Pattern of Femoral Fractures


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Abstract

Background: To assess the pattern of femoral fractures.

Methods: In this descriptive study patients presenting with fracture of femur were enrolled. The relative frequencies of different fractures according to site and type of fracture, duration of hospital stay and gender and age based patterns of fracture incidence were analyzed.

Results: There were 2232 patients with femoral fractures, comprising 39% of the complete patient load. Majority (64%) were males. Age incidence was bimodal. In younger patients (≤40 years of age) mid shaft of femur was the commonest region involved (79%) and road traffic accidents were the commonest mechanism of injury (86%). In older patients (>40 years) pertrochanteric fracture was the commonest fracture (62%) and low energy falls were the commonest cause (62%). Average stay in hospital of patients with proximal femur fractures was 11 ± 5 days and that of shaft was 14 ± 7 days.

Conclusion: The fractures in the young patients were predominantly due to motor vehicle accidents, whereas the fractures in elderly often result from low energy falls, indicating presence of prior predisposition.

Introduction

A large proportion of patients admitted in the orthopaedic ward are suffering from femoral fractures. The femur is the longest, strongest and heaviest tubular bone in the human body and one of the principal load bearing bones in the lower extremity.1 Femoral fractures can cause prolonged morbidity and extensive disability unless treatment is appropriate. Complications and injuries associated with femoral fractures in the adult can be life-threatening and may include hemorrhage, internal organ injury, wound infection, fat embolism, and adult respiratory distress syndrome.2 3 A cross-sectional study was undertaken in order to assess the incidence of specific types of femoral fractures in different age groups and gender.

Patients and Methods

This was a cross-sectional study, carried out from January 2009 to December 2011, in the Department of Orthopaedic Surgery, Benazir Bhutto Hospital, Rawalpindi. All patients who presented with fracture of femur involving neck, pertrochanteric region, shaft and condylar region were included, except for those with pathological fractures and multiple fractures. Age and gender specific fracture incidence rates were measured. Patients were divided into four groups with respect to their age. Paediatric group: age 10 years and less; youth and young adults: between 11-40 years; middle age group: between 41-60 years and elderly patients more than 60 years of age.

Results

Cases of femoral fractures constituted 39% of the total patients admitted in Orthopaedic Department of BBH during the study period, followed by humerus (15%), tibia and fibula (11%) (Table 1). Majority (63.8%) were male. The mechanism of injury in 1398 patients (62.6%) was motor vehicle accidents, and in 834 (37.3%) there was history of fall from height. Fractures of shaft of femur comprised around 45% of total femoral fractures, pertrochanteric fractures 35% and neck of femur 20% (Table 2). Majority (34.6%) were in the age group of 11 to 40 years and 31.1% patients were over 60 years of age, showing bimodal trend in both male and female patients (Table 1; Fig 1).

In paediatric group fracture shaft of femur was most common (91.5% of all fractures in this age group), as was also the case in youth and young adult group in which 75.5% were recorded as femoral shaft fractures. In middle age group fracture of pertrochanteric region of femur was commonest (56.5% of all fractures in this age group). In elderly age group fracture pertrochanteric region of femur (68.4%) was also the highest (Table 1). In male patients, the commonest fracture was in the shaft of femur (54.5%
Table 1. Distribution of fractures in different age groups as percentage of total femoral fractures with gender ratios

<table>
<thead>
<tr>
<th>Age group</th>
<th>Neck of Femur</th>
<th>Pertrochanteric</th>
<th>Shaft of Femur</th>
<th>Total fractures</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤10 years</td>
<td>0.9%</td>
<td>0.4%</td>
<td>14.4%</td>
<td>15.7%</td>
</tr>
<tr>
<td>M:F ratio</td>
<td>1.22:1</td>
<td>9:1</td>
<td>2:1</td>
<td></td>
</tr>
<tr>
<td>11-40 years</td>
<td>5.2%</td>
<td>3.1%</td>
<td>26.2%</td>
<td>34.6%</td>
</tr>
<tr>
<td>M:F ratio</td>
<td>3:1</td>
<td>3.6:1</td>
<td>6.6:1</td>
<td></td>
</tr>
<tr>
<td>41-60 years</td>
<td>5.0%</td>
<td>10.3%</td>
<td>3.0%</td>
<td>18.5%</td>
</tr>
<tr>
<td>M:F ratio</td>
<td>0.81:1</td>
<td>1.03:1</td>
<td>1.28:1</td>
<td></td>
</tr>
<tr>
<td>&gt;60 years</td>
<td>8.4%</td>
<td>21.3%</td>
<td>1.3%</td>
<td>31.1%</td>
</tr>
<tr>
<td>M:F ratio</td>
<td>1.09:1</td>
<td>0.83:1</td>
<td>1.73:1</td>
<td></td>
</tr>
</tbody>
</table>

In female patients the commonest fracture was in the pertrochanteric region (48.3% of all fractures in females).

Incidence of neck of femur fracture is bimodal with an initial peak around 15 years of age and second higher peak around 65 years (Figure 2). The incidence of pertrochanteric femur fracture is very low in children but shows sharp increase after 35 year of age with peak around 65 years (Figure 3). Incidence of shaft of femur fracture is highest in children (≤10 years) which sharply decreases till 40 years and then tapers down gradually (Figure 4). Average stay in hospital of patients with proximal femur fractures was 11 ± 5 days and that of shaft was 14 ± 7 days.

Table 2: Fractures distribution

<table>
<thead>
<tr>
<th>Fracture</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hip/Femur</td>
<td>39</td>
</tr>
<tr>
<td>Humerus</td>
<td>16</td>
</tr>
<tr>
<td>Tibia/Fibula/Ankle</td>
<td>11</td>
</tr>
<tr>
<td>Knee/Patella</td>
<td>7</td>
</tr>
<tr>
<td>Radius</td>
<td>6</td>
</tr>
<tr>
<td>Pelvis</td>
<td>2</td>
</tr>
<tr>
<td>Spine</td>
<td>1</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>15</td>
</tr>
</tbody>
</table>

Discussion

The risk of sustaining a femoral shaft fracture is thought to vary in different populations. The peak occurrence of femoral shaft fractures in males from 15-24 years of age is a well-known phenomenon, but the incidence figure reported varies considerably. The incidence in this age group is reported to be as high as 64.6 per 100,000 person year.3 The annual incidence of mid shaft femur fractures has also been reported as approximately 10 per 100,000 person years.4 The incidence peaks among the young, decreasing after age 20, and then again rises in the elderly.5

From middle age overall fracture incidence in women particularly climbs steeply as bone density falls. Many fractures (e.g. the hip) have been reported to occur twice as commonly in women as in men.6,7 However, although we see a marked rise in fracture incidence with increasing age in our female patient population, it does not substantially exceed male incidence.

It has been reported that eighty percent of patients 35 years of age or older with femur fractures due to moderate trauma had prior evidence of generalized osteopenia or a condition likely to cause localized osteopenia.3 In older adults low energy falls are the most common cause, accounting for sixty-five percent of fractures. These typically occur in the home. The treatment and management demands of these diverse fractures depend upon the part of bone involved. The average number of days lost from work or school from femoral fractures has been reported as 30 if timely surgical intervention is done.8

The proximal femoral fractures in the elderly occur sometimes because of ineffective or suboptimal protective responses, cognitive impairment and fear of falling.9 Decline in visual perception, proprioception and transient circulatory insufficiencies as well as
impaired sensory motor integration and unexpected perturbations are additional determinants. Physically inactive patients are twice at risk of suffering from fracture than active adults. Due to its highly negative impact on bone health, muscle physiology, muscle mass, overall health status and on inadequate vitamin D exposure, physical inactivity is currently preferred as the most salient explanatory factor for the increasingly high hip fracture rates reported by developing countries as well as many first world countries.

Globally human population continues to age at an impressive rate. Between 1900 and 1992 the number of individuals aged 65 and above increased from 1% (15 million) to 6% (342 million) of the world’s population. By the year 2050 these figures will have risen to 20%, or 2.5 billion. The rapid growth of the senior population has already had a significant economic impact because of their unique medical requirements and the fact that seniors consume one third of country’s health care resources.

Several studies have demonstrated excess mortality in association with hip or vertebral fracture. They have found that hip fractures are associated with an overall reduction in survival of 10%-20%, with the majority of deaths occurring within the first 6 months of the fracture; they may be attributed to acute fracture complications or to surgical management. One Canadian study attempted to evaluate factors associated with poor outcome, and reported that cognitive impairment, older age, and male gender were all adverse prognostic indicators. The length of hospital stay for proximal femoral fractures in our study is comparable to other hospitals.

**Conclusion**

1. Patients with femoral fracture present the largest admission load and longest stay.
2. The frequency of fracture mid-shaft of femur is considerably large in male gender of paediatric and young adult group (less than 40 years).
3. Fractures of proximal femur like pertrochanteric and neck of femur fractures are commonest in elderly patients (more than 40 years) both male and female gender.
4. Fractures in the young patients are predominantly due to motor vehicle accidents, whereas the fractures in elderly often result from low energy falls and indicate presence of prior predisposition.
5. Public education regarding diet, exercise and safety culture can help to reduce and prevent these fractures.
6. The recognition and prevention of precipitating factors can help to reduce the incidence of femoral fractures, especially in elderly.

**References**

1. Fractures of the Lower Extremity. A. Paige Whittle; Canale and Beaty: Campbell’s Operative Orthopaedics, 11th ed. 2007 Mosby ;3190