



Outcomes of surgical management of the proximal humerus fractures about 58 cases

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Abstract

Introduction: The purpose of our study was to describe the epidemiological and therapeutic aspects of the proximal humerus fractures and to evaluate their functional results.

Materials and methods: This was a retrospective study about all patients operated for proximal humerus fracture at the South-Essonne Dourdan-Étampes Hospital Center between January 2016 and December 2017.

Results: 58 patients were operated. Women represented 65.5% with a female / male sex ratio of 1.9. The mean age was 67.3 years (17-95 years). Fracture following a fall in 86% and 60% concern the left side. according to the Neer classification, 65.5% were 2-parts fractures, 22.4% 3-parts fractures and 12% 4 or over 4 parts. In 19% were operated after orthopedic treatment failure. The telegraph nail represents 62% of used materials. 12% of the patients had benefited a total shoulder arthroplasty. At the last follow-up of 14 months (8-22 months) consolidation was achieved in 98% of osteosynthesis. The abduction average was 145 ° (45 ° - 180 °). Mean Constant score was 79 (64 - 95). 1 case of humeral head necrosis was noted and 5 cases of shoulder stiffness in abduction.

Discussion: We believe, as many authors, that many factors seem to influence functional evolution. The type of fracture influences the therapeutic choice and is the main predictor of functional outcome, failure, complications and re-intervention.

Conclusion: There is certainly no consensus in the management of the proximal humerus fracture, but many choices are currently available for surgeons. "Every age group is served"

Keywords: proximal humerus fracture; management, surgery.

INTRODUCTION

Proximal humerus fractures (PHF) represent approximately 5% of all fractures and more than 10% in the elderly [1,2]. This incidence is increasing because of aging of the population [3]. The choice between surgical and orthopedic treatment is not easy. Since Neer's work in 1970 [4,5], where he presented the classification of PHF, and the results evaluation, the management of these fractures has become controversial. According to Neer, 75% to 85% of these fractures were little or no displaced and treated orthopedically [4]. The surgical treatment does not give sufficiently reliable results due to several factors but the main difficulty lies in the technique choice. This choice depends mainly on the type of fracture, the age of the patient, (osteoporosis) as well as its activity. Several surgical means exist such as wires,

plates, Telegraph nail, or shoulder arthroplasty among others, with satisfactory results between 50% -75% [6-9]. Whatever the therapeutic option, complications such as tuberosity migration, mal-union, humeral head osteonecrosis or shoulder stiffness are mainly encountered [10]. The objective of our study was to describe the epidemiological and therapeutic aspects of PHF and to evaluate their functional results.

MATERIALS AND METHODS

This was a retrospective study about all patients operated for PHF at the South-Essonne Dourdan-Étampes hospital Center over a 2-year period (January 2016 to December 2017). Lost patients were not included in the study. All patients were operated under general anesthesia. We used as implants: telegraph nail (TGN), Metaizeau pins, total anatomical or inverted shoulder prosthesis (TSP), LCP plate. The nailing and pinning were made by closed approach; the plates were put by deltopectoral approach (reduction was controlled using the image intensifier) and prosthesis by trans deltooid approach. In the elderly, we had indicated TGN in 2 or 3 parts fractures, TSA in 4 or more parts fractures. The plates were used in the young adult, and the Metaizeau pin (according to the Kapandji's technique) for variable use (**figure 1**). Functional rehabilitation was started as soon as possible in all our patients, for muscles strengthening and to restore joint amplitude. Functional follow-up was performed at the last follow-up according to the Constant scores [11]. Our data was collected using individual records, entered and processed using Office 2016 and SPSS V 23.0 software.

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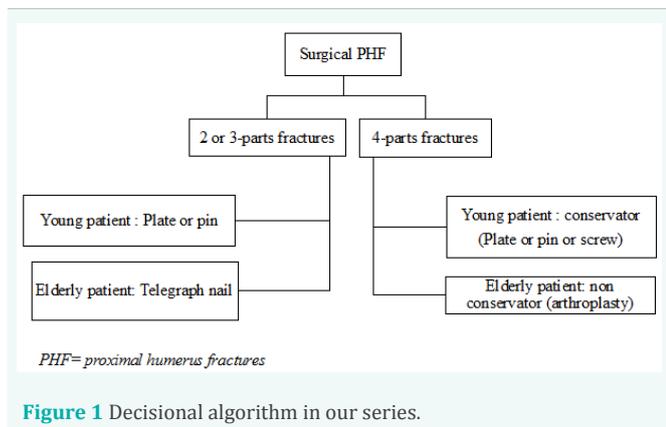


Figure 1 Decisional algorithm in our series.

RESULTS

58 patients were operated on (**Table I**). 65.5% were women (n = 38) and 34.5% men (n = 20), a female / male sex ratio of 1.9. The mean age was 67.3 years (17-95 years). The most relevant age group is between 70-80 years old. The fracture occurred following a fall in 86.2 (n = 50) and accident of public highway (APH) in 13.8% (n = 8). It interests the left side in 60% (n = 35). According to the Neer classification, 65.5% (n = 38) of fractures were 2 parts, 22.4 (n = 13), 3 parts and 12% (n = 07), 4 parts. In 19% (n = 11) patients were operated after orthopedic treatment failure. Telegraph nail represents 62% (n = 36) of the used materials (figure). 12% (n = 07) of patients had received TSA (**figure 2**). At the last follow-up of 14 months (8-22 months),

consolidation was achieved in 98% of osteosynthesis. Tuberosities were in place in all patients. 88% of cases were considered well reduced on x-ray control. One case was consolidated in valgus of 18°. 04 cases in varus of 22° (15° - 30°). The abduction average was 145° (45° - 180°). No prosthesis loosening was noted. 1 case of humeral head necrosis was noted, resumed by TSA. 5 cases of abduction stiffness despite prolonged functional rehabilitation. The abduction force average was 70% (40% - 90%) according to the contralateral side. Our functional outcomes were good to excellent in 84.5 (n=49) cases. Mean Constant score was 79 (64 - 95). (**Figure 3**)

Table 1: Patients characteristic data.		
Parameters	Enrolment	Percentage (%)
Number of cases	n=58	100
Age (years)	67,3 (17- 95)	-
Gender (men/ women)	20/38	34,5 /65,5
Antecedents:		
--Diabetes:	23	39,65
--AHT /heart disorder	18 / 16	31 / 27,6
--Alzheimer:	07	12
side (Right / Left)	23/ 35	39,65 /60,35
Circumstances (Fall/APH)	50 / 08	86,2 / 13,8

AHT= Arterial Hyper Tension; APH= Accident of the Public Highway

DISCUSSION

The objective of the surgical management of PHF is to obtain an anatomical reduction and recover the function of the shoulder. The functional results depend on several factors: age of patients, the type of fracture as well as the surgical technique and the orientation of the humeral head. The choice of the technique itself is influenced by these factors. It is therefore necessary to make the correct diagnosis. In some types of PHF, standard radiography alone is not sufficient to make the diagnosis. It would determine the cervicodiaphyseal angle (45° (30° -60°)) or a possible dislocation associated. CT is desirable and will help to assess the prognosis and define the therapeutic possibilities. The literature reports a rate around 85% of PHF little or no displaced due to orthopedic treatment [4]. That is, fractures with a humeral head rocker of less than 45° and / or an inter-fragmentation displacement of less than 01 cm. But we believe that this rate of orthopedic treatment is declining given the high rate of recovery. Whatever the technique for which one opts, the best results are observed in the young subjects. In the elderly, bone fragility could lead to complex fractures, secondary displacements or vicious callus due to precarious fixation of the osteosynthesis material.

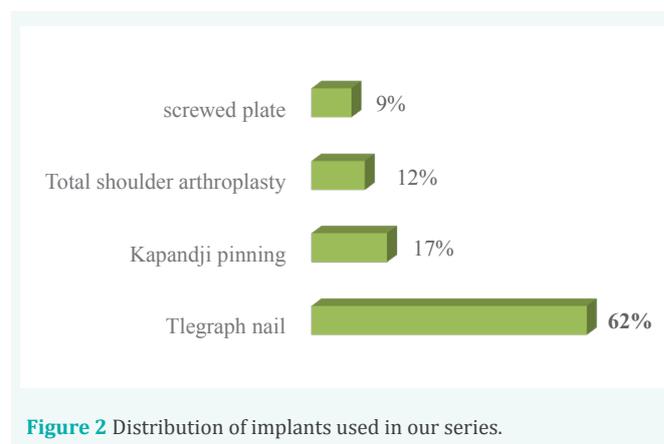


Figure 2 Distribution of implants used in our series.

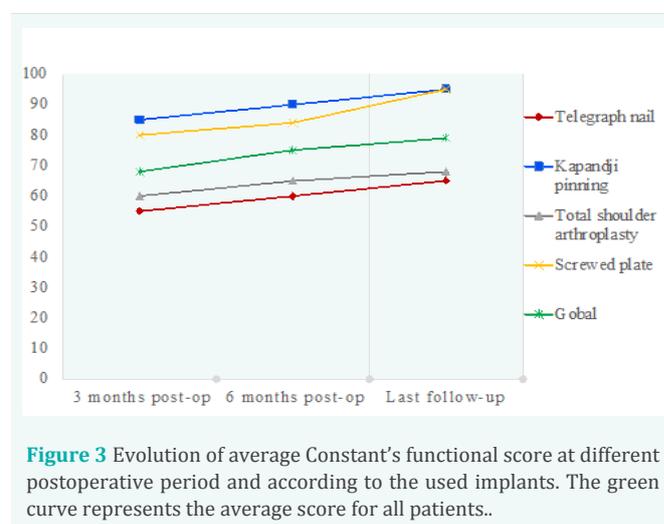


Figure 3 Evolution of average Constant's functional score at different postoperative period and according to the used implants. The green curve represents the average score for all patients..

The results could also be influenced by some pre-existing lesions. This influence of the age factor was reported by several authors [12-14] Regardless of age, a poor reduction or a secondary displacement also give poor prognosis. Similarly, the type of fracture line could influence the functional outcome. [15,16]. Our attitude was such that any 2 or 3 parts PHF of the elderly was treated by Telegraph nail (**figure 4**) and the 4 parts fractures by TSA (**figure 5**). Several types of nails were used for PHF such as Postel nail, Marchetti-Vicenzi nail and telegraph nail, the most recent. For our series, we used the Telegraph nail in 62% of the cases for these advantages and specificities which are the stability, the rigidity and the satisfactory mechanical resistance with regard to the axial pressure. With its biomechanical properties for stress in torsion movements, it allows early rehabilitation of the shoulder and therefore increases the chances of better shoulder mobility. Kapandji pinning was performed in 17% of cases. This

is a technique described by Kapandji in 1989, indicated in the single-strand PHF [17]. It is fast and minimally invasive. But with the more recent possibility of using a Telegraph nail especially in the elderly, we have reserved it for young patients presenting a simple PHF. As for the screwed plate, we used it in the young patients rather than in the elderly because of certain prognostic factors like the preoperative displacement of the fracture or the quality of the bone and the vascularization of the humeral head (age-related factors) such as reporting by Hardeman [18]. 9% of our patients had benefited with an excellent functional result. Some types of fractures such as Neer's 4 or more parts may require shoulder arthroplasty, except in younger subjects, where a chance may be given to these subjects. In our patients who had benefited arthroplasty, the indication was based on the type of fracture (4-part), particularly in the elderly, 12%. Another factor influencing functional outcomes is cephalic orientation.

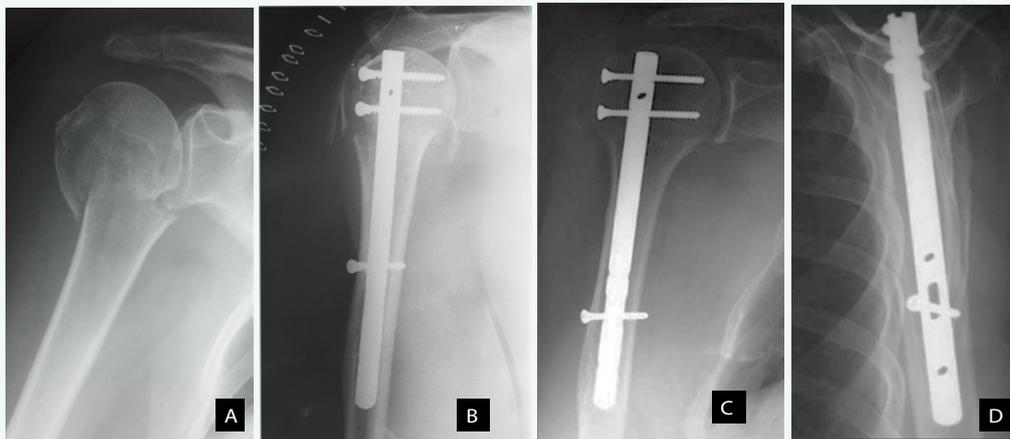


Figure 4 X-ray of the right shoulder. (A) pre-operative frontal incidence showed a 2-parts proximal humerus fracture; (B) immediate post-operative control after Telegraph nail; (C and D) X-ray control at the last follow-up.

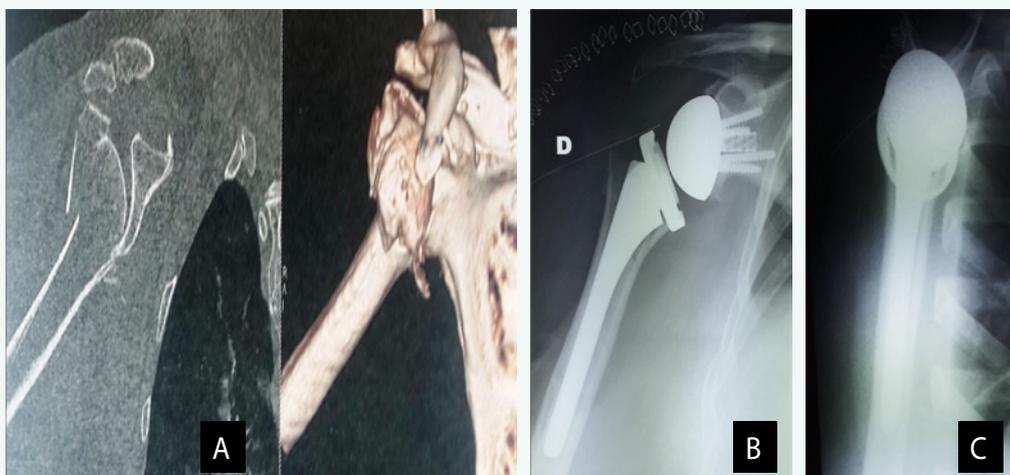


Figure 5 Case of comminuted fracture. (A) Computed tomography of the right shoulder showing a comminuted fracture; (B and C) X-ray control after inverted total shoulder arthroplasty.



But many authors report results where the influence of this factor is not so obvious [13,19]. Complications are possible after surgical treatment of PHF, with a rate of up to 50%. Some are related to patients, others to surgical technique. At last follow-up, the 30% decrease in abduction force on average compared to the contralateral side shows the difficulty in functional recovery after a PHF. This decrease in strength was remarkable in the elderly.

CONCLUSION

The CT made the diagnostic of proximal humerus fractures easy and the choice of orthopedic or surgical treatment is no longer subject to debate. On the other hand, the choice of surgical materials is difficult, despite the diversity. It depends on several such as the age of the patient, his activity or the type of fracture. The surgeon should remember that the ultimate aim of surgical treatment is to achieve a better reduction and a better functional result.

Ethical approval

This study is exempt from ethical approval in the author's institution

Consent

Consent was taken from patients involved. Patient has been de-identified.

Author's contribution

Badarou Chaibou : collection of data, conceptualizing and writing of the paper

Mohammed Abdoul Wahab and Mahamadou Dalatou Habibou: assistant to writing of the manuscript

Mohammed Zaaf : Main surgeon involved in care of patients and final editor of manuscript

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