



International Journal of Orthopaedics Sciences

E-ISSN: 2395-1958

P-ISSN: 2706-6630

IJOS 2021; 7(3): 608-611

© 2021 IJOS

www.orthopaper.com

Received: 25-05-2021

Accepted: 27-06-2021

Kombate NK

Orthopedics and Traumatology
Department at Saint Jean de
Dieu Hospital in Afagnan, Togo

Akloa KEK

Department of Orthopedics and
Traumatology of CHU-SO Togo

Dellahn YY

Department of Orthopedics and
Traumatology of CHU-Sokodé,
Togo

Towoezim T

Department of Orthopedics and
Traumatology of CHU-Kara,
Togo

Anatomical and functional outcomes after surgical treatment of distal humeral fracture in Sylvanus Olympio hospital

Kombate NK, Akloa KEK, Dellahn YY and Towoezim T

DOI: <https://doi.org/10.22271/ortho.2021.v7.i3i.2811>

Abstract

Introduction: The treatment of humeral shaft fractures in adults is usually surgical, and the use of two plates to reconstruct the two abutments is recommended. The purpose of this study was to evaluate the clinical, radiological, and functional outcomes of surgically treated humeral shaft fractures.

Materials and Methods: This was a prospective, single-center study from January 2014 to December 2017 of patients over 15 years of age operated on for humeral shaft fracture and followed regularly over a period of at least 6 months at CHU-SO (Togo).

Results: Thirty-four (34) patients including 25 males and 9 females were treated and followed during this period. The average age of the patients was 42 years and the age group most affected was 16-30 years (41.17%). The right side was the most affected (76%) and road accidents were the main etiology found. Type C lesions (55.9%) were predominant, followed by type A lesions (26.5%). The posterior approach was the most common (76.34%). Olecraniotomy was performed in 55.88% of cases. The screw plate was the most commonly used stabilization material. We obtained 76.5% consolidation, 5 cases of malunion and 3 cases of pseudarthrosis. Evaluation according to the Mayo Elbow Performance Score showed 79.4% excellent and good results and 11.7% poor results.

Conclusion: Humeral shaft fractures are complex injuries due to the violence of the etiological mechanisms. Surgical treatment offers satisfactory results despite the slow pace of management. Early management and rigorous and intense rehabilitation will further improve these results.

Keywords: humeral shaft fracture, osteosynthesis, results

Introduction

Humeral shaft fractures are defined as any break in continuity below the distal insertion of the anterior brachialis muscle ^[1,2].

They represent 1 to 2% of all adult traumatic pathology and one third of elbow fractures and are most often articular ^[3].

Although orthopedic treatment is sometimes used for non-displaced fractures, or exceptionally for large fractures, surgery is now considered the preferred treatment ^[4]. However, this surgical treatment remains difficult. It must meet the principle of treatment of joint fractures, to restore a joint space and allow immediate mobilization, in order to combat stiffness, which is the most frequent and most dreaded complication ^[5].

In addition to these difficulties, the surgeon is also confronted with difficulties in the evaluation of functional results whose criteria vary from one author to another ^[6].

In Togo, a 2015 study on the epidemiology of fractures at the CHU SO estimates humeral shaft fractures at 7.3% of all humeral fractures and 2.5% of all fractures ^[7]. Surgical treatment is increasingly proposed for complex lesions due to the improvement of the technical platform and the availability of new types of implants. Few of the patients who undergo surgery comply with the rehabilitation programs and the regularity of the postoperative follow-up, which makes it difficult to evaluate the results. We therefore proposed to determine the anatomopathological, therapeutic and evolutionary aspects of humeral shaft fractures treated surgically in the traumatology and orthopedics department of the Sylvanus Olympio University Hospital.

Corresponding Author:

Kombate NK

Orthopedics and Traumatology
Department at Saint Jean de
Dieu Hospital in Afagnan, Togo

Materials and Methods

Patients

From January 2014 to December 2017, a prospective monocentric study was conducted on patients aged more than 15 years, surgically treated for palmar fracture and regularly followed for a period of at least 6 months. Patients who did not respond to appointments for clinical and functional evaluation, and those who stopped monitoring before 6 months were excluded. Epidemiological data analyzed were: sex ratio, age, mechanism of injury; duration of hospitalization; time from injury to surgery. Open fractures were classified according to the Gustilo-Anderson classification and ulnar nerve involvement was systematically sought. For the description of the fractures, the classification of Müller and Allgower^[8] was used for the study of radiological data (standard radiography and scans). The set-up and the approach were based on the anatomopathological type of the lesion (Fig. 1). Postoperatively, a rehabilitation protocol was instituted. Active mobilization of the hand and fingers was started the next day. From the fourth to the fourteenth day, active and passive mobilization of the elbow began, limiting it to the amplitude that triggered the pain. Rehabilitation was intensified once the wound had healed and continued an outpatient basis.

Evaluation Method

Objective clinical evaluation was performed using the Mayo Elbow Performance Score. Radiological evaluation was done only on elbow radiographs to look for unitive callus, delayed consolidation, pseudoarthrosis, arthrosis, and ankylosis.

Statistical Method

Data were collected on individual survey forms, and statistical analysis was performed using Excel and SPSS software.

Results

Four twenty-two (82) patients were admitted for humeral palmar fracture during this period. Of these, 53 underwent surgery. Thirty-four patients responded regularly to monitoring. Eleven patients stopped monitoring before the 6th month and 8 others were lost to follow-up. In this study, 34 patients were reviewed, including 25 men and 9 women with an average age of 42 years. The age range most affected was 16-30 years. The fractures were closed in 26 cases (76.5%) and open in 8 cases (23.5%). According to the Gustilo-Anderson classification, type IIIA was the most common with 3 cases. We noted three cases of ulnar nerve damage due to palmar fracture. Damage to the radial and median nerves was not observed in this study. We found 19 cases (55.9%) of Type C lesions (Fig. 2), 9 cases (26.5%) of Type A lesions, 6 cases (17.6%) of Type B lesions. The distribution within the different types showed a predominance of type C2 lesions (Fig. 3). The average operative time for our patients was 10 days (Table 1). Five patients (14.7%) were operated on within 24 hours of admission. Lateral decubitus was used in 28 cases (82.4%) and dorsal decubitus in 6 cases (14.6%). The posterior approach was used in 26 cases (76.34%). Interruption of the extensor apparatus by an olecranotomy (Fig. 1) was performed in 19 cases (55.88%). The screwed plate was the predominant material used for osteosynthesis of paddle fractures in this study. Plates were used more in types C and A. Screw fixation was performed most in Type A and Type B lesions (Table 2). Consolidation was achieved in 26 cases (Fig. 4). At the last recoil, pain was alleviated in 27 patients, 5 patients had mild pain, and 2 had moderate pain. In

terms of mobility, 25 patients had an arc of mobility greater than 100°, and 5 patients had mobility between 50 and 100°. We found 4 cases of elbow stiffness, including 3 cases in flexion and one in extension. Evaluation by the Mayo score revealed 58.8% of excellent results (Fig. 5) and 11.7% of poor results (Table 3).

We found 4 cases (44.4%) with excellent results in type A, 3 cases (33.3%) with good results and 1 case (11.1%) with poor results.

In group B, we noted 3 cases (50%) of excellent results and 3 cases (50%) of good results.

In group C, there were 13 cases (68.4%) of excellent results, 1 case of good results and 3 cases (15.7%) of bad results.

Complications

We recorded two cases of postoperative infection in open fractures in which an external fixator had been placed. Eight cases (23.5%) of late complications, including 5 cases of malunion and 3 cases of pseudarthrosis, were recorded.

Discussion

This study highlights the good results of surgical treatment of humeral palmar fractures. Its objective was to analyze the results of surgery. For this purpose, this study had limitations: the lack of financial means of some patients to carry out the scan and to pay for the material necessary for the operation was one of the difficulties encountered. This explains the fact that out of 82 patients with a palmar fracture, only 53 could be operated on. Our results are in line with the literature.

The average age of the patients was 42 years, which is consistent with the literature^[8-10].

Most of the series^[8-10] reported a predominance of type C fractures, reflecting the complexity of these lesions, which are difficult to manage. The posterior approach was used in 76.4% of our series, and in more than 90% of Elhag^[9] and Ragabbi^[10]. This preference for the posterior approach is due to the better view it offers of all the elements of the humeral palmar^[11]. The plate was the osteosynthesis material that allowed us to achieve good results. Although the material used differs from one author to another, depending on the type of fracture, the Lecestre plate is the most commonly used material in most series^[12, 13]. This may be related to the fact that they adapt correctly to the morphology of the humeral palmar and offer better stability. The latter is the key to early mobilization.

We noted 4 cases of ulnar nerve expectation. The incidence of nerve injury is difficult to assess in the international literature. They mainly concern the ulnar and radial nerves, due to their anatomical situation which exposes them during fractures of the humeral palmar, especially in supra- and inter-condylar fractures. During surgery, transposition of the ulnar nerve is not systematically performed^[14-16]. However, in case of preoperative ulnar nerve injury or threat from the osteosynthesis material, transposition is recommended^[17-19].

Vicious calluses accounted for 14.7% in our series. Their occurrence is thought to be related, on the one hand, to the complexity of the lesions and, on the other hand, to the reduction defects of these fractures^[17]. Early management and the use of premolded plates allow perfect reduction, thus avoiding this complication, which promotes elbow stiffness^[9, 10, 20].

The latter remains the most dreaded complication of humeral palmar fractures. Its frequency remains high in the various series, ranging from 16% to 22%^[9, 17, 21]. It represented 14.7% in our study and is thought to be related to patients' failure to

follow rehabilitation programs. Self-rehabilitation protocols taught to patients could reduce this high complication rate. We found 79.4% of excellent and good results. Although the evaluation scores of the functional results are very variable, making comparisons between the different series difficult, all the authors found satisfactory results of more than 80% with surgical treatment [17, 18, 22, 23]. These results confirm the value of surgical management of humeral palmar fractures, the functional prognosis of which depends on perfect anatomical restitution and the possibility of early mobilization.

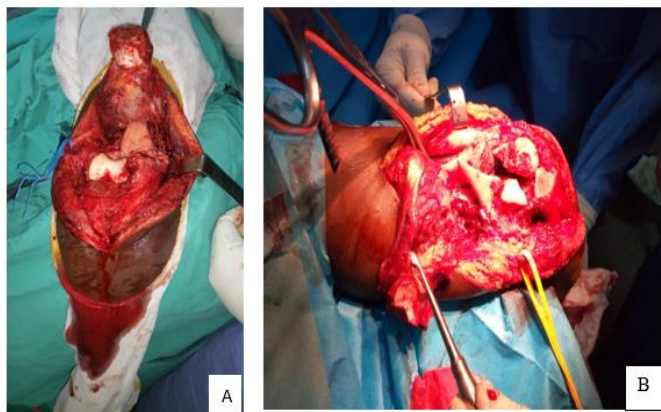


Fig 1(A): Posterior approach with olecranonotomy **(B):** exposure of the fracture



Fig 2(A): fracture of the humeral paddle type C2 Muller Allgower **(B)** CT scan of the elbow showing the Muller Allgower type C2 fracture

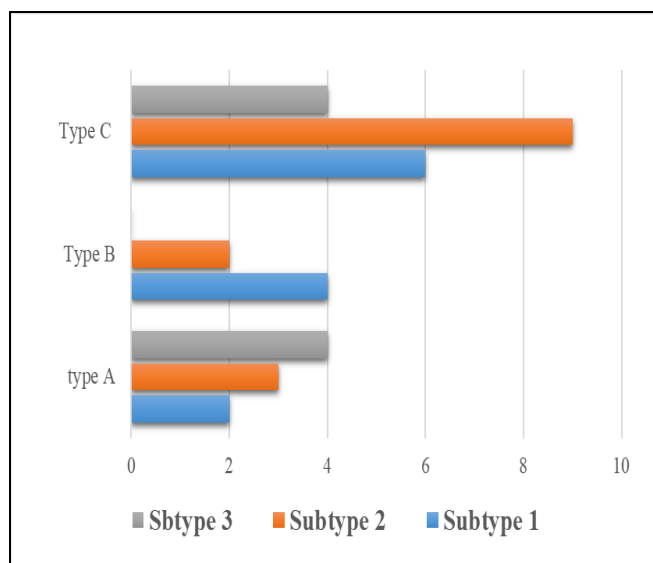


Fig 3: Distribution within each anatomopathological type

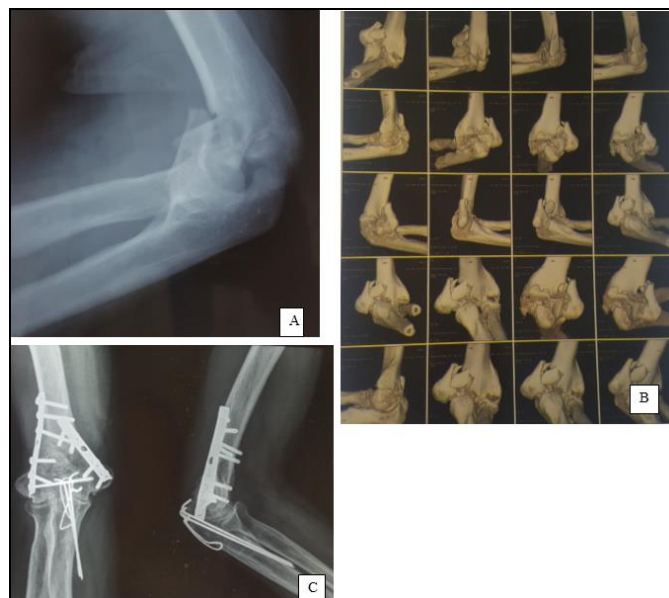


Fig 4A: X-ray of the elbow: Fracture of the pallet type C1 **(B)** CT scan of the elbow: fracture of the humeral pallet type C1 **(C)** Fracture synthesized by two plates and union acquired after six months

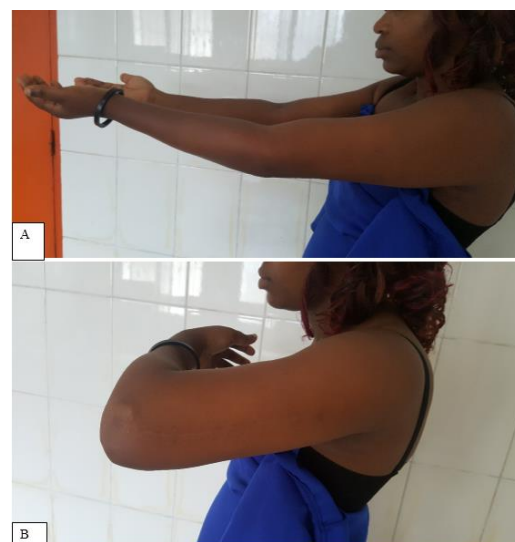


Fig 5: 23-year-old patient operated on for fracture of the left humeral paddle type C2. **(A)** Full elbow extension **(B)** 130 ° elbow flexion

Table 1: Distribution according to operating time

	Effective	Percentage
J0-J1	5	14.7
J2-J7	3	08.8
J8-J14	17	50.0
J15-J21	9	26.5
Total	34	100

Table 2: Breakdown of material used according to anatomopathological type

	Type A	Type B	Type C	Total
Plaque	4	3	11	18
Plate+ Screwing	-	-	6	6
External fixator	3	-	-	3
External fixator + broaching	-	-	2	2
Screwing	2	3	-	5
Total	9	6	19	34

Table 3: Functional results according to the Mayo score

	Effective	Percentage
Excellent	20	58.8
Good	7	20.5
Average	3	8.9
Bad	4	11.7
Total	34	100

Conclusion

Fractures of the humeral pallet are becoming more and more frequent due to the increase in the number of cars on the road, which is often a source of high energy accidents.

These fractures mainly affect young adults with a strong male predominance. Supra- and inter-condylar fractures are the most frequent. Surgical treatment is almost systematic for these fractures and the posterior approach with interruption of the extensor apparatus offers a better view of all the elements of the pallet. The Lecestre screw plate is the material that offers the best stability and allows early rehabilitation, which guarantees a better functional prognosis. Our results, which are 79.4% satisfactory, certainly corroborate the data in the literature. Particular emphasis must be placed on postoperative rehabilitation in order to improve these results.

Conflicts of Interest: None declared

Level of Evidence: II Prospective study

References

- Marcireau D, Oberlin CH. Fracture de la palette de l'adulte, E.M.C. App. Locomoteur 1995;14-041-A-10:8.
- Cadot B, Da Silva Rosa R, Tawill HJ. Fractures de l'extrémité inférieure de l'humérus : Techniques in Encycl Med Chir. Techniques chirurgicales-Orthopedie Traumatologie 2003, 44-322.
- Morrey BF. Distal Humeral Fractures Treated with Noncustom Total Elbow Replacement. J Bone Joint Surg Am 2004;86(5):940-47.
- Redouane H, Mustapha N, Kharmaz M, Mohamed E, Lahlou A, Lamrani MO *et al.* Le traitement chirurgical des fractures de la palette humérale chez l'adulte. PAMJ. 2017;26(10):1-7.
- Saragaglia D, Rouchy RC, Mercier N. Fractures de l'humérus distal ostéosynthésées par plaque Lambda: à propos de 75 cas au recul moyen de 9,5 ans. RCOT. 2013;99(6):586-92.
- Chantelot C, Robert G. Intérêt du fixateur externe dans le traitement des fractures de l'humérus : à propos de 23 fixateurs. Chirurgie de la main 2002;21:34-9.
- Dellanh YY, Ayoub G, Bakriga B, Kombate NK, Akpoto MY, Walla A *et al.* Aspects épidémiologiques lésionnels des fractures au CHU Sylvanus Olympio de Lomé. J. Rech. Sci. Univ. Lomé (Togo), 2018 ;20(3):321-326
- Jwalant P, Motwani G, Shah H, Daveswar R. Outcome after internal fixation of intraarticular distal humerus (AO type B & C) fractures: Preliminary results with anatomical distal humerus LCP system. JCOT. 2017;8:63-67.
- Elhag R, Maynou C, Jugnet PM. Résultats à long terme du traitement chirurgical des fractures bicondyliennes de l'extrémité distale de l'humérus chez l'adulte. Chirurgie de la main 2001;20:144-54
- Steinitz Amir, Sailer Jannis, Rikli Daniel. Distal humerus fractures: areview of current therapy concepts. Curr Rev Musculoskelet Med 2016;9:199-206.
- Feron JM, Jacquot F, Signore TF. Traitement chirurgical des fractures sus et inter-condyliennes du coude de l'adulte. Pathologie chirurgicale du coude. Sauramps 1999, 99-102
- Mannuedu A, Hoffmeyer P, Haluzickry M, Blanc Y, Borst F. Fracture de la palette humérale chez l'adulte : évaluation fonctionnelle et mesure de forces isométriques. RCO 1997;83:551-560.
- Sané AD, Dakouré PW, Diémé CB. L'ostéotomie de l'olécrane dans le traitement des fractures de la palette humérale de l'adulte : évaluation anatomique et fonctionnelle du coude à propos de 14 cas. Chirurgie de la main 2009;28:93-9.
- Kundel K, Braun W, Wiebernet J. Intraarticular distal humerus fractures, factors affecting fonctionnal outcome. Clin Orthop 1996;332:200-208.
- Wang KC, Shinh HN, Hsu KY. Intracondylar fratures of distal humerus. Routine antérieur subcutaneous transposition of ulnar nerve in posterior operative approach. J Trauma 1994;36:770-73
- Raiss M, Hroa A, Moughil S, Mahfoud M, Bardouni A, Oudghiri M. Fracture de la palette humérale chez l'adulte : à propos de 63 cas. Lyon Chir 1995;91(5):397-400.
- Kamrani RS, Mehrpour SR, Aghamirsalam MR, Sorbi R, Bashi RZ, Kaya A. Pin and plate fixation in complex distal humerus fractures: surgical technique and results. International Orthopaedics (SICOT) 2012;36:839-844.
- Duparc F, Selva O, Bocquet G, Ahomine JM. Résultats à long terme du traitement chirurgical des fractures de l'extrémité distale de l'humérus. Pathologie chirurgicale du coude ; Masson. 1999, 103-111
- Patela J, Motwania G, Himanshu S, Daveswar R. Outcome after internal fixation of intraarticular distal humerus (AO type B & C) fractures: Preliminary results with anatomical distal humerus LCP system. JCOT. 2017;8:63-67.
- Ring D, Jesse B, Jupiter J. Articular fractures of distal part of the humerus. The J.B.J surg 2003;85(2): 232-238.
- Roques B. Fracture de l'extrémité inférieure de l'humérus. Pathologie chirurgicale du coude 1999;8:91-8.
- Ramachandran G, Vishal S, Ramesh CB, Rajender KV. Clinico radiological Outcome Analysis of Parallel Plating with Perpendicular Plating in Distal Humeral Intra-articular Fractures: Prospective Randomised Study. Journal of Clinical and Diagnostic Research 2017;11(2):13-16.
- Sanjiv K, Sudhir S, Dharmender K, Neeraj K, Reetu V. Intercondylar Humerus Fracture- Parallel Plating and Its Results. Journal of Clinical and Diagnostic Research. 2015;9(1):01-04.