

## Management of Humeral Fractures in a Resource Poor Region in North-Western Nigeria

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### Abstract

**Background:** Humeral fractures can occur alone or as part of associated injuries in polytrauma. We aim to document the pattern and management of these fractures in our sub-region.

**Patients and Method:** This was a retrospective study of all cases of humeral fractures that presented at our outpatient and emergency departments from January 2012 to December 2014. Information obtained includes age, sex, mechanism and pattern of injury, treatment offered and outcome. Level of significance was  $< 0.05$

**Results:** A total of eighty cases were seen with a M: F ratio of 4.3:1. Thirty-three percent of patients were between 31-40 year and the left humerus was affected in 51.3%. Road traffic accident was the commonest mechanism in 71.3%. Eighty-five percent of cases were closed fractures and diaphyseal fractures constituted 56.3%. Oblique fracture pattern was the commonest in 42.5% followed by transverse in 23.8%. There were associated injuries in 52.5% of cases. Eighty-four per cent of patients presented within 72 hours of injury while 11.3% of patient had prior treatment by Traditional bone setters (TBS). Complications at presentation in those with prior TBS intervention was statistically significant ( $P=0.005$ ). Treatment offered were cast splintage in 57.5%, open reduction and internal fixation in 17.5%. Amputation was done in 5.0% of cases. Wound sepsis (5.0%), elbow stiffness (2.5%), chronic osteomyelitis (2.5%) were the encountered post intervention complications.

**Conclusion:** Fractures involving the humerus are mainly diaphyseal and cast splintage is the commonest mode of management in our sub-region.

**Keywords:** Humeral fractures; Resource poor society

### Introduction

Humeral fractures can occur alone or as part of associated injuries in Polytrauma. Injuries involving the humerus cuts across all ages and the mechanism of injury varies from Road traffic accidents, falls and assault. Fractures involving the proximal humerus occurs commonly in elderly osteoporotic females. Humeral shaft fractures can occur as a result of a direct blow or fall on the outstretched arm and is also the site of pathological fractures. The true incidence of humeral fractures in our environment is not known, however the incidence is dependent upon age and gender, with an overall bimodal distribution due to a peak incidence for males between 20 to 30 years old and a second peak for older females aged between 60 and 70 years [1]. Humeral shaft fractures are a relatively common fracture presenting to trauma services worldwide, with an incidence of 13 per 100000 per year [2]. Distal humeral fractures are uncommon and are associated with a high morbidity and could be intra-articular. Management of humeral fractures varies from cast immobilisation to internal fixation. Non-operative management of humeral shaft fractures using functional bracing is the currently accepted gold standard of treatment [3]. When splints and casts are used, it usually involves the immobilization of the shoulder and elbow joints and this would often result in subsequent stiffness to the joint once the treatment regimen was complete [4]. Sarmiento et al. recognized this morbidity and described the outcome of functional bracing for the treatment of humeral shaft fractures [5]. This functional brace is applied to the arm once acute pain and swelling subside and is recommended as soon as possible, once the patient can tolerate it. Humeral shaft fractures may serve as a predictor of potential intra-abdominal pathology [6]. We therefore aim to document the pattern and management of these fractures in our sub-region.

### Patients and Method

This was a retrospective study of all cases of humeral fractures that

presented at our outpatient and emergency departments from January 2012 to December 2014. Cases seen at the outpatient were those with delayed presentations. Those that presented at the emergency were those with acute injuries. Information obtained includes age, sex, mechanism and pattern of injury, treatment offered and outcome. Statistical analysis was done with IBM SPSS 20. Results are presented in tabular and graphical forms. Level of significance was  $<0.05$ .

### Results

A total of eighty cases were seen over a three-year period with a M: F ratio of 4.3:1 (Figure 1). Thirty-three percent of patients were between 31-40 years while 15% of patients were under the age of 10 years (Table 1). The left humerus was affected in 51.3% of cases. Eighty-five per cent of cases were closed fractures and humeral shaft fractures constituted 56.3% while distal fractures were 21.3% (Table 2). Road traffic accident was the commonest mechanism of injury with 71.3% while Domestic accident was responsible in 11.3% of cases followed by fall from height in 7.5% of cases (Table 3). Oblique fracture pattern was the commonest in 42.5% followed by transverse in 23.8% (Table 4). There were associated injuries in 52.5% of cases with Head injury constituting 11.3%, femoral fractures and elbow dislocation (8.8%) respectively

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Received November 27, 2015; Accepted December 21, 2015; Published December 29, 2015

Citation: Oboirien M, Ukwuani S (2015) Management of Humeral Fractures in a Resource Poor Region in North-Western Nigeria. J Trauma Treat 4: 279. doi:10.4172/2167-1222.1000279

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(Table 5). Eighty- four percent of patients presented within 72 hours of injury while 3.8% of patients presented later than 6 weeks. Those that had prior intervention by traditional bone setters were 11.3%. Complications at presentation include gangrene (5.0%), non-union (2.5%), mal-union (1.3%) and was statistically significant (P=0.005) in those with prior TBS intervention (Table 6). Treatment offered were cast splintage in 57.5%, open reduction and internal fixation in 17.5%. Amputation was done in 5.0% of cases (Table 7). Wound sepsis (5.0%), elbow stiffness (2.5%), chronic osteomyelitis (2.5%) were the post intervention complications (Table 8).

## Discussion

Road traffic accidents are a major aetiological factor in humeral injuries in our sub-region. Motorcycles are a major means of transportation and injuries resulting from motorcycle accidents are varied. This is reflected in the ages of those mostly affected which were

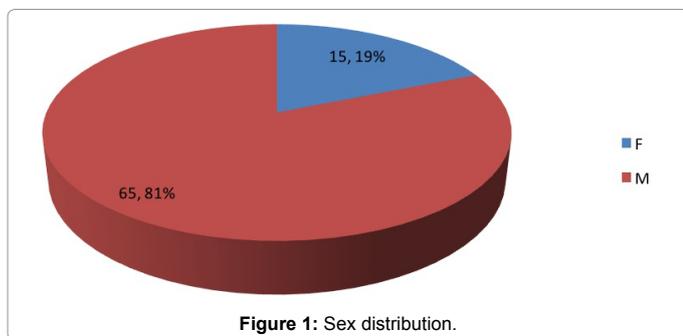


Figure 1: Sex distribution.

Age Group	Frequency	Percentage
0-10	12	15.0
10-20	5	6.2
21-30	20	25
31-40	26	32.5
41-50	12	15
51-60	2	2.5
60-70	3	3.8
<b>Total</b>	<b>80</b>	<b>100.0</b>

Table 1: Age distribution of patients.

Radiologic location of fracture	Frequency	Percent
Diaphyseal	45	56.3
Distal	17	21.3
Proximal (Anatomic neck)	6	7.5
Proximal(Surgical)	8	10.0
Salter Harris 1	2	2.5
Not Indicated	2	2.5
<b>Total</b>	<b>80</b>	<b>100.0</b>

Table 2: Radiologic location of fracture.

Mechanism of injury	Frequency	Percent
Animal Attack	2	2.5
Assaults	1	1.3
Domestic accident	9	11.3
Fall from a height	6	7.5
Gun Shot Injuries	3	3.8
Industrial accident	2	2.5
Road traffic accidents	57	71.3
<b>Total</b>	<b>80</b>	<b>100.0</b>

Table 3: Mechanism of injury.

Pattern of fracture	Frequency	Percent
Comminuted	13	16.3
Oblique	34	42.5
Spiral	10	12.5
Transverse	19	23.8
Not indicated	4	5
<b>Total</b>	<b>80</b>	<b>100.0</b>

Table 4: Pattern of fracture.

Associated injuries	Frequency	Percent
None	38	47.5
Chest injury	1	1.3
Clavicular fracture	4	5.0
Colles fracture	1	1.3
Elbow dislocation	7	8.8
Femoral fracture	7	8.8
Hand injury	4	5.0
Head injury	9	11.3
Mandibular fracture	4	5.0
Pelvic fracture	2	2.5
Tibiofibular fracture	3	3.8
<b>Total</b>	<b>80</b>	<b>100.0</b>

Table 5: Associated injuries.

Complication at presentation	intervention B4 presentation		
	No intervention	TBS	Total
Yes	0	9	9
No	71	0	71
<b>Total</b>	<b>71</b>	<b>9</b>	<b>80</b>

P=0.005

Table 6: Complication at presentation \* intervention B4 presentation crosstabulation.

Intervention	Frequency	Percent
Amputation	4	5.0
Cast immobilisation	46	57.5
External fixation	1	1.3
ORIF (Plate and screw, intramedullary nail)	14	17.5
SAMA	15	18.8
<b>Total</b>	<b>80</b>	<b>100.0</b>

SAMA: Signed Against Medical Advice

Table 7: Intervention.

Post intervention complication	Frequency	Percent
COM	2	2.5
Elbow joint stiffness	2	2.5
No complications	57	71.3
SAMA	15	18.8
Wound sepsis	4	5.0
<b>Total</b>	<b>80</b>	<b>100.0</b>

COM: Chronic osteomyelitis; SAMA: Signed against medical advice

Table 8: Complications Post intervention.

mainly in the second and third decades. Domestic accidents and fall from height are major contributors in younger age groups. Unrestrained play at home and tendency to climb trees in search of fruits by youngsters may result in supracondylar fractures or epiphyseal injuries. Isolated humeral injuries were seen in about half of the patients while the commonly associated injuries were head injuries and skeletal injuries. Adili A et al found that patients who sustained a humeral fracture from motor vehicular collision had a significant greater number of liver

injuries, forearm/hand injuries, tibial fractures and femoral fractures [6]. The oblique fracture pattern and the mainly diaphyseal fracture pattern seen suggest a direct blow or a twisting force. In children, a supracondylar fracture pattern is seen. Early presentation at a health facility in cases of fractures will affect the outcome of management as appropriate splintage and monitoring reduces the chances of compartment syndrome. The rate of complications in those that sought traditional bone setters' (TBS) treatment was not unexpected as patronage of their services by people has continued to gain popularity. They serve as the first port of call in the community as their services are cheap and accessible [7]. Since majority of the injuries were closed, splintage was an effective mode of treatment and this is what the TBS employs without regards to principles.

Majority of our patients did well with cast immobilisation following manipulation. The shoulder and elbow joints are immobilised for an average period of six weeks and this was later converted to a functional cast brace to allow for shoulder and elbow exercises. Factors that determined this mode of treatment in our sub-region include the nature and pattern of the fracture, cost, phobia for operation, and availability of theatre space. Since most of the fractures were closed, cast immobilisation was a readily available option in management as some of the reasons while people patronise TBS is the supposedly low cost of treatment. An appropriately supervised casting and rehabilitation has been found useful in our resource poor setting. Various authors have found no remarkable difference in the healing rate between casting and operative management [8-10]. The rate of non-union is 5.5% following closed treatment of humeral shaft fractures in some studies [11]. Operative procedures done include open reduction and internal fixation with plate and screws for those with non-union and mal-union; amputations in those with gangrene from inappropriately managed supra condylar fracture especially in children. Some previous studies have indicated that consolidation time and complication rates were similar after operative and non-operative treatment. There is no evidence available from randomised controlled trials to ascertain whether surgical intervention of humeral shaft fractures gives a better or worse outcome than no surgery [12]. Debridement and temporary application of external fixators were also done in those with open fractures. Those that decline treatment after initial visit may have preferred a TBS intervention or treatment in some other facilities. The complication of elbow stiffness was seen in those with cast

immobilisation and this was managed with functional cast bracing and physiotherapy.

## Conclusion

Fractures involving the humerus are mainly diaphyseal and despite the advances made in other climate with regards to operative management of these fractures, cast immobilisation and physiotherapy remains the commonest mode of management in our sub-region.

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