Admission for osteoporotic pelvic fractures and predictors of length of hospital stay, mortality and loss of independence

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Abstract

Objective: to study the implications of osteoporotic pelvic fractures in older patients in terms of mortality, length of hospital stay and independent living.

Methods: the study included 110 consecutive patients, aged over 60 years, with osteoporotic pelvic fractures admitted to the Queen Elizabeth Hospital, Gateshead, between July 2009 and March 2011. Demographic and routine clinical data were collected prospectively until date of discharge, and vital status data were collected up to 3 months post-fracture. These data were analysed to assess associations with outcomes such as length of hospital stay, mortality and loss of independence (according to changes in residential housing status).

Results: fourteen patients died either in hospital, or within 3 months of fracture. Length of hospital stay was associated with age (β = 0.77 days per year, 95% CI 0.001, 1.54, P = 0.05) and was significantly longer in those with acute medical problems on admission (β = 21.2 days, 95% CI 8.72, 33.73, P = 0.001). The odds of changing from independent to institutionalised accommodation were significantly associated with age (OR 1.08 per year, 95% CI 1.01, 1.04, P = 0.007) and length of hospital stay (OR 1.12 per day, 95% CI 1.01, 1.04, P = 0.007).

Conclusion: in-hospital mortality rates in this patient group are similar to those seen for hip fractures, yet pelvic fractures in older people receive relatively little in the way of attention or funding. Guidelines to improve the management of such fractures in older people are important to improve care while in hospital, reduce time spent in hospital and reduce the impact on independent living.

Keywords: osteoporosis, pelvic fracture, mortality, older people

Introduction

Osteoporosis is a common condition estimated to affect >200 million people worldwide [1]. It is characterised by the progressive loss of bone mineral content and consequently an increased risk of fracture. Osteoporosis is a condition associated with advancing age and, as we face what seems to be an exponentially ageing population, the incidence of osteoporotic fractures looks set to increase.

In people aged over 60 years old, osteoporosis is the underlying aetiology in the majority of pelvic fractures. A large Finnish study reported that 94% of all pelvic fractures in people aged over 60 years were attributable to osteoporosis [2]. The precise incidence of osteoporotic pelvic fractures is relatively poorly defined, but it is estimated that this fracture occurs at a rate of 25 to 92 per 100,000 person years [2–4]. Additionally, there is evidence to support the suggestion that the incidence of osteoporotic pelvic fractures is rising [2].

Osteoporotic fractures of the pelvis typically result from low trauma injuries, such as simple falls [5, 6]. Such fractures relatively rarely require surgical intervention and are typically managed ‘conservatively’. However, this is not to say that osteoporotic pelvic fractures are ‘benign’. Short- and long-term survival has been reported to be significantly lower in older patients who suffer an osteoporotic pelvic fracture than in age-matched controls [3, 6].

Several authors have highlighted the mortality implications of osteoporotic pelvic fractures in an older patient
population [3–8]. However, other important outcomes such as independent living circumstances, residential and mobility status, post-fracture have less often been considered in this context. We sought to characterise mortality and other outcomes, including changes in living circumstances, in patients with osteoporotic pelvic fractures admitted to a district general hospital in northern England.

Methods

This study took place at the Queen Elizabeth Hospital, Gateshead Health NHS Foundation Trust. We prospectively collected routine data on 110 consecutive patients, aged over 60 years, with radiological evidence of a low-trauma osteoporotic pelvic fracture, admitted to general medical wards within the hospital between July 2009 and March 2011. A consultant Elderly Care Physician (Y.S.) and Osteoporosis Nurse Specialist (S.W.) routinely undertook a process of ‘case finding’ to identify, on a weekly basis, all patients with osteoporotic fractures requiring admission to a medical bed within the hospital. Length of hospital stay was defined as time from admission to discharge. Those who were not able to go home directly from hospital were transferred to an intermediate care bed once medically fit. They stayed there for at most 6 weeks with view to go home or to a nursing home. Demographic and routine clinical data were prospectively collected from the case notes for all included patients from the time of their admission until their discharge from hospital. All patients had their pre-morbid mobility and living circumstances documented on admission. Mobility status and accommodation type on discharge were also routinely recorded in case notes. Accommodation was categorised as either dependent (nursing or residential care home facility or intermediate care) or independent (all other accommodation types). Similarly, mobility was divided into independent or dependent (requiring the use of a walking aid for safe mobilising or unable to mobilise).

For all older patients admitted with a suspected fragility fracture of the pelvis, plain radiographic imaging was performed and serum 25(OH) vitamin D level measured. Bone density assessment with dual-energy X-ray absorptiometry (DXA) was undertaken, unless a patient’s condition prohibited this examination. Osteoporosis was defined as per World Health Organisation guidelines [9] as a T-score of less than −2.5 at the hip or lumbar spine on DXA scanning.

Three-month mortality (time from fracture) was confirmed via the hospital’s electronic record which includes up to date information on all deaths in hospital and in the community. Information was collated anonymously before analysis took place.

Statistical methods

For the femoral neck T-score, mean and standard deviation are presented. All other continuous variables (age, length of stay, vitamin D level and lumbar spine T-score) were not normally distributed, and medians and interquartile ranges (IQR) are presented. Associations between continuous outcomes (length of stay) and potential predictors were analysed using linear regression from which regression coefficients (b) and corresponding 95% confidence intervals (95% CI), calculated using robust standard errors, are presented, while mortality and changing from independent to institutionalised accommodation, as binary outcomes, were analysed using logistic regression from which odds ratios (OR) and corresponding 95% CIs are presented. Statistical analyses were done in the statistical software package Stata, version 10 (StataCorp, College Station, TX).

Results

The study included 110 patients, 91 (83%) of whom were female. Descriptive statistics on the included patients are given, by sex, in Tables 1 and 2. The majority of patients (71 and 73% in females; 63% in males) had at least one acute medical problem during their admission to hospital, with most suffering urinary tract or respiratory tract infections (data not presented). The median length of hospital stay in our study was 30 days for women and 39 days for men, with an overall range of 5 to 170 days. Around half of male (n = 9; 47%) and female patients (n = 51; 56%) had a past fracture history.

Ten patients (8 females) died in hospital in a further three females and one male dying within 3 months of fracture. This gives an in-patient mortality rate of 9% and an all-cause mortality rate within 3 months of fracture of 13%. No significant associations were seen between mortality and any of the variables included in this study.

Length of hospital stay was significantly associated with age (b = 0.77 days per year of age, robust 95% CI 0.11, 1.43), P = 0.02) and was significantly longer in those with acute medical problems on admission (b = 21.2 days, (95% CI 11.6, 30.8), P < 0.001). When both variables were included in the same model, acute medical problems on admission remained significantly associated with length of hospital stay (b = 19.37 days, (95% CI 9.43, 29.3), P < 0.001), but age did not (P = 0.12). Similar results were seen when excluding deceased patients from the length of stay analysis. No significant associations were seen with the DXA data and length of hospital stay.

On admission to hospital, 89% of patients lived independently, but, at the point of discharge from hospital, this figure was only 64%. In those living in independent accommodation on admission, and alive at the end of the study period, the odds of changing from independent to

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in institutionalised accommodation were significantly associated with age (OR per year of age 1.08, (95% CI 1.01, 1.17), P = 0.025), but length of hospital stay (OR per day 1.02, (95% CI 1.00, 1.04), P = 0.007). As these are continuous odds ratios, they show the increase in odds per unit, so the OR for age would be 1.0810 (2.16) per every 10 years of age. With both variables included within the same model, length of stay remained a significant predictor of changing accommodation status (adjusted OR per day 1.02, (95% CI 1.002, 1.03), P = 0.024), but age did not (P = 0.105).

Of the 57 patients classed as having independent mobility at admission, only 10 were classed as having dependent mobility at discharge. There were no significant associations with changes in mobility independence.

**Discussion**

In this study of patients admitted to a hospital in Northern England with osteoporotic fractures of the pelvis, we report an in-patient mortality rate of 9% and an all-cause mortality within 3 months of fracture of 13%. None of the included variables significantly predicted mortality risk or changes in mobility dependence. Increasing length of hospital stay was associated with increased odds of changing from independent to non-independent residential status. In turn, presence of acute medical problems during admission predicted length of hospital stay, independently of age, but did not predict change in residential status.

The in-hospital mortality rates are comparable with those from previous studies of older patients with non-traumatic pelvic fractures [3, 8]. The median length of hospital admission in our study was 30 days for women and 39 days for men. This is longer than many published series. However, the patients in this study were provided with both acute and rehabilitation care, in contrast to where many previous studies have reported only the length of time in an acute geriatrics bed. Advancing age and the presence of an acute medical problem during admission were, unsurprisingly, predictors of a longer hospital stay, although age was not an independent predictor. There was a dramatic increase in the number of patients moving from independent to dependent residential living following their fracture.

Only 10 patients changed mobility independence status, so it is likely that this part of the analysis was underpowered to be able to detect significant associations. Similarly, the cohort was relatively small. This may mean that other associations were undetectable, but it should also be noted that a number of significant associations were seen in this sample, despite the relatively small sample size.

The major strength of this study is that data were collected prospectively and from unselected consecutive patients admitted with osteoporotic pelvic fractures. As we did not consider those patients with an osteoporotic pelvic fracture who did not require admission to hospital, it is possible that we have selected an inherently frailer subset of patients. However, the study of this group is valid if we are to identify and address factors influencing length of hospital stay, independence and mortality. Although we addressed rates of all-cause mortality, we were unable to consistently access the recorded cause of death for the 14 patients in our study who died, and, with such small numbers, mortality by cause was not possible. This is a limitation and is something we hope to address in a future, longer and larger prospective study.

The clinical implications of this study are that elderly care physicians must recognise the mortality and wider implications of this fracture type. The in-hospital mortality rate we have reported is comparable with that seen after hip fracture [10] and yet pelvic fractures in older people arguably receive little in the way of national attention or funding. National guidelines to support the management of osteoporotic pelvic fractures in older people would, we postulate, improve care and outcomes in the way that national guidance for hip fractures has succeeded in recent years. This could potentially have significant impact on patient care and also on individuals to maintain an independent life.

**Key points**

- In-hospital mortality rates in this patient group are similar to those seen for hip fractures.
- Change in independence associated with age at admission.
- Change in independence associated with length of hospital stay.

**Conflicts of interest**

None declared.

**References**

Objectively assessed physical activity and lower limb function and prospective associations with mortality and newly diagnosed disease in UK older adults: an OPAL four-year follow-up study

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Abstract

Background: objective measures of physical activity and function with a diverse cohort of UK adults in their 70s and 80s were used to investigate relative risk of all-cause mortality and diagnoses of new diseases over a 4-year period.

Participants: two hundred and forty older adults were randomly recruited from 12 general practices in urban and suburban areas of a city in the United Kingdom. Follow-up included 213 of the baseline sample.

Methods: socio-demographic variables, height and weight, and self-reported diagnosed diseases were recorded at baseline. Seven-day accelerometry was used to assess total physical activity, moderate-to-vigorous activity and sedentary time. A log