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Research Article

A Comparison of Mortality following Distal Femoral Fractures and Hip Fractures in an Elderly Population

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Introduction. Patients suffering a distal femoral fracture are at a high risk of morbidity and mortality. Currently this cohort is not afforded the same resources as those with hip fractures. This study aims to compare their mortality rates and assess whether surgical intervention improves either outcome or mortality following distal femoral fractures. *Methods*. Patients over sixty-five admitted with a distal femoral fracture between June 2007 and 2012 were retrospectively identified. Patients mobility was categorised as unaided, walking aid, zimmer frame, or immobile. The 30-day, six-month, and one-year mortality rates were recorded for this group as well as for hip fractures during the same period. *Results*. 68 patients were included in the study. The mortality rate for all patients with distal femoral fractures was 7% at 30 days, 26% at six months, and 38% at one year, higher than hip fractures during the same period by 8%, 13%, and 18%, respectively. Patients managed surgically had lower mortality rates and higher mobility levels. *Conclusion*. Patients suffering a distal femoral fracture have a high mortality rate and surgical intervention seems to improve both mobility and mortality.

1. Introduction

Distal femoral fractures can result from either high energy injuries in young adults or low energy injuries in elderly patients with osteoporotic bone [1–3]. This injury accounts for around 6% of all fragility fractures [3] and its frequency is likely to rise with the increasing geriatric population. The prevalence of periprosthetic fractures following knee arthroplasty is 0.5%–2.2% [4, 5] which is also likely to increase with the rise in arthroplasties being performed [6].

Patients suffering a distal femoral fracture are at a high risk of complication given the prevalence of medical comorbidities in this cohort [7–9]. The mortality rates have been reported to be around 18% at six months and 18–30% at one year [1, 2, 10, 11]. The presence of either a knee arthroplasty or a significant comorbidity is associated with an increased mortality [2]. The injury has a significant effect on patients' mobility with one series reporting only 18% were able to walk unaided with 23% housebound and 26% not able to perform social activities [12].

Traditionally traction followed by cast bracing was the common treatment technique [13]; however this option results in prolonged bed rest [14], loss of motion [15, 16], and either nonunion or malunion [17]. Butt et al. performed a randomised controlled trial comparing six weeks of traction followed by bracing with plate fixation. The authors reported good or excellent results in 53% of the surgical group and only 31% of the nonoperative group. The nonoperative group also had a longer hospital stay and a higher complication rate [11]. The aims of surgery are to restore articular congruency and alignment. The use of both intramedullary nails [18–20] and locking plates [2, 3, 21–24] has been shown to have good results. Locking plates allow load to be evenly distributed amongst all screws avoiding loading on single screw and this may be preferable in osteoporotic bone [25]. However reports suggest that locking plates are associated with a higher complication rate [26, 27]: nonunion (5.5% versus 5%), fixation failure (4.9% versus 3%), and infection (2.1% versus 0.4%) [1, 26, 28]. The presence of either an ipsilateral knee or hip arthroplasty may limit the use of intramedullary devices and needs to be considered when planning surgery.

Hip fractures occur in a similarly elderly and at risk group of patients. The number of hip fractures between April 2012

and March 2013 in the UK was 61,508 patients, the mean length of stay was 20 days, and the 30-day mortality rate was 8.2% [29]. One-year mortality has been separately reported at 20% [30, 31]. This high mortality is probably due to a combination of trauma, major surgery, and concurrent medical problems [30]. The hip fracture cohort has received prioritisation and funding in the National Health Service (NHS) in the UK with the recent implementation of the "best practice tariff." This tariff provides financial incentive to hospitals for successfully achieving six criteria which aim to drive up the quality of care, admission to orthopaedic ward within 4 hours, surgery within 48 hours, monitoring for pressure ulcers, preoperative assessment by an orthogeriatrician, discharge on bone protection medication, and a falls assessment prior to discharge.

The aim of this study, for the first time, is to compare the mortality rates between hip and distal femoral fracture patients in one centre. In addition, the study aims to assess whether the outcome or mortality is improved when distal femoral fractures are managed either surgically or nonoperatively.

2. Methods

All patients over the age of sixty-five admitted with a distal third femoral fracture between June 2007 and June 2012 were retrospectively identified. Pathological fractures and those resulting from high velocity trauma were excluded from the study. High velocity trauma was defined as a pedestrian hit by a vehicle, high speed road traffic collision (combined velocity > 40 mph), ejection from vehicle, fatality in the same vehicle, or fall from a significant height (>5 metres). Electronic records were analysed for patient demographics, the presence of a knee arthroplasty, and whether the patient underwent nonoperative or surgical treatment with either plate fixation or intramedullary nailing. Patients were followed up regarding their mobility categorised as unaided, walking aid, zimmer frame, and immobile. The 30-day, six-month, and one-year mortality rates were recorded. The mean follow-up was 3.2 years (range 1 to 5 years).

In addition, all patients over the age of sixty-five admitted during the same time period with a hip fracture were also identified. For this group no exclusion criteria were applied. The 30-day, six-month, and one-year mortality rates were also recorded for this group.

3. Results

During the study 74 patients were treated for a distal femoral fracture. Six patients were excluded, two due to a pathological fracture and four due to high energy mechanism of injury. 30 patients were excluded from mobility analysis as they either received no follow-up or died during the first-year period. 58 (85%) of the patients were female, the mean age was 84 years, and 8 (12%) had periprosthetic fractures. 43 patients (63%) were managed nonoperatively and of those treated surgically 7 had plate fixation (28%) and 18 had intramedullary nailing (72%). The demographics for these separate groups is illustrated in Table 1.

Table 1: Patient demographics according to treatment received.

	Conservative	Plate fixation	Intramedullary nail
Number	43	7	18
Mean age (years)	84	77	87
Female *N* (%)	38 (88)	6 (86)	16 (83)
Knee arthroplasty *N* (%)	6 (14)	1 (14)	1 (6)

Table 2: Mortality rate according to treatment received.

Mortality	Nonoperative	Surgery	Intramedullary nail	Plate fixation
30 days *N* (%)	4 (9)	1 (4)	1 (6)	0 (0)
6 months *N* (%)	14 (33)	5 (20)	4 (22)	1 (14)
1 year *N* (%)	20 (47)	7 (28)	5 (28)	2 (29)

The mortality rate for all patients with distal femoral fractures was 7% (5 patients) at 30 days, 26% (18 patients) at six months, and 38% (26 patients) at one year. During the same study period there were 2,327 hip fractures and the mortality rates were 8% at 30 days, 13% at six months, and 18% at one year. The comparison between the two groups is illustrated in Figure 1. Those patients managed surgically had lower mortality rates (Table 2).

Only 38 of patients (56%) had data available for mobility at follow-up over one year, 26 patients (38%) had died during this period, and 2 patients (6%) received no formal follow-up and therefore data was not available. Comparison of mobility between the surgically and nonoperatively managed groups is demonstrated in Figure 2.

4. Discussion

Patients suffering a distal femoral fracture are a high risk group and the authors report a 38% mortality rate at one year. This value is higher than those reported in the literature [1, 2, 10, 11] and maybe a reflection of the high number of patients managed nonoperatively. To allow for direct comparisons between studies further information regarding the comorbidities is required and due to the retrospective nature of the study this was not feasible.

Those patients managed surgically had better outcomes in terms of mobility (immobility 21% after nonoperative treatment versus 5% after surgical intervention) and mortality (47% versus 28%). Although categorised differently this mobility was at least comparable to that reported in the literature [12]. Surgical intervention allows for earlier knee movement and mobilisation, aids nursing care, and facilitates an earlier discharge, and this may explain the improved outcomes in this group. Therefore focus should be on early surgical intervention to aid patient recovery and achieve the optimal outcome. Previous reports in hip fracture patients have

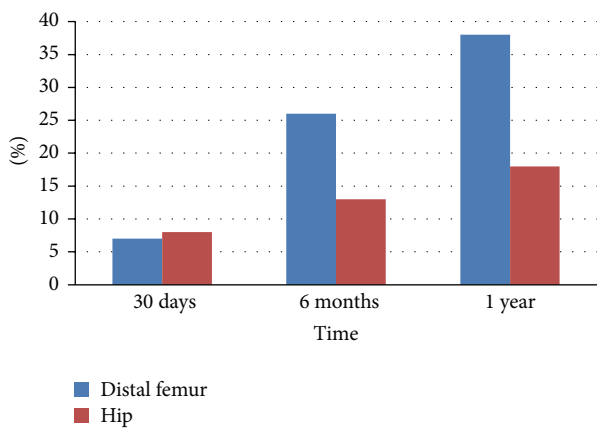

Figure 1: Comparison of mortality between distal femur and hip fracture patients.

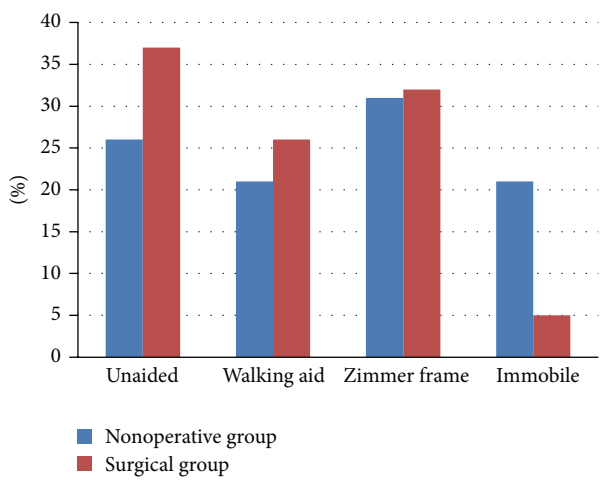

Figure 2: Comparison of mortality between surgical and nonoperative group.

shown that a delay to surgery can increase mortality rates [32]. The number in the current study is too small to test whether a delay to surgery negatively impacted on patient outcomes but this seems feasible and further work to address question is required.

The results show that patients with distal femoral fractures had a worse outcome than their hip fracture counterparts in terms of mortality over the same time period. Further details regarding the distribution of comorbidities would have improved this comparison but this finding is supported by figures from the literature [29–31]. A multidisciplinary approach to hip fractures has been shown to be beneficial [33–35] and application of these principles to distal femoral fracture patients seems logical and has the potential to reduce both morbidity and mortality. However the authors must stress that the incidence of distal femoral fractures over the study period was 34 times lower than hip fractures and therefore the absolute mortality numbers were actually much higher in the hip fracture group.

The study had some limitations, the main one being its retrospective nature with data collection being limited to that routinely recorded in patient notes. Further information regarding patient comorbidities, previous ambulatory status, and cognition would have provided important information to aid comparison of the groups. A validated patient reported outcome would have given a patient's perspective on the success of treatment but these were not routinely recorded. The distal femoral fracture group contained only 68 patients compared to 2,327 in the hip fracture group; this small study group could have substantially affected the mortality rate observed. The considerably higher incidence of hip fractures has previously been reported in the literature [1, 9]; despite the higher percentage mortality in the distal femur group, the absolute number of deaths in the hip fracture group is significantly higher. The data included were from a single centre and may not be universally representative of all patients. However the paper does have two key messages: firstly that these patients are a high risk group with worse outcomes than their hip fracture counterparts and secondly that surgery seems to improve outcome and early intervention should be targeted.

5. Conclusion

Patients suffering a distal femoral fracture have a high mortality rate and surgical intervention seems to improve both mobility and mortality. Further research assessing a multidisciplinary approach to managing this cohort is required.

Conflict of Interests

The authors declare that there is no conflict of interests regarding the publication of this paper.

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