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Mid-term results of the Latitude primary total elbow arthroplasty

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Background: The Latitude total elbow prosthesis is a third-generation implant, developed to restore the natural anatomy of the elbow. Literature on this prosthesis is scarce. The aim of this study was to analyze the mid-term results of the Latitude total elbow prosthesis.
Methods: We retrospectively evaluated 62 patients (21 men and 41 women). The mean age at the time of surgery was 65 years (range, 28-87 years). The main indication for surgery was inflammatory arthritis. The outcome measures were complications, reoperations, self-reported physical functioning, pain, satisfaction, objectively measured physical functioning, and radiologic signs of loosening. Kaplan-Meier survival analysis was used to determine survival with revision as the endpoint.
Results: Sixty-nine primary Latitude prostheses were placed in 62 patients between 2008 and 2019. Six patients (7 prostheses) died, 3 elbows underwent revision, and 9 patients were lost to follow-up. A total of 44 patients (50 prostheses) were available for follow-up. The mean length of follow-up was 51 months (range, 10-144 months). Kaplan-Meier survival analysis showed a survival rate of 82% at 10 years after surgery. The main reason for revision was aseptic loosening. Radial head dissociation was seen in 8 patients (24%), but none had complaints. Self-reported and objectively measured physical functioning yielded good results, although 23 patients (46%) did show radiolucent lines on radiographs.
Conclusion: Latitude total elbow arthroplasty is considered a successful procedure with low pain scores, high patient satisfaction, and good physical functioning. Survival rates nonetheless remain low and complication rates remain high yet are comparable to those of other elbow arthroplasties. We recommend biomechanical studies to concentrate on specific postoperative loading instructions to minimize wear and consequent loosening.
Level of evidence: Level IV; Case Series; Treatment Study

Keywords: Latitude total elbow prosthesis; primary total elbow arthroplasty; elbow arthritis

The study was reviewed and approved by the Medical Ethical Committee of University Medical Center Groningen (no. METc2019/532). Local approval was obtained from Martini Hospital (no. MEC 2020-021).

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Total elbow arthroplasty (TEA) is frequently used in the Netherlands to treat a variety of debilitating elbow pathologies.[15] The indications for TEA currently include rheumatoid arthritis and osteoarthritis, as well as complex fractures of the elbow in elderly patients or in patients with post-traumatic arthritis.[21] Unfortunately, the survival rates of elbow arthroplasties (10-year survival rates of 80%-85%) remain low compared with hip and knee arthroplasties (10-year survival rates of 90%-95%).[9,11,14,30,32] The major reason for revision is aseptic loosening.[22]

Several new implant designs have been developed over the past few decades to improve TEA survival.[6,19,30,32] The first designs were fully constrained, but the high force transmission caused early failure. Unlinked designs were developed to avoid this constraint issue. However, these designs caused problems in patients with ligamentous deficiency and instability. The Latitude total elbow prosthesis (Wright Medical Group, Memphis, TN, USA, USA) was developed to restore the natural anatomy. It is a convertible device and can be used as either an unlinked version or a linked version. The linked version was developed with 7° of varus-valgus laxity. The native radial head can be either preserved, resected, or replaced by a radial head component, depending on the anatomy of the elbow joint and the surgeon's preference. It has a titanium coating to enhance long-term fixation. Our common practice was to retain the native radial head only if it was in relatively good condition. Replacement of the native radial head with a prosthesis was performed in cases with severe degeneration or deformation of the radial head with adequate alignment with the capitellum. In all other cases, the radial head was resected. The original Latitude prosthesis was updated in 2013 to the Latitude EV prosthesis (Wright Medical Group), with changes in the humeral design, coating of the humeral and ulnar components, and bending of the ulnar component; besides the prosthetic changes, the instrumentation was also simplified to facilitate the surgical technique.

The Latitude prosthesis has been in clinical use since 2001, but literature on the prosthesis is scarce and survival rates are not always reported. Recently, Wagener et al[31] reported their mid-term results with the Latitude prosthesis at a mean follow-up of 43 months but did not analyze survival rates. A major complication in their study was dissociation of the radial head component, occurring in 31% of their patients. They did not detect loosening of the prosthesis, which has been described frequently as a long-term complication after TEA.[10,13,18,21] However, they did see radiolucencies around the humeral, ulnar, and radial components (4%-6%). Cinats et al[5] published their results with the Latitude prosthesis in a study with a mean follow-up period of 4.7 years but did not report survival rates either. They reported a rate of radial head dissociation of only 9%. However, radiolucencies were seen in 60% of their patients, which might be a concern in the long term because progressive radiolucencies can result in early prosthetic loosening. Mehta et al[17] are the only authors to report the survival rate of the Latitude prosthesis, with a 95% survival rate at short-term (2 years') follow-up.

The aim of our study was to analyze the mid-term results of the Latitude elbow prosthesis, specifically survival, complications, pain, satisfaction, physical functioning, and radiologic outcomes.

Materials and methods

A retrospective study was conducted at 2 Dutch hospitals, University Medical Center Groningen and Martini Hospital (Groningen). Included were all patients with a primary Latitude elbow prosthesis who were treated between 2008 and 2019, comprising a total of 62 patients (21 men and 41 women) with 69 prostheses. The mean age at the time of surgery was 65 years (range, 28-87 years). Of the prostheses, 43 were left sided and 26 were right sided. The indication was inflammatory arthritis in 36 cases, osteoarthritis in 6, post-traumatic arthritis in 17, hemophilic arthropathy in 2, acute fracture in 3, instability in 1, Hegemann disease in 2, pseudarthrosis in 1, and synovial chondromatosis in 1 (Table I).

Surgical technique

All procedures were performed by 2 senior orthopedic surgeons (A.L.B. at University Medical Center Groningen in 2008-2012 and A.L.B. and C.L.E.G. together at both hospitals in 2013 onward). In 23 cases, a triceps-detaching approach was used[2]; in 46 cases, a triceps-sparing approach was used.[1] The ulnar nerve was always located and released. The radial head was excised in 18 cases; a radial head component was placed in 48 cases. In the remaining 3 cases, the radial head was left intact. All components were inserted with cement, and all prostheses were linked. In 16 cases, a Latitude prosthesis was inserted; in 53 cases, a Latitude EV prosthesis.

When the triceps-detaching approach was performed, the elbow was protected by a removable cast for 4 weeks postoperatively, avoiding active extension. Thereafter, the elbow was mobilized without a brace, and active triceps training was allowed. When the triceps-sparing approach was performed, patients were allowed to start functional mobilization immediately and weight bearing after 3 weeks. All patients were advised to limit weight bearing to up to 1 kg repetitively and 5 kg incidentally.

Outcome measures

Outcome measures were survival, complications, reoperations, pain, satisfaction, self-reported physical functioning, objectively measured physical functioning, and radiolucent lines on anteroposterior (AP) and lateral radiographs. Elbow function was measured with the Oxford Elbow Score,[7] which consists of 3 subdomains: pain, function, and social-psychological. Total scores range between 0 and 48, with a lower score representing greater severity. The Dutch-language version is considered reliable and valid.[8] Upper-limb function was assessed using the Quick Disabilities of the Arm, Shoulder and Hand (Quick-DASH) questionnaire,[27] which yields a score out of 100, with a higher score

Table I Patient characteristics

Patient No.	Sex	Age at surgery, yr	Indication	Side	Prosthesis type	Surgical approach	Radial head	Survival, yr	Reason for revision	Complication	Flexion, °	Extension deficit, °	OES	QDASH score	EQ-5D-5L score	MEPS	NRS score at rest	NRS score with activity	Radial head dissociation	Deceased
1	F	43	PTA	R	Lat	TD	PR	12		CAP	115	25	12	77	40	55	7	9		
2a	M	63	HA	R	Lat	TD	PR	11			120	35	45	7	85	95	0	0		
2b		62	HA	L	Lat	TD	PR	12			125	35	45	7	85	100	0	0		
3	F	74	PTA	L	Lat	TD	RES	10			145	25	32	43	40	85	3	7		
4	F	56	IA	L	Lat	TD	PR	10		INF, FRA	140	15	31	50	30	90	0	1		
5	F	83	PTA	L	Lat EV	TD	PR	7		AL	120	70	18	75	90	35	5	6		
6a	F	54	IA	R	Lat EV	TS	RES	2		ULN	135	25	34	61	50	85	6	6		
6b		53	IA	L	Lat EV	TS	RES	3			140	25	42	46	50	85	0	4		
7a	F	68	IA	R	Lat EV	TS	PR	3			130	75	12	86	50	50	5	7		
7b		68	IA	L	Lat EV	TS	RES	3		RDN	135	60	8	91	25	50	7	9		
8	F	74	PTA	L	Lat	TD	RES	7			140	30	48	36	75	95	1	3		
9	M	44	PTA	L	Lat EV	TS	PR	5		AL	110	20	7	75	45	55	10	7		
10	F	50	IA	L	Lat EV	TS	PR	5			120	85	23	57	50	75	1	2		
11	F	46	IA	L	Lat EV	TD	PR	6			145	40	21	48	60	70	4	7		
12	M	28	PTA	R	Lat EV	TS	PR	5			135	40	40	25	50	95	0	3		
13	F	52	PTA	L	Lat EV	TS	RES	2												
14	M	43	PTA	L	Lat	TD	RES	7	AL											
15	F	77	PTA	L	Lat	TD	PR	2												Yes
16	F	77	OA	L	Lat	TD	PR	4	INF											
17a	F	73	PTA	L	Lat	TD	PR	2												Yes
17b	F	73	PTA	R	Lat	TD	PR	2												Yes
18	F	63	IA	L	Lat	TD	PR	6		AL										Yes
19	F	67	IA	L	Lat EV	TS	RES	2												Yes
20	F	67	IA	L	Lat	TD	PR	6		INF										
21	F	85	IA	R	Lat EV	TS	PR	2												Yes
22	F	64	IA	L	Lat EV	TD	PR	5	AL											
23	M	46	HD	L	Lat EV	TS	PR	5			110	40	21	39	70	80	1	4		
24	F	87	FRA	R	Lat EV	TS	RES	1			100	25				75	0	0		
25	M	78	FRA	R	Lat EV	TS	PR	3		ULN										
26	F	45	INST	L	Lat EV	TD	PR	6					48	2	95		0	0		
27	M	56	PTA	L	Lat EV	TD	PR	5		ULN	120	20	22		70	70	7	7		
28	M	66	PTA	R	Lat EV	TS	PR	4			140	25	48	9	95	100	0	1	Yes	
29a	M	71	IA	L	Lat EV	TS	RES	3			100	40	46	0	90	95	1	1		
29b		71	IA	R	Lat EV	TS	PR	3			125	25	46	0	90	100	1	1		
30	F	77	IA	R	Lat EV	TS	PR	1			135	40	48	0	90	95	0	0		
31	M	71	IA	R	Lat EV	TS	PR	5			140	30	47	5	80	100	0	0	Yes	
32	M	65	OA	R	Lat EV	TS	PR	1			125	15	47	0	95	100	0	1		
33	F	70	IA	R	Lat EV	TD	PR	6			140	10				100	0	0	Yes	
34	M	81	IA	L	Lat EV	TS	PR	3		ULN	125	15	46	0	90	100	0	0		
35	F	80	PSA	L	Lat EV	TS	PR	5			140	15	48	0	85	100	0	0		
36	F	66	OA	L	Lat EV	TS	PR	5			130	20	29	50	50		7	7		
37	F	70	IA	R	Lat EV	TS	PR	2			125	30	29	41	80	80	3	3	Yes	
38	F	72	IA	R	Lat	TD	PR	7			140	10	48	30	30	95	0	0	Yes	
39a	M	42	IA	L	Lat EV	TS	PR	5			110	10	28	55	30	75	5	7		

39b		46	IA	R	Lat EV	TS	PR	2			100	30	28	55	30	80	5	7	Yes	
40	M	46	IA	L	Lat EV	TS	RES	2												
41	F	58	PTA	R	Lat EV	TS	PR	1			110	35	32	25	80	80	3	3		
42	F	75	FRA	L	Lat EV	TS	RES	4		OBF	130	20				100	0	0		
43	F	76	IA	L	Lat EV	TS	PR	5												
44	F	52	IA	L	Lat EV	TS	RES	4		ULN	130	30	36	30	70	95	0	4		
45	M	67	IA	R	Lat EV	TS	RES	2		ULN	120	20	34	46	70	85	3	4		
46	F	32	IA	R	Lat EV	TS	RES	3			135	75	35	23	50	100	0	4		
47	F	71	HD	L	Lat EV	TS	RES	4		ULN	135	35	28	52	60	85	3	3		
48	F	83	IA	R	Lat EV	TS	PR	1			145	10	44	36	75	100	0	0		
49	M	60	SC	L	Lat EV	TS	RET	2		ULN	120	25	42	7	90	95	2	3		
50	F	55	PTA	L	Lat EV	TS	PR	3		PIN, RHD	140	5	2	91	10	30	8	10		
51	F	72	IA	R	Lat EV	TS	RET	4		INF										Yes
52	M	69	PTA	L	Lat EV	TS	RES	3			135	0	42	11	100	100	0	0		
53a	M	69	IA	R	Lat EV	TS	PR	4			120	15	46	55	70	100	0	0	Yes	
53b		69	IA	L	Lat EV	TS	PR	3			135	15	46	55	70	100	0	0		
54	M	72	IA	L	Lat EV	TS	RET	2		INF	140	5	32	46	50	100	2	3		
55	F	66	IA	L	Lat EV	TS	PR	2												
56	M	69	OA	R	Lat EV	TS	PR	3			130	5	42	7	85	100	0	0		
57	F	83	IA	L	Lat EV	TS	PR	4		ULN										
58	F	78	OA	L	Lat	TD	PR	7												
59	F	55	IA	L	Lat	TD	PR	7			140	10	32	50	60		4	5		
60	F	74	OA	L	Lat EV	TD	PR	6			130	5	40	63	75	85	2	4		
61	M	74	IA	R	Lat EV	TS	PR	5			130	20	48	7	70	100	0	0	Yes	
62	F	70	PTA	L	Lat EV	TS	RES	3			150	5	39	11	85	100	1	2		
Mean (SD)		65 (13)									129 (12)	27 (19)	35 (13)	36 (27)	66 (23)	86 (18)	2 (3)	3 (3)		

SD, standard deviation; *F*, female; *M*, male; *PTA*, post-traumatic arthritis; *HA*, hemophilic arthropathy; *IA*, inflammatory arthritis; *OA*, osteoarthritis; *HD*, Hegemann disease; *FRA*, fracture; *INST*, instability; *PSA*, pseudarthrosis; *SC*, synovial chondromatosis; *R*, right; *L*, left; *Lat*, Latitude; *TD*, triceps detaching; *TS*, triceps sparing; *PR*, prosthesis; *RES*, resected; *RET*, retained; *AL*, aseptic loosening; *INF*, infection; *CAP*, removal of cap; *ULN*, ulnar nerve neuropathy; *RDN*, radial nerve neuropathy; *OBF*, olecranon bursa osseous fragment; *PIN*, posterior interosseous nerve neuropathy; *RHD*, radial head dislocation; *OES*, Oxford Elbow Score; *QDASH*, Quick Disabilities of the Arm, Shoulder and Hand; *MEPS*, Mayo Elbow Performance Score; *NRS*, numeric rating scale.

indicating greater disability. The questionnaire is available in Dutch and is considered reliable and valid. Health-related quality of life was measured by the EQ-5D-5L visual analog scale, a widely used and valid generic instrument for measuring health-related quality of life that is validated in Dutch.[12,28] Elbow pain was determined using a 10-point numeric rating scale. The pain level was scored during activity and at rest. Finally, patients were asked whether they were satisfied with their elbow prosthesis. This item is self-constructed and consists of 5 answer options: completely agree, agree, neutral, disagree, or completely disagree.

Range of motion (flexion, extension, pronation, and supination) was measured using a goniometer. A systematic review analyzing use of a goniometer in elbow measurements showed high intrarater and inter-rater reliability of the universal goniometer.[26] Elbow stability was classified as intact, $<10^{\circ}$ of instability, or $>10^{\circ}$ of instability. Motor and sensory deficits of the ulnar, median, and radial nerves were tested. The Mayo Elbow Performance Score was calculated and measures elbow function across 4 subdomains: pain, range of motion, stability, and daily functional tasks.[25]

In all patients, standard AP and lateral radiographs of the elbow were obtained. Radiolucent lines around the implant were classified using a system described by Wagener et al.[31] Radiographs were also assessed for prosthetic dislocation or dissociation and periprosthetic fractures. Dissociation was defined as dissociation of the radial head component from the stem on the AP or lateral view.

Statistical analysis

Descriptive statistics were used to describe patients' characteristics and clinical outcomes. Kaplan-Meier survival analysis was performed with revision as the endpoint. The Kruskal-Wallis test for independent samples was used to analyze differences in indications for surgery between the 3 major groups (inflammatory arthritis, osteoarthritis, and post-traumatic arthritis). The Mann-Whitney U test (data were not normally distributed) was used to analyze differences in outcomes between type of Latitude elbow prosthesis and surgical approach. SPSS statistical software (version 24.0; IBM, Armonk, NY, USA) was used. $P < .05$ was considered statistically significant.

Results

The mean follow-up period was 51 months (range, 10-144 months). At follow-up, 6 patients (7 prostheses) had died and 3 prostheses had been revised. This left 53 patients with 59 prostheses in situ who were invited for a follow-up visit. Nine patients were unable to visit the hospital because of several comorbidities, sometimes combined with COVID-19 (coronavirus disease 2019), so the clinical data of 44 patients (50 prostheses) are reported in this study (Fig. 1). There was no significant difference in age or sex between the patients lost to follow-up and those available for follow-up. There was no significant difference in outcome measures between patients with >24 months' follow-up and those with <24 months' follow-up. Therefore, we decided to include all patients regardless of length of follow-up.

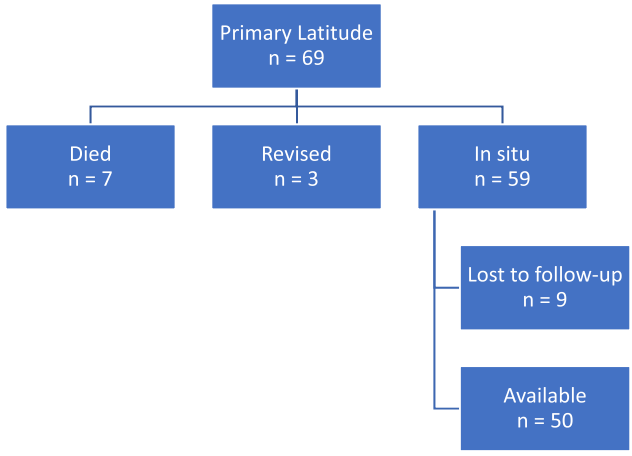

Figure 1 Flowchart of Latitude elbow prostheses.

Survival

The Kaplan-Meier survival analysis (Fig. 2) showed survival rates of 91% and 82% at 5 and 10 years after surgery, respectively. All 69 primary Latitude prostheses were included in this analysis. Three elbow prostheses had been revised. The reasons for revision were aseptic loosening in 2 cases (5 and 7 years after TEA) and infection in 1 case (4 years after TEA). In addition, 1 patient died of sepsis caused by an infected elbow prosthesis (4 years after TEA), so this was also registered as an event. There were no significant differences in survival rates between indications for surgery.

Complications and reoperations

Not including revisions, all complications and reoperations of the total group (62 patients, 69 prostheses) are reported in this section. The most frequently reported complication was ulnar nerve neuropathy, occurring in 9 patients (13%), 3 of whom (4%) needed additional surgery. Other neuropathies were seen in 2 patients (3%): 1 radial nerve neuropathy, proximally from the elbow joint and treated conservatively, and 1 neuropathy of the posterior interosseous nerve due to cement leakage, requiring surgical removal of the cement. Loosening of the humeral component was reported in 2 patients (3%), 1 of whom also had loosening of the radial head component. These 2 patients were not scheduled for revision surgery because one was asymptomatic and the other had several comorbidities. There was 1 radial head dislocation (2%), requiring surgical removal. An infection occurred in 3 patients (4%): 1 required 3 additional surgical procedures and 2 required 2 procedures. All 3 patients retained the primary prosthesis. A perioperative fracture of the coronoid was observed in 1 patient (1%) and was treated with a wire cerclage. Two additional surgical procedures were performed, one

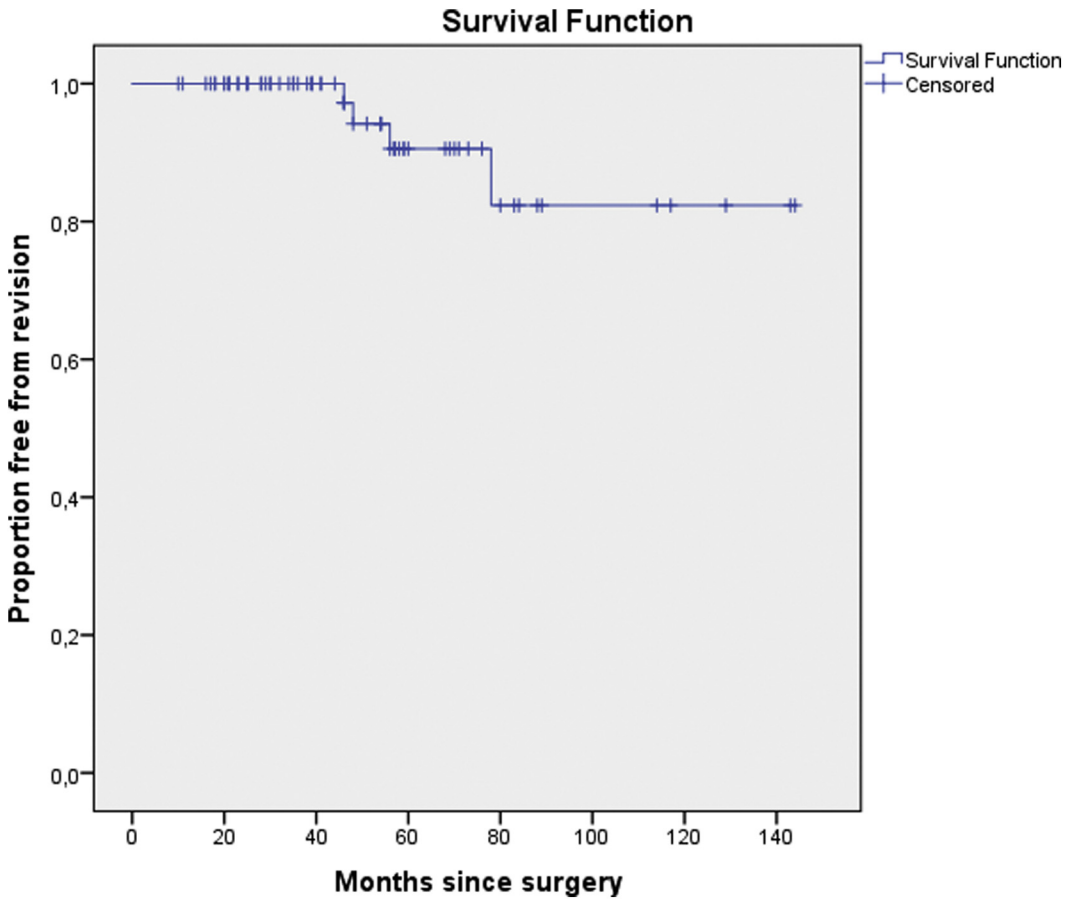

Figure 2 Kaplan-Meier survival analysis curve with revision for any reason as the endpoint. The number at risk by 5 years was 17 and that by 10 years was 3.

involving removal of an osseous fragment in the olecranon bursa and the other involving removal of the cap of the Latitude prosthesis to an unlinked version; this was planned in conformity with the original recommendation, yet soon after the first TEA procedures, both the distributor and our colleagues advised that this was not necessary.

Self-reported physical functioning

The outcomes of the 44 patients (50 prostheses) available for follow-up are reported in this section. The mean Oxford Elbow Score was 35 (range, 2-48; standard deviation [SD], 13); mean DASH score, 36 (range, 0-91; SD, 27); and mean EQ-5D-5L visual analog scale score, 66 (range, 10-100; SD, 23). The mean numeric rating scale pain score was 2 (range, 0-10; SD, 3) at rest and 3 (range, 0-10; SD, 3) during activity, indicating low pain levels. Overall, most patients (79%) were satisfied with their Latitude elbow prosthesis. Five patients (10%) were not satisfied with the result: 3 had neuropathies and 2 reported high pain levels. One patient (2%) was no longer satisfied owing to neuropathy and a radial head dislocation requiring revision surgery. Four patients (8%) were neutral. There were no significant differences in these self-reported outcomes between surgical techniques, types of Latitude prostheses, and indications for surgery.

Objectively measured physical functioning

The outcomes of the 44 patients (50 prostheses) available for follow-up are reported in this section. Mean flexion was 129° (range, 100°-150°; SD, 12°); mean extension deficit, 27° (range, 0°-85°; SD, 19°); mean pronation, 69° (range, 25°-85°; SD, 14°); and mean supination, 68° (range, 10°-90°; SD, 19°). Stability was intact in the majority of patients. In 3 patients (5%), the elbow was unstable: 2 patients with a diagnosis of loosening of the prosthesis and 1 patient with an unlinked Latitude prosthesis. The mean Mayo Elbow Performance Score was 86 (range, 30-100; SD, 18), indicating good results. There were no statistically significant differences in these objectively measured physical outcomes between surgical techniques and types of Latitude prostheses. The indication for surgery did influence postoperative supination. This difference was significant

($P = .013$) between osteoarthritis (mean supination, 83°) and post-traumatic arthritis (mean supination, 62°), favoring patients with osteoarthritis.

Radiologic assessment

The outcomes of the 44 patients (50 prostheses) available for follow-up are reported in this section. At the clinical assessment, 1 additional patient showed loosening of both the humeral and radial head components (Fig. 3). Diagnostic testing did not reveal an infection, so 1-stage revision was scheduled to be performed a few months later. During revision surgery, the humeral spool was also loose.

Radial head dissociation was visible on radiographs in 8 patients (24%, total of 34 patients with radial head components in this group), yet none had complaints. Furthermore, a total of 23 patients (46%) showed radiolucent lines, especially in zones 1 and 5 of the humeral component (Supplementary Table S1). Looking back at the already revised cases, we noted that 1 patient had aseptic loosening of all 3 components and the other patient had a massive pseudotumor with particle disease and aseptic loosening of the humeral spool.

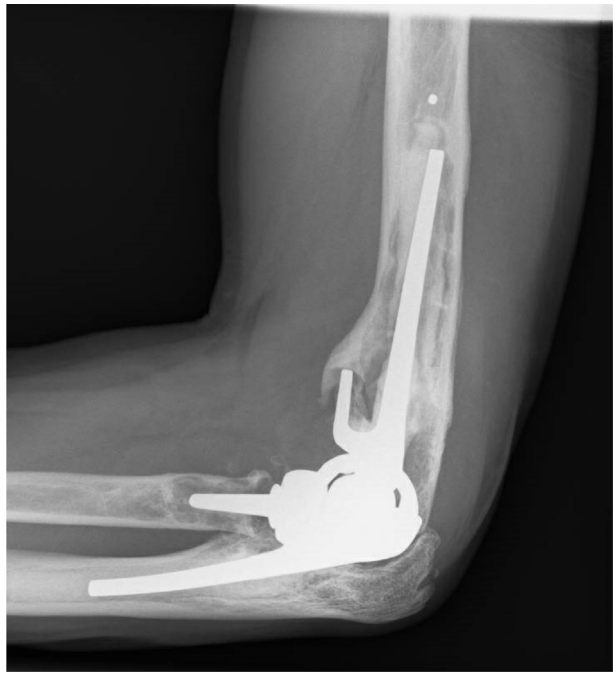

Figure 3 Radiologic loosening of humeral and radial head components.

Discussion

This study shows survival rates of 91% and 82% at 5 and 10 years, respectively, after Latitude TEA. These results are comparable to the survival rates of other TEA designs, with rates ranging between 82% and 90% at 5 and 10 years' follow-up.[32]

The reasons for revision in our series were infection in 1 patient and aseptic loosening in 2 patients. Aseptic loosening of the humeral component was observed in 3 other patients (6%) in our study, and 2 of them also had loosening of the radial head component. These results are comparable to previously reported results in a review by Prkic et al,[22] with aseptic loosening as the most common reason for revision, followed by infection.

Several mechanisms causing aseptic loosening have been reported. Marsh et al[16] ascribed loosening to long-term overloading. Overloading leads to polyethylene wear, which in turn eventually results in bone and tissue destruction, causing unstable fixation and loosening. In our series, 2 of 5 patients with aseptic loosening performed heavy physical work, despite our postoperative instruction to limit weight bearing to up to 1 kg repetitively and 5 kg incidentally. Overloading might have contributed to early loosening of the prosthesis in these cases.

Besides overloading, the design of the prosthesis might influence the risk of loosening. It is hypothesized that unlinked TEAs induce less stress and hence reduce wear and loosening. In their cadaveric study, Brownhill et al[4] investigated humeral loading of the linked and unlinked Latitude elbow prosthesis and concluded that linking the Latitude prosthesis leads to a nearly doubled amount of humeral loading in the varus direction. This may have detrimental effects on implant survival, as loading might induce wear and loosening. The authors therefore advised that patients with a linked version of the Latitude prosthesis "should be cautioned to avoid heavier activities as a result of the greater stress on the implant." However, to our knowledge, no specific postoperative loading instructions for patients following TEA are available. We therefore recommend that future research concentrate on specific postoperative loading instructions to minimize wear and, consequently, loosening. Although in vitro studies have shown favorable results for unlinked designs, these results are not yet supported by clinical evidence. Welsink et al[32] concluded in their systematic review that there was no single type of design (eg, linked or unlinked) that could be supported over another when looking at survival rates and complications following TEA. Similar results have been reported for linked and unlinked Latitude prostheses.[5,17,29,31] It is considered an advantage of the Latitude prosthesis that it offers the possibility to decide whether the prosthesis is placed in a linked or unlinked manner. Yet, considering the lack of clear evidence for use of one design over the other, it is difficult to make an evidence-based decision. In our series, removal of the cap of the Latitude prosthesis to an unlinked version was performed in 1 case. Initially, this was scheduled for all patients, but soon after the first TEA procedures, both the distributor and our colleagues advised that this was not necessary.

Other major findings in our series were radial head dissociation in 8 patients (24%) and 1 radial head dislocation (2%), requiring surgical removal. These numbers are lower than those presented by Wagener et al,[31] who showed dissociation of the radial head in 31% of cases, but higher than those reported by Cinats et al,[5] who showed radial head dissociation in only 9% of cases. Although patients in our study did not have complaints of radial head dissociation, the implications of this problem remain unclear. Recently, Wright Medical Group developed a newer, more modular type of radial head component, possibly preventing this complication. Another possibility is to leave the native radial head in place.[31]

Furthermore, ulnar nerve neuropathy was seen in 9 patients (13%), 3 of whom (5%) needed additional surgery. Still, ulnar nerve neuropathy rates appear to vary in the literature, and it is unclear whether mobilizing the nerve affects the outcomes.[3,5,17,18,20,23,24] Our routine care therefore remains locating and releasing the ulnar nerve during TEA while leaving the nerve posteriorly if possible or transposing it anteriorly when needed because of tension and pressure.

Another concern is that a total of 23 patients (46%) showed radiolucent lines, especially in zones 1 and 5 of the humeral component. Progression of radiolucent lines can lead to loosening of the prosthesis. We recognize the aspect of asymptomatic radiolucent lines following TEA as described earlier,[13,18] and we expected that a more anatomic design would provide better fixation and show fewer of these radiologic signs. Our series did show, however, that also after a TEA with the Latitude prosthesis, patients should be followed up for asymptomatic loosening. Structural follow-up is therefore warranted to allow for timely intervention, thereby preventing severe bone destruction, which also hampers the results of revision surgery.

Despite the low survival rates and high complication rates, we consider TEA a successful procedure because this study and previous studies show that patient satisfaction is high, pain scores are low, and scores of self-reported and objectively measured physical functioning are good.

Limitations

Our study had a retrospective design, which entailed an important loss of patients. Furthermore, owing to the retrospective design, we had a wide range of follow-up.

Conclusion

Latitude TEA is considered a successful procedure with low pain scores, high patient satisfaction, and good physical functioning. Outcomes were similar for all indications for surgery. Survival rates nonetheless remain low and complication rates remain high yet are comparable to those of other elbow arthroplasties. We recommend that biomechanical studies concentrate on specific postoperative loading instructions to minimize wear and consequent loosening.

Disclaimer

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