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ORIGINAL ARTICLE

Coonrad-Morrey total elbow arthroplasty for patients with rheumatoid arthritis: 54 prostheses reviewed at 7 years' average follow-up (maximum, 16 years)

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Background: Total elbow arthroplasty is a therapeutic option for severe rheumatoid arthritis. We hypothesized that the semiconstrained characteristics of the Coonrad-Morrey prosthesis do not compromise the survival rate of the implant in a rheumatoid elbow.
Methods: Between 1997 and 2012, there were 54 Coonrad-Morrey total elbow prostheses performed for rheumatoid arthritis in 46 patients. Minimum follow-up was 2 years. There were 35 women and 11 men with a mean age of 60 years (29-83 years). According to the Mayo classification for rheumatoid elbow, there were 30 type IIIA, 21 type IIIB, and 3 type IV. The surgical procedure was the same for all patients. Survivorship was assessed with use of the Kaplan-Meier method, with revision surgery as the end point.
Results: The survival rate was 97% (95% confidence interval, 83.6-99.6) at 5 years and 85% (95% confidence interval, 68.3-93.7) at 10 years. At an average of 7 years of follow-up (2-16 years), the mean Mayo Elbow Performance Score was 91 points (55-100 points), and the shortened version of the Disabilities of the Arm, Shoulder, and Hand score was 34 points (0-75 points). There was a significant improvement in Mayo Elbow Performance Score and in all range of motion at latest follow-up in comparison to preoperative values ($P < .0001$). Radiolucencies were observed in 6 cases around the humeral component and in 6 cases around the ulnar component. Bushing wear was observed in 16 cases (29%). There were 14 complications (26%). Revisions were performed in 6 of them (11%).
Conclusion: The Coonrad-Morrey prosthesis provides satisfactory results with follow-up. The rate of complications remains high even if the rate of implant revision stayed low.

Institutional Review Board approval was not required for this study. All patients were informed about the use of their personal data for this study, and all accepted.

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Rheumatoid arthritis (RA) affects roughly 1%-2% of the general population; it affects the elbow in 20%-65% of patients and is isolated to the elbow in 5% of cases.[19] Despite progress in the medical treatment of RA, notably in biotherapies, total elbow arthroplasty remains a therapeutic option in severe cases after failure of medical treatment.

The problems to consider are often pain during joint movement, loss of mobility, and elbow instability in the case of advanced osseous destruction or ligament insufficiency.[2,6,17,24] The elbow prosthesis used should thus eliminate pain, allow recuperation of a functional elbow range of motion, and ensure stability of the elbow. A semiconstrained prosthesis fulfills these criteria.[9,10] However, this type of prosthesis presents the potential risk of complications, notably due to mechanical failure but also due to loosening in the long term as well as infection in patients who are often immunosuppressed. Few studies report the long-term results in this context.[4,10,18,20] The objective of this study was to evaluate the long-term outcomes and survival of the Coonrad-Morrey semiconstrained prosthesis in RA. It was hypothesized that the prosthesis would be viable in the long term, with a survival rate of 80% at 10 years. The principal judgment criterion was the prosthesis survival curve at 5 and 10 years. Secondary judgment criteria included clinical results according to the Mayo Elbow Performance Score (MEPS), radiography results, and complication and revision rates.

Materials and methods

Patients

This was a retrospective, monocentric study of a cohort prospectively observed since 1997. Inclusion criteria included all patients presenting with elbow RA for which a Coonrad-Morrey prosthesis was used as first-line treatment between 1997 and 2012 and reviewed within a minimum of 2 years. Exclusion criteria included patients who had Coonrad-Morrey total elbow arthroplasty for a condition other than RA, for the revision of a previous prosthesis, or with a follow-up period of <2 years. During this period, 151 Coonrad-Morrey prostheses were administered in our department, 80 of which were for elbow RA. Sixty-six had a follow-up of at least 2 years, 6 of which were admitted for distal humerus fracture. Six prostheses were placed for the revision of another prosthesis. Overall, 46 patients (54 elbows) were included, with an average follow-up of 7 years (2-16 years). Surgery was bilateral for 8 cases. Patients included 35 women and 11 men, with an average age of 60 years (29-83 years) at the time of surgery. According to the Mayo classification for rheumatoid elbow, 30 cases were type IIIA, 21 cases were type IIIB, and 3 cases were type IV.

Evaluation criteria

Clinical evaluation was carried out preoperatively and at final follow-up by MEPS.[14] Joint mobility was measured using a goniometer. Strength was analyzed by an evaluation against resistance and against gravity in flexion and extension, with elbow flexed 90°, and compared with the opposite elbow. Strength was considered normal when it was between 80% and 100% of the opposite elbow. Loss of strength was considered moderate when strength was observed as 50%-80% of the opposite elbow and severe if <50%. The shortened version of the Disabilities of the Arm, Shoulder, and Hand (QuickDASH) score was also evaluated at final follow-up.[1,13]

Radiographic analysis was carried out at final follow-up by standard radiography of the elbow in anterior-posterior and lateral views. Loosening was evaluated between 0 and 4 according to Morrey et al.[15] Wear of the polyethylene bushings in the prosthetic hinge was judged by anterior-posterior radiography of the elbow; an absence of bushing wear was considered when the angle of the ulnar implant in relation to the humeral implant was <3.5°, wear was considered partial for an angle of up to 5°, and total wear was considered for an angle >5°.[8]

Surgical technique

Surgical intervention was similar for all patients. Patients were placed in a supine position with the forearm on the abdomen. The Bryan-Morrey approach was used in all cases. Ulnar nerve transposition was systematically carried out. Bone preparation and implant positioning were performed according to Morrey's recommendations.[14] The implant was fixed with cement according to recommendations by Faber et al[3]: after washing and drying of the canals, a low-viscosity cement with antibiotics was injected with an adapted cement gun. The triceps were then reinserted by transosseous sutures according to the description by Morrey.[14] Postoperatively, the elbow was immobilized in extension using an anterior splint for 48 hours, then a simple sling was left for 3 weeks. No rehabilitation was prescribed, and the patient was allowed to move the elbow according to the level of pain. Lifting was limited to 5 kg for a single effort or 1 kg for repeated efforts.

Statistical analysis

Statistical analysis was by χ^2 test for qualitative variables and by Student test for quantitative variables. A difference was estimated to be statistically significant when the P value was $< .05$. The survival rate was analyzed according to the Kaplan-Meier method, with 95% confidence interval, with revision due to any cause considered an end point. Calculations were performed with the statistical analysis program R (version 2.14.1).