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Research Article

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Screwed Plate Treatment for Diaphyseal Fractures of Humerus: Case of 15 Patients

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Abstract

Therapeutic arsenal for humeral diaphyseal fractures is huge. It ranges from non-operative treatment to various osteosynthesis techniques by exofixation or endofixation. The goal of our study is to determine the place of screwed plate on diaphyseal fractures of the humerus. We gathered 15 cases of humeral diaphyseal fractures treated by screwed plate out of 106 (14%). The average age of our patients was 37.13 years. The fracture was isolated in six (6) cases and associated with other fractures of 9 patients. The site of the fracture line was at the middle third in 73.3% of cases. The line was transversal in 53.3% of cases, oblique in 20% and comminuted in 6.7% of cases. The average operating time was 13.2 days. All of our patients were treated by dynamic compression plates (DCP). Consolidation was obtained in all of patients over an average time of 74 days. The mean evaluation follow up is 22.2 months. Results, according to the STEWART and HUNDLEY score, were judged excellent in 93.3% of patients. The scar was unaesthetic in 33.3% of cases. Three complications noted were mal union, radial nerve palsy and the infection of the operating site. Osteosynthesis by screwed plate of humeral diaphyseal fractures, though appropriate for specific fractures, gives good clinical results.

Keywords: Fracture, Humerus, Screwed Plate

Introduction

Diaphyseal fractures of the humerus are defined as a solution of continuity for humeral diaphysis delimited in proximal by pectoral muscle insertion and in distal by brachialis muscle [1]. They are easy to diagnose and can be serious when complications occur especially lesions of radial nerve and mal union. Theses fractures can be treated non operatively or by surgery. Surgical treatment consists of osteosynthesis that can be done whether by screwed plate, intra medullar nailing, Kirschner wires or by external fixation [1]. Surgical treatment with screwed plate is of great importance because it allows perfect reduction of the fracture and favors early mobilization of the limb [2].

The main goal of our research was to assess recent diaphyseal fractures of humerus treated by screwed plate at Orthopedics and Traumatology ward of ARISTIDE LE DANTEC Hospital in Dakar, Senegal.

Presentation of the Series

We conducted a retrospective and descriptive study over a period of 8 years on 15 patients having humeral diaphyseal fractures treated by screwed plate. To assess our results, we used the STEWART and HUNDLEY score [3] (Table 1) to estimate pain intensity, elbow or shoulder amplitude limitation and the presence of an angulation at X-ray photography.

Table 1: Score of STEWART and HUNDLEY [3]

Result	Pain	Amplitude	Angulation
Very good	Nil	Normal	None
Good	Climatic	Stiffness < 20°	< 20°
Fair	After an effort	Stiffness between 20° and 40°	> 20°
Bad	Persistent	Stiffness > 40°	Mal union

The average age of our patients was 37.13 years with a minimum of 22 years and a maximum of 63 years. All of our patients fractured their right side while 60% of them were left-handed.

Associated lesions were reported in nine patients: four (4) cases of polytraumatism, four (4) cases of polyfracture and one (1) case of an open fracture. Isolated fractures were observed in six (6) patients. In 73.3% of cases, the site of the fracture line was at the middle third corresponding to pattern D4 according to HACKETHAL classification modified by DE LA CAFFINIERE [4] (Table 2). The line was transversal in 53.3% of cases, oblique in 20% and comminuted in 6.9%.

Table 2: Distribution of 15 patients according to AO classification [7] and Hackethal classification modified by De La Caffinière [4]

	D1	D2	D3	D4	D5	D6	Total
12A1	0	0	0	0	0	0	0
12A2	0	0	0	1	2	0	3
12A3	0	0	0	7	1	0	8
12B1	0	0	0	0	0	0	0
12B2	0	0	0	2	0	0	2
12B3	0	0	0	0	0	0	0
12C1	0	0	0	0	1	0	1
12C2	0	0	0	1	0	0	1
12C3	0	0	0	0	0	0	0
Total	0	0	0	11	4	0	15

The average operating time was 13.2 days with a minimum of one and a maximum of 55 days. We treated all of our patients with dynamic compression plates (DCP). We put on 80% of compression plates without beforehand screwing, 60% of fixed plates with 8 cortical screws.

Results

Clinic And Anatomic Results

Consolidation was obtained in all of our patients over an average time of 74 days (from 55 to 113 days). The mean evaluation follow up is 22.2 months. According to STEWART and HUNDLEY [3] score, results were excellent in 93.3% of patients. The scar was unaesthetic in 33.3% of cases.

Complications

Postoperative complications were marked with one case of iatrogenic radial nerve paralysis which recovered completely after six (6) months, one case of mal union surgically treated by a plate of LECESTRE, one case of material dismantling on an infection of operating site treated by plate removal and antibiotic treatment with skin wound healing and an excellent consolidation after 21 months.

Discussion

Screwed plate was often indicated in patients with associated lesions contrary to the series of Paris, et al. and Bezes, et al. where it was indicated in patients with an isolated humeral fracture [2, 5]. In fact, since 1970 a consensus was reached in favor of screwed plate for both isolated fractures and fractures associated with lesions [6]. According to AO classification, fractures of type A were concerned with this indication [7].

The use of neutralizing plate was frequent in the series of Bezes, et al. at a rate of 76.82% against 20% in our series. These results are often attributed to the transversal character of the fracture line, which is not favorable to putting a compression screw in our series. On the contrary, putting preliminary compression screws should be done without devascularizing fragments and it's not a factor for malunion. It is an operating technique and vascularization should be respected [2].

Our plate was fixed with at least six (6) screws. In fact, the Association of Osteosynthesis has clearly stressed on the necessity of making a rigid setting by compression relevant to the location of the fracture and with six (6) or eight (8) cortical at both sides of the fracture site (a plate with at least 7 holes) [8]. The compression

of the fracture site is acquired by a plate known as DCP with oval holes or holes plate stretcher or with screws set in compression through the site in association with neutralizing complementary plate. Biomechanics studies have shown the stability of such settings and their quality when compared to other osteosynthesis techniques, especially endomedullar techniques [9-11].

In our series, a low rate of mal union is an accordance with the results in the series of Bezes, et al. contrary to a higher rate in the series of S. Plaweski, who attributes the result to the diversity and the operators' relative inexperience [2, 12]. The iatrogenic paralysis of radial nerve radial in our research was limited to a single case in agreement with information in the literature. Osteosynthesis with screwed plate has many advantages. The most important is the absence of immobilization. Other advantages that result from this immobilization are the absence of shoulder and elbow stiffness, the absence of algodystrophy and osteoporosis of upper limb and the possibility of undertaking a normal activity soon after the synthesis except for daunting exercises or activities [2, 6].

The ostheosynthesis by intra medullar nailing in the series of Tanglang et al. revealed a slight high rate of post-operative mal union contrary to the bundle nailing using K wires results of Dieme et al. [13, 14].

Intra medullar nailing is not invasive and preserves vascularization in addition to fracture hematoma. Its intramedullary location also provides it with advantageous biomechanical characteristics. However, the introduction of proximal locking screws subject to the lesion of circumflex nerve [15, 16]. Also from distal part, locking with screws has neurological risks for radial nerve, muscles and skin [17, 18].

Finally, Chapman et al. and Mac Cormack et al. in comparative prospective research on nailing and osteosynthesis with plate, have concluded that every technique has specific complications but with comparable results [19, 20].

Conclusion

Osteosynthesis with screwed plate for humerus shaft fractures used to be the treatment of reference for polytraumatism and initial radial nerve palsy in the past has acquired wide application in the treatment of isolated fractures at the expense of constraining and demanding non operative treatment. Functional result and the reliability of this technique depend on complying with codified osteosynthesis rules edited by Switzerland's Association of Osteosynthesis. Osteosynthesis ensures perfect anatomic reduction and contributes to early mobilization of adjacent joints.

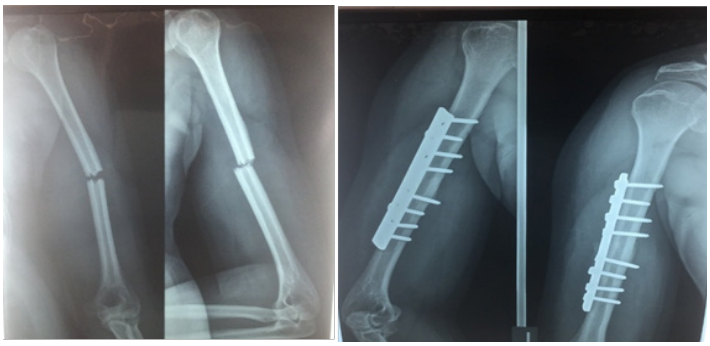
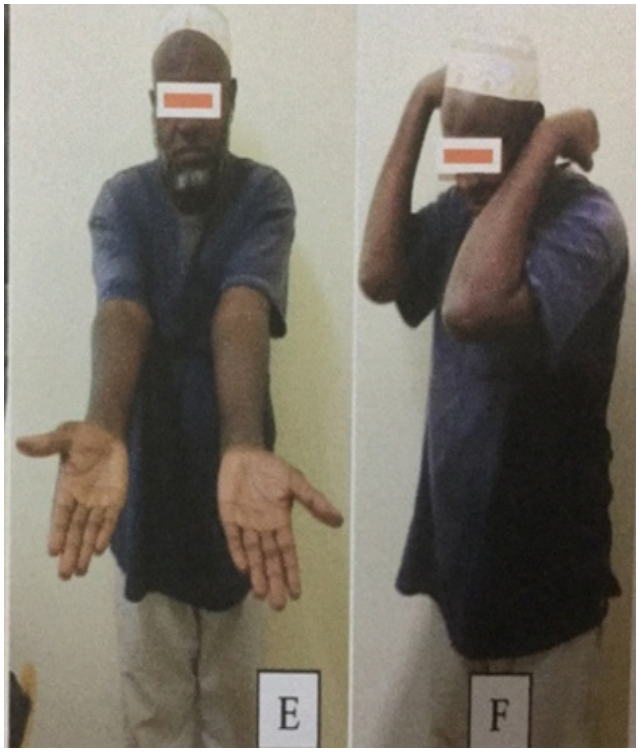


Figure 1: anatomic and complete consolidation of fracture assessed to post operating M6.



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