

Arthrolysis of the elbow

13 cases of posttraumatic stiffness

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On an average 5 years after arthrolysis for posttraumatic stiffness of 13 elbows, motion was good in eight, fair in three, and poor in two. The poor cases were re-operated on with unsatisfactory results.

The term *arthrolysis of the elbow* has been introduced to describe a procedure that is intended to mobilize a stiff joint or to improve motion in a severely limited one. The operation implies excision of intraarticular or extraarticular mechanical obstacles. Some authors have reported anterior and/or posterior capsulotomy (Glinn et al. 1976, Urbaniak et al. 1985) in order to treat an elbow with limitation of motion. Such an approach would not take into account the incongruency of the articular facets of the joint, which is commonly found in posttraumatic cases. In similar instances, we have employed a technique designed to improve motion by open rearrangement of the articular components of the elbow, without any external force. We report our results of this procedure in 13 cases.

Patients and methods

During the last 10 years, 15 elbows in 13 patients were operated on for posttraumatic limitation of motion. Eight were males and 5 were females, aged 29 (11-45) years (Table 1). The dominant limb was affected in 3 patients, and the follow-up time was 5 (2-10) years. Ten patients were reexamined for the purpose of this study. One patient left the country 7 years after surgery, and 2 moved to the north and could not be traced. Concerning these latter 3 patients, information was obtained from the medical records in which the last follow-up examination was recorded 4 and 9 years after surgery. In all the patients, the stiffness of the elbow had a traumatic origin; Case 11 also had arthritis. The time that had

elapsed between development of joint stiffness and arthrolysis averaged 5 (0.5-30) years. The associated affections were ulnar neuropathy in 3 cases, median neuropathy in 2 cases; and in 1 of the cases with ulnar neuropathy, there was a reflex sympathetic dystrophy.

Preoperative evaluation

In the 13 cases reported here (Table 1), the average preoperative range of flexion-extension was 35°, and the rotation of the forearm was 111°. None of the elbows had instability or swelling. Spontaneous pain was absent in 10 cases; it appeared during physical exertion in 2 cases, with daily normal activities in 1 and at rest in 1. All the patients experienced pain on forced flexion and extension over the existing range of motion.

The preoperative radiographic examination showed nonunion and/or malunion of fragments in nine elbows, periarticular ossifications in two, and loose bodies and arthrosis in three. In two elbows in which the radial head had been resected previously, the remaining neck was found to be long and thickened by new bone formation (Figure 1).

Operation

There are two consecutive steps common to any type of arthrolysis of the elbow: release of all soft tissues that are seen to interfere with motion and excision of bone obstacles found during the surgical exposure of the joint. We use an extended lateral approach, which would render a wide exposure of the joint by reflecting muscles and the periosteum of the distal humerus (Figure 2). Resection of the radial head was performed; in the two elbows in which it



Figure 1. A. Severe intraarticular and extraarticular changes after a comminuted fracture of the distal end of the humerus. Note malunion of the fragment and periarticular ossification.

B. A supracondylar fracture that healed with anterior displacement. Note the bone protuberance at the posterior aspect, which prevents the tip of the olecranon to engage the fossa. There is a severe limitation of extension.

C. Massive ossification surrounding the proximal end of the radius after excision of the radial head.



Exposure of the joint.

Resection of radial head and peeling of soft tissues found on the way of motion.

Bone obstacle at the anterior articular aspect of the humerus.

Figure 2. Stages of the procedure

Table 1. Arthrolysis of the elbow in 13 patients

Case	Age, sex	Etiology	Time until oper. (yrs)	Assoc. pathology ¹	Follow-up (yrs)	Preop. range of motion		Postop. range of motion		Results ²	
						Flexion-extension	Pronation-supination	Flexion-extension	Pronation-supination	Obj.	Subj.
1	29, m	Intraartic. fracture	0.9		7.5	80-50	85-90	110-40	85-90	G (40)	U
2	28, m	Supracond. fracture	9		10	115-60	30-90	115-20	85-90	G (40)	S
3	25, m	Intraartic. fracture	0.5		7	85-90	85-90	120-55	85-90	G (60)	S
4	30, f	Intraartic. fracture	1		8	165-80	85-90	165-20	85-90	G (60)	S
5	29, m	Fracture dislocation	0.7	A	3.5	130-90	85-90	130-60	85-90	F (30)	S
6	42, f	Intraartic. fracture	30		6	70-65	5-0	105-40	85-30	G (60)	S
7	45, m	Intraartic. fracture	0.3		4	120-90	85-45	165-20	85-90	G (115)	S
8	35, f	Intraartic. fracture	2	B	2	85-65	70-90	120-30	30-90	G (70)	S
9	11, m	Fracture dislocation	1.3		2	120-40	60-90	125-0	20-90	G (45)	S
10	30, m	Anterior dislocation	1.3	A	2.5	140-60	10-90	140-80	85-90	P (-20)	U
11	21, m	Humeral shaft fracture	1	B, C	2	90-60	10-0	90-60	10-0	P (0)	U
12	23, f	Radial head fracture	3		2.5	50-45	70-70	90-60	70-70	F (25)	U
13	31, f	Intraartic. fracture	1.3		5	130-80	80-80	140-10	80-80	G (80)	S
Average amplitudes						107-73	45-66	125-40	63-73		

¹ A median neuropathy, B ulnar neuropathy, C reflex sympathetic dystrophy.

² G good, F fair, P poor, U unsatisfied, S satisfied. Improvement in flexion-extension range in parentheses.

had been excised previously, a portion of the thickened proximal end of the radius was resected. Any bone obstacles on the line of motion of the humeral-ulnar hinge were also resected. An appropriate access to the olecranon fossa was achieved by peeling the tissues over the distal end of the humerus. In several cases, deepening of an almost obliterated fossa by resecting accumulated bone tissue was carried out to accommodate the tip of the olecranon and to improve the range of extension. Once full or acceptable range of motion was accomplished, the muscles overlying the joint were readapted by interrupted sutures, taking care that the amplitude of passive motion was maintained. The joint capsule was not sutured. Suction drainage was routinely employed. A bulky soft dressing would complete the procedure. Motion was started on the second day after surgery.

Evaluation

At follow-up the patients were divided into three categories according to the amplitude of motion gained by the procedure. "Good" included elbows with 40° or more improvement of their preoperative flexion-extension range; "Fair" included elbows with a gain of less than 40° but no less than 20°; "Poor" included elbows with practically no gain or even with some loss of motion compared with the preoperative range.

Although in many instances pronation-supination improved considerably after arthrolysis, this motion was not taken into consideration in the final evaluation; an improved pronosupination would not contribute much to the functional capacity of the elbow if the flexion-extension range would improve less than 20°.

Results

Ten patients were satisfied and 4 patients stated that they were unsatisfied with the procedures. Motion was good in nine, fair in three, and poor in two elbows. The average range of postoperative rotation of the forearm was 136°, a gain of 25°.

Two elbows developed ulnar-nerve entrapment 2 or 3 months after the arthrolysis, which necessitated release and anterior transfer of the nerve. Case 11 developed intraarticular bleeding in the early postoperative period, which impaired the final outcome.

Table 2. Evaluation of results

	Good	Fair	Poor
Gain of amplitude	≥40°	<40°	≤0°
Cases	9	3	2

Discussion

Various surgical approaches have been described in order to achieve an adequate exposure of the elbow. Some authors report on a routine posterior approach (Shariaree et al. 1979). Others employ a combined lateral and medial approach (Bhattacharyya et al. 1974), occasionally releasing and transposing the ulnar nerve. In most instances, we have used an extended lateral approach, similar to the one we have described for synovectomy of the elbow (Eichenblat et al. 1982, Kessler 1985). This series, with a good result in the majority of cases, confirms the results of Bhattacharyya (1974).

Arthrolysis of the elbow is not an innocent procedure. Even a badly damaged elbow could be made worse by mismanagement. Although a specific loss of amplitude of 70° in each direction has been regarded as a minimal requirement to justify the operation, every patient should still be considered individually. The specific needs of the patients, their age, social and professional status are factors that should be taken into account.

In order to achieve the best possible results, very strict preoperative conditions have to be observed. First of all, an adequate functional condition of the relevant muscles is a necessity; lack of appropriate motors to activate the increased passive range of motion would nullify the value of arthrolysis. Acceptable skin coverage is also a prerequisite; abundance of scars in the close vicinity of the elbow, or skin of poor quality, would interfere with motion and would increase the danger of postoperative infection.

Case 11, with a poor result, had a reflex sympathetic dystrophy before the operation, and intraarticular bleeding that followed surgery jeopardized the rehabilitation. No gain of motion was achieved. In Case 12, there was a pronounced lack of cooperation, and the final outcome did not correlate with the scarce pathologic findings and with relative easiness by which a full range of motion was restored intraoperatively. Both cases had a second arthrolysis with poor final results. Retrospectively, a reinterven-

tion does not seem to be justified in such instances. Caution should be used when the patient is uncooperative or not motivated to undergo a vigorous rehabilitation program.

The only component of the elbow in which motion takes place after arthrolysis is the humeral-ulnar hinge. But even there, the nonweight-bearing mechanism of motion would not produce an intimate

contact between the corresponding articular surfaces. It seems that in such an articulation, the integrity of the joint cartilage is less important than in a weight-bearing joint, in which impact between the articular surfaces is constant, intimate, and compressive. This, we believe, is the main reason for the generally favorable response to such an extensive debridement of the elbow.

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