Long-Term Follow-up after Implantation of a Bipolar Radial Head Prosthesis Versus Osteosynthesis to Treat Complex Radial Head Fractures: A Matched Pair Retrospective Study

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Purpose: Radial head replacement is indicated for complex radial head fractures that are not treatable with open reduction and internal fixation. Literature suggests an osteosynthesis is preferred if feasible. Implantation of a bipolar radial head prosthesis after radial head excision ensures stability of the elbow and forearm, thereby promoting ligament healing and restoring elbow and arm function. The purpose of the current study was to evaluate if a treatment with radial head prosthesis shows inferior results to an open reduction and internal fixation.

Methods: To compare the 2 groups according to their clinical outcomes, we chose a matched pair study design. We analyzed 52 patients with a radial head fracture. Pairs were matched to split them in 2 groups: 26 patients were treated with a Tornier, CRF II Bipolar Radial Head Prosthesis® (Group P) and the other 26 patients were treated with an osteosynthesis (Group O). The 2 groups were additionally divided into 2 subgroups each: 18 patients had an isolated radial head fracture, whereas 8 patients had a complex elbow trauma with additional ligament and/or bony injury. The mean follow-up was 42 months in Group P and 85 months in Group O. Clinical and ultrasonographic assessments were done. Final functional outcome was assessed by Disabilities of the Arm, Shoulder and Hand score (DASH), and range of motion (ROM) measurement, Strength test was done with a Jamar® Hydraulic Hand Dynamometer, and instability test with ultrasonographic dynamic measurement.

Results: The mean DASH was 27 (range, 0-73) within Group P and 24.2 (0-76) in Group O. For Group P the mean pain level (0-10) was 2.2 and 2.0 in Group O. Mean satisfaction level on a scale of 0-10 was 8.3 in Group P versus 8.2 in Group O. We discovered in Group P a persisting extension gap in 22 patients (mean 10.8°), average flexion was 118°, mean motion arcs were 108° in flexion-extension and 144° in pronation-supination. In comparison Group O showed a persisting extension gap in 21 patients (mean 16°), average flexion was 124°, mean motion arcs were 109° in flexion-extension and 155° in pronation-supination. For Group P mean forearm strength in midflexion was 64%, compared to the contralateral unharmed side. In Group O mean forearm strength in midflexion was 50%. In Group P first degree instability in varus/valgus stress showed in 10 patients. For Group O, 2 patients showed a first degree instability in varus/valgus stress.

Conclusion: Patients after implantation of a bipolar radial head prosthesis showed good results, especially the patients with an isolated radial head fracture. There were no significant differences evident within all examined parameters compared to the osteosynthesis group. The patients with associated injuries of bones and/or ligaments showed a worse outcome in both groups. This study shows that a prosthetic replacement of the radial head is a noninferior procedure to treat patients with a complex fracture of the radial head in comparison to an osteosynthesis.

See pages 401 - 442 for financial disclosure information.