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ORIGINAL ARTICLE

Total elbow arthroplasty for acute distal humeral fractures in patients over 65 years old — Results of a multicenter study in 87 patients

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KEYWORDS
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Summary
Introduction: Fractures of the distal humerus represent 5% of osteoporosis fragility fractures in subjects over the age of 60. Osteoporosis, comorbidities and intra-articular comminution make management of this entity difficult.
Hypothesis: The hypothesis was that total elbow arthroplasty could be a reliable treatment option in subjects over the age of 65 presenting with a fracture of the distal humerus.
Materials and methods: Eight-seven patients (80 women and 7 men) mean age 79 years old (65—93) underwent total elbow arthroplasty for the treatment of an AO type A fracture in 9 cases, type B in 8 and type C in 70.
Results: After a mean follow-up of 37.5 months (6—106) the Mayo Elbow Performance Score MEPS was 86 ± 14, the quick-DASH score was 24 ± 19 and the Katz score was 5 ± 1.5 points. The MEPS was better in patients with a high preoperative Katz score and a history of inflammatory arthritis who were living at home. Fifty-five patients (63%) presented with a pain-free elbow, and 20 (24%) with slight pain. The flexion-extension range of motion was 97 ± 22° and 48% presented with a flexion-extension arc of at least 100°. Function was normal in 69 patients. Complications were identified in 20 cases (23%) and revision surgery was necessary in 8 (9%). Two arthroplasties had to be changed, one for a fracture of the humeral stem component and the other for loosening. Only one infection occurred in this series.

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Conclusion: Total elbow arthroplasties provide fractured patients with immediate satisfactory results and a stable, painless and functional elbow. These results seem to be reliable and durable. The rate of complications is low with revision surgery in approximately 10%.
Level of evidence: Level IV.

Introduction

Fractures of the distal humerus are less frequent than fractures of the proximal humerus but represent 2% of all fractures and 5% of osteoporotic stress fractures in subjects over the age of 60. They occur in fairly young men with two peaks of frequency and in elderly women with an incidence that increases over the age of 60 [1]. In the past few years the incidence has seemed to increase and could be multiplied by three by 2030 [2]. Problems exist in the oldest population because of osteoporotic bone, comorbidities, and articular comminution, which make management difficult [3—8]. Total elbow arthroplasty (TEA) for the treatment of fractures of the distal humerus was proposed by Cobb and Morrey in 1997 with immediate satisfactory results [9]. The hypothesis of this study was that TEA could be a reliable therapeutic option in subjects over 65 years old presenting with an articular fracture of the distal humerus.

Materials and methods

Population

This retrospective multicenter study was performed in 18 French Hospitals and one Swiss center. Patients operated on between 2000 and 2010 who were over 65 with an isolated, non-pathological articular or extra-articular fracture of the distal humerus and with at least 6 months follow-up were included in the study. Patients who were younger than 65 with an associated fracture of the upper limb, a pathological fracture and/or follow-up of less than 6 months were excluded.

Eighty-seven patients were included in the study. There were 80 women and 7 men, mean age 79 (65—93). The fracture was on the dominant side in 40 cases (46%). Patients presented with very few comorbidities: 63 were classified as ASA 1 and 2, 23 ASA 3 and one ASA 4 and 5 [10]. Patients were relatively autonomous with a preoperative Katz score of 5.4 points (1.5—6) [11]. Seventy-eight patients lived in their own homes and 9 in a retirement home. Patients' medical history included underlying inflammatory arthritis in 8 patients, osteoarthritis of the elbow in 5, a history of osteoporotic stress fracture in 10 and a neuropsychiatric disease in 9. Four patients were receiving long-term corticosteroid treatment.

X-rays of the fractures showed [12]: 9 AO type A fractures, 8 type B and 70 type C fractures with 16 C1 fractures, 17 C2 and 37 C3. Osteoporosis was considered to be evident on X-ray in 59 cases (68%).

The fracture was closed in 80 cases and open in 7. There was a Gustilo [13] stage 1 fracture in 6 cases and stage 2 in one. There was one immediate neurological complication related to an ulnar nerve injury. There were no vascular injuries in this series.

Eighty-three patients were treated with primary total elbow arthroplasty, one following failure of conservative treatment and 3 following unsuccessful internal fixation. A Coonrad—Morrey® (Zimmer) prosthesis was used in 85 cases, a Discovery® (Biomet) prosthesis in one case and a Latitude® (Tornier) prosthesis in one case.

Surgical technique

The patient was installed in lateral decubitus position in 37 cases and in dorsal decubitus in 50. The Bryan—Morrey approach was used in 58 cases, the Gschwend approach in 20 cases, the reversed V in 6, the transolecranon in 2, the laterotricipital in 1. The ulnar nerve was identified in 67 cases (77%) but was only transposed in 41 cases (47%). For the Coonrad—Morrey prosthesis, a 10-cm long humeral component was used in 63 cases, a 15-cm in 20 cases, and a 20-cm in 2 cases. In 18 cases the longer flange option was chosen. For the ulnar implant, the standard length was used in all cases. Antibiotic cement was used in 75 cases (86%). A cement restrictor was used in the humerus in 60 cases (69%) and in the ulna in 42 cases (48%). The cement was injected manually in 12 cases, by syringe in 58 and with a specific injection gun in 16. A bone graft was used in 60 cases (69%) beneath the anterior flange of the prosthesis. Prophylaxic antibiotics were systematically used. Surgery lasted a mean 104 minutes (45—253). Forty-three patients were immobilized after surgery for a mean 14 days (2—42). Fifty-six patients (64%) received rehabilitation for a mean 2.5 months.

Method of evaluation

At the final clinical follow-up patients were evaluated using the Mayo Elbow Performance Score or MEPS [14] and the quick-Dash score [15]. Range of motion was evaluated by goniometry. Strength was analyzed by flexion and extension counter-resistance testing compared to the opposite side with the elbow in 90° flexion. Patient autonomy was evaluated by the Katz score. X-ray analysis was based on AP and lateral X-rays to determine the position of the implant, whether it was centered or non-centered, the quality of cementing (correct or insufficient), and the presence or not of intraprosthetic radiolucent lines. Radiolucencies were considered to be absent, less than 1-mm, 2-mm or more and progressive. The quality of graft integration beneath the anterior flange of the implant was also evaluated. Wear of the polyethylene bushings was judged in relation to the