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Predictors of poor clinical outcome following hip fracture in middle aged-patients

Robbie I. Ray [a,*], Stuart A. Aitken [a], Margaret M. McQueen [a], Charles M. Court-Brown [a], Stuart H. Ralston [b]

[a] Department of Orthopaedics, Royal Infirmary of Edinburgh, Edinburgh, United Kingdom
[b] Institute of Genetics and Molecular Medicine, University of Edinburgh, United Kingdom

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ABSTRACT

The aim of this study was to investigate morbidity and mortality following hip fractures in middle aged patients. In addition, we aimed to identify risk factors which could be used to predict postoperative complications. All patients aged 40–55 who sustained a hip fracture in Lothian from 2007 to 2008 were identified from a prospective trauma database. The main outcomes were complications and 5-year mortality. Thirty hip fractures were included in the study. Complications occurred in nine (30%) cases. Deep infection was seen in three cases (10%). Mortality was 20% at 5 years, 26 times higher than for the general population. All surviving patients were contacted for risk factor analysis (24). Low energy fractures, alcohol excess, smoking and history of previous fractures were significantly associated with complications ($p < 0.05$). Complications only occurred amongst low energy fractures. Risk factors were further analysed using the WHO FRAX algorithm. No patient with a FRAX score of less than 10 suffered a complication, whereas 50% of patients who had a FRAX score of more than 10 suffered a complication. The results of our study suggest that low energy hip fractures in middle age are due to underlying morbidity and are associated with a high incidence of postoperative complications and mortality. The FRAX score could be used as a simple method of identifying patients in this age group who are at risk of a poor outcome.

Introduction

Hip fractures are a common complication of osteoporosis which predominantly affect elderly individuals [1–5]. In contrast, hip fractures are unusual under the age of 50 and traditionally have occurred as the result of high-energy trauma. Research in this group has focused on the technical aspects of surgery to preserve the natural femoral head and delay the need for prosthetic joint replacement [6–8].

There is an intermediate group of patients, who sustain hip fractures in middle-age. It is suggested that the underlying cause of these injuries is related to chronic medical comorbidities [6,9,10]. In this study, we sought to investigate the mortality and postoperative morbidity, in a group of patients who suffered hip fractures between the aged of 40 and 55.

In addition, we aimed to examine whether the patients' FRAX score, using the World Health Organisation [WHO] fracture risk assessment tool, was related to their postoperative outcome. The FRAX score is a numerical value which gives the 10-year probability of a major osteoporotic fracture [11]. We hypothesised that those with a higher FRAX score would not only have a greater risk of further skeletal injury, but would also suffer a greater number of postoperative complications.

Patients and methods

The study group compromised all patients aged between 40 and 55 years who suffered a hip fracture in the Lothian region between July 2007 and June 2008. This was available from a prospective, surgeon collected database of epidemiology, the complete results of which are available elsewhere [12]. Patients with pathological fractures occurring secondary to malignant disease were excluded.

We gathered data on patient demographics, fracture type, fracture treatment, complications, re-admission, further surgery and mortality from electronic patient records. All surviving patient were contacted and data regarding smoking, family history of hip

* Corresponding author at: Trauma and Orthopaedics, Royal Infirmary of Edinburgh, 51 Little France Crescent, Edinburgh EH16 4SU, United Kingdom. Tel.: +44 0131 536 1000; fax: +44 0131 242 6467.
E-mail address: Robbie.ray@nhs.net (R.I. Ray).

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fracture, height, weight, corticosteroid use, rheumatoid arthritis, alcohol intake, smoking and secondary causes of osteoporosis were collected. From this the FRAX score was calculated. We defined a complication as deep prosthetic infection/prosthetic dislocation/systemic sepsis/avascular necrosis/fracture non-union or malunion. Mortality data were confirmed as accurate by cross-referencing with general practitioner data from death certificates [11].

Statistical analysis

Statistical analysis was performed using SPSS version 19 [13]. A patient survival analysis was performed using the Kaplan–Meier method to determine the 5-year mortality rate. The log rank test was used for comparison of mortality rates between groups. Categorical data were compared using the chi square test and the independent *t* test was used to compare the distribution of continuous variables.

Results

Demographics of study population

In total, 30 fractures occurred in patients aged 40–55 years of age which represents 3.6% of all hip fractures ($n = 819$) occurring during the period of study, and 2.8% of 1062 fractures that occurred during this time in the 40–55 age group.

Relevant clinical and demographic details of the hip fracture patients are shown in Table 1. There were 18 intra-capsular and 12 extra-capsular fractures. Three-quarters of injuries resulted from a low-energy fall from standing (Table 1).

Details of surgical treatment

All high energy fractures were treated with internal fixation as were all low energy extracapsular fractures and undisplaced intracapsular fractures. Low energy displaced intracapsular fractures were treated with internal fixation, bipolar hemiarthroplasty or total hip replacement.

Table 1
Clinical and demographic characteristics of study cohort.

Age (mean and range)	49.6 (42–55)
Gender	Male 18 (60%) female 12 (40%)
Mechanism of injury	Fall from a standing height 22 (73.3%) Road traffic accident 5 (16.7%) Fall from above standing height (2 (6.7%) Sporting injury 1 (3.3%)
Type of fracture	Intracapsular 18 (60%) Extracapsular 12 (40%)

Morbidity and mortality

The 5-year mortality was 20% which is four-times higher than the 5-year mortality rate (5%) seen for middle-aged patients suffering non-hip fractures ($p < 0.001$, log rank test), (Fig. 1). Postoperative complications occurred in nine of 30 cases (30%); all nine patients had sustained low-energy trauma and alcohol misuse was a contributing factor in seven of nine cases. There were three deep prosthetic infections, one case of non union within 3 months of hip fracture, one case of AVN 4 years postinjury, one prosthetic dislocation, one fracture mal union and two cases of postoperative pneumonia with multi-organ failure.

Predictors of complications

Fracture risk assessment data were obtained from all surviving patients ($n = 24$). The mean BMI of patients suffering low-energy trauma (23.1, range 15.7–36.0) was lower than those sustaining high-energy injury (28.4, range 18.0–34.7), ($p = 0.025$, *t* test). Patients sustaining a low energy hip fracture were significantly more likely to have a postoperative complication when compared to patients sustaining high energy hip trauma ($p = 0.025$, chi squared test). Risk factors significantly associated with an

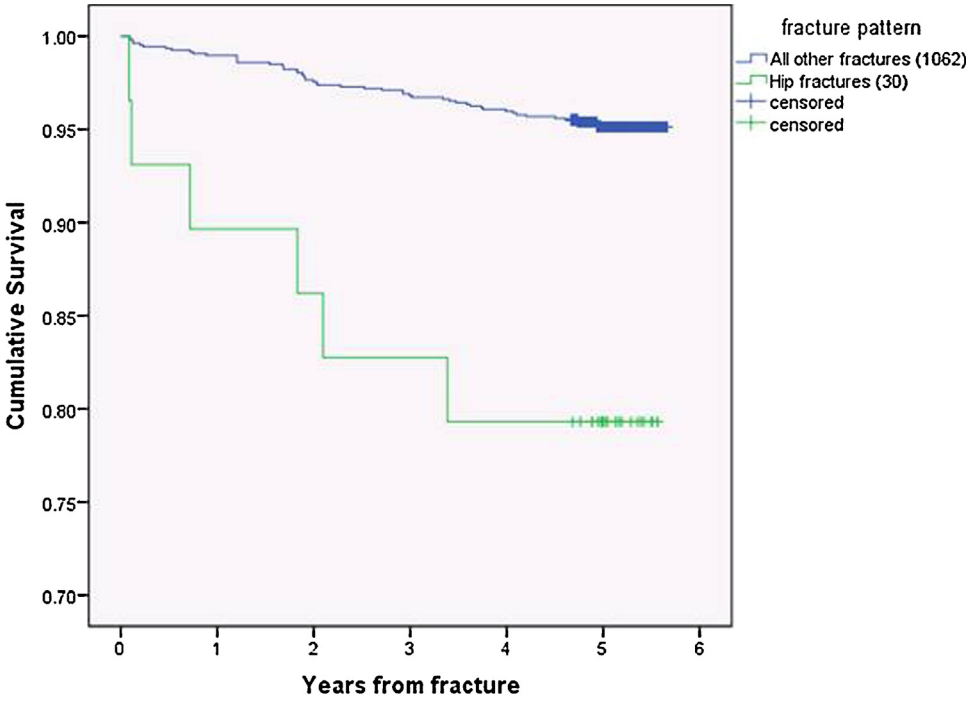

Fig. 1. Kaplan meier survival curve of hip fractures compared to all other fracture patterns at 5 years ($p < 0.001$, log rank test).