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Anatomical and Functional Results of Surgical Treatment of the Upper End of the Humerus

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Abstract

Fractures of the upper end of the humerus are common, they represent about 5% of all fractures, and their frequency of occurrence increases to more than 1 0% beyond 65 years where they are the third cause of osteoporotic fractures of members after the fractures of the upper end of the femur and wrist. We studied the anatomical and functional results of conservative surgical treatment of these fractures, and this through a retrospective study of 24 cases of upper end of humerus fractures treated surgically in the department of orthopedic surgery B CHU MED VI Marrakech between January 2012 and December 2015 with a mean of 11 months.

The middle age of patients was 44 years with a male predominance (67%). A radiograph of the shoulder front and profile was done in all patients and allowed us to diagnose and identify the anatomical type according to Neer and duparc classification. Postoperative immobilization was necessary in all patients (between one and three weeks) followed by functional rehabilitation.

We noted as complications: one case of superficial wound infection, one case of secondary displacement, 2 cases of malunion and one case of shoulder stiffness. The functional results (Constant score) were good to excellent in 76 %. Anatomical judged cases showed 88 % of cases. The overall results were influenced by patient age, fracture type, surgical technique, and anatomical result and also by the quality of rehabilitation. Overall, we can say that our results are very satisfactory but we cannot draw conclusions because of the small number of our series and low recoil.

Keywords: Fracture; Proximal Humerus; Osteosynthesis; Results -Surgical treatment

Introduction

Fractures of the upper end of the humerus are frequent traumatic lesions, they represent between 4 to 5% of fractures of the adult [1]. Despite being known for its good consolidation, and despite the multiplicity of treatments proposed for this type of fracture, the results often remain disappointing, especially in the elderly osteoporotic. Their treatment has generated much discussion in the literature; if orthopedic treatment is for non-displaced fractures, surgical treatment remains a challenge for the orthopedic surgeon because he has a vast arsenal of surgical techniques and none has been ideal.

The purpose of this work is to evaluate the functional and radiological results of conservative surgical treatment in our patients.

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Patients and Methods

This is a retrospective study of 24 cases of fractures of the proximal end of the humerus treated surgically at the traumato-orthopedics B department of the MED VI Hospital of Marrakech between January 2012 and December 2015. Excluding all patients presenting fractures of the proximal humerus treated orthopedically as well as shoulder prostheses. The collection of the data was made from a record of exploitation containing the age, the sex, the side reached, and the mechanism of the trauma, the pathological type according to the classification of Duparc [2], Neer [3], and time to consolidation, functional assessment, anatomical reduction, and postoperative complications. For the evaluation of the functional results of our patients, we will use "Functional classification of the shoulder according to Constant" [4] to appreciate the importance of the inconvenience caused by a suffering of the shoulder, then of the quality of the result obtained by the treatment. The evaluation was also based on the QUICK DASH score and SF 36. The radiological results will be evaluated on several criteria, by studying more consolidation and looking for signs of cephalic necrosis.

Results

The overall average age was 44 [16 to 74], the sex ratio (M/F) was 2. Half of the treated patients had a 54% two-fragment fracture, the other half had a three-way fracture or four fragments. According to the anatomical type, we have a clear predominance of surgical neck fractures with 13 cases, or 54%. The etiology of the lesional mechanism was a direct trauma in 17 patients, i.e. 71% of our studied population follows a road accident in 54% of cases. All our patients have been referred to the physiotherapy center to benefit from re-education sessions. Of the 24 patients, only 17 could be contacted or 30% lost to follow-up. The evaluation of the radiological results was considered anatomical in cases with a translation less than 0.5 cm, an overlap of less than 0.5 cm, a trochanteric displacement of less than 5 mm, and an angle alpha equal to 45° more or less 10°. According to these criteria, the reduction was considered anatomical in 88% of cases. The overall mean absolute Constant score was 86% with extremes of 67% and 97%, according to the QUICK DASH the summer score was 23 on average. The analysis of the functional results according to the age group shows that all the patients with an age less than 20 years show good results. In our series, we found that 80% of patients with fractures of the isolated surgical collar had well to excellent results (43% of all good to excellent results). The functional and radiological results are excellent in 33% of patients treated with kapandji racking and 29% treated by screwed plate (Figure 1). We noted as complications, a case of superficial infection of the wound, a case of secondary displacement, 2 cases of vicious callus and a case of stiffness of the shoulder (Table 1).

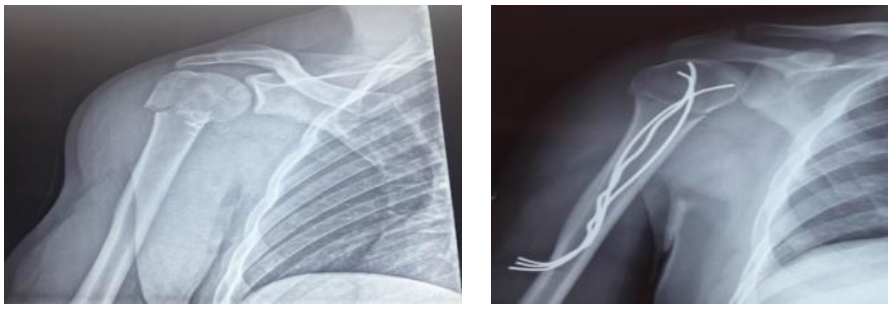

Figure 1: Tuberterous fracture treated by kapandji snapping.

According to Neer / According to duparc	2 fragments	3 fragments	4 fragments	%
Fractures of the surgical collar	13	0	0	54%
Fractures of the surgical collar + le trochiter	0	4	0	17%
Fractures of the surgical collar + le trochin	0	1	0	4%
Fractures cephalotuberositaire	0	5	1	25%
Fractures cephalometaphysaire +Luxation	0	0	0	0%
Percentage	54%	42%	4%	100%

Table 1: the different types of fractures studied in our series with their frequency.

Discussion

Fractures of the upper extremity of the humerus are frequent traumatic lesions, of which the surgical treatment is mainly addressed to 20% of them, in the case where they are complex or the level of activity of the patient. Requires an optimal functional result [5]. In our series, the age group between 40 and 60 years was the most affected with 41.7%. The average age was 44 with extremes of 16 and 74 years. This could be explained by the fact that this age group represents an active layer thus exposed to accidents on the public road and which most often presents a vulnerable porous bone .BENGER-V [6], LIND-T [7] have also found a predominance of 45 to 65 years. The average age of Kapandji [8] was 28.6 years. Men were the most affected with 67% this would be explained by the fact that men are more exposed to accidents than women. This result is consistent with that of NEER-CS [9]; DUPARC-J [10]. The most frequent etiology is represented by road accidents 54% of cases, concordant with the results of other series. This would be explained mainly by the non-respect of the Highway Code.

In our study, the clinical signs encountered were pain, functional impotence, edema and exquisite pain point. Virtually all authors have mentioned these signs in their studies. In order to classify the fractures and thus to guide their treatment, a complete radiographic assessment must be carried out. Several classifications have been proposed. It is in fact the work of Codman [11] (1934) which remains the reference with his well-known scheme. We have adopted the Duparc classification [2] and the Neer classification [3] which is directly inspired by the Codman classification. The radiological study revealed the predominance of 2-fragment fractures in most series including ours. Regarding the radiological results, the anatomical reduction rate present in our series was very close to that reported in the different series of literature (Figure 2).

Figure 2: Consolidated cephalo-tuberosity fracture treated by a locked screwed plate.

According to the qualitative evaluation of CONSTANT, according to the differential between the index of CONSTANT (IC) of the operated side and that of the opposite healthy side, the results were good to excellent in 76% of the cases in our series, which is very close to those found by Gn kumar [12] in his series with 76, 5% and by MF Amar [13] with 77%. We note that the results of the QUICK DASH and SF 36 in our study are very close to those found in the different series of the literature. Some of the treatment used, most authors agree that the results are even better than the patients are young, as confirmed by the study of S.MODA [14] performed on 25 patients between 20 and 40 years when he scored good to excellent results in 84%. Thus, we found, like most authors, that age is a negative factor. In fact, more than age, it is bone quality that matters in particular bone fragility. Older adults may still be involved in functional outcomes through a lack of co-operation in rehabilitation and pre-existing lesions of the joint. In our series, the mean constant score was 94.5 before age 20, 88 between 20 and 40, 75 between 40 and 60 and 65 after age 60.

SF-36	Average According to Each Item
Physical activity	89.3
Physical pain	79.7
Limitation of the physical state	85
Limitation of the physical state	97.6
Perceived health	82
Physical health	88.4
Life and relationship with others	86.5
Vitality	77

Table 2: The average results of the SF 36 according to each item.

Bougherbi, et al. [15] consider that the treatment of joint fractures meshed gave more good results compared to disengaged articular fractures as well as compared to

those extra articular. 80% of our patients with isolated surgical neck fractures had well to excellent results. In general, a complex fracture is often associated with poor bone quality resulting in poorer anatomical and functional results. In our series, 77% of excellent and good results, in our patients treated by a racking in palm tree according to the technique of kapandji. This technique was described by Kapandji which published in 1989 a series of 15 patients of which 93 3% of the results were excellent and good [8].

Authors	Average global mean
Alexa o [35]	70.33
M. Elidrissi [36]	88.6
R. Chassat [37]	60
k. Lahrach [38]	76
Our study	79

Table 3: Comparison of Mean Constant Results Found in The different series of literature.

The osteosynthesis of fractures of the proximal end of the humerus by screwed plate has been widely used, and multiple series have been described throughout the literature, this technique has the advantage of ensuring a more stable assembly compared to other techniques of racking allowing an early mobilization with better functional results. 42% of our patients benefited from this type of osteosynthesis of which 72% had excellent and good results which is very close to those found by Burton, et al. [16] with 71% good and excellent results (Figure 3 and 4).

Figure 3: Consolidated cephalo-tuberosity fracture treated By a locked screwed plate.

Figure 4: Functional evaluation at last follow-up in a patient Treated by screwed plate.

The statistical analysis of the functional and radiological results according to the surgical technique did not show superiority of one technique over the other, which is consistent with the literature. The parallelism between the final orientation of the head and the functional result is not obvious if one refers to the literature in our series, when an anatomical reduction was obtained (angle alpha = 45 +/- 10) and that it has been maintained, the results have all been excellent and good. However, we obtained less satisfactory results, in our patients presenting a non-anatomical reduction, comparing our results with those of the literature, we noted a low rate of complications, and notably the infection in one case is 6%, a case of secondary displacement, 2 cases of vicious callus and a case of stiffness of the shoulder which remains comparable to other studies. No case of NATH has been reported in our series; however it is found in other series with different percentages, this is probably due to the slight decline of our series (Figure 5).

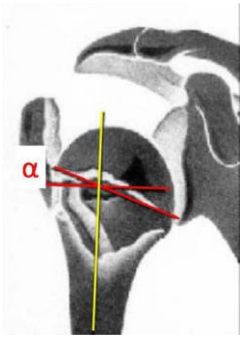

Figure 5: Alpha angle measurement.

Conclusion

We concluded that the quality of these results, especially the functional ones, depends not only on the technique or the material used, but also on several factors such as age, fracture type, anatomical result after treatment, as well as the quality of the postoperative rehabilitation.

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