

FREQUENCY OF IPSILATERAL FEMORAL NECK FRACTURES IN PATIENTS WITH FEMORAL SHAFT FRACTURES

E.N. Muteti, MMed Orth (Mak), FCS (Ecsa), Orthopaedic Surgeon & Lecturer, Moi University, Eldoret, Kenya, **E.K. Naddumba**, MMed(Mak), FCS(Ecsa), Director & Consultant Orthopaedic Surgeon, Nagulu Hospital, Kampala, Uganda and **S. Muwazi**, PhD, FCS(Ecsa), Consultant Orthopaedic Surgeon, Nsambya Hospital, Uganda

Correspondence to: Dr. E.N. Muteti, Moi University, P. O. Box 1998-30100, Eldoret, Kenya. Email: enmuteti@gmail.com

ABSTRACT

Background: Ipsilateral associated femoral neck and shaft fractures are reported to occur in 2.5-6% of all femoral shaft fractures.

Objective: To establish the frequency of ipsilateral femoral neck fractures amongst all patients presenting with femoral shaft fractures in Mulago Hospital.

Methodology: This was a descriptive cross-sectional study in which all patients presenting to Mulago Hospital with femoral shaft fractures were studied.

Results: One hundred and eighty five patients with femoral shaft fractures were studied over a period of 8 months. Three of these were found to have an ipsilateral femoral neck fracture; giving a frequency of 1.6%. These were caused by road traffic accidents and a fall from a height. The femoral shaft fractures were closed, middle or upper third; and AO classes A2, C1 and C3. The femoral neck fractures were displaced, intertrochanteric or basal fractures.

Conclusions: The frequency of ipsilateral femoral neck fractures in patients with femoral shaft fractures was lower than that found in other centers.

Recommendations: A multicenter study is required to find out the frequency at a national level.

INTRODUCTION

Fractures of the femur are among the most common fractures seen in orthopaedic practice (1). In a review of the records of Mulago Hospital casualty department, 360 cases of femoral shaft fractures are seen every year. Several authors have all noted the following in their reports: 2.5% to 6% of femur shaft fractures are associated with an ipsilateral femoral neck fracture; 20% to 30% of the associated neck fractures are missed during the initial evaluation of the patient; and nearly one third of these are detected after intramedullary nailing of the shaft fracture, which makes treatment of the neck fracture very difficult (1-7).

These dual fractures which occur in the young adult with an average age of 30 years are associated with high velocity accidents and accompanied by multiple system trauma (7). Consequently, the more obvious and life-threatening injuries are noted, while the femoral neck fracture is missed (1, 3). The radiographic appearance of the neck fracture is unique in that it is usually undisplaced and hence less obvious; while the shaft fracture is markedly comminuted and obvious (2, 7, 8).

MATERIALS AND METHODS

This was a descriptive cross-sectional study carried out at Mulago Hospital which involved all patients with femoral shaft fractures admitted to Mulago Hospital and consented to participate in the study. Using the

formula described by Leslie and Kish, 1965, the sample size for the study was determined to be 185 patients.

The study variables included:

- (i) Socio – demographic characteristics
- (ii) Clinical features:
 - associated injuries
 - mechanism of injury
- (iii) Femoral radiographs:
 - shaft fracture characteristics
 - neck fracture characteristics

The following procedures were used:

- (i) All patients with femur shaft fractures were admitted according to the hospital protocol in the emergency ward overnight.
- (ii) Principal investigator interviewed, with consent, those patients who presented to the Emergency unit of Mulago Hospital with femoral shaft fractures.
- (iii) Physical examination of the patient was carried out in a comfortable, well-lit examination room in the presence of a chaperone in the emergency ward.
- (iv) X-rays of the femur (AP and lateral views), hip (AP and lateral) and pelvis (AP view) were taken. The X-rays were interpreted with the help of a radiologist for fractures of the neck and shaft regions of the femur, which were then classified according to Garden's and AO classifications; respectively.

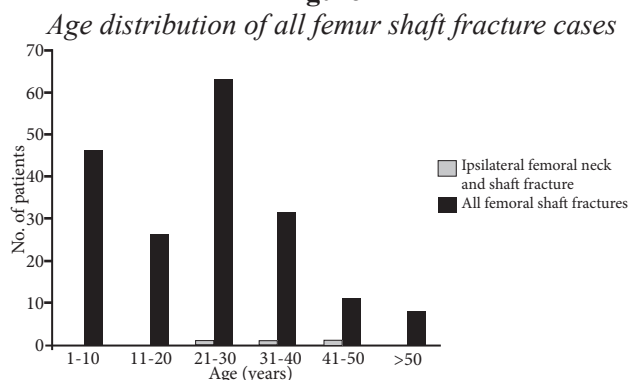
(v) Tools for data collection

- A coded questionnaire was used for collecting data.
- The patient or attendant(s) was interviewed.

RESULTS

Frequency of ipsilateral femoral neck fractures amongst patients with femoral shaft fractures: A total of 185 patients with femoral shaft fractures were seen over the study period of 8 months (April 2004 to December 2004). Three of these patients had an associated ipsilateral femoral neck fracture. This gives a frequency of 1.6%.

Social demographic characteristics: There were 138 males (75%) and 47 females (25%) seen in this study. The youngest patient seen was 1 year old while the oldest was 94 years old, giving a range of 94 years. The mean age was 24.21 years. The median age was 24 years, while the mode was 40 years. The most common age group of all the patients with femoral shaft fractures was the 21-30 year age-group accounting for 34.1% followed by the 1-10 year age-group (24.9%) and then the 31-40 year age-group (16.8%). The three patients with an ipsilateral femoral neck fracture were male and were distributed equally in the age-groups 21-30 years, 31-40 years and 41-50 years (Figure 1).

Figure 1

Mechanism of injury: Two of the three patients with associated ipsilateral femoral shaft and neck fractures had been involved in a road traffic accident while the third had fallen from a height.

Point of impact: The point of impact in two of the patients with ipsilateral femoral neck and shaft fractures were foot and thigh, respectively; with one being undetermined.

Presence of a wound (open fracture): All the femoral shaft fractures were closed in the patients with ipsilateral neck fractures.

Associated injuries: All the three patients with ipsilateral femoral neck fractures had associated injuries. Two of them had multiple injuries (head, chest, spine), while the other had maxillofacial injuries.

Fracture patterns: Two of the patients with ipsilateral femoral neck fractures had middle third femoral shaft fractures. The other was in the upper third. The femoral

shaft fracture pattern were AO classes A2, C1 and C2. The ipsilateral femoral neck fracture location was basal in two and the other was intertrochanteric. These fractures were displaced: Garden IV basal femoral neck fracture and a displaced intertrochanteric fracture.

DISCUSSION

Frequency: The overall frequency of ipsilateral femoral neck fractures amongst patients presenting with a femoral shaft fracture in Mulago Hospital was 1.6%. Most investigators quote a prevalence rate of 2.5 to 6% (1, 3, 7, 9). Consequently, this prevalence rate is lower. This may be attributed to diagnostic methods since CT scans were not used to detect very subtle femoral neck fractures as advocated by Yang *et al* (10) because of cost implications. However, Alho (2) in his review of 722 cases quotes a much wider prevalence of 0.8 to 8.6% which is more in keeping with the finding in this study.

Secondly, it is unclear from literature review whether these higher prevalence rates included patients diagnosed to have an ipsilateral femoral neck fracture after surgery. This group was not part of the study population in this study and may explain the lower rate found in this study.

Age and sex distribution: Out of the 185 femoral shaft fracture patients, 138 (75%) were males and 47 were females; giving a male to female ratio of 3:1. This is consistent with the tendency for males to be involved in risky activities. All the three patients with an ipsilateral femoral neck and shaft fracture were males. This is most likely related to the larger male population with femoral shaft fractures that these cases have been drawn from. It is note-worthy that even in literature males were predominant (2, 3,7-9, 11-14).

The three male patients with an ipsilateral femoral neck fracture were equally distributed in the 21-30, 31-40 and 41-50 year age-groups. The fracture was not found in children and the elderly, which is consistent with other literature (3,10).

Mechanism of injury: Two of the ipsilateral femoral neck and shaft fractures were as a result of road traffic accidents while the third was due to a fall from a height. These were high velocity injuries (7). The point of impact could not be determined in one of these patients due to accompanying head injury; while the foot (suggesting an axial longitudinal force) and thigh were the points of impact in the other two, respectively. The suggested mechanism of causation of this fracture combination is axial (longitudinal) compression forces usually acting at the foot of the extended lower extremity, or a bent knee.

Associated injuries: These femoral shaft fractures are due to high- energy trauma (eg road traffic accidents) as discussed above, which causes injuries in other body regions. Two of the patients with the ipsilateral femoral neck and shaft fracture combination had multiple

injuries. These included head injury, spine injury and chest injury with lung contusion in one patient; while the other sustained head injury and a radius fracture. The third patient had polio of the involved lower limb and had maxillo-facial injuries as well. It is evident that these were severely multiple injured patients and similar patterns were noted by Zettas & Zettas (7). No fractures of the foot, tibia or patella were noted in these patients.

Fracture characteristics

Femoral shaft fracture patterns: The narrowest and conceivably the weakest point of the femoral shaft is the isthmus which is located in the middle third. This is the site of the fracture in two of our three patients with ipsilateral femoral neck and shaft fractures. Two of the three had comminuted/complex femoral shaft fracture pattern. This indicates that this latter group is more likely to be caused by a higher magnitude of force than an isolated femoral shaft fracture.

Femoral neck fracture pattern: Only three of the one hundred and eighty five femoral shaft fractures were associated with an ipsilateral femoral neck fracture, making this a rare injury in our set-up. Two of these fractures were basal while one was intertrochanteric. This is consistent with previous studies in literature and indicates that the forces cause a buckling of the femoral shaft and shearing force at the base of the femoral neck. These femoral neck fractures were all displaced (garden IV). This is unlike Schatzker and Barrington's cases in which the fractures were minimally displaced (14). This may be a result of higher forces or the handling of the lower extremity at the scene of accident and during the ensuing transfer of the patient to the hospital.

CONCLUSION

The frequency of an ipsilateral femoral neck fracture in patients with femoral shaft fractures in Mulago Hospital is 1.6% which is lower than in literature (1,3,7,9).

RECOMMENDATIONS

- (i) Ipsilateral fractures of the femoral neck should be suspected in all patients with femur shaft fractures.
- (ii) A similar study needs to be undertaken over a longer duration or a multicenter study so as to get a more complete picture of the frequency of this problem.

REFERENCES

1. Crenshaw, A.H., Daugherty K., Campbell W.C., (Eds) (1992). Campbell's Operative Orthopaedics, 8th ed. (pp.883-884), Missouri, Mosby-Year Book Inc.
2. Alho, A. Concurrent ipsilateral fractures of the hip and shaft of the femur. A systematic review of 722 cases. *Ann Chir Gynaecol.* 1997; **86**(4): 326-336.
3. Casey, J.M. and Chapman, M.W. Ipsilateral concomitant fractures of the hip and femoral shaft. *J Bone Joint Surg.* 1979; **61-A**: 503-509.
4. Daffner, R.H., Reimer B.L. and Butterfield, S.L. Ipsilateral femoral neck and shaft fractures: an overlooked association. *Skeletal Radiology.* 1991; **20**(4): 251-254.
5. Konig, G., Bergen, P. and Suren, E.G. Femoral shaft fracture and secondary diagnosis of ipsilateral femoral neck fracture. Typical constellation or a complication of a distal femoral nail? *Unfallchirurg.* 2002; **105**(7):656 – 659.
6. Swiontkowsky, M.F. Ipsilateral femoral shaft and hip fractures. *Orthop Clin North Am.* 1987; **18**:73- 83.
7. Zettas, J.P. and Zettas, P. Ipsilateral fractures of the femoral neck and shaft. *Clin Orthop.* 1981; **160**:63.
8. Bernstein, S.M. Fractures of the femoral shaft and associated ipsilateral fractures of the hip. *Orthop Clin North Am.* 1974; **5**: 799- 818.
9. Koldenhoven, G.A., Burke J.S. and Pierron, R. Ipsilateral femoral neck and shaft fractures. *South Med J.* 1997; **90**(3):288-293.
10. Yang, K.H., Dan, D.Y., Park, H.W., *et al.* Fracture of ipsilateral neck of femur in shaft nailing: Role of CT in diagnosis. *J. Bone Joint Surg (Br).* 1998; **80- B**: 673- 678.
11. Bucholz, R. and Rathjen, K. Concomitant ipsilateral fractures of the hip and femur treated with interlocking nails. *Orthopaedics.* 1985; **8**:1402- 1406.
12. Kimbrough, E.E. Concomitant unilateral hip and femoral shaft- a too frequently unrecognized syndrome. *J Bone Joint Surg.* 1961; **43-A** : 443- 449.
13. Bennett, F.S., Zinar, D.M. and Kilgus, D.J. Ipsilateral hip and femoral shaft fractures. *Clin Orthopaedics.* 1993; **296**: 168-177.
14. Schatzker, J. and Barrington, T.W. Fractures of the femoral neck associated with fractures of the same femoral shaft. *Can J Surg.* 1968; **11**: 297.