ABSTRACT

Background: Magnitude of fracture neck of femur associated with ipsilateral fracture shaft of femur is rare and challenging in terms of diagnosis and management. Fracture neck of femur is associated with 0.8-9% of ipsilateral fracture shaft of femur. Fracture neck of femur is often missed preoperatively with incidence ranging from 20-50%. This study was done with an objective of assessing the magnitude of fracture neck of femur in patients with ipsilateral fracture shaft of femur.

Methods: This was descriptive study of retrospective data of 187 fracture shaft of femur. Data from all the patients with fracture shaft of femur in the age group of 17 to 70 years admitted and operated between September 2018 to September 2022 were analyzed with magnitude of ipsilateral fracture neck of femur diagnosed preoperatively or postoperatively as main variable. Descriptive statistics was used to calculate frequency and percentage.

Results: Out of 187 fracture shaft of femur, 8.02% (n=15) cases were associated with ipsilateral fracture neck of femur. 73.33% (n=11) cases of fracture neck of femur were identified preoperatively on plain radiograph whereas diagnosis of 26.66% (n=4) cases of fracture neck of femur was missed on initial evaluation and diagnosed on postoperative plain radiograph.

Conclusions: Current study showed the magnitude of fracture neck of femur as 8.02% associated with ipsilateral fracture shaft of femur. Careful clinical evaluation, proper radiography of hip, possible CT scan in doubtful cases and intraoperative fluoroscopic evaluation of hip may decrease the incidence of missed diagnosis.

INTRODUCTION

The magnitude of fracture neck of femur (NOF) and ipsilateral fracture shaft of femur (SOF) is rare. Such fracture results from high velocity injury and is often associated with polytrauma.1 Fracture neck of femur can coexists in 0.8-9% of fracture shaft of femur.1-2 When fracture NOF is associated with ipsilateral fracture SOF, it possesses more challenges in terms of diagnosis and management.1,3 Fracture neck of femur in ipsilateral fracture shaft of femur can be missed on initial evaluation in many situations.1,2 Literature suggests that the chance of missing the diagnosis of fracture NOF associated with ipsilateral fracture SOF is high.3,4 The magnitude of missing such fracture can range from 20-50%.1,3 When fracture NOF is missed, it is associated with high morbidity because of non-union of fracture and avascular necrosis of femoral head.4 Thus, early diagnosis of such fracture is essential for proper management and avoidance of these complications.

There is lack of study of magnitude of NOF fracture associated with ipsilateral fracture SOF in our context. The objective of this study was to find the magnitude of fracture NOF in patients with ipsilateral fracture SOF and assess the missed diagnosis of fracture NOF preoperatively.

METHODS

It was a descriptive study of retrospective data of 187 fracture shaft of femur carried out at high volume trauma centre, College of Medical Sciences, Bharatpur, Chitwan. Prior approval for the study was taken from institutional review committee (IRC no. COMSTH-IRC/2023-07).

Inclusion criteria was all the patients with fracture shaft of femur in the age group of 16 to 75 years, admitted and operated from September 2018 to September 2022.

Exclusion criteria were patient <16 years or >75 years, pathological fracture, refracture and patient operated at other centres.

Demographic data, clinical data, operative details and postoperative events were collected from in-patient charts of the hospital. Magnitude of preoperative and postoperative
findings of possible fracture neck of femur and missed diagnosis assessed from plain X-ray noted in the case sheet were the main outcome variables analyzed.

All the relevant demographic and clinical data was entered into Excel master chart and analysis was done using SPSS version 20.0. Percentage was calculated for the categorical variables and mean was calculated for the continuous variables using descriptive statistics.

RESULTS

There were total of 187 fracture SOF in 185 patients (2 patients had bilateral fracture SOF) in the study with mean age of 39 years (range 17-67 year). Details of clinical characteristics of injury is presented in table 1. Out of 187 fracture SOF, 8.02 % (n=15) had ipsilateral fracture NOF. Eleven cases (73.33 %) of fracture NOF were diagnosed preoperatively based on plain radiograph. Four cases of fracture neck of femur were missed preoperatively giving rise to magnitude of missed fracture NOF 26.66%. All the preoperatively diagnosed fracture NOF were treated with proximal femoral nail. Two cases of missed fracture NOF were revised with proximal femoral nail whereas other 2 missed cases were revised with supplementation of multiple cannulated cancellous screws (Fig. 1).

Table 1: Clinical characteristics of fracture SOF

<table>
<thead>
<tr>
<th>Variables</th>
<th>Number (%)</th>
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<tbody>
<tr>
<td><strong>Sex</strong></td>
<td></td>
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<tr>
<td>Male</td>
<td>162 (87.56)</td>
</tr>
<tr>
<td>Female</td>
<td>23 (12.44)</td>
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<tr>
<td><strong>Laterality of Fracture</strong></td>
<td></td>
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<tr>
<td>Right</td>
<td>112 (59.89)</td>
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<tr>
<td>Left</td>
<td>75 (40.10)</td>
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<tr>
<td><strong>Mode of injury</strong></td>
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<tr>
<td>Road traffic accident</td>
<td>172 (92.97)</td>
</tr>
<tr>
<td>Fall from height</td>
<td>13 (7.03)</td>
</tr>
</tbody>
</table>

In our study, 4 cases (26.66%) of fracture NOF out of 15 cases of fracture NOF associated with ipsilateral fracture SOF were missed on preoperative plain radiographs. Wu et al reported 7 (21.21%) cases of missed diagnosis of fracture NOF in the study of 33 cases of fracture SOF and ipsilateral fracture NOF.10 Reimer et al reported missing of 10 (31.25%) cases of fracture NOF in the study of 32 cases of ipsilateral fracture NOF.1 Laporte et al reported missing of 1 case of fracture NOF out of 10 cases of ipsilateral femoral neck and shaft fracture.11 Gill et al reported missed diagnosis of 4 cases (30.76%) out of 13 cases of ipsilateral intracapsular femoral neck and shaft fracture.12 Oh et al retrospectively analyzed data of 74 fracture SOF and ipsilateral NOF collected from seven centers in which 27% of fracture NOF was missed initially and the mean timing of delayed diagnosis was 11.1 days after injury.5

Magnitude of missed diagnosis in the current study is consistent with the results shown in the literature.3-5, 10 There could be several reasons for missing the diagnosis. Ipsilateral fracture NOF associated with fracture SOF is usually undisplaced which was evident in all missed cases in our study. Diagnosis of such undisplaced fracture may be delayed or missed by plain radiograph.5 Many patients also had polytrauma in which fracture neck of femur could be easily overlooked or missed on initial evaluation. Poor quality of x-ray of hip is another important reason for missing the diagnosis.

Various authors have recommended preoperative CT scan for diagnosis of occult fracture neck of femur.12, 13 Tornetta et al recommended evaluation of femoral neck with fine cut (2 mm) tomography and dedicated internal hip radiograph to improve the diagnosis of NOF fracture associated with SOF fracture.12 They claim to reduce the delay in diagnosis by 91% by following this protocol. Similarly, Yang et al recommend preoperative CT scan of femoral neck in high-risk patients and fluoroscopic examination of the hip before and after nailing of fracture shaft of femur.13 They emphasized on intraoperative and postoperative imaging in detecting missed fracture NOF associated with ipsilateral fracture SOF.14 Sadozai et al found the sensitivity of 86% and specificity of 98% of CT scan for detecting occult femoral neck fracture.14

Surgical treatment of concomitant fracture SOF and fracture NOF is challenging. Various operative methods are described for such fractures. In our cases, 13 cases were managed with long proximal femoral nail whereas 2 cases were managed with

DISCUSSION

Fracture neck of femur associated with ipsilateral fracture shaft of femur is an uncommon diagnosis. Current study showed the overall magnitude of fracture NOF in ipsilateral fracture SOF as 8.02%. Literature varies regarding the magnitude of such neck of femur fracture in ipsilateral SOF, ranging from 0.8-9%.1,2 Muteti et al studied 85 femoral shaft fractures in which 3 (3.52%) cases were associated with ipsilateral fracture neck of femur.7 Schmal et al reported 21 fracture NOF(1.1%) in 1935 fracture SOF.8 Daffner et al studied 304 patients with fracture shaft of femur in which 20 patients (6.57%) had associated fracture neck of femur.9 Our study showed higher magnitude. It could be probably due to higher number patients with high velocity injuries in the current study.
antegrade femoral intramedullary nail with supplementation of multiple cannulated cancellous screws. Tharoushas A et al managed 11 patients of ipsilateral fracture SOF and NOF with reconstruction nail. Wiss et al treated 33 patients with ipsilateral intracapsular femoral neck and shaft fracture with antegrade intramedullary nail and cancellous screws. Khallaf et al treated 17 patients with ipsilateral femoral neck and shaft fracture. SOF fracture was treated with compression plate fixation and NOF fracture with dynamic hip screw or cannulated cancellous screw in their study. Harewood, S et al reported case series of 3 patients treated by rendezvous technique. Limitations of the current study are relatively small number of sample size, retrospective nature of study, absence of analysis of the fracture union and single centre study. Multicentre study involving large number of cases with analysis of outcome may provide further evidence to substantiate the findings of this study.

CONCLUSION

Current study showed the magnitude of fracture NOF as 8.02% in ipsilateral fracture SOF in adults with significant percentage of missed diagnosis preoperatively. Careful clinical evaluation and suspicion, proper preoperative plain radiography of hip, possible CT scan and intraoperative fluoroscopic evaluation of hip may decrease the magnitude of missed diagnosis of fracture NOF in associated ipsilateral fracture SOF.

CONFLICT OF INTEREST: None

FINANCIAL DISCLOSURE: None

REFERENCES: