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ORIGINAL ARTICLE

Epidemiology of distal humerus fractures in the elderly

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KEYWORDS
Humeral distal fracture;
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Summary
Introduction: Despite recent treatment advances, management of distal humerus fractures in the elderly remains one of the most challenging aspects of trauma surgery. Although these fractures are relatively rare, they fall under the umbrella of osteoporotic fractures, which themselves are increasing in frequency.
Material and methods: Two studies were performed: one retrospective study of 410 patients over a 10-year period and one prospective study of 87 patients over a 1.5-year period. This allowed us to analyse the epidemiology of distal humerus fractures in subjects above 64 years of age in 19 different French hospitals. All of the included patients were reviewed, except for one subject in the retrospective study who had died, but whose data was still used.
Results: Most of the fractures were AO type C, occurred in women in more than 80%, and occurred in nearly one of two persons above 80 years of age. Most of the patients had a high level of autonomy and lived at home. Unlike other upper limb fracture sites, nearly 90% of patients required surgical treatment. The presence of osteoporosis was found to have a tremendous impact on fracture care, complications and results.
Conclusion: Functional status is more important than chronological age in this patient population; the former must be taken into account when determining treatment indications.
Level of evidence: Level IV.

Introduction

Distal humerus fractures fall under the umbrella of osteoporotic fractures, as do proximal femur, proximal humerus and distal radius fractures. These are defined as fractures

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occurring as a result of low-energy trauma in patients above 60 years of age.

Around 30% of people 65 years or older living at home and more than 50% of those living in nursing homes or retirement homes fall every year, and about half of those who fall do so repeatedly [1]. Five percent of these falls result in fracture.

Material and methods

Inclusion criteria

Patients were included if they were 64 years of age or more and had an isolated, non-pathological, complex articular fracture of the distal humerus. The prospective study was conducted from June 15, 2010 to October 15, 2011, while the retrospective study was conducted from 2000 to 2010. Every patient had at least five months of follow-up.

Recruitment rate

Slightly more patients (224, 55%) were included in the second half of the retrospective period (after 2005).

Statistics

The study design comprised two multicentre observational studies grouping 19 French hospitals. The software STATA® (Version 11.0) was used to perform all the statistical testing. The overall results were assessed with a 0.1% significance threshold. A 5% threshold was used for testing related to the outcome measures. To take into account potential covariances in the multivariate models, variables were introduced into the initial model using a 20% threshold; variables for the final model were selected using a 5% threshold. To assess which factors were likely to affect the clinical and radiological results, multiple linear regression models and logistic regression models were performed using the Hosmer—Lemeshow test to determine goodness of fit.

Study population

Retrospective study

The retrospective study included 537 patients, of which 1 subject had died but was retained because of the 82-month follow-up available before his death, and 127 were excluded (52 lost to follow-up, 31 had died with no or insufficient follow-up, 44 had key data missing). As a consequence, the 410 patients retained for the study had an average follow-up of 34 months (range 5—142.4).

Prospective study

The prospective study initially included 112 patients, but 25 of those were subsequently excluded (4 had died, 6 were lost to follow-up, 15 had key data missing). The 87 patients retained for the study had an average follow-up of 10 months (range 5.2 to 21.2).

Table 1 Fractures types according to AO classification.

Retrospective study	Prospective study
79 A (19%)	23 A (26%)
58 B (14%)	19 B (22%)
273 C (67%) with: 85 C1, 79 C2, 109 C3	45 C (52%) with: 20 C1, 13 C2, 12 C3

Fracture type

Fractures were classified using the AO classification system [2]; this system guides the treatment choice, evaluates the prognosis and offers the best opportunity for comparison with other published international studies (Table 1). The retrospective study had 67% type C fractures, with a fairly equal distribution between types C1, C2 and C3. The prospective study also had mostly type C fractures (52%) but not as many as in the retrospective study.

Various treatment groups

In the retrospective study, 71% of patients were treated with internal fixation (IF) and 21% with total elbow arthroplasty (TEA) (Table 2). In the prospective study, more cases (25%) were treated conservatively (CT) than in the retrospective study. If both study cohorts are combined, 89% of the 497 patients required surgical treatment (69% internal fixation and 20% total elbow arthroplasty). This rate was much higher than the surgical treatment rate for proximal humerus fractures (21%) reported at one French trauma centre in 2012 [3]. Functional or conservative treatment was used in 11% of cases in this study, while it was used in 5% of cases in a 2007 study with the same patient population [4] and 25% of cases in a 1979 study including patients of all ages [5].

Results

Retrospective study (410 cases)

The average patient age was 78.4 years (range 64—100), with 41% of patients being above 80 years of age. The cohort

Table 2 Treatments used.

Retrospective study	Prospective study
34 CT or FT (8%) with: 29 CT, 5 FT	22 CT (25%)
289 IF (71%) with: 189 reconstruction plates, 87 locked compression plates, 7 both, 4 EF	53 IF (61%) with: 21 reconstruction plates, 24 locked compression plates, 8 both
87 TEA (21%) with: 84 CM, 1 Latitude, 1 discovery	12 TEA (14%) with: 6 CM, 5 Latitude, 1 discovery

CT: conservative treatment; FT: functional treatment; IF: internal fixation; EF: external fixator; TEA: total elbow arthroplasty; CM: Coonrad—Morrey.