Ulnar Head Replacement: 21 Cases; Mean Follow-Up, 7.5 Years

Peter Axelsson, MD,* Christer Sollerman, MD,* Johan Kärrholm, MD†

Purpose To report clinical and radiographic outcomes for the Herbert ulnar head prosthesis after a mean of 7.5 years (range, 2.0−12.5 years).

Methods We performed 22 Herbert ulnar head prosthesis arthroplasties between 2000 and 2011. Five were primary procedures, and the remaining 17 were done after an average of 2 (range, 1−5) previous operations. The mean age at surgery was 55 years (range, 31−74 years). Follow-up including clinical examination, standardized questionnaires, and radiographic examination was done after mean 7.5 years (range, 2.0−12.5 years) in 21 cases. We used the Disabilities of the Arm, Shoulder, and Hand questionnaire, the Patient-Rated Wrist Evaluation questionnaire, and the Mayo wrist score questionnaire. Pain and satisfaction were evaluated with a 10-cm visual analog scale (VAS). Measurements of range of motion and strength for grip were recorded.

Results Wrist range of motion was not affected by the arthroplasty except for supination, which significantly improved from 55° to 70°. At follow-up, grip strength averaged 25 kg (range, 10−48 kg) in the operated wrists and 31 kg (range, 8−74 kg) on the contralateral side. Visual analog scale-pain averaged 2.9 (range, 0−8.7) during activity and 1.7 (range, 0−7) at rest. Satisfaction VAS was 8.9 (range, 4.3−10). Five patients had VAS-pain above 5 during activity, and 1 patient was dissatisfied and regretted having undergone arthroplasty. Mean outcomes were 27 (range, 5−50) for Disabilities of the Arm, Shoulder, and Hand measure, 31 (range, 0−90) for the Patient-Rated Wrist Evaluation score, and 71 (range, 30−90) for the Mayo wrist score. One patient was reoperated with capsuloplasty 9 months after the arthroplasty owing to recurrence of painful instability. Full stability was not achieved but the pain resolved. None of the implants showed any radiographic signs of loosening.

Conclusions The Herbert ulnar head prosthesis was a safe method of treatment and provided satisfactory midterm results for selected cases of distal radioulnar joint disorders.

Clinical relevance Increased knowledge of performance for ulnar head implant arthroplasty may aid surgical decision making for distal radioulnar joint disorders. *(J Hand Surg Am. 2015;40(9):1731−1738. Copyright © 2015 by the American Society for Surgery of the Hand. All rights reserved.)*

Type of study/level of evidence Therapeutic IV.

Key words Distal radioulnar joint, ulnar head replacement, ulnar head prosthesis, wrist arthroplasty.

*From the *Department of Hand Surgery, and †Department of Orthopaedics, Institute of Clinical Sciences, Sahlgrenska Academy, University of Gothenburg, Gothenburg, Sweden.*

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Corresponding author: Peter Axelsson, MD, Department of Hand Surgery, Institute of Clinical Sciences, Sahlgrenska Academy, University of Gothenburg, SE-41345 Gothenburg, Sweden; e-mail: peter.axelsson@vgregion.se.

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Instability and arthritic pain of the distal radioulnar joint (DRUJ) severely affect basic functions of the wrist and forearm.[1,2] Treatments for these conditions have been complete or partial resection of the ulnar head or a combination of distal ulnar resection and DRUJ arthrodesis, the Sauvé-Kapandji procedure. Because the ulnar head is fundamental to the function of the DRUJ,[3,4] it cannot be resected without mechanical consequences.[5,6] Despite this, the outcome of

resection procedures has often been satisfactory, especially in patients with low demands for loading.[7,8] In patients with a more active lifestyle, the risk of failure with these procedures is higher.[9–11] If this occurs, it might end up in painful instability that is even more disabling than the condition existing prior to the resection.[10,12,13] Such instability might be treated with soft tissue procedures, radioulnar arthrodeses, allograft interposition, or one of several other methods,[14–19] but results have been inconsistent.[20,21]

Another approach to treat DRUJ disorders or failed resection arthroplasties is to replace the deficient or missing ulnar head with an artificial implant. Early attempts were made with Swanson silicone implants. The initial results were encouraging, but most cases failed after the short term.[22] Herbert and coworkers[23] further developed this concept to a more resistant, metal ulnar head implant. The initial reports from groups involved in the development of this and similar implants have been promising.[23–25] Biomechanical laboratory studies of ulnar head implants support the early clinical results and indicate that kinematics and loading properties can be restored.[6,26–29] Few studies, however, have reported mid- to long-term results.[30,31] Hence, we know little about durability, long-term efficacy, and safety of these implants. To address these issues, we reviewed our midterm radiographic and clinical outcomes of a consecutive series of arthroplasties performed with the Herbert ulnar head prosthesis (Herbert UHP). Ulnar head arthroplasties have commonly been performed as salvage procedures for painful radioulnar impingement syndrome. Indications have expanded to arthritis and other DRUJ disorders, but there is less support of this usage in the literature. Secondary aims of our study were, therefore, to analyze if there were any differences in results for primary compared with secondary procedures or if surgery was performed owing to painful instability or painful arthritis. We also studied if the outcome could be correlated to the state of soft tissue support or radiographic features such as the condition of the sigmoid notch.

MATERIALS AND METHODS

Patient series

Ethical approval for this study was obtained. All patients who had undergone Herbert UHP arthroplasty at our department at least 2 years earlier were requested to attend a follow-up visit. All 21 accepted, but 1 died before scheduled follow-up. One patient had bilateral procedures performed. Thus, we were able to evaluate 20 patients (11 men and 9 women) with 21 prostheses. The mean age at surgery was 55 ± 12 years (range, 31–74 years). Table 1 lists demographics and characteristics of the study population.

All procedures were performed or supervised by senior surgeons not involved in the re-examination of the patients. The first author (P.A.) reviewed all patients at an average 7.5 years (range, 2.0–12.5 years) after surgery. The rationale for the procedure was painful instability after previous resection arthroplasty (10 wrists), pain due to osteoarthritis (9 wrists), and rheumatoid arthritis (3 wrists). Ten patients had an initial injury, 9 fractures and 1 ligament tear. Eleven patients had bilateral DRUJ arthritis. Fourteen procedures were performed on the dominant side. The arthroplasty was the first wrist surgery in 5 cases. Seventeen patients had previously undergone a total of 34 surgical procedures at the wrist, corresponding to median/mean values of 1 and 2 (range, 1–5). Previous surgery included fixation of distal forearm fractures (n = 2), corrective osteotomy of the distal radius (2), plate removal (2), ulnar shortening (2), ulnar styloidectomy (1), triangular fibrocartilage reinsertions (3), Darrach procedures (10), stabilizations of unstable ulnar stump (3), total wrist arthroplasty (3), total wrist arthrodesis (1), arthroscopy with shaving (1), tendon transfer (1), synovectomy (1), and neuroma excision (2).

Implant design

The Herbert UHP (Martin Medizin Technik, Tuttlingen, Germany) is a modular total head endoprosthesis with a ceramic head. The head is available in 3 different sizes, which fit any of the 9 sizes of titanium-coated stems (3 different thicknesses and 3 different neck lengths) that are press-fit into the ulnar medullar cavity (Fig. 1). The operations were performed as described in detail by van Schoonhoven et al[23] and Herbert and van Schoonhoven.[32]

Postoperative care

The limb was placed in an above-elbow plaster splint for 3 weeks and then in a below-elbow cast for another 3 weeks. Some patients were treated with a wrist orthosis for an additional 3 weeks if full stability was not present. Formal physiotherapy started after removal of the cast. The patients were initially allowed unloaded active mobilization and then gradually returned to normal activity.

Follow-Up

Pain and satisfaction were estimated on a 10-cm visual analog scale (VAS). Functional and general outcomes were evaluated using the Mayo wrist score questionnaire and the validated Swedish versions of the Disabilities of Arm, Shoulder, and Hand (DASH) and