Short Report

Distal forearm fracture history in an older community-dwelling population: the Nottingham Community Osteoporosis (NOCOS) study

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Abstract

Objectives: to assess the prevalence of a history of Colles’ fracture (occurring after the age of 40 years) and to ascertain the extent of investigation and treatment of osteoporosis in this population.

Methods: we studied subjects aged ≥ 60 years from the age–sex register of three general practices. We recorded a history of fractures and details of any previous investigation for osteoporosis and treatment with bone-protective drugs. Bone mineral density was performed at the heel using dual-energy x-ray absorptiometry (Lunar PIXI machine). We classified subjects into normal, osteopaenic or osteoporotic according to the machine manufacturer’s recommended World Health Organisation ‘equivalent T-score thresholds’ (0.6 for osteopaenia and 1.6 for osteoporosis).

Results: of the 605 subjects invited, we recruited 259 women and 194 men (response rate = 74.8%). Twenty-eight (10.8%) of the women and five (2.6%) of the men had a history of Colles’ fracture. Of women with a prevalent Colles’ fracture, 39% were osteoporotic and 36% were osteopaenic. These rates were significantly greater than in women without a Colles’ fracture (19.9% osteoporotic, 29.4% osteopaenic; P=0.018). Assuming the same PIXI thresholds for men, two (40%) of the five men with a history of Colles’ fractures were osteoporotic and the rest were osteopaenic, compared with 20.6 and 31.2% of men without a history of Colles’ fractures. None of the subjects in the Colles’ fracture group had previously been investigated with bone densitometry. Women with and without a history of Colles’ fracture did not differ significantly in ever having (32.1% vs 27.2%; P=0.4) or currently having (14.3% vs 10.4%; P=0.4) hormone replacement treatment. None of the men and only one woman with a previous Colles’ fracture had ever taken a non-hormone replacement treatment for osteoporosis.

Conclusions: older community-dwelling subjects with previous Colles’ fracture have a high prevalence of osteoporosis and are under-investigated and under-treated. Methods for identifying subjects with a previous Colles’ fracture need to be developed in primary and secondary care.

Keywords: Colles’ fracture, forearm, osteoporosis

Introduction

Distal forearm (Colles’) fracture is one of the commoner fractures occurring as a consequence of osteoporosis. In the United Kingdom, the lifetime risks of a Colles’ fracture are 13 and 2% respectively for 50-year-old Caucasian women and men respectively [1]. The incidence in women increases rapidly from the first 5 years of the menopause, reaching a peak between the ages of 60 and 70. In some series the incidence flattens off after this age, whereas in others it continues to rise [2, 3]. In men, the incidence remains relatively constant between ages the ages of 20 and 80 [3, 4].

Bone mass in subjects with Colles’ fracture is reduced compared with that in controls, although some studies have not found bone mass to be lower than expected in the upper part of the age range [5–7]. Several studies have shown that the risks of subsequent vertebral and
hip fractures are significantly increased in those with previous Colles’ fractures [8–11]. Interventions to prevent future fractures are therefore appropriate in these subjects.

There are few data on treatment with bone-protective drugs in patients who have sustained a Colles’ fracture. In a study using the UK General Practice Research Database, there was no increase in bone protective treatment at 1 year in subjects with Colles’ fracture compared with controls [12].

The aims of this study were: first, to assess the prevalence of a Colles’ fracture history in an older community-dwelling population; secondly, to determine the prevalence of osteoporosis in these subjects; and, thirdly, to ascertain the extent of investigation and treatment of osteoporosis that this group receive.

Methods
We analysed cross-sectional baseline data from the first 5 months of recruitment into the Nottingham Community Osteoporosis (NOCOS) study. The NOCOS study is an ongoing prospective study of community-dwelling older people with the aim of establishing risk factors for fractures and falls. We sent invitations to men and women aged 60 and over from the age–sex registers of three general practices to an osteoporosis screening consultation with a research nurse at their general practitioner’s surgery. Data collected included demographic details, a history of any fracture, current and previous medication and any previous investigations for osteoporosis, including bone mass measurements.

Bone mineral density was measured at the heel using dual-energy x-ray absorptiometry (Lunar PIXI machine). Osteoporosis and osteopaenia were defined using the manufacturer’s recommended World Health Organisation (WHO) ‘equivalent T-score thresholds’ for the PIXI machine. (The T-score is the standard deviation above or below mean bone mineral density for sex-specific groups of ‘young normals.’) The conventional WHO criteria thresholds for diagnosing osteoporosis and osteopaenia (T-scores of −2.5 and −1.0 respectively) apply only for the distal forearm, lumbar spine and hip sites and cannot necessarily be applied to all skeletal sites because of the presence of ‘discordance’ in T-scores between different skeletal sites [13]. The ‘equivalent T-score thresholds’ for osteoporosis and osteopaenia are −1.6 and −0.6 respectively for heel measurements on the PIXI machine (determined by calculating the equivalent prevalence of osteoporosis and osteopaenia that occurs at the femoral neck site using the WHO criteria).

Data were analysed using the SPSS package (version 8). Approval for the study was gained from the Nottingham research ethics committee.

Results
We sent invitations to 605 subjects aged ≥60 years and recruited 453 subjects (259 women and 194 men): a response rate of 74.8%. The mean age was 69 ± 6.3 years (range 60–94); 10.8% of the women (n=28) and 2.6% of the men (n=5) reported having sustained a previous low-trauma Colles’ fracture after the age of 40. There was no significant difference in mean age between those who had had a Colles’ fracture (70.4 years) and those who had not (69.3 years).

Table 1 shows the numbers and percentages of women with and without a history of Colles’ fracture classified according to bone mineral density measurements as osteoporotic, osteopaenic and normal. Seventy-five percent of women with a history of Colles’ fracture were either osteoporotic or osteopaenic, compared with 49.3% of those without a history of Colles’ fracture. Assuming the same PIXI T-score criteria, all of the five men with a history of Colles’ fracture were either osteoporotic (n=2, 40%) or osteopaenic (n=3, 60%) compared with 20.6% (n=39) and 31.2% (n=59) of the men without a history of Colles’ fracture. None of the subjects studied had previously been investigated with bone densitometry.

The numbers of women in the two groups who had ever taken hormone replacement therapy (HRT) are shown in Table 2. The groups did not differ significantly in past HRT use. Similarly, there was no significant difference in the number of current HRT users in the two groups (four (14.3%) of those with a history of Colles’ fracture and 24 (10.4%) of those without; P=0.4). Only one woman with a Colles’ fracture had ever taken non-HRT osteoporotic treatment (Calcichew). None of

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<th>Table 1. Classification of osteoporosis and osteopaenia in women with or without Colles’ fracture</th>
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<td>Colles’ fracture history</td>
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<td>Normal bone mineral density</td>
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<td>Osteopaenia</td>
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<td>Osteoporosis</td>
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P = 0.018.

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<th>Table 2. History of treatment with hormone replacement therapy in women with or without a Colles’ fracture</th>
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<td>Colles’ fracture history</td>
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<td>History of hormone replacement</td>
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P = 0.4.
the five men with a history of Colles’ fracture had ever taken osteoporotic treatment.

Discussion

The occurrence of a Colles’ fracture is important clinically because several studies have shown that the risk of subsequent osteoporotic fractures is significantly increased. Original data from Rochester showed that the risk of subsequent hip fracture was increased two-fold in women who were aged >70 years at the time of their first Colles’ fracture [8]. Subsequent data from the same population confirmed these findings, although the risk was then found to be 1.6-fold and there was no significantly increased hip fracture risk if the Colles’ fracture occurred before the age of 70 [9]. In men, the risk of hip fracture in those with previous Colles’ fracture was increased 2.7-fold (95% confidence interval 0.98–5.8). Two Scandinavian population-based cohort studies (one Swedish, one Danish) showed that the risk of hip fractures in subjects with a Colles’ fracture were increased 1.5- to 1.9-fold [10, 11]. With regard to subsequent vertebral fractures, the Rochester data showed that, at all ages, the occurrence of a Colles’ fracture resulted in a significantly increased risk of subsequent vertebral fractures, which was 5.2-fold in women and as much as 10.7-fold in men. This implies that, in men as well as women, the occurrence of a Colles’ fracture should not be ignored [9].

This study shows that, in a community-dwelling population aged ≥60 years, the prevalence of a history of low-trauma Colles’ fracture (occurring after the age of 40 years) was 10.8% in women and 2.6% in men. These subjects had a higher proportion of osteoporosis than those without a Colles’ fracture history, and were under-investigated and under-treated for osteoporosis.

The study may have some limitations. First, the history of Colles’ fracture was not confirmed because of the difficulties in obtaining x-rays, reports or notes for some subjects whose fracture may have occurred many years previously or outside the Nottinghamshire area. However, a recent Finnish study showed that self-reporting of wrist fractures, unlike other fractures, was accurate, with a sensitivity of 95% and specificity of 99%. Data from the European Prospective Osteoporosis Study confirmed the accurate self-reporting of Colles’ and hip fractures in the form of a postal questionnaire, suggesting that the non-validation of fractures in our study may not be a problem [14, 15].

Secondly, there may be some bias in recruitment as subjects needed to travel to their general practitioner’s surgery, and some of the frailter subjects, including those with cognitive impairment, may not have attended the screening programme. This may have led to an under-estimate of the fracture prevalence.

Thirdly, we used the easily-transportable heel dual energy x-ray absorptiometry scanning technique rather than the more standard central (hip and spine) dual energy x-ray absorptiometry to measure bone mineral density, and the problem of discordance in T-scores means that the WHO criteria for diagnosing osteopaenia and osteoporosis cannot be applied [13, 16]. Data from an older Caucasian population, however, suggest that overall fracture prediction is comparable, regardless of the skeletal site used to measure bone mineral density (including heel), although measurement at the hip provides the greatest predictive value for hip fractures [17]. The device-specific equivalent T-score thresholds for the PIXI machine, calculated on the basis of equal prevalence of osteoporosis in the femoral neck is a partial solution to the problem of ‘discordance’ in T-scores and allows the heel site to be used to classify individuals into normal, osteopaenic and osteoporotic [18]. These ‘equivalent T-score thresholds’ do not fully address the problem of ‘discordance’ and the thresholds chosen are somewhat arbitrary, although altering the thresholds is unlikely to alter the conclusions.

A further limitation is that the data on prevalence of osteopaenia and osteoporosis in subjects with Colles’ fracture are based on only 28 women and five men.

Despite these potential limitations, this study provides useful data on the prevalence of Colles’ fracture in an older UK community population and confirms previous data that subjects with a history of Colles’ fracture are under-investigated and under-treated for osteoporosis. These findings imply that methods for identifying subjects with a previous Colles’ fracture in primary care need to be developed, as do systems for ensuring that those who attend casualty departments and fracture clinics with such fractures are adequately investigated and treated. Furthermore, the opportunity should be taken to question all patients admitted to or attending hospital about previous fractures.

Key points

- We measured calcaneal bone density in 453 older men and women, 7% of whom had a history of Colles’ fracture.
- The prevalence of osteoporosis and osteopaenia was higher in women with a previous distal forearm fracture.

Acknowledgements

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References


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