The Souter-Strathclyde elbow replacement in rheumatoid arthritis

13 patients followed for 5 (1–9) years

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13 Souter-Strathclyde unconstrained elbow prostheses for rheumatoid arthritis were followed for 5 (1–9) years. Pain relief was achieved in all the patients. Flexion-extension was increased by 22°, and pronation/supination by 27°. There were no infections. Three humeral components were radiographically loose, but no patient had any symptoms. One patient sustained a fracture of the distal humeral epicondyle, two patients developed neuropathies and one patient had a postoperative dislocation that needed treatment with an external Hoffman fixator.

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Patients with rheumatoid arthritis frequently have involvement of the elbows (Souter 1989). The range of motion decreases as the pain progresses and the rheumatoid patient's ability to function independently becomes limited. Synovectomy of the elbow joint provides relief of pain, but often gives only minor improvement in joint motion.

Previously we have reported on the initial results after elbow replacement using the Souter-Strathclyde prosthesis (Sjödén et al. 1988); we now present our late results in 13 patients.

Patients and methods

From 1982 to 1991, the Souter-Strathclyde (Souter 1985) unconstrained prosthesis for total elbow replacement was used in 10 women and 3 men with seropositive rheumatoid arthritis. Their mean age at the operation was 64 (50–76) years. In 8 patients, the nondominant left elbow was operated on, and 5 patients had their dominant right elbow operated on. One patient had a revision done after 5 months due to loosening of the humeral component after a humeral epicondylar fracture. All patients were on treatment with NSAID and one patient also received 8.75 mg prednisolone per day. The elbows were radiographically stage 4 or 5 according to Wadsworth (1982). The indications for operation were pain at rest and decreased mobility with severe destruction of the elbow joint due to rheumatoid arthritis.

The operation was performed with the patient prone and using a tourniquet. With the elbow flexed 90°, an almost straight postero-lateral incision was carried out starting some 8 cm above the elbow (Wadsworth 1982). The ulnar nerve was not explored. The triceps was incised 6 cm above the olecranon and reflected distally like a tongue. The annular ligament was incised together with the radial collateral ligament. The head of the radius was then excised and the trochlea was resected, leaving the medial epicondyle and the capitellum. The anterior portion of the ulnar collateral ligament was left intact.

After dislocation of the elbow joint by swinging the flexed arm to the ulnar side, the floor of the trochlear notch was excised and the medullary cavity of the ulna was opened. The prosthesis was cemented with Palacos® with gentamicin (Schering Corp). The triceps fascia and radial ligaments were sutured with PDS® (polydioxonan, Ethicon) sutures. Prophylactic intravenous antibiotics using four doses of cefuroxim (Zinacef®, Glaxo, 1.5g x 3) were routinely given.

A posterior splint with the elbow in 90° of flexion was used for 5 days. Then passive movements were started and the splint was used intermittently between exercises. Active movements were started after 2 weeks.

The average follow-up with a full clinical and radiographic examination was 5 (1–9) years.

Table 1. Observations in 13 patients with elbow arthroplasties

A	B	C	D	E	F	G	H	I	K	L	M	N	O	P	R
1	F	66	102	N	90	125	75	65	0	20	0	0	1	1	
2	M	60	101	N	120	155	20	35	80	80	80	70		0	
3	F	75	99	D	135	140	5	70	60	80	60	60	2	2	
4	M	76	84	N	140	140	30	35	45	90	45	45		1	
5	F	55	74	N	105	120	40	30	0	0	0	45		0	
6	F	56	69	N	130	155	50	25	60	80	60	90		1	
7	F	67	65	N	110	140	30	50	10	60	10	80	3	0	1
8	F	62	42	D	140	145	20	15	90	80	45	70		2	2
9	M	73	38	N	130	140	50	20	80	90	80	45		0	
10	F	55	18	D	110	135	30	35	80	70	70	90		0	
11	F	58	15	D	110	140	40	25	90	90	60	80	4	0	3
12	F	61	14	N	150	150	50	15	70	80	70	90		2	4
13	F	65	13	D	130	150	80	50	90	60	60	90		0	5
Mean		64	56		123	141	40	36	58	68	49	66			

A Case number
B Sex
C Age at operation
D Follow-up in months
E Side
  D dominant
  N nondominant
F Preoperative flexion
G Flexion at follow-up
H Preoperative extension
I Extension at follow-up
K Preoperative pronation
L Pronation at follow-up
M Preoperative supination
N Supination at follow-up

O Complications
  1 ulnar neuropathy
  2 radial and ulnar neuropathies
  3 humeral epicondyle fracture
  4 postoperative luxation
  5 ulnar neuropathy
P Radiolucency
  0 no zone visible
  1 ≤ 2 mm
  2 ≥ 2 mm
R 1 revision of humeral component after 4 months
  2 humeral component proximal migration
  3 Hoffman external fixator for 6 weeks
  4 cement fracture on humeral side
  5 long stem humeral component

Results

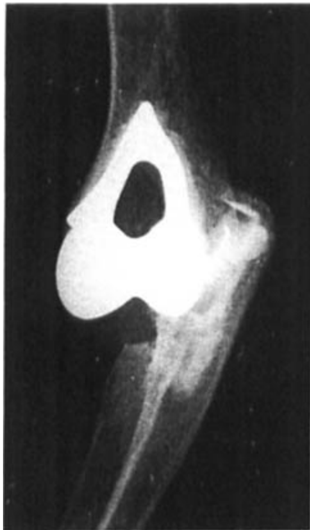
Following surgery, the range of flexion-extension increased by 22° and the range of pronation-supination by 27°. Flexion increased from 123° to 141°, while the extension lag decreased marginally from 40° to 36°. Pronation increased from 58° to 68° and supination from 49° to 66°. A radiolucent zone ≤ 2 mm was evident in 4 elbows, while radiolucency ≥ 2 mm was noted around 3 humeral components. In one elbow the humeral component migrated 3 mm proximally and there was a concomitant fracture of the supporting cement. No patient experienced pain at rest or when active. In 3 patients a slight instability (< 10°) was noted when valgus stress was applied, but none had instability interfering with daily activities.

One woman had a revision of the humeral prosthesis because of loosening following fracture of the ulnar humeral epicondyle. One woman (Case 11, Table 1) presented with a postoperative luxation of the unconstrained prosthesis on follow-up 6 weeks after surgery. The initial postoperative radiograph had shown good prosthetic alignment. She was then treated with open reduction and immobilization in plaster of Paris with the elbow flexed 100°, but due to persistent luxations the elbow was maintained in an external Hoffman fixator for four weeks (Figure 1). She regained full stability and good range of motion after two months.

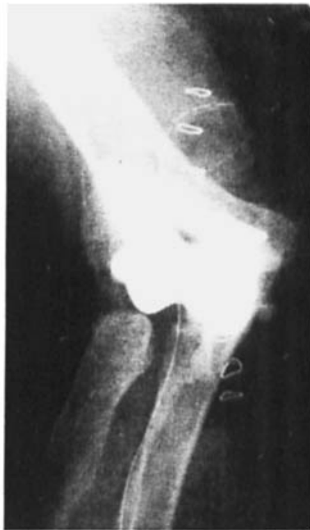
Neurological complications occurred in two cases, one with ulnar neuropathy and one with combined radial and ulnar neuropathies. While the radial nerve partially recovered, the ulnar neuropathies persisted.

Discussion

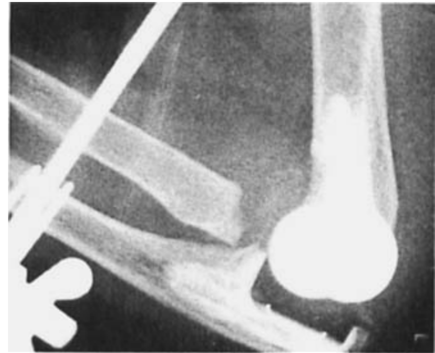
The restoration of painless elbow movement was satisfactory in our series. We confirm our initially good results (Sjödén et al. 1988). The increased range of postoperative flexion did not decrease with time. The range of flexion and pronation-supination was also permanently increased, but the fixed flexion deformity hardly improved with time. The results are largely



6 weeks postoperatively.



After open reduction a redislocation was evident after 1 day.



The elbow was reduced by flexing the elbow > 90° and the elbow was maintained in that position using an Hoffman external fixator for 4 weeks.

Figure 1. Case 11. A 58-year-old woman with humero-ulnar dislocation six weeks after a Souter-Strathclyde elbow replacement. The elbow had a range of motion of 30°–90°.

comparable with those reported by others (Jonsson et al. 1990, Burnett et al. 1991).

We do not think that the extension lag was increased by the triceps splitting approach. The inability to fully extend the elbow may have been due to soft tissue derangements on the anterior side of the elbow. Capsulectomy and synovectomy of the anterior side of the elbow through the posterior approach are not always complete.

The functional range of motion in the elbow requires 100° of flexion and 100° of pronation/supination. However, the most useful arc of flexion is 30° to 130°, while in rotation 50° of pronation and 50° of supination will permit almost all activities in daily life (Morrey et al. 1981). The range of motion after Souter-Strathclyde arthroplasty in our series is therefore satisfactory.

We found no clinical signs of loosening after an average follow-up of 5 years, although radiographic loosening was present in 3 elbows. As with other elbow prostheses, it is around the humeral component that radiographic signs of loosening first appear.

The high complication rate (4/13) suggests that joint replacement of the elbow should be reserved for the advanced cases of rheumatoid arthritis.

Acknowledgement

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