SCIENTIFIC ARTICLE

Revision Arthroplasty of the Wrist in Patients With Rheumatoid Arthritis, Mean Follow-Up 6.6 Years

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Purpose Management of failed total wrist arthroplasty (TWA) can be challenging; surgical treatment options include salvage arthrodesis, revision arthroplasty, and resection arthroplasty. There are few studies regarding salvage arthrodesis, and revision arthroplasty has been infrequently investigated. The aim of the study was to report the outcome after revision arthroplasty of the wrist.

Methods A retrospective cohort of 16 revision TWAs was evaluated between 2003 and 2016. Data were collected before surgery and 1 and 5 years after surgery. The indication for revision arthroplasty was failed TWA. The primary end point was implant survival. Secondary outcome measures included visual analog scale (VAS) pain scores, range of motion, handgrip strength, and functional scoring with the Canadian Occupational Performance Measure (COPM), Patient-Rated Wrist Evaluation (PRWE), and Disabilities of the Arm, Shoulder, and Hand (DASH).

Results Mean follow-up was 6.6 years. Synthetic bone graft was used in 9 cases, allograft corticocancellous bone graft in 1 case, and cement in 6 cases. Of the 16 revision TWAs, 4 were re-revised, 1 because of infection, and 3 cases underwent total wrist arthrodesis. In the non–re-revised cases, range of motion and grip strength was preserved compared with preoperative results. The VAS pain score in activity improved, but not significantly, at 1 (median, 1; range, 0–4.5) and 5 years after surgery (median, 0) compared with before surgery (median, 5). The COPM performance and satisfaction as well as PRWE scores improved significantly at 1 year (median COPM performance, 4.8; COPM satisfaction, 5.6; and PRWE, 24) and improved, but not significantly, at the 5-year follow (median COPM performance, 4.8; COPM satisfaction, 5.0; and PRWE, 37) in the non–re-revised cases.

Conclusions Revision arthroplasty of the wrist is a valid motion-preserving option to wrist arthrodesis in the management of failed TWA. However, the outcome is uncertain and as many as 25% require additional surgery. *(J Hand Surg Am. 2017;■(■):1.e1-e7. Copyright © 2017 by the American Society for Surgery of the Hand. All rights reserved.)*

Type of study/level of evidence Therapeutic IV.

Key words Total wrist arthroplasty, osteoarthritis, rheumatoid arthritis.

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TOTAL WRIST ARTHROPLASTY (TWA) is an evolving procedure in which previous designs have been associated with a high frequency of component loosening.[1–3] However, a recently published study has shown implant survival of 81-95% after 8 years, depending on the type of implant used.[4]

Management of failed TWA can be challenging and treatment options include salvage arthrodesis, resection arthroplasty, and revision arthroplasty. Arthrodesis after failed TWA can be difficult when it comes to obtaining stable fixation and achieving bony fusion.[5–7] Franko et al[8] have shown that functional disability of the wrist is in direct correlation with decreased wrist motion. Resection arthroplasty can result in an unstable joint and a weak grip.[9,10] These findings might speak in favor of revision arthroplasty in the management of a failed TWA; however, there are few studies published.[11–13] Revision arthroplasty can be technically demanding owing to severe bone loss caused by failure of the primary arthroplasty procedure.

The aim of this study was to evaluate implant survival in a cohort of 16 patients who underwent revision arthroplasty after failed TWA, all operated on at a Swedish tertiary referral center by the same surgeon (K.P.). Secondary outcome measures included patient-related outcome measures, visual analog scale (VAS) pain scores, range of motion, grip strength, tip, and key pinch strength.

MATERIALS AND METHODS

The regional ethical committee in Uppsala, Sweden (No. 2016/205) approved the study. The study was registered in the Swedish Public Trials Registry FoU i Sverige Registration number 174601. A revision arthroplasty was defined as exchange of the whole, or parts, of the prosthesis. Indications for revision arthroplasty were implant loosening or prosthetic fracture combined with patient-related symptoms such as pain or instability. In a series of 206 TWAs in 178 patients at our center, we identified 16 revision arthroplasties in 15 patients (1 patient underwent bilateral revision arthroplasty), all operated on by a single surgeon (K.P.) at the university hospital in Örebro, Sweden, between 2003 and 2011.

Clinical evaluation

In the group of non–re-revised cases, the following outcome measurements were performed before surgery, at 1 year (n = 13), and 5 years (n = 9) after surgery: Patient-Rated Wrist Evaluation (PRWE) score; Disabilities of the Arm, Shoulder, and Hand (DASH) score; Canadian Occupational Performance Measure (COPM) performance and satisfaction; range of motion (flexion, extension, radial deviation, ulnar deviation, pronation, and supination); hand grip strength (in kilograms); key pinch strength (in kilograms); tip pinch strength (in kilograms) and pain (VAS scores at rest and in activity). The validated Swedish translations of the questionnaires for PRWE,[14] DASH,[15] and COPM[16] were completed by the patients. The PRWE consists of 15 items rating pain and disability equally. The maximum score is 100 where a higher score indicates more pain and functional disability. The DASH evaluates function of the whole upper extremity in a 30-item questionnaire covering pain and disability. The score ranges from 0 (no disability) to 100 (severest disability). The COPM includes 2 variables, COPM satisfaction and COPM performance. The patient rates her or his own level of performance and satisfaction in 5 identified activities of daily living. Ten points indicates very good performance or high satisfaction. Range of motion was recorded by a physiotherapist using a goniometer. A physiotherapist recorded tip pinch strength and key pinch strength using a pinch gauge (North Coast Medical Inc., Gilroy, CA) and grip strength using a hydraulic hand dynamometer (North Coast Medical Inc) as the mean of 3 attempts. Pain was rated both at rest and in activity by the patients according to the VAS (range, 0–10, where 10 represents the worst pain imaginable).

Surgical technique for revision arthroplasty

The previous incision on the dorsum of the wrist is used. The fourth compartment is incised in a z-shaped manner, and the dorsal surface of the distal radius is exposed subperiosteally. The joint is incised via a longitudinal T incision to the joint capsule. The whole, or a part of, the total wrist implant is removed with care taken to preserve bone stock. Bone cement, synthetic, or allograft bone is used to compensate for bone loss around the distal component. Implant positioning is assessed using intraoperative radiography. A dorsal cast for stabilization of the wrist is used for between 2 and 4 weeks depending on the magnitude of bone loss. The patient is then allowed to start moving the wrist under the guidance of a hand therapist, allowing full wrist motion and intermittent use of an orthosis for 3 months. Lifting heavy objects is discouraged and maximum load is set to 10 kg.

Statistics

Implant survival was measured as the time from revision arthroplasty until re-revision or the end of study, which was set to May 31, 2016. Cumulative