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Failure of the Wadsworth elbow

Nineteen cases of rheumatoid arthritis followed for 5 years

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Nineteen Wadsworth elbow prostheses were inserted in 15 patients with rheumatoid arthritis during the 4 years 1979–1982. The patients were followed prospectively for an average of 5.7 years. Five elbows were revised because of mechanical loosening and one because of deep infection. Of the remaining 13 prostheses, there were radiographic signs of loosening in 8 cases.

Rydholm et al., 1984, reported our 2–3-year results with the Wadsworth elbow prostheses in rheumatoid arthritis. Clinically, the results were good as far as the effect on pain, instability, and range of motion was concerned. The revision rate was low, but radiographically there were signs of loosening in an alarmingly high proportion. We have now followed our cases for another 3 years to establish whether radiographic signs of loosening also imply clinical failure.

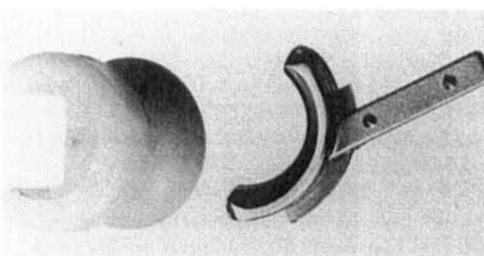

Figure 1. The Wadsworth resurfacing elbow prosthesis.

Patients and methods

Totally, 19 elbows in 15 patients (12 females, 3 males; mean age 54 [18–73] years) were operated on with the Wadsworth nonconstrained surface replacement prosthesis (Figure 1) during the 4 years 1979–1982. The technique used was described in detail by Rydholm et al. (1984) when they reported on their 2.5-year results of this series. The patients have now been followed prospectively for an average of 5.7 (4.6–6.9) years.

Pain at rest and in motion was recorded as none to severe. The elbows were examined for range of motion (extension, flexion, pronation, supination) and instability (stressed valgus and varus angulation). Elbows with an instability of more than 10° were considered unstable. The radiographs, taken in two standardized projections, were studied for signs of loosening of either of the two prosthetic components (radiolucent zone more than 2 mm and/or change of position). The progression of these signs was followed. Fractures of the distal part of the humerus and the proximal part of the ulna were searched for. The present late results were compared with the previously reported early results.

Results

During the first 2.5 years, two Wadsworth prostheses were revised—one because of deep infection and one because of mechanical loosening. During the remaining follow-up time, four other prostheses were revised because of mechanical loosening. In three elbows, including the infected one, the prostheses were removed. One elbow with early mechanical loosening was revised with another Wadsworth prosthesis, which had to be removed 18 months later because of loosening. Three of these four elbows were only moderately unstable, whereas in the fourth elbow the instability was considerable. In two elbows the prosthesis was removed and a bone block from the iliac crest was transplanted into the defect in the distal part of the humerus to minimize loss of stability.

No changes in range of motion were recorded during follow-up (Table 1); at the early follow-up the mean extension-flexion was 31°–132°; and 3 years later, it

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Table 1.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
1	36	F	R	5	7	25–130	10–150	5–150	2	1	1	3	1	1	3	1	1	1	0	0
2	59	M	R	5	7	20–120	20–150	50–130	1	1		3	2	1	2	1	2	0	1	3
3	59	F	L	3	7	30–145	20–140	0–150	2	1	1	3	1	3	1	2	3	0	1	2
4	37	F	L	4	6	30–120	30–120	45–130	2	1	1	3	1	1	3	1	1	1	0	0
5	53	M	R	5	6	30–110	30–130	20–145	2	1	1	3	2	2	3	2	2	0	1	0
6	62	F	R	3	6	25–135	30–100	60–120	1	1	1	3	1	2	1	1	1	1,3	1	0
7	48	F	R	4	6	40–150	30–120	55–135	3	1	1	3	2	1	1	1	2	0	1	3
8	69	F	R	5	6	15–140	30–140	30–120	3	1	1	3	1	3	2	1	3	0	1,2	0
9	18	M	R	–	6	60–140	80–120	65–90	3	1	1	3	1	3	1	1	1	0	1	0
10	73	F	R	4	6	10–140	20–140	20–160	3	1	1	3	2	2	2	2	3	0	1	0
11	49	F	L	4	6	40–130	5–110	–30–165	3	2	1	3	1	2	2	2	3	1,3	1	1,2
12	66	F	R	4	6	40–100	70–135	75–135	3	1	1	3	2	3	2	1	1	0	1,2	0
13	42	F	R	5	5	10–120	30–145	30–120	3	1	1	3	1	2	1	1	2	1	1	2
14	63	F	L	5	5	60–140	40–140	70–150	1	1	1	3	1	1	1	1	1	0	0	0
15	61	M	L	4	5	50–120	5–140	45–150	2	1	1	3	1	3	1	1	2	0	1	0
16	68	F	R	3	5	30–120	35–135	45–140	2	1	1	2	1	1	2	1	2	0	0	0
17	48	F	R	4	5	20–90	40–140	30–150	2	1	2	3	1	2	1	1	1	2	0	2
18	51	F	R	4	5	30–95	40–115	50–130	2	1	1	3	1	1	1	1	1	0	0	0
19	58	F	R	3	5	70–90	25–135	60–120	2	1	2	3	1	3	1	1	3	3	1,2	0

A Age.
B Sex.
C Side.
D Larsen classification 1–5.
E Years of follow-up.
F Extension-flexion, preoperatively.
G Extension-flexion, 2.5 years.
H Extension-flexion, 5.7 years.
I Pain at rest, preoperatively.
J Pain at rest 2.5 years postoperatively.
K Pain at rest 5.7 years postoperatively.
L Pain in motion preoperatively.
M Pain in motion 2.5 years postoperatively.
N Pain in motion 5.7 years postoperatively.
(I–N: 1 = None–slight. 2 = Moderate. 3 = Severe.)

O Instability preoperatively
P Instability 2.5 years postoperatively
Q Instability 5.7 years postoperatively
(O–Q: 1 ≤10°. 10° <2 ≤20°. 20° <3)

R Complications: 0 = No complication. 1 = Delayed wound healing. 2 = Deep infection. 3 = Ulnar nerve lesion.

S Radiography: 0 = No loosening. 1 = Loosening (see text). 2 = Fracture.

T Revision: 0 = No revision. 1 = Rearthroplasty. 2 = Removal of prosthesis. 3 = Removal of prosthesis + bone transplantation.

was 38° – 136°. Before the operation, 10 elbows were recorded as stable. At the 2.5-year follow-up, 15 elbows were stable, whereas only eight elbows were stable 3 years later.

At the early follow-up, seven elbows had no radiographic signs of loosening; but at the latest follow-up, there were only five. The radiographs of the five elbows that were revised because of mechanical loosening and of the eight elbows showing radiographic signs of loosening without having been revised were analyzed. In all 13 cases, there were signs of loosening of the humeral component. In addition, there were signs of loosening of the ulnar component in 3 cases. The loosened humeral components dislocated backwards (Figure 2) and/or migrated axially in a proximal direction. A progressive loss of bone stock in the distal part of the humerus, resulting in spontaneous fracture of one of the pillars, was found in 4 cases (Figure 3).

Discussion

The early results with nonconstrained elbow prostheses were promising (Ewald et al. 1980 and 1984, Kudo et al. 1980, Souter 1981, Pritchard 1984, Rosenburg and Turner 1984), but the long-term results were unknown until recently. Roper et al. (1986) reported a 0.3 (15/51) revision rate after 5 years with the Roper-Tuke elbow. Trancik et al. (1987) reported a 0.2 (5/31) revision rate after 6 years with the capitellocondylar total elbow. In our series of 19 Wadsworth prostheses, six prostheses have been revised after 6 years, for a revision rate of 0.3. Thus, the early radiographic signs of loosening, previously reported have been followed by a high revision rate, as would be expected. The difference in revision rate of the Wadsworth and Roper-Tuke elbows compared with the capitellocondylar elbow probably reflects differences in design of the humeral component.

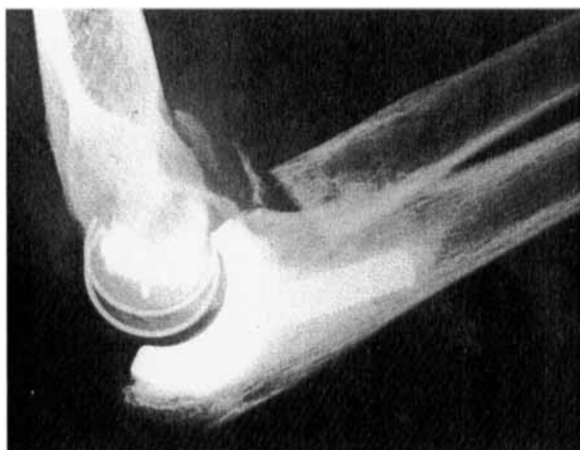

Figure 2. Mechanical loosening of the humeral component. Note the backward dislocation.

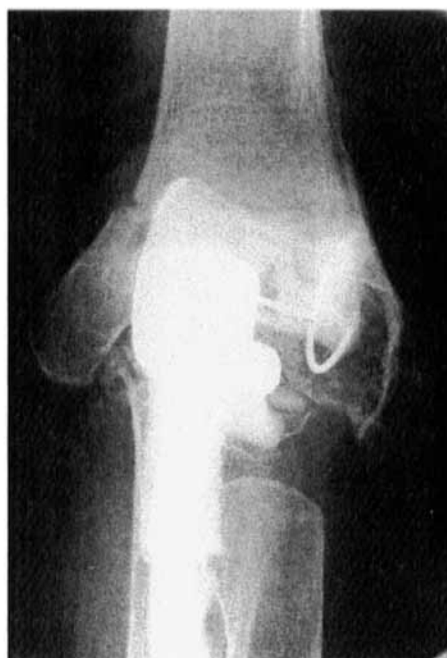

Figure 3. Mechanical loosening of the humeral component. Note the fracture of the medial pillar (arrow).

When compared with other elbow prostheses, the bone resection required for the Wadsworth prosthesis is small. This is an important factor after failure has occurred; an extensive bone resection causes greater instability if the prosthesis is removed.

In our patients, prosthetic loosening did not always cause pain. The recurrence of instability was a more reliable clinical sign of loosening. However, we recommend radiographic examination at follow-up in order to detect loosening before it has caused major humeral bone loss, making revision surgery difficult or impossible. The risk of fractures of the pillars should also be considered.

The humeral component loosened far more often than the ulnar component. The humeral component either dislocated backwards or migrated upwards, which is consistent with the direction of the joint forces acting on the distal part of humerus during forearm flexion and extension (Amis et al. 1979 and 1980). The design of the humeral component and the mode of fixation must provide for the transmission of these forces to the distal part of humerus. In this respect, the humeral component of the Wadsworth resurfacing prosthesis is far from optimal. Apparently, the capitellocondylar elbow offers a better solution.

In our hands, the Wadsworth prosthesis has been a failure, and we have not used it since 1982. Better long-term results have been reported with nonconstrained resurfacing elbows with a stemmed humeral component, notably the capitellocondylar total elbow. At present, this type of prosthesis has a place in the treatment of the rheumatoid elbow with minor or moderate bone destruction.

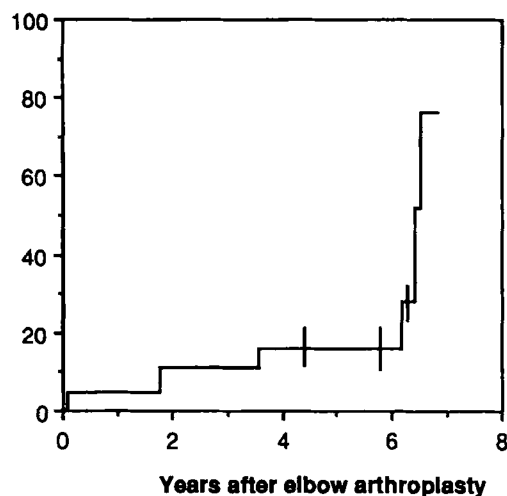

Figure 4. Survivorship analysis in 19 Wadsworth total elbow replacements (Kaplan-Meier). Vertical bars indicate remaining fraction of patients (0.75–0.50–0.25).

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