependent deterioration over a mean follow-up period of 8.7 years was observed. Therefore, open elbow synovectomy should be considered as a reliable option for surgical treatment of the elbow joint in RA patients.

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