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PATTERNS AND SHORT OUTCOMES OF PROXIMAL FEMUR FRACTURE IN SKELETALLY MATURE PATIENTS

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ABSTRACT

Background: Proximal femur fractures are a major cause of hospital admissions, especially in the elderly after low-energy trauma. They carry high morbidity, mortality, and socioeconomic burden, with outcomes influenced by fracture type, patient factors, and treatment availability. **Objectives:** To assess the different patterns of proximal femoral fracture and its effect on the outcomes in individuals who have proximal femoral fracture within 3 months post. Trauma. **Methods:** This is a prospective longitudinal study conducted at Basrah City for the duration from 1st of July 2024 till 1st of July 2025, included 104 surgically treated proximal femur fracture patients ≥18 years. Data collection covered sociodemographics, fracture type, Katz ADL index, clinical/radiological assessment, and surgical details (intracapsular/extracapsular management). Postoperative evaluation included complications, hospital stay, and follow-up at 2 weeks (clinical outcomes) and 3 months (functional status). **Results:** This prospective study included 104 patients (mean age 65.3 years, 71 (68.3%) females). Most were ≥65 years, urban residents, housewives, and 68 (65.4%) had chronic diseases (hypertension/diabetes). Intertrochanteric fractures were most common 47 (45.2%), with PFNA the main treatment 64 (61.5%). Mean hospital stay was 4.11 days, and mean time to weight-bearing 4.17 days. Intensive care unit admission occurred in 13 (13.8%), while mortality was (5.8%). Significant associations were observed: shorter admission time (P=0.044) and longer operative duration (P=0.001) in deceased patients, higher mortality with femoral neck fractures (15%, P=0.006), and arthroplasty (15%, P=0.001). Functional recovery was favorable in 63.8% (Katz Index). **Conclusions:** This study highlights that proximal femoral fractures predominantly affect elderly females of low socioeconomic status. PFNA showed superior outcomes, while delayed surgery, long operations, and poor perioperative care increased complications, emphasizing prevention, optimization, and rehabilitation.

KEYWORDS: Characteristics, Fracture, Femur, Proximal, Results.

1. INTRODUCTION

Proximal femur fractures in orthopedic practice are considered as a leading cause of hospital admission and are associated with complications affecting both mortality and morbidity.[1] As with high energy trauma, proximal femur fractures can happen in elderly after simple trauma.[2] However, they have adverse functional outcomes and a significant socioeconomic impact.[3,4] Proximal femur fractures include the neck, intertrochanteric and sub-trochanteric regions.[5] However, each fracture pattern varies in its prognosis and treatment. Treatment of the proximal fractures varies according to the fracture pattern, anatomical location, presence of pathology, age of the patients and physical activity level.[6] The same fracture pattern might be treated in different methods according to previous parameters and the availability of orthopedic implants.[7] Metastasis targets proximal femur region as a common site, making its management different from non-metastatic fractures.[8, 9]

Typically, proximal femoral fractures occur in the elderly because of low energy trauma (i.e., a fall from standing). In the UK, the last report of the National Hip Fracture database (NHFD) reveals that 91.6% of hip fractures occur in patients over 70, and 72% are females.[10] reflecting the increasing probability of falling (in the over 65 years, one in three people fall each year) and osteoporosis with advancing age.[11]

The aim of the study is to assess the different patterns of proximal femoral fracture and its effect on the outcomes in individuals who have proximal femoral fracture within 3 months after Trauma.

2. PATIENTS AND METHODS

First of all, ethical approval was granted from the Ministry of Higher Education, University of Basrah, College of Medicine, Research Ethics Committee and the Ministry of Health and Environment, Basrah Health Directorate, Training, and human resources center research unit. Informed consent from each participant was taken and all personal information was kept anonymous.

This is a prospective longitudinal study conducted at Basrah City to evaluate the short-term outcomes and different patterns of proximal femur fractures over a three-month after trauma period. For the duration from 1st of June 2024 till 1st of June 2025. One hundred and four patients presented with proximal femoral fractures who were admitted and managed by the specialist who works in Al-Basrah Teaching Hospital and treated by surgery were included in the study. The study excluded patients who are younger than 18 years of age (Skeletal Immaturity), or those with fractures occurring around previously implanted prosthetic devices or patients with proved pathological fractures such as metastatic bone disease as leading to spontaneous fractures without significant trauma. Follow up data were not obtained from those patients.

Data were collected using a questionnaire and structured clinical assessments, including; patients' sociodemographic information include age, gender, occupation residency, marital status and educational level. Patient clinical characteristics such as side of injury, type of fracture if intra or extracapsular. Furthermore, the questionnaire includes questions about the Katz ADL is an appropriate tool to assess functional status when measuring the client's ability to perform activities of daily living independently. It takes less than five minutes to perform and requires training; physiotherapists use the tool when assessing function and detect problems in performing ADL and formulate a plan care. The Index ranks adequacy of performance in six functions: bathing, dressing, toileting, transferring, continence, and feeding. One point means the person is independent; zero points means the person requires supervision, direction, personal assistance or total care.

Then each patient had a detailed clinical examination of the injured limb, assessment of pain, deformity and function, and neurovascular assessment checking for any nerve or vascular insult. After that, the patients were sent for Radiographic imaging (X-ray), However, CT or MRI were performed for complex fractures or cases where X-rays were inconclusive.

The fractures were divided into intracapsular and extracapsular fractures, and take in consideration the time for hospital admission, time for operation, time for surgical intervention and length of hospital stay. Surgical options include; closed Reduction with Cannulated Screw Fixation, open Reduction Internal Fixation (ORIF), hemiarthroplasty and total hip arthroplasty (THA). For extracapsular fractures (intertrochanteric and subtrochanteric Fractures) Surgical options include; closed reduction and proximal femoral nail antirotation (PFNA) or open reduction internal fixation (ORIF).

Postoperatively, the patients were assessed for vital signs, surgical conditions and complications until discharge. Follow-up assessment was done 2 weeks and 3 months after surgery. A two-week assessment includes physical examination, wound assessment, evaluation of early complications (ICU admission, time for weight bearing, readmission to the hospital, while three-month assessments include a functional assessment by katz index.

The data presented as mean, standard deviation and ranges. Categorical data presented by frequencies and percentages. Independent t-test (two tailed) was used to compare the continuous variables according to mortality. Chi square test was used to assess the association between mortality and certain information, while fisher exact test was used instead when the expected frequency was less than 5. A level of P – value less than 0.05 was considered significant.

3. RESULTS

A total of 104 patients participated in this study. All of them were skeletally matured and complained from proximal femur fracture and underwent surgical operation.

The distribution of study patients by general characteristics is shown in table (3.1) and figure (3.1 and 3.2). Study patients' age ranged from 47 to 81 years with a mean of 65.3 years and standard deviation (SD) of ± 8.5 years. The highest proportion of study patients was aged ≥ 65 years (76%). Regarding sex, proportion of females (no.71) was higher than males (no.33) (68.3% versus 31.7%) with a male to female ratio of 1:2.15.

In this study, 44.2% of patients were married, 39.4% finished the primary school, 61.5% were living in urban area, 64.4% were housewives, 46.2% were overweighed,

65.4% were complaining from chronic disease as HTN and/or DM.

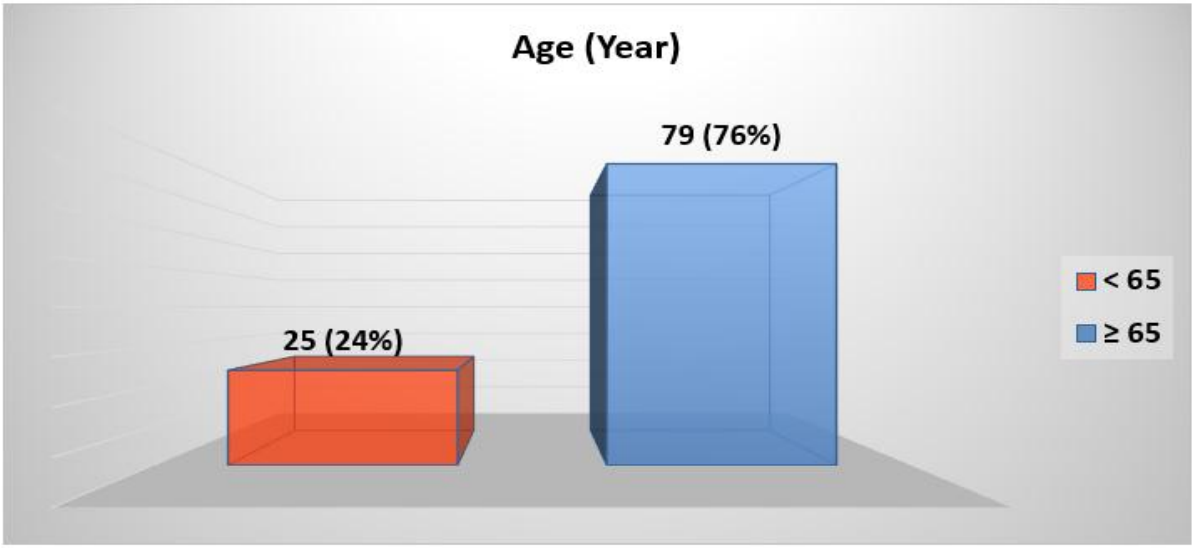

Figure 3.1: The distribution of study patients by age

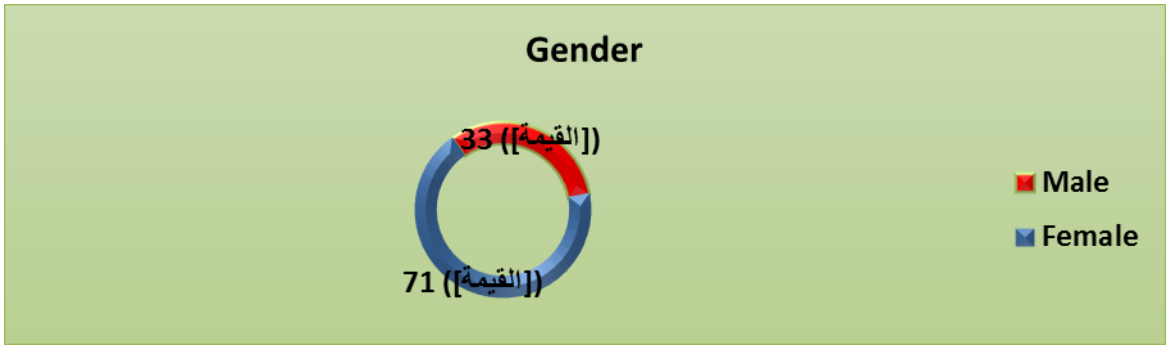

Figure 3.2: The distribution of study patients by gender

Table 3.1: Distribution of study patients by general characteristics.

Variable	No. (n= 104)	Percentage (%)
Marital status		
Currently Married	46	44.2
Unmarried(widowed,divorced)	58	55.8
Educational Level		
Illiterate	32	30.8
Primary	41	39.4
Secondary	20	19.2
College	11	10.6
Residence		
Urban	64	61.5
Rural	40	38.5
Occupation		
Employee	23	22.1
Housewife	67	64.4
Retired	10	9.7
Private work	4	3.8
Body weight		
Normal	16	15.4

Overweight	48	46.2
Obese	40	38.4
Chronic disease		
HTN and/or DM	68	65.4
Thyrotoxicosis	4	3.8
No	32	30.8

As shown in table 3.2, the right side was injured in 53.8%, the most common type of fracture was the intertrochanteric (45.2%), and 61.5% of patients were managed by PFNA.

Table 3.2: Distribution of study patients by clinical characteristics.

Variable	No. (n= 104)	Percentage (%)
Side		
Right	56	53.8
Left	48	46.2
Type of fracture		
Intertrochanteric	47	45.2
Neck of femur	40	38.5
Subtrochanteric	17	16.3
Management option		
PFNA	64	61.5
Arthroplasty	40	38.5

Table 3.2.1: Distribution of the patients by the mechanism of injury.

Variable	No. (n= 104)	Percentage (%)
Low- energy fall	**high- energy trauma**	
Intertrochanteric	43	4
Neck femur	36	4
Subtrochanteric	6	11

Tables 3.3 and 3.4 show the details of preoperative information. The time till hospital admission ranged from 30 minutes to 24 hours with a mean of 2.61 ± 4.3 hrs. The time till management ranged from 3 hours to 10 days with a mean of 2.76 ± 2.4 days. Operation time ranged from 1 to 2 hours with a mean of 1.58 ± 0.44 hours. We noticed that 46.2% of patients needed blood transfusion during operation.

Table 3.3: Details of preoperative timing.

Variable	Mean ± SD	Range
Time till hospital admission (hr.)	2.61 ± 4.3	30 mint. – 24 hrs.
Time till management (day)	2.76 ± 2.4	3 hrs. – 10 days
Operation time (hr.)	1.58 ± 0.44	1 – 2 hrs.

Table 3.4: Distribution of study patients by perioperative blood transfusion.

Perioperative blood transfusion	No. (n= 104)	Percentage (%)
Yes	48	46.2
No	56	53.8

In this study, 15.3% of patients admitted to ICU, (six) 5.8% of the total patients died. The majority of alive patients showed full function (63.3%). The time of hospital stay ranged from 1 to 11 days with a mean of 4.11 ± 2.5 days. The time till weight bearing ranged from 1 to 14 days with a mean of 4.17 ± 4.2 days as shown in figure (3.3) and tables (3.5 and 3.6).

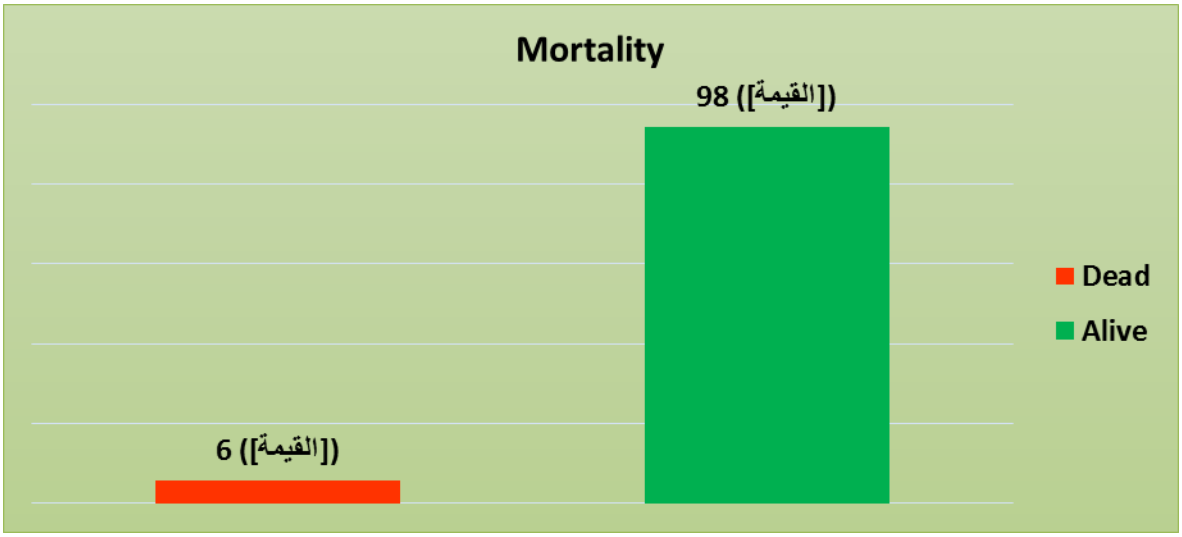

Figure 3.3: Mortality rate.

Table 3.5: Details of postoperative information.

Variable	Mean ± SD	Range
Hospital stays (day)	4.11 ± 2.5	1 – 11 days
Time till weight bearing (day)	4.17 ± 4.2	1 – 14 days

Table 3.6: Distribution of study patients by postoperative details.

Postoperative details	No. (n= 98)	Percentage (%)
ICU admission		
Yes	17	15.3
No	87	84.7
KATZ Index		
Full function	62	63.3
Moderate functional impairment	36	36.7

Time till hospital admission was significantly lower (P= 0.044), while the operation time was significantly higher (P= 0.001) in patients who died than that in those who survived as shown in (table 3.7).

Table 3.7: Comparison of certain clinical characteristics according to mortality.

Variable	Mortality		P - Value
	Died Mean ± SD	Alive Mean ± SD	
BMI (Kg/m^2)	27.5 ± 1.4	28.94 ± 4.0	**0.268**
Time till hospital admission (hrs.)	1.7 ± 0.48	2.7 ± 4.6	**0.044**
Time till management (days)	5.0 ± 3.6	2.52 ± 2.2	**0.057**
Operation time (hrs.)	2.0 ± 0	1.53 ± 0.44	**0.001**

All the patients who died was complained from fracture of neck femur (15%, P= 0.006) and all these patients underwent arthroplasty (15%, P= 0.001) with significant associations (P < 0.05) between mortality in both the type of fracture and the management option as shown in table (3.8).

Table 3.8: Association between mortality and clinical characteristics of patients.

Variable	Mortality		Total (%) n= 104	P - Value
	Died (%) n= 6	Alive (%) n= 98		
Age (Year)				
< 65	0 (0)	25 (100.0)	25 (24.0)	**0.155**
≥ 65	6 (7.6)	73 (92.4)	79 (76.0)	
Gender				
Male	2 (6.1)	31 (93.9)	33 (31.7)	**0.93**
Female	4 (5.6)	67 (94.4)	71 (68.3)	

Type of Fracture				
Intertrochanteric	0 (0)	47 (100.0)	47 (45.2)	**0.006**
Neck of femur	6 (15.0)	34 (85.0)	40 (38.5)	
Subtrochanteric	0 (0)	17 (100.0)	17 (16.3)	
Chronic disease				
HTN and DM	6 (8.8)	62 (91.2)	68 (65.4)	**0.185**
Thyrotoxicosis	0 (0)	4 (100.0)	4 (3.8)	
No	0 (0)	32 (100.0)	32 (30.8)	
Management option				
PFNA	0 (0)	64 (100.0)	64 (61.5)	**0.001**
Arthroplasty	6 (15.0)	34 (85.0)	31 (38.5)	

4. DISCUSSION

This research studying demographics, clinical patterns, surgical options and early clinical outcomes of 104 skeletally matured patients who experienced proximal femoral fracture with two types of surgical interventions. In our study the mean age of this cohort was 65.3 years and shows the majority of cohort (76%) being ≥ 65 years old. This finding is consistent with global evidence that conclude the proximal femoral fracture is more common in elderly persons due to many causes mainly osteoporosis, liability to falls and patient fragility.[12]

The predominance of females (68.3%) over males (31.7%) is also aligns with previous reports, where postmenopausal bone loss is the main contributor for that.[13] Lifestyle and the economic level were clearly playing a role in this issue, as most patients were low socioeconomic state, housewives and low education level that highlights the low awareness about bone health, ways to prevent unnecessary falls and less contact with health providers. While a low body weight was considering a risk factor for pelvic fractures, more recent studies suggest that obesity does not protect against falls but also contribute to low quality bone.[14]

Regarding clinical patterns of our cohort, the distribution of fracture types showed the intertrochanteric type (45.2%) was most common, followed by femoral neck fracture (38.5%). This picture is agreed with epidemiological reports that mentioned that the intertrochanteric one was the most fracture type in elderly patients.[15]

The majority of patients (61.5%) were treated by proximal femoral nail antirotating (PFNA), while others (38.5%) treated with arthroplasty. This reflects the orthopedic preference that shows the intramedullary fixation is considered a very good option for the unstable intertrochanteric fractures, this was aligned with study that orthopedics use cephalomedullary nails mainly for the management of intertrochanteric hip fractures.[16]

In recently published study for more than 260 patients assessed for continuous seven years to assess the clinical and radiological outcomes for patients with proximal femoral fractures treated with PFNA shows a very good results with 6% reoperation and a favorable outcome regarding implant positioning, excellent healing rate and less post operative complications.[17]

The mean time to reach hospital was (2.6 hours) consider relatively short and good, although the time to intervention was long averaging by 2.76 days, the international guidelines recommend the average of 24-48 hours for surgery as delays associated with more complications and increase the mortality and morbidity rates.[18] We observe delay in our study that for several factors (e.g.: operating room availability, referral delays etc..) make a true challenge and need to draw attention to improve it for outcomes optimization.

Approximately half of our cohort need blood transfusion perioperatively (42.2%), explaining the significant blood loss in these types of fractures and during operation as well.[19] The mean hospital stay was 4.1 days, and it was shorter than known international series, which shows 7–14-day hospital stays for such types of fractures, this short period may reflect health system policies, or on the patient or their relative preference. And the mean time for functional weight bearing was 4.2 days it was reasonable.

Functional results and outcomes in this cohort was motivational, with 63.3% were regain full independence (Katz Index), although 36.7% has moderate functional impairment but still functional and these results agreed with reports that indicate hip fractures as a well-known cause of functional disability in a critical review of 83 studies from forty two publications shows The majority of recovery of walking ability and other activities for daily living regained within 6 months after fracture. Between 40 and 60 % of patients recovered their pre-fracture state of mobility and ability to do their heavy activities of daily living, while 40-70 % regained their level of independence for basic activities of daily living. For people independent in self-care pre-fracture, 20-60 % required assistance for many daily tasks 1 and 2 years after fracture.[20]

The overall in-hospital mortality was 5.8%, and it consider relatively low comparing with global studies that shows the 30 days in-hospital mortality was 5%-10%- and one-year mortality was 20-30%, and the one-year mortality from intertrochanteric fracture is more common than femoral neck fracture.[21] This low

mortality rate may be due to short duration postoperative follow up.

Importantly, mortality was clearly linked with fracture type and intervention type. All deaths occurred in patients experienced femoral neck fractures treated with arthroplasty, yet no deaths were registered in patients managed with PFNA. Previous studies have suggested that arthroplasty, has high benefits for early mobilization, may be associated with higher perioperative risks compared to internal fixation.[22]

Of note, comorbidities such as diabetes and hypertension, was highly prevalent (65.4%), but did not show a statistically significant association with mortality in this cohort, may be due to limited sample size.

5.1. CONCLUSIONS

In summary, this research indicate that proximal femoral fractures affect old ages females predominantly that were low education and socioeconomic level. PFNA was used to treat extra-capsular fractures with quite good functional outcomes and low complications rates, while arthroplasty was used for intracapsular fractures with more complications rate (specifically mortality). Delayed surgical intervention and long duration operations were linked with more complications, emphasizing the importance of perioperative preparations. Chronic diseases like hypertension and diabetes were evident in our patient's cohort but without significant relations with patients' outcomes.

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