World Journal of Advanced Research and Reviews
eISSN: 2581-9615 CODEN (USA): WJARAI
Cross Ref DOI: 10.30574/wjarr
Journal homepage: https://wjarr.com/

(RESEARCH ARTICLE)

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Osteosynthesis or arthroplasty in the management of complex fracture of the proximal humerus in elderly patients

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World Journal of Advanced Research and Reviews, 2025, 26(02), 2271-2275

Publication history: Received on 03 April 2025; revised on 11 May 2025; accepted on 13 May 2025

Article DOI: https://doi.org/10.30574/wjarr.2025.26.2.1873

Abstract

Fractures of the upper end of the humerus pose a therapeutic problem, particularly for complex fractures with 3 or 4 fragments. It remains a big challenge for orthopedic surgery. The main purpose of our study was to compare the functional results and identify the factors for choosing between osteosynthesis and arthroplasty in the face of a displaced fracture with 3 or 4 fragments of the proximal humerus in elderly patients.

It is a retrospective and descriptive study of 90 over 60 aged patients who underwent surgery for complex fracture of the proximal humerus collected between January 2019 and June 2024 in the orthopedic surgery department of de Casablanca High teaching hospital.

A female predominance with a sex ratio of 0.36M/F was noticed in our study. The average age was 64 years. The most common mechanism injury was a simple fall (66% of cases). (58.7%) benefited from osteosynthesis. (41.3%) benefited from arthroplasty.

The treatment time was less than 72 hours in 60% of cases. The overall satisfaction rate was good to excellent in 90% of arthroplasties and 70% of osteosynthesis. The constant score at final follow-up was excellent too good in 92% of cases for arthroplasties and 84% of cases for osteosynthesis.

Keywords: Osteosynthesis; Arthroplasty; Proximal; Elderly

1. Introduction

Fractures of the proximal humerus are among the most common fractures in adults, it represents the 3rd most common fracture in patients over 60 years old. Complex fractures carry a significant risk of necrosis which worsens their prognosis. Therapeutic management of these fractures remains a subject of controversy [1, 2].

The main purpose of the study is to compare the functional results and identify the factors for choosing between osteosynthesis and arthroplasty in the face of a displaced fracture with 3 or 4 fragments of the proximal humerus in elderly patients.

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2. Materials and methods

This is a retrospective and descriptive study of 90 over 60 aged patients who underwent surgery for complex fracture of the proximal humerus collected between January 2019 and June 2024 in the orthopedic surgery department of de Casablanca High teaching hospital.

The functional assessment was done by the patient satisfaction rate, the evaluation of post-operative mobility, the absolute constant score is a radiographic evaluation in the immediate post-operative period, during external consultations and at last follow-up.

2.1. Study population

Elderly man or woman, having benefited from the implementation of osteosynthesis or arthroplasty for a displaced aged over 60 complex cephalo-tuberous fracture of the upper end of the humerus during the period study.

2.2. Judgment criteria

- Objective functional results (measurement of joint amplitudes, Constant score) and subjective results according quality of life scores, patient satisfaction;
- Radiological results based on the tuberosity consolidation, humeral radiolucent lines and loosening, scapular notches);
- Non operative cases were not concerned by the study

3. Results

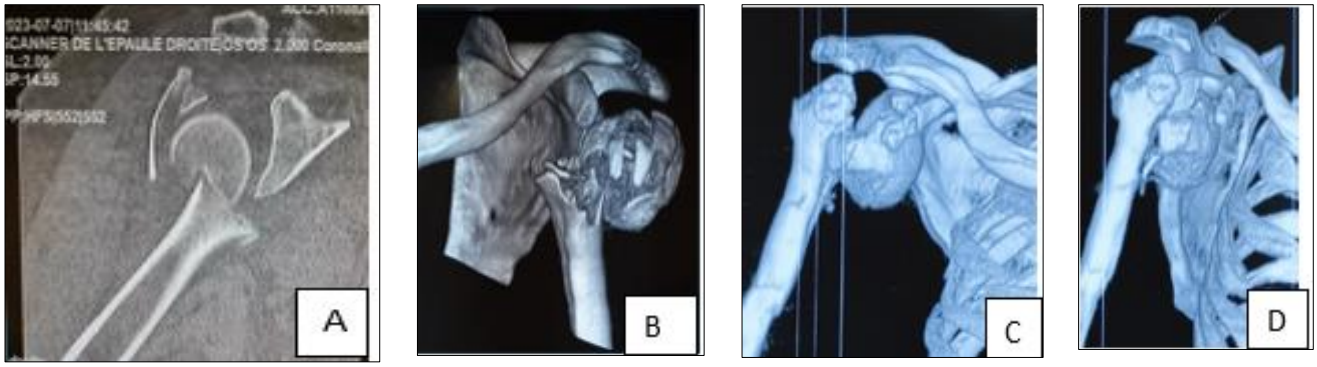
In our study there was a female predominance with a sex ratio of 0.36M/F. The average age was 64 years.

The most common mechanism injury was a simple fall (66% of cases). (58.7%) benefited from osteosynthesis. (41.3%) benefited from arthroplasty. The treatment time was less than 72 hours in 60% of cases.

The overall satisfaction rate was good to excellent in 90% of arthroplasties and 70% of osteosynthesis. The constant score at final follow-up was excellent to good in 92% of cases for arthroplasties and 84% of cases for osteosynthesis.

A Frontal incidence X-ray image **B** Profile incidence X-ray image

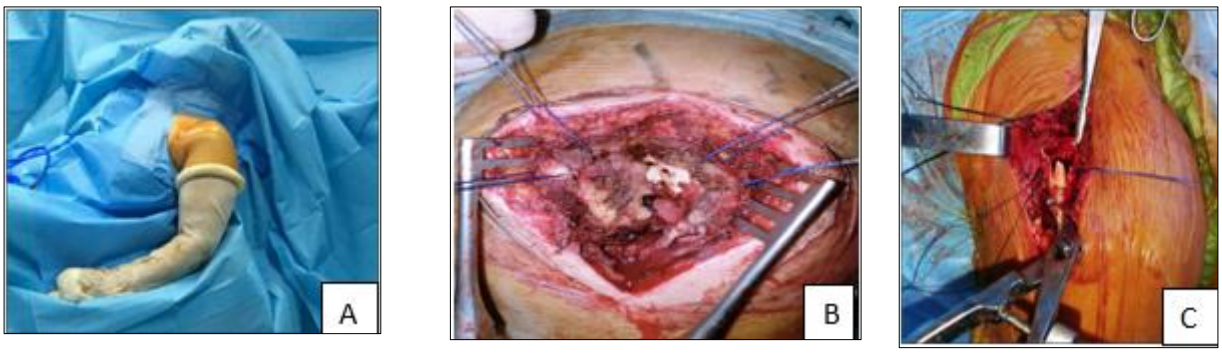
Figure 1 Preoperative radiological assessment for proximal humerus fractures



A frontal cut of the fracture with 3 fragments

B, C, D 3D incidence of the fracture with 4 fragments

Figure 2 Computed tomography scan images



A Installation in beach chair position

B, C per operative view of the deltopectoral route

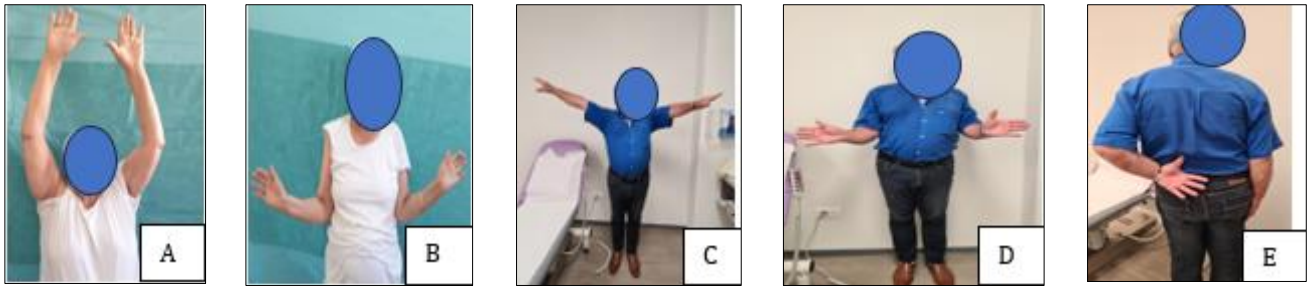
Figure 3 Intraoperative images via deltopectoral approach of the shoulder

A post-operative radiological control after philos plate

B post-operative radiological control after intramedullary nailing

C post-operative radiological control after arthroplasty

Figure 4 Immediate post-operative radiological control



A Comparative ante pulsion of the shoulder after osteosynthesis

B Comparative external rotation of the shoulder after osteosynthesis

C Shoulder abduction in comparison with healthy rating after arthroplasty

D Shoulder external in comparison with healthy rating after arthroplasty

E Shoulder internal rotation in comparison with healthy rating after arthroplasty

Figure 5 Images showing the functional results of the 6-month follow-up series

4. Discussion

There is no consensus on the surgical treatment of unstable fractures of the proximal humerus in the elderly. Two therapeutic choices currently oppose each other. The first, defended by numerous authors [1, 2], is osteosynthesis. It proves difficult given the often-poor quality of the bone in the elderly and the risk of osteonecrosis of the humeral head is not negligible [3], [4].

The second, initiated by Neer in the 1950s, is to perform a prosthetic replacement of the glenohumeral joint [9]. Hemiarthroplasty using an anatomical prosthesis requiring reinsertion of the tuberosities is exposed to frequent complications with a catastrophic impact on the functional future of the shoulder [4].

Teams [5], [6] are turning to the reverse shoulder prosthesis (Grammont type), which makes it possible to do without the tuberosities, and therefore the rotator cuff. The osteosynthesis of fractures of the proximal end of the humerus provided by an anatomical plate is more favorable, it has the advantage of a more stable assembly compared to pinning techniques and of allowing early mobilization compared to nails and cup-and-ball implants. Gicquel concluded that the anatomical plate presents a similar and satisfactory overall mechanical resistance to axial pressure and seemed to be more mechanically adapted and allows early mobilization of the shoulder; it best opposed the lateralization of the head and the separation of the tuberosities [7, 8].

Treatment by arthroplasty of displaced fractures of three or four fragments of the proximal humerus does not currently guarantee that the patient will regain the shoulder he had before the trauma. The therapeutic choice therefore lies in the most reproducible option that quickly restores the best possible comfort of life to the elderly patient. Anatomical hemiarthroplasty gives good functional results despite often prolonged immobilization, but also uncertain depending on the tuberosity reduction. Reverse arthroplasty provides reliable, rapid and reproducible results regarding abduction, ante elevation and pain. But there remains the problem of rotation deficiency affecting the quality of life of patients and the long-term outcome of the implant (glenoid notches).

The reverse prosthesis can therefore provide an advantage in the surgical treatment of complex fracture of the upper end of the humerus, once these two problems have been resolved, thus allowing its implantation to be validated, which for the moment does not seem reasonable to us under 70 years of age.

The results of surgical treatment vary in the literature from one series to another. For Robinson and al. [9], excellent results with relatively low complication rates can be obtained with philos plate osteosynthesis, even in elderly subjects.

FRASER and al. [10] found in their studies results that actively mean better in patients who have benefited from an arthroplasty: reverse total shoulder prosthesis.

The decision-making algorithm for a 75-year-old patient differs from that of a 60-year-old patient, especially if the latter is an active and healthy manual worker.

5. Conclusion

The management of fractures of the proximal humerus in the elderly remains a challenge for the orthopedic surgeon. Randomized controls and expensive analyzes are needed to determine the optimal method of treating these fractures. The choice will therefore lie in the most reliable therapeutic option, in the acquisition of a useful mobility sector, in a reproducible manner and quickly restoring the best possible comfort of life to the patient the older the patient.

Compliance with ethical standards

Disclosure of conflict of interest

No conflicts declared by the authors.

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