

Management of Femoral Shaft Fractures in a Tertiary Centre, South East Nigeria.

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ABSTRACT

Background: The femur is the longest and strongest bone in the body. The long straight part of the femur is the shaft. The femoral shaft is circumferentially padded with large muscles. A femoral shaft fracture is a fracture of the femoral diaphysis occurring between 5cm distal to the lesser trochanter and 5cm proximal to the adductor tubercle. This occurs more in young adults. Femoral shaft fractures results from a high energy injury. The forces can be by direct, indirect or a combination of both.

Objective: To determine the cause, pattern of femoral shaft fractures, treatment modalities and their clinical outcome.

Methods: This is a hospital based retrospective study of all patients managed for traumatic femoral shaft fracture over a six year period. Children were excluded from this study. Cases with incomplete records were also excluded. Results were analyzed with Statistical Package for Social Sciences Version 17(SPSS Inc., Chicago, Illinois, USA) and presented in tables.

Results: Two hundred and seventy two (272) fractures were treated in Two hundred and forty two (242) patients. Their ages ranged from 18 to 77years with a mean age of 35.0+4.5years. More males were affected than females with a ratio of 2.4:1. Road traffic accidents were the leading cause of femoral shaft fractures (78%) followed by

falls(15%). The most common fracture pattern was oblique, accounting for 70% of cases. The treatment modalities involved included both conservative and various operative techniques. There were no differences in the average mobilization time across the operative treated fractures except for Interlocking intramedullary nailing. Complication rates varied across the various treatment modalities. Early surgical intervention showed rather decreased complication rate.

Conclusion: Road traffic accidents are the most common cause of femoral shaft fractures in our environment. Interlocking intramedullary nailing should be the modality of choice for operative treatment. Early surgical stabilization is safe in patients without co-existing multi-systemic injuries. Early mobilization improves clinical outcome.

Key Words: Femoral shaft, Cause, Fracture pattern, Treatment modalities.

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INTRODUCTION

The femur is encased in a pad of musculature, yet fractures are not alien to it. Winquist, Hansen et al (1984) classified femoral shaft fractures into four types¹. This is based on fracture comminution. The energy required to fracture the femur is usually one of high energy thus synchronous life threatening injuries may coexist.^{2,3} The shaft of the femur constitutes the portion of the femur that lies between 5cm from the lesser trochanter to 5cm proximal to the adductor tubercle.⁴ Various classification systems exist for shaft fractures, but the anatomic classification is used in this study for the simplicity it projects: proximal femoral shaft

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fractures, mid shaft fractures and distal femoral shaft fractures.¹

The incidence of femoral fracture may vary across climates, but the age of predilection ranges from 15-49 years with males having a 2-9 times more propensity to fracture than females within 15-45 years (95% CI 2.7-3.1) and females above 60 having a 2-3 times greater propensity to fracture than males (95% CI 2.1-2.4)⁵.

Treatment of femoral shaft fractures has spanned centuries. The rich history of femoral shaft fracture management reflects the challenges of maintaining anatomic alignment while encouraging early functional rehabilitation.⁶ Hippocrates (460-377BC) used manual reduction while emphasizing knee extension to avert shortening.^{4,7} By the 19th century, the advent of radiology cast a beam on the problems of mal-alignment and nonunion⁸. Today, shaft fractures are treated either non-operatively (with skeletal traction and cast brace) or operatively.

Presently, skeletal traction is largely reserved for patients who opt out of surgery. Paediatric patients are commonly managed with skin traction.^{8,9} Cast brace offers the advantage of preventing rotational bending forces¹⁰. Most importantly cast brace is used to prevent joint stiffness¹ Operative fixation on the other hand includes Kuntscher nail, Interlocking intramedullary nail and dynamic compression plate (reserved for situations in which Interlocking intramedullary nail is contraindicated)¹¹. The drawback of Kuntscher nail is the fact that weight bearing is delayed till fracture healing is complete. This is due to rotational instability. Interlocking intramedullary nail obviates the need for delay in weight bearing but may require image guidance if the procedure is to be done closed.

The aim of this study is to present our experience with some of these treatment modalities while

elucidating on treatment outcomes. We also present the spectrum of fracture patterns in our environment and outcome.

METHODS

The study is a retrospective analysis of all patients who presented with femoral shaft fractures at Nnamdi Azikiwe University Teaching Hospital, Nnewi over a 6 year period (1st January 2010 to December 31st, 2016). Relevant information for the study was extracted from the patient's case notes and theatre records. This included patients socio demographic data (age, sex, occupation), cause of fracture, pattern of fractures, associated injuries, type of treatment offered, duration of treatment, mobilization time after treatment, complications, radiographic reports and clinical assessments during period of follow up.

A total number of two hundred and sixty two (262) patients were seen over the period. Twenty (20) patients had incomplete records and were excluded from the study. Fractures of the shaft of femur in children and supracondylar fractures were excluded from this study. Patients with incomplete records were also excluded from this study. Two hundred and forty two (242) patients with complete records were included into the study.

Data obtained were used to categorize patients into groups based on fracture type, pattern, time of presentation, treatment offered, mobilization time and over all outcome viz a viz fracture healing. Data were analyzed with Statistical Package for Social Sciences Version 17 (SPSS Inc., Chicago, Illinois, USA) and presented in tables.

RESULTS

Two hundred and seventy-two (272) femoral shaft fractures were managed over the study period in two hundred and forty-two (242) patients. Thirty (30) patients had bilateral femoral shaft fractures. The fractures involved 171 (70.7%) males and

71(29.3%) females. The age ranged from 18-77 years; the mean age was 35.0 ± 4.5 years. (Figure I) Affected patients involved people from various walks of life: palm wine tappers, craftsmen, farmers, students, civil servants and traders. Road traffic accidents (RTA) constituted the major cause of injuries (Figure II). A total of 162 (67.0%) patients presented in the first 24hours following injury. While 100 (41.3%) patients had associated injuries in other systems; 53 (21.9%) had head injuries, 36 (14.9%) had blunt chest injuries and 21(8.7%) had blunt abdominal injuries.

A total of 77 (31.8%) patients had open fractures while 165 (68.2%) patients had closed fractures.

The most prominent radiologic configuration was the oblique pattern (Figure III). While 191 (70.2%) fractures had operative fixation (Dynamic compression plate, Kuntscher nail, interlocking intramedullary nail), 32(11.8%) had initial skeletal traction and eventual operative fixation. 49 (18.0%) had skeletal traction as definitive treatment. 20(8.3%) mortalities were observed. Complications occurred more in patients with open fractures. Other complications recorded included non union, malunion, limb length discrepancy as shown in table I

Figure I: Age Distribution of Patients

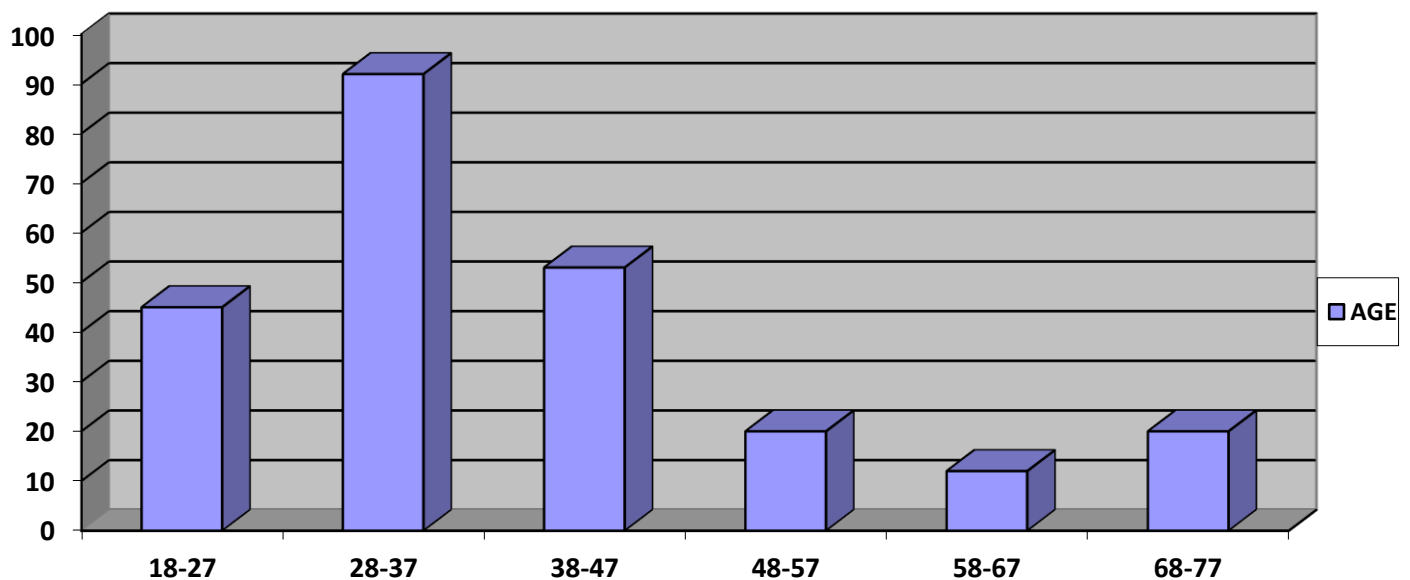


Figure II: Cause of Femoral Shaft Fracture

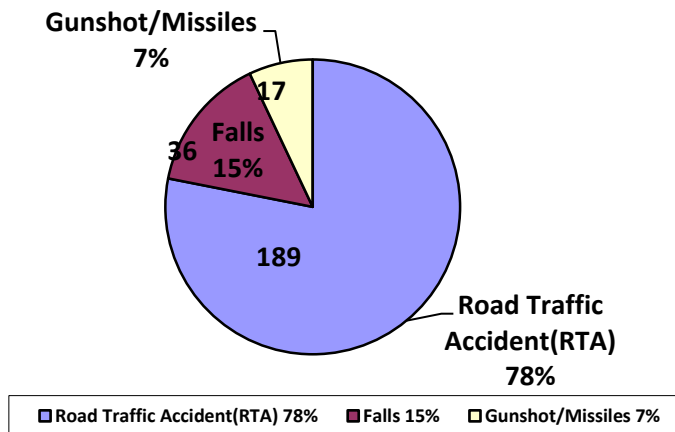


Figure III: Pattern of Fractures

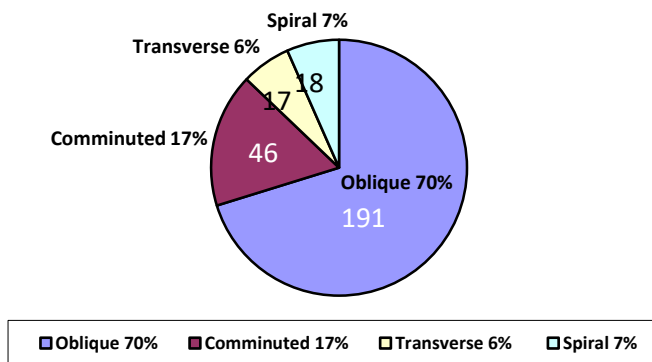


Table I: Treatment Modalities and Complications Observed

COMPLICATIONS	TREATMENT MODALITIES				
	Kuntscher nail	Dynamic Plating	Compression	Interlocking Intramedullary Nail	Skeletal Traction
Mal union	-	2	-	-	30
Non Union	7	6	-	4	10
Knee Joint stiffness	5	6	-	6	25
Growth Disturbance	-	10	-	-	-
Thrombo-embolism	-	-	-	-	3
Infection	8	7	-	5	-
Mortality	-	-	-	-	5

Table II: Treatment Type and Average Mobilization Time

Treatment Type	Frequency (%)	Average Mobilization Time (Partial Weight)
Skeletal traction	49(18.0%)	7 weeks
Skeletal traction + surgery	32(11.8%)	8weeks
Interlocking intramedullary nail	76(27.9%)	3 days
Dynamic compression plate	46(16.9%)	8 weeks
Kuntscher-nail	69(25.4%)	6 weeks

Figure IV: Pre-operative and post-operative radiograph of the right femur of a patient with bilateral segmental fractures. Retrograde interlocking intramedullary nailing was done.



Figure V: Pre-operative and post-operative radiograph of the left femur of the same patient. Retrograde interlocking intramedullary nailing was done.



DISCUSSION

In our study, we observed that the bulk of patients managed for femoral shaft fractures over this six year review period were within the age of 18-77 years and were predominantly males. This may be attributed to the fact that in the South East region of Nigeria, males are considered 'bread winners' and are said to be the more outgoing sex. They are thus more likely to be involved in road traffic accidents or falls from heights at their places of work. These findings are in tandem with those of BR Singer et al who documented a male preponderance for fracture between the ages of 15-49⁵. Singer also documented that beyond the age of 60, females are more likely to have mid shaft femoral fracture than males⁵. We however note the persistence of the male predilection even beyond the age of 60 years as all patients in this age range managed were all males. The patients in this age group however had one thing in common; all were

either palm wine tappers (an occupation prominent among the inland dwellers of South East Nigeria) or farmers. This may underscore the fact that many people in the South East Nigeria continue their bread-winning occupations even into their geriatric age.

The mechanism of injury of femoral shaft fracture in the study by Kootstra et al, was mainly road traffic accident (57-74%).⁴ Our finding here shows 78% of mid shaft femoral fractures being accounted for by road traffic accident. This high figure may be accounted for by the dilapidated state of roads in this part of the country coupled with the poor knowledge of traffic rules that is common among many road users in this part of the country. 16 (7%) patients in this study had femoral shaft fracture following missile injuries and 0.8% of cases ended up in fatalities. These fatalities were as a result of associated co-existing injuries to the abdomen and

chest from the missile. 67% of patients managed during the study period presented within the first 24 hours of injury. Of these, 12% had coexisting life threatening injuries to the chest, abdomen and head and were thus deemed unfit for immediate fracture fixation for fear of the 'second -hit' phenomenon, thus they had initial skeletal traction. 70% of fractures were managed operatively but only 32.7% of cases were considered fit for immediate fracture fixation but only 18.4% had an early fracture fixation. 14.3% of patients remained undecided on the treatment option they wanted at the initial stages of management but went on to have delayed fracture fixation.

There was no increase in complication rate following early fixation. These findings were in agreement with the work by Kutscha-Lissberg et al, that the frequency of complication is determined by the overall severity of injury rather than by the type of acute surgical treatment¹². Up to 32% of fractures that were open had debridement and dressing followed by skeletal traction as initial treatment. In our study, 20.7% of patients on skeletal traction for open injuries came down with at least one complication. This explains the reason why skeletal traction is being abandoned as a choice of treatment in the developed world.

The choice of fracture fixation in the latter period of this review was interlocking intramedullary nail (universal nail). Prior to this period, Kuntscher nail was always the preferred option. The decision to employ this modality was due to the absence of the functional image guidance at our center as at that time.

11.9% of cases that had dynamic compression plating were patients who for traditional superstitious beliefs declined an implant passing through their bone. There were no differences in complication rate between patients who had Kuntscher nail and those with dynamic compression

plating. We observed clinical healing without radiological visible callus in some patients with dynamic compression plate. This may be accounted for by the inter-fragmental compression that was perhaps done in those patients. Interlocking intramedullary nailing availed our patients the opportunity for early ambulation and reduced hospital stay, but when comparing the average mobilization time across all fracture fixation methods, there was no differences observed.

CONCLUSION

The most common mechanism of injury resulting in femoral shaft fracture in our environment remains RTA. The active age group appears to be more prone with males dominating females. Early surgical fixation does not appear to increase complication rate in stable patients. Conservative treatment with skeletal traction is associated with increased complication rate. Interlocking intramedullary nailing should be the modality of choice. Where this is not available, Kuntscher nail and Dynamic compression plating should be useful alternatives. The average mobilization time across all modalities of surgical treatment was uniform.

Ethical considerations: Ethical clearance for the study was given by the Institutional Ethics Committee

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Conflict of interest: None declared.

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