

Elbow arthroplasty in rheumatoid arthritis

Function after 1-2 years in 20 cases

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The function of the hand and arm was studied after total elbow arthroplasty in a consecutive series of 18 rheumatoid patients with a total of 20 primary arthroplasties and one revision. Extensive clinical evaluation with locomotion score and Sollerman's hand function test was undertaken preoperatively and at 6 months postoperatively. The mean flexion range increased 25° and extension lag decreased 5°. Pain relief was achieved in all the cases, and 16 of 20 primary operated on elbows became fully painfree. Hand function score (max. 80) improved from 52 to 64, upper extremity score (max. 100) from 57 to 68 and subjective score (max. 100) from 46 to 58. Complications were 2 cases of ulnar nerve paresthesia and 1 epicondylar fissure.

We present our results of total elbow replacement using the Souter/Strathclyde unconstrained prosthesis (Howmedica, London).

Patients and methods

During the 2-year period from September 1987 to September 1989, a consecutive series of 20 primary total elbow arthroplasties and one revision were performed in 18 patients with seropositive rheumatoid arthritis (ARA criteria 5-8). The mean age at operation was 61 (41-83) years and the duration of the disease was 20 (8-41) years. All the patients had destructions of the elbow joint, radiographically grade 4-5 (1). Indications were severe pain, instability, and restriction of motion. The mean observation time was 20 (6-30) months (March 1990).

Preoperative analyses were done in all the cases with our locomotion score (2) and Sollerman's hand function test (3). Patient data are summarized in Table 1.

Operation. The Souter/Strathclyde unconstrained elbow endoprosthesis (Howmedica, London) was used (Figure 1). The incision was straight posterolateral including triceps tenotomy. The ulnar nerve was released and protected, but not transposed anteriorly except in cases having symptoms of nerve entrapment. Resection of the radial head and extensive synovectomy were performed if not done earlier.



Figure 1. The Souter-Strathclyde elbow arthroplasty (Case 10).

Table 1. Observations in 21 total elbow arthroplasties (including one revision) for rheumatoid arthritis

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
1	1	52	8	0	0	1	30	69	76	86	74	66	50	81	71	74	61	56	41	10	10	140	140
2	1	41	18	1	0	1	30	59	66	83	78	60	59	80	68	70	63	50	46	10	13	130	140
3	2	60	30	0	0	2	30	59	65	64	64	44	58	54	56	49	56	34	48	10	10	110	150
4	1	71	13	1	1	2	29	29	32	47	41	6	13	38	40	22	26	6	8	0	5	90	150
5	1	73	23	1	2	1	27	0	50	67	75	35	69	72	83	53	76	25	52	10	17	110	155
6	1	57	31	0	0	2	26	66	75	53	57	45	42	50	77	47	60	35	29	10	13	110	140
7	1	56	11	0	3	2	25	45	71	56	65	39	41	62	69	51	55	29	36	10	5	120	140
8	1	68	29	0	3	2	24	54	62	61	65	37	55	64	76	50	65	27	42	10	13	130	120
9	1	53	9	0	0	2	22	66	59	74	81	50	75	71	91	61	83	40	58	10	17	140	150
10	1	61	10	1	0	1	17	52	75	80	87	58	61	85	93	72	77	48	46	10	15	120	135
11	1	58	26	1	0	2	16	57	64	61	71	40	63	56	66	48	65	30	46	10	17	90	150
12	2	61	31	1	0	1	16	31	32	66	70	52	74	67	55	59	65	42	49	10	25	130	150
13	1	54	11	0	0	2	14	63	78	72	83	53	92	74	65	63	79	43	67	10	25	115	135
14	1	61	36	1	0	2	13	44	78	73	83	45	73	79	82	62	77	35	56	10	17	115	150
15	1	83	15	1	0	2	13	27	54	70	77	44	72	74	82	59	77	34	56	10	17	150	140
16	1	43	19	1	0	1	11	61	63	78	85	60	72	67	89	63	80	47	55	13	17	140	140
17	1	64	20	1	0	1	11	57	75	76	89	50	67	85	94	68	80	40	50	10	17	135	150
18	1	78	39	1	0	2	10	72	76	70	91	41	94	84	95	62	95	31	61	10	33	120	145
19	1	56	20	1	0	1	10	70	61	71	75	58	65	74	90	66	71	48	50	10	17	130	145
20	1	55	12	0	0	1	6	65	70	64	69	46	50	69	88	57	65	36	45	10	25	150	160
21	1	74	41	0	0	2	6	47	65	64	68	41	50	67	75	54	60	31	45	10	13	130	140

- A Case

B Sex: 1 female, 2 male

C Age at operation

D Years of disease duration

E Previous operation in the elbow

0 none

1 synovectomy with radial head resection

F Other preoperative conditions

1 total humero-ulnar dislocation after fracture

2 ulnar nerve entrapment (previous synovectomy)

3 previous ipsilateral wrist arthrodesis

G Affected side: 1 dominant, 2 nondominant

H Follow-up, months

I Hand score before operation

J Hand score after operation

K Total locomotion score before operation

L Total locomotion score after operation

M Subjective score, upper extremities, before operation

N Subjective score, upper extremities, after operation
- O Objective score, upper extremities, before operation

P Objective score, upper extremities, after operation

Q Total locomotion score, upper extremities, before operation

R Total locomotion score, upper extremities, after operation

S Ability, upper extremities, before operation

T Ability, upper extremities, after operation

U Preoperative pain score, upper extremities

V Postoperative pain score, upper extremities

W Preoperative range of flexion

X Postoperative range of flexion

Y Preoperative extension lag

Z Postoperative extension lag
- Case 9 = contralateral side of Case 1.

Case 12 = contralateral side of Case 3.

Case 16 = revision of Case 2.

The ulnar collateral ligament was preserved in 19 cases and reinserted in 2. Gentamycin Palacos® (Schering Corp.) was used for cementation without plugging of the medullary canal. Two days of intravenous broad-spectrum antibiotic prophylaxis was used (Cefuroxim® 1 x 3). The elbow was immobilized in maximum extension with a dorsal plaster splint and kept elevated. On the second day, the splint was removed and active excercises were instituted. Physiotherapy was continued for 4-6 weeks. The mean operation time was 120 (90-160) min and the hospitalization 8 (6-12) days.

Follow-up. Postoperatively, all the patients were examined after 6 weeks, 3 and 6 months, and then every 6 months. Radiographic examinations were done at the 5th postoperative day, and again after 3 and 6 months, and yearly. Standardized frontal and

lateral exposures were obtained in maximum flexion and extension. Six months postoperatively, all the patients were assessed with Sollerman's test (3) for hand function and our score (2) for locomotion. status

The Student's *t*-test was used with *P* < 0.05 considered significant.

Results

The extension lag decreased from 35° to 30° and flexion increased from 120° to 145° (*P* < 0.001; Figure 2). A loss of 15° flexion was noted in 2 cases.

The total locomotion score (max. 100) did not change (68 preoperatively and 72 postoperatively),

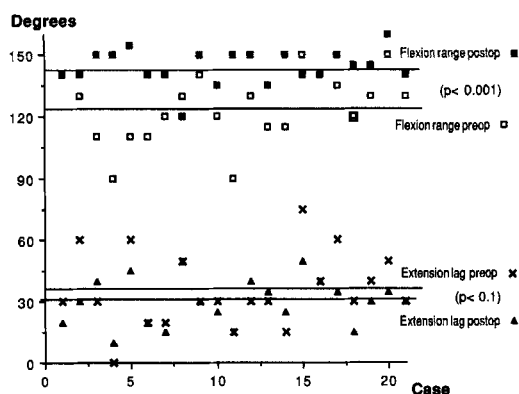


Figure 2. Flexion range and extension lag after elbow arthroplasty.

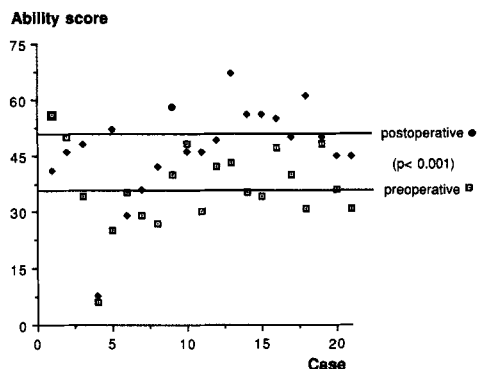


Figure 3. Upper extremity ability score (max. 67) after elbow arthroplasty.

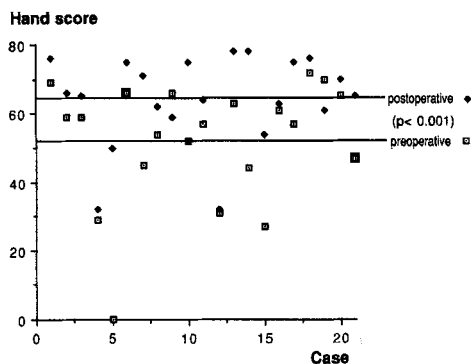


Figure 4. Preoperative and postoperative hand score (max. 80) after elbow arthroplasty.

but the total score (max. 100) for the upper extremities together increased from 57 to 68 ($P < 0.001$). The subjective score (max. 100) for the upper extremities increased from 46 to 58 ($P < 0.001$), but the objective score (max. 100) did not change appreciably.

The mean upper extremity ability score (max. 67) increased from 36 to 46 ($P < 0.001$; Figure 3). The hand score improved substantially (Figure 4) and the pain score (max. 33) for the upper extremities together from 10 to 16 ($P < 0.001$). Preoperatively, all 18 patients had moderate or severe pain of the elbow. At 6 months postoperatively, none had pain at rest while 4 had slight pain when being active.

There were no healing complications. Case 2 had a discrete fissure of the lateral humeral epicondyle on routine postoperative radiographs. The patient had uneventful recovery and training, but increasing resorption occurred around the undisplaced fracture. After 18 months, an asymptomatic 4-mm ulnar displacement of the humeral component was seen. The loose component was then revised using an 8-cm-long stem version, the epicondyle being fixed to the implant with osteosutures and iliac grafts being added. Bony healing was obtained within 3 months with good functional recovery. Two cases had ulnar nerve paresthesia; 1 persisted (Case 1), whereas the other recovered within 6 weeks (Case 13). One case of persisting ulnar nerve paralysis (Case 5) from entrapment after a previous synovectomy remained unchanged postoperatively despite neurolysis and transposition.

Discussion

In early cases (Larsen et al. (1), grades 0-3) synovectomy (4-7) with or without radial head resection, as well as intraarticular steroids (8), may give good symptomatic relief, but the effect may not be long-lasting (6). Arthrodesis impairs function too much (9, 10), and different types of resection arthroplasties may give disappointing results owing to instability and pain (11).

Restoration of elbow motion was satisfactory in our series, with a postoperative flexion range well over 100° . This conforms to Souter's (12) results and is slightly better than the reports of Sjöden et al. (10) using the same type of prosthesis, Rydholm et al. (13) using the Wadsworth prosthesis, and Ewald and Jacobs (14) using his own prosthesis. A slight reduction of the extension lag corresponded to previous reports (10, 12-14).

Our postoperative regimen was different from what is generally used. The elbow is usually immobilized in 90° of flexion for a postoperative period of 4 days (12) up to 14 days (10). To lower the risk of extension lag, we immobilize in full extension and start active exercises on the 2nd postoperative day, so that the patient can obtain a final flexion range of at least 100° (aim 130°; 15). We have not experienced any increased risk of wound complications by this active treatment.

Unconstrained elbow endoprotheses are reported to have a low rate of early loosening and limited complication rate compared with other designs (9, 10, 16). The early complications in our series were somewhat less than those reported by Sjöden et al. (10). We had no cases of disturbed wound healing, skin necrosis, or infection compared with the 9 percent reported by Morrey et al. (15) and the 15 percent reported by Weiland et al. (17). The epicondylar fissure in our series occurred most likely intraoperatively and conforms to previous reports (10, 21).

Postoperative ulnar nerve affection seems inescapable. An incidence of 5 (18) to 29 percent (9) has been reported for transient neuritis and 4-5 percent for permanent loss of function (13, 14). In the first 100 Souter's elbow arthroplasties in Edinburgh, the incidence of transient ulnar neuritis was about 15 percent (12). Entrapment from mechanical nerve compression or surgical hematoma causing nerve vascular disturbance has been suggested (14, 18). Ulnar nerve transposition may not lead to improvement (13, 19).

We consider the early results and functional improvement quite satisfactory in this category of disabled patients.

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