

Original Article

Assessment of the Pattern of Femoral Fractures Using X-Ray Findings of Patients Presenting at Irrua Specialist Teaching Hospital (ISTH), Irrua, Edo State, Nigeria

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ABSTRACT

Femoral fractures are common presentations at the accident and emergency sections of hospitals, generally caused by high-energy forces, and often associated with multisystem trauma. The spectrum of the fracture ranges from non-displaced fractures to severely comminuted and segmental fractures. Variation in this spectrum is dependent on the direction of the force applied and the amount of energy absorbed by the femur at the time of the fracture. This study aimed at evaluating the pattern of femoral fractures using x-ray findings of patients who presented at Irrua Specialist Teaching Hospital (ISTH), Irrua, Edo state, Nigeria, between January 2020 and December 2021. The study adopted a retrospective descriptive study design. Findings from this study on the pattern of femoral fracture recorded among the 95 patients who presented during the period under review revealed that, 58 (61.10%) were males while 37 (38.90%) were females. Patients aged 19 to 59 years were most commonly affected by femoral fractures (n = 63, 66.32%). Road Transport Accidents was identified as the leading cause of femoral fractures (n = 72, 75.80%), distal comminuted femoral fracture was the most common fracture (n = 35, 36.80%) and internal fixation was the most common treatment method (n = 40, 42.10%). It is recommended that those in charge of healthcare planning at ISTH, Irrua ensure that equipment and manpower needed for treatment of femoral fractures are readily available. Also, traffic authorities are encouraged to develop strategies aimed at reducing Road Transport Accidents (RTAs) and consequently femoral fractures amongst individuals.

INTRODUCTION

The femur is the longest bone in the human body, it has different parts which include the head, neck, greater and lesser trochanters, shaft, and the distal condyles, and fracture can occur in any of these areas.¹ As the strongest, largest, and heaviest tubular bone in the human body, it requires a considerable amount of force to fracture.² A femoral fracture (FF) is a break in the continuity of the bone involving the

femur. FFs are one of the most common fractures encountered in orthopaedic practice³ and are typically sustained in high-impact trauma, or due to an ongoing pathology which weakens the bone or isolated gunshot injuries. FFs are thus associated with significant pain, deformities, bleeding, and varying degrees of injuries.⁴ Open fractures of long bones are common in developing countries and are mostly due to the ever-increasing number of

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vehicular road traffic crashes, communal clashes, and civilian gunshot injuries.⁵ In Nigeria, functional emergency medical services are often non-existent and patients with open fractures usually present late to the hospitals, some of whom would have had some intervention by traditional bonesetters.⁵

Femoral fracture is one cause of physical disability and thus has physical, social, emotional, and economic implications. Persons who have had such fracture often endure a diminished quality of life from deformities and disabilities, posttraumatic stress, and loss of personal income. The overall effects of these injuries constitute socio-economic and psychological losses of great magnitudes particularly for any country plagued with poverty and lack of exceptional rehabilitation services.⁶ In Nigeria, defining the full magnitude of the problem of femoral fractures has been hampered by a lack of systematic information and robust empirical scientific data on the occurrence and pattern of femoral fractures. There is very limited information on national patterns of FFs.⁷ Such important scientific data elements could have constituted a trauma database useful for management of femoral fractures. Lack of systematic data generation mechanisms for FFs both at the national, state, and local government level leads to limitations in designing appropriate intervention strategies to deal with the problem of femoral fractures in the country. Adopting a public health approach with a view to tackling the problem of bone fractures should trigger the creation of a data system that provides detailed, robust, consistent and comparable information nationwide, from time to time. Analyses of such data will be crucial for highlighting the magnitude of the problem and for developing, testing, targeting, and evaluating interventions.⁸ Epidemiological studies of FFs are of great importance in the management of fractures as the information obtained will be used to plan the treatment, define priorities, and enhance the understanding of the challenging subgroups of traumas.⁹ Research efforts must therefore be channeled towards improving understanding of the patterns of femoral fractures so that planning in the health sector would be based on statistics and trends observed and analysed over a period rather than

innate feelings or expectations.¹⁰ This study was motivated by the paucity of information on the epidemiology of femoral fractures in Nigeria generally and the Edo Central Senatorial District of Edo State specifically. Thus, it aimed at evaluating the pattern of femoral fractures using X-ray findings of patients who presented at Irrua Specialist Teaching Hospital (ISTH), Irrua over a two-year period, between January 2020 and December 2021 by establishing and documenting the socio-demographic characteristics of patients as well as the pattern, cause and treatment of FFs amongst patients.

MATERIALS AND METHODS

This study adopted a descriptive retrospective study design and was limited to evaluating the pattern of femoral fracture using x-ray findings of patients who presented with FFs at ISTH. The sample population was gotten using convenience sampling method. Suitable cases were selected to form part of this study. Therefore, the sample size of this study consisted of the patients, all of whom presented with femoral fractures between January 1st 2020 and 31st December, 2021 at Irrua Specialist Teaching Hospital. However, patients who presented with femoral fractures during the period under review but were unable to undergo x-ray examination before death or discharge as well as patients with obvious congenital or acquired deformities of the lower extremity were excluded from this study. Patient radiology reports and case notes provided data needed for this study. The collected data on the socio-demographic characteristics of presenting patients as well as the pattern, cause, and treatment of FFs were extracted from the radiology reports and entered in a data collection sheet. Data obtained from this study were analyzed using Statistical Package for the Social Sciences (SPSS) version 21 and results presented using frequency tables and charts. Ethical approval (number: ISTH/HREC/20222609/380) for this study was obtained from the Research and Ethics Committee of Irrua Specialist Teaching Hospital, Irrua, Edo State.

RESULTS

In this study, evaluation of radiology reports revealed that a total of 95 patients, who met the selection criteria, presented with FFs at ISTH between January 2020 and December 2021. Sociodemographic findings from this study as well as the pattern, cause and treatment of FFs are presented below using descriptive statistics on tables (showing the frequency and percentage) as well as bar and pie charts in a logical order.

Findings of this study on the socio-demographic characteristics i.e., gender, age and occupation of the patients who had femoral fractures at ISTH, Irrua within the period under review showed that of the 95 patients, 37 (38.90%) were female while males were 58 (61.10%). Femoral fractures had a higher incidence among adults who alone accounted for 66.32% of the total recorded cases. The elderly, children, adolescents and infants formed the minority in the population. As it regards occupation of patients, it was found that 6.4% of the patient population in this study were unemployed while 32.60% were students.

The occupation of employed patients with femoral fractures ranged from trading (34.70%), civil servants (17.80%), driving (5.3%) to farming (3.20%) (Table 1).

In this study, distal comminuted femoral fracture (36.84%, $n = 35$), mid-shaft comminuted femoral fracture (26.32%, $n = 25$) and proximal comminuted femoral fracture (17.89%, $n = 17$) were the most common types of femoral fractures recorded at ISTH, Irrua in the period under review. Midshaft simple femoral fracture (7.37%, $n = 7$), distal simple femoral fracture (4.21%, $n = 4$) and proximal simple femoral fracture (3.15%, $n = 3$) were equally observed in this study. Femoral neck fracture, proximal femoral neck fracture, neck distal comminuted femoral fracture and proximal femoral fractures were the rarest categories with each having a frequency of 1 (1.05%). Comminuted fractures (at both the distal, mid-shaft, neck, and proximal sites of the femur) were found to be most occurring in this study (82.11%, $n = 78$). In consideration of the site of fracture, the most frequent site of fracture in this

study is distal (41.05%, $n = 39$), followed by mid-shaft (33.68%, $n = 32$), then proximal (22.11%, $n = 21$). Femoral fractures at the neck had a rare occurrence (3.156%, $n = 3$) (Figure 1).

The predominant cause of femoral fractures amongst patients who presented and had x-ray done at ISTH, Irrua was found to be RTA (75.80%, $n = 72$). In this study, the second leading cause of femoral fractures was found to be pathology (9.50%, $n = 9$), closely followed by falls (8.40%, $n = 8$) while gunshot (6.30%, $n = 6$), contributed the least (Figure 2).

This study revealed that 93 (97.9%) of the 95 patients with femoral fracture, received treatment at ISTH. The type of treatment commonly used for treatment of femoral fractures in ISTH, Irrua was found to be internal fixation (42.10%, $n = 40$), followed by cast (16.8%, $n = 16$), plate and screw (15.8%, $n = 15$), intermedullary nailing (10.6%, $n = 10$) and external fixation (8.4%, $n = 8$) as commonly used treatments options for femoral fracture treatment at ISTH, Irrua. Other treatments recorded in this study such as amputation, combination of cast and fixation, cast with, plate and screw as well as use of wires were seldomly used (1.1%, $n = 1$ each) (Figure 3).

Table 1: Sociodemographic characteristics of patients who presented with FFs.

Socio-demographic characteristic		Frequency	Percent
Gender	Female (F)	37	38.90
	Male (M)	58	61.10
	TOTAL	95	100.0
Age	Infant (Under 1 year)	2	2.11
	Children (1 – 11 years)	11	11.58
	Adolescent (12 – 18 years)	5	5.26
	Adult (19 – 59 years)	63	66.32
	Elderly (60 years and above)	14	14.73
	TOTAL	95	100.00
Occupation	Trading (Business)	33	34.7
	Unemployed	6	6.4
	Civil servant	17	17.8
	Driver	5	5.3
	Farming	3	3.2
	Student	31	32.6
	TOTAL	95	100.00

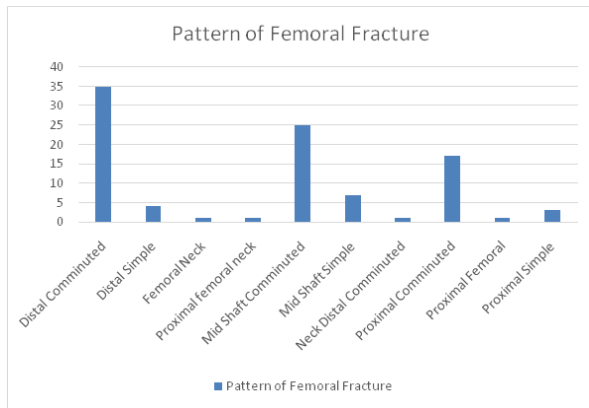


Figure 1: Pattern of femoral fracture recorded amongst patients at ISTH, Irrua.

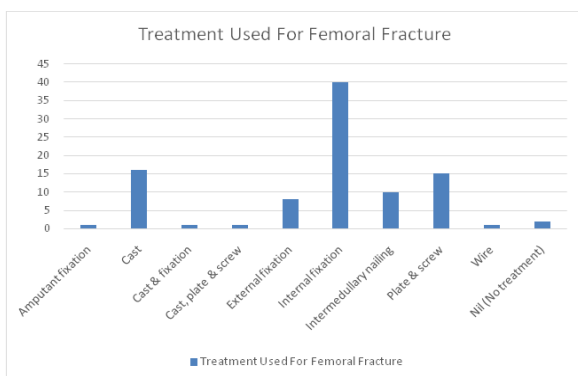


Figure 3: Type of treatment used for femoral fractures in ISTH, Irrua

DISCUSSION

Findings of this study indicated that there was a higher incidence of femoral fractures among men than women, a finding that agrees with previous research work that studied the pattern of femoral fractures and associated injuries in a Nigerian tertiary trauma centre, which recorded an incidence of 63.7% of all femoral fractures in males.⁴ This is indicative of the fact that in Nigeria, the incidence of femoral fractures is higher amongst males, possible due to the high mobile nature of males who are more likely to be involved in trauma-associated ventures such as driving, and motorcycle riding. Nwagbara and Nwabueze made a similar conclusion in the reports of their 2019 study that presented a male to female ratio of 4.3:1 amongst patients with femoral fracture at Imo State University Teaching Hospital. Similarly, a male preponderance to femoral fractures after recording a male to female ratio of 2.3:1 has been previously reported.¹¹ Analysis of the age distribution of the 95 patients recorded in this study showed an age range from 7 months to 88 years

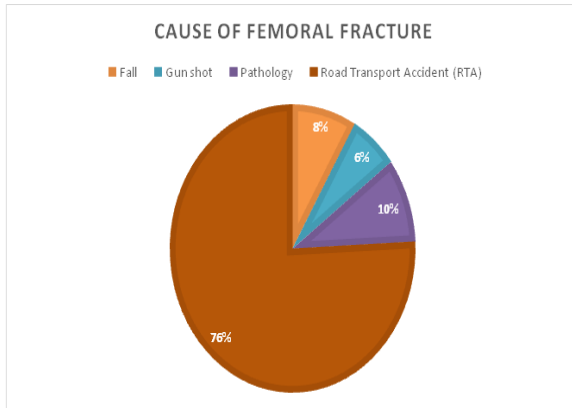


Figure 2: Cause of femoral fractures amongst patients who presented at ISTH, Irrua.

which is similar to age range identified in a previous study where the recorded age range of patients was from 3 days to 100 years.⁴ A similarity in patients age range also existed between this study and a 2020 study which recorded an age range of 16 to 105 years.¹² In this study, femoral fractures had a higher incidence among adults whose occupations were trading, civil servants, driving and farming. These identified occupations are some of the predominant occupations available in Esan land where the tertiary health facility under review is situated.¹³

In this study, distal comminuted femoral fracture, mid-shaft comminuted femoral fracture and proximal comminuted femoral fracture were the most common types of femoral fractures recorded at ISTH, Irrua in the period under review. Midshaft simple femoral fracture, distal simple femoral fracture and proximal simple femoral fracture were equally observed in this study, though in a comparatively lesser proportion. Femoral neck fracture, proximal femoral neck fracture, neck distal comminuted femoral fracture and proximal femoral fractures were the rarest categories. Comminuted fractures (at both the distal, mid-shaft, neck, and proximal sites of the femur) were found to be most occurring in this study. This finding is similar to that of a previous study which reported comminuted fractures as the most common pattern of femoral fracture observed.¹⁴ The frequent sites of femoral fracture as recorded in this study was the distal region, followed by mid-shaft and the proximal regions with femoral fractures at the neck having a rare occurrence, a finding that is in keeping with that

of Onyilo and Omoyibo which found that the most frequent site of fracture was midshaft (accounting for 43.5%), with distal site accounting for 29.3% and the proximal site accounting for 27.2%.¹⁵

The predominant cause of femoral fractures amongst patients who presented and had x-ray done at ISTH, Irrua was found to be RTA (75.80%, n = 72), followed by pathology (9.50%, n = 9), falls (8.40%, n = 8) and gunshot (6.30%, n = 6). This finding is similar to that of Nwagbara and Nwabueze who identified the most common cause of the femoral fracture injury in their study to be RTA (82.9%), of which 64.3% of cases were as a result of motorcycle accidents.¹⁶ Similarly, research has previously shown that femoral fractures were mostly caused by traumatic injuries from motor vehicle and motor cycle crashes as well as home accidents such as trivial falls within the homes.¹⁴ It has also been found that the most common etiological factor causing femoral fractures was road traffic accidents.⁴ These statistics emphasize the fact that RTAs are a major factor influencing not just bone health but also general human mortality and morbidity. The World Health Organization earlier ranked RTAs among the top 10 leading causes of death and several public health experts worldwide have also conceded that there is a global epidemic of RTA, and that RTA is the leading cause of injury-related deaths including deaths from femoral fractures.¹⁷ In Nigeria, the incidence of RTAs is high as road accidents have been identified as the third-leading cause of overall deaths as well as the leading cause of trauma-related deaths and the most common cause of disability.¹⁸ In this study, fall was identified as the third leading cause of femoral fractures to the general patient population and the second leading cause of femoral fractures among the elderly. This finding in this study on the predisposition of the elderly to femoral fractures from falls made it like reports earlier made by Anyaehie and colleagues.⁴ These reports showed that the femoral fractures amongst geriatric patients were mostly secondary to trivial falls within their homes.⁴ Pathological conditions that can cause femoral fractures include osteoporosis, metastatic disease, and infection.¹⁹ Higinbotham and Marcove, 1965 reported after their retrospective analysis that

approximately 8% of cancer patients will sustain a pathologic fracture.²⁰ In recent times, the incidence of pathologic fractures has been observed to be on the rise, primarily due to improved diagnosis and treatment of metastatic disease leading to prolonged patient survival.²¹ This increase in the incidence of pathological femoral fracture was observed in this study as pathology was responsible for about 9.50% of the femoral fractures reviewed in this study.

Treatment used for femoral fractures in Nigeria have been identified to include conservative management, open reduction, and internal fixation (using plates and screws, nails, angle and condylar blade plates, dynamic compression plates and screws), hemiarthroplasty, and external fixation for some open fractures after debridement.³ Upon data analysis in this study, it was revealed that of all the treatment modalities available, internal fixation, (using plate and screw and intermedullary nailing) and casting were the treatments commonly used for femoral fracture treatment at ISTH, Irrua. These findings differ from that of a previous study on the epidemiology and treatment of femur fractures at a northern Tanzanian referral centre where skeletal traction was identified as the most common treatment for femoral fractures (n = 85, 40%).²² However, the findings of this study are similar to those of a Nigerian based study that reported that majority of patients with femoral fractures, particularly adults were treated with operative methods including open reduction and internal fixation. (n = 629, 47.20%), plates and screws (n = 206, 15.4%), K-wires (n = 18, 1.3%), external fixation (n = 176, 13.2%) and amputations (n = 5, 0.4%). Casting, a non-operative treatment was equally used sometimes (n = 136, 10.20%) in treatment of femoral fractures.²³ The difference observed in the treatment options for femoral fractures in different studies could possibly be because the modality or treatment for managing femoral fractures in a health institution depends on several factors such as the age of the patient, etiology and site of the femoral fracture, surgeon's preference, local hospital treatment protocol, resources available in the institution and patient's request.³

CONCLUSION

This study has shown that there was at least a total of 95 patients with femoral fractures presenting at ISTH, Irrua in the two-year period. Males were more prone to femoral fractures. Distal part of the femur was identified as the site where femoral fracture was most likely to happen with comminuted fracture being the prevalent type of fracture. RTA was identified as the major cause of femoral fractures while internal fixation was the most used treatment modality. In consideration of the findings of this research, there is the need for healthcare planners at ISTH, Irrua to prioritize the availability of equipment, skilled manpower and a proper referral system needed for femoral fractures management. Also, traffic regulating agencies should consider measures such as safe mass transit systems, enforcement of traffic offenses, strengthening the licensing process for drivers and provision of good roads that can lead to a reduction in RTAs.

Recommendations

In line with the findings from this study, the researchers recommend that regulatory bodies in charge of road traffic should advance strategies to reduce the number of RTAs as it has been identified as the major cause of femoral fractures.

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Conflict of Interest

The authors declare no conflicts of interest.

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