Elderly patients with two episodes of fragility hip fractures form a special subgroup

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ABSTRACT

Purpose. To identify the demographic features of patients aged 65 years or older admitted with 2 episodes of fragility hip fractures.

Methods. From July 2003 to December 2004 inclusive, 50 consecutive elderly patients underwent surgery for a second episode of hip fracture. Patients in a very poor physical condition and therefore unfit for surgery were excluded. Risk factors of fractures in both episodes and whether risk factors were corrected after the first episode were analysed. Detailed radiological assessment and charting of elderly mobility scores and Barthel index were completed and the one-year mortality rate documented. The rehabilitation periods for the 2 episodes of hip fracture were compared.

Results. Most patients were female and had trochanteric fractures. In patients aged 65 to 75 years, the incidence of femoral neck fracture occurred as often as trochanteric fracture; while trochanteric fracture was predominant in older patients. Subclinical osteomalacia and undiagnosed hyperthyroidism was found in 3 of the 7 younger patients. Only 30% of them were on treatment for osteoporosis after the first fracture, which underlines the importance of osteoporosis treatment in these patients.

Conclusion. Elderly patients with 2 episodes of fragility hip fractures form a special subgroup among geriatric hip fracture patients. Fall prevention programmes and treatment for osteoporosis are recommended.

Key words: aged; geriatrics; hip fracture; treatment outcome

INTRODUCTION

Hip fractures increase morbidity and mortality of elderly patients with multiple co-morbidities. The negative effects of low-energy fragility fractures on elderly patients resemble those of high-energy trauma to younger individuals, with the first-year mortality rates being 15 to 25%. Only 50% of elderly patients with hip fractures are able to regain their original mobility status, despite prolonged rehabilitation.

Patients with 2 episodes of fragility hip fractures seem to constitute a subgroup among elderly hip
fracture patients. Characteristics of such elderly patients were recorded and compared with those of elderly persons with a single episode of hip fracture documented in the literature.

MATERIALS AND METHODS

Between the period July 2003 and December 2004 inclusive, consecutive patients aged ≥65 years with a history of hip fractures requiring surgery admitted to the Pamela Youde Nethersole Eastern Hospital or the Ruttonjee Hospital for second hip fracture surgery were included and their details obtained from hospital logs. Patients in a very poor physical condition and therefore unfit for surgery were excluded.

The injury mechanisms/risk factors for fall of the first and second episodes of hip fractures were recorded, as per patients’ recollections, eyewitness accounts of relatives or attending staff of nursing homes. Co-morbidities (especially cardiopulmonary or endocrine disorders), and treatment methods used for the previous hip fracture were noted, as was any treatment for osteoporosis. Any history of previous fragility fractures in other parts of the body were documented, particularly of the wrist and the spine. For each patient, initial mobility status and ability to manage activities of daily living were also assessed.

The patients’ cardiopulmonary fitness and orthopaedic condition were assessed, with particular emphasis on the ipsilateral and contralateral lower extremities and the neuromuscular status of the upper and lower extremities. Preoperative and postoperative radiography, fracture classification of both episodes, assessment of the hips, and laboratory blood work (including the calcium and phosphate levels) were undertaken for each patient. Relevant blood investigations were ordered, depending on preliminary test results, such as for endocrine screening.

Rehabilitation began immediately after surgery and consisted of posture, balance retraining, as well as strength and gait training. Muscular retraining involved both strength and, later, endurance exercises. Elderly mobility and Barthel index scores were assessed before and after hospital discharge. The time required to reach maximum improvement in function and mobility was defined as 2 identical serial Barthel index and/or elderly mobility scores. The times required for rehabilitation after the first and second episodes of hip fracture were analysed using Student’s t test. The rehabilitation protocol and the multidisciplinary care team was essentially the same for both episodes.

RESULTS

Patient characteristics including age, gender, interval between the first and second hip fracture, injury mechanisms, and types of injury are shown in Table 1: the mean age was 85 (range, 65–96) years, the male to female ratio was about 1:6 (8 males, 42 females). Of the 50 patients, 7 were aged 65 to 75 years, 23 were between 76 and 85 years, and 20 ≥86 years old.

Regarding the second episode of hip fracture, 40 (80%) were trochanteric (3 patients aged 65–75, 17 were aged 76–85, and 20 ≥86 years). The 10 patients having femoral neck fractures were in the younger age-groups (4 aged 65 to 75 years, 6 aged 76 to 85 years, and none ≥86 years).

Of the 7 patients aged 65 to 75 years, 2 had predisposing factors for osteoporosis in the form of hyperthyroidism and steroid intake, and one had associated subclinical osteomalacia; all 3 of these patients had femoral neck fractures.

The mean interval between the 2 episodes of hip fractures was 2 (range, 0.5–4) years. Comparing the fracture types of the 2 episodes, 34 (92%) of the 37 patients with trochanteric hip fracture had the same type of fracture after a mean interval of 1.8 years. The
same situation was not observed for femoral neck fracture; only 7 (54%) of the 13 patients with femoral neck fracture had the same fracture type in the second episode. Associated fragility fractures of other bones were quite common: 30% of the patients had had prior osteoporotic vertebral fractures, and another 20% had had prior distal radial fractures.

The injury mechanisms/risk factors of fall were classified as intrinsic (lower limb weakness and incoordination, confusion and dizziness, poor vision, and urination-related rush to bathroom) or extrinsic (slippery floor, tripping over an obstacle, and improper shoe-wear and walking aids) [Table 2]. The injury mechanism was unknown in 6% of the patients. Regarding the second episode of hip fracture, 25 (50%) were attributed to intrinsic factors, 14 (28%) to extrinsic factors, 8 (16%) to multiple factors, and 3 (6%) to unknown factors. The most common intrinsic cause was lower limb weakness and/or incoordination, whereas the most common extrinsic causes were slippery floor and tripping over an obstacle. Urinary urgency, particularly at night, was a major contributory factor.

The mean time to attain maximum improvement was 2.5 months after the first episode of hip fracture and 4.5 months following the second episode; this difference was statistically significant (p<0.01). The one-year mortality rate of our patients was 8%; mostly from cardiopulmonary causes.

### DISCUSSION

The impact of fragility hip fracture on elderly patients is much more significant than that of fragility fractures of the distal radius. Low-energy hip fracture in the frail elderly is not much different from high-energy trauma in younger individuals, both having a high one-year mortality. The subgroup of patients with 2 episodes of hip fractures displays special characteristics warranting further research.

Our patients’ ages were very advanced (mean, 85 years). The number of hip fractures increases exponentially with increasing age, after the fifth decade. The peak bone mass of humans is attained at the second decade, and the rate of bone loss accelerates especially after menopause in females. Accelerated bone loss of postmenopausal women relative to men, lasts 10 years, at which time even men start to have accelerated bone loss. Not surprisingly, our patient population was predominantly female. Other factors such as steroid intake and certain endocrine disorders may contribute to even quicker bone loss in women, as noted in 3 (43%) of our 7 younger women. A Massachusetts General Hospital study and another more recent study found that up to 27% of hip fracture patients had osteomalacia. In our patient with subclinical osteomalacia presenting with femoral neck fracture, Looser’s zones and Milkman’s lines typical of osteomalacia were found on the concave sides of their long bones. It is therefore important to search for underlying osteomalacia, particularly in younger patients (aged 65–75 years) with 2 episodes of hip fracture.

As far as fracture type is concerned, the pattern of trabecular loss with age predisposes a higher chance of intertrochanteric fracture than femoral neck fracture. 34 (91%) of our 37 patients with trochanteric hip fracture had the same fracture in the second episode; but this pattern did not hold true for

<table>
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<tr>
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<td>85/M</td>
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#### Table 2

Patients with 2 episodes of hip fracture attributed to multifactorial causes (n=8)
patients with femoral neck fracture. Of the 20 patients aged ≥86 years, none had femoral neck fracture. Trochanteric fractures are thus more likely in an ageing population.

More than one third of our patients had a history of fragility fracture of the spine or distal radius, corresponding to the principle that “fragility fracture predicts fragility fracture”. It is alarming that only 30% of patients received treatment for osteoporosis after the first hip fracture. This has been observed in many countries and its importance is echoed by many authors.5

Patients with sequential falls resulting in hip fractures are at higher risk of falling again. Prevention of falls is therefore an effective means of fracture prevention.6 To explore the need for any home modifications, an occupational therapist made a home visit to assess what predisposed to the fall, based on patients’ recollections or eyewitness accounts. The underlying cause of the fall was unknown in only 6% of patients, which was far lower than in other studies in the elderly. Some report that falls in the elderly are mainly multifactorial7; we found this to be so in only 16% of our patients. Many of our patients were able to recall the cause of fall after returning to their homes. Intrinsic causes were the most common (50%) and included lower limb weakness and/or incoordination. Extrinsic causes (28%) included slippery floor and/or tripping over an obstacle. Multifactorial causes are very varied (Table 2). In many patients, the mechanism of the fall responsible for the first episode repeats itself in the second episode. It is therefore recommended that the real underlying cause of a fall leading to hip fracture be identified and corrected. To be cost-effective, only patients with genuine multifactorial causes of falls require assessment by a multidisciplinary team in a fall-prevention clinic.

The mean time required for rehabilitation following the second episode of hip fracture was 80% longer than that after the first episode, this difference being statistically significant (p<0.01). The rehabilitation protocol for both episodes of hip fracture was the same, the patients acting as their own controls.

CONCLUSION

Most geriatric patients with 2 episodes of hip fractures were female and had trochanteric fractures. Femoral neck fractures occurred as often as trochanteric fractures in patients aged 65 to 75 years, but in older patients the latter were more common. Subclinical osteomalacia and undiagnosed hyperthyroidism were occasionally found in younger patients. The mean period of rehabilitation following the second episode of hip fracture was 80% longer than that after the first episode, which necessitates extra costs and manpower for multidisciplinary care. Alarmingly, only 30% of the patients were on treatment for osteoporosis after the first hip fracture. The importance of osteoporosis treatment and fall prevention strategies need wider publicity and recognition. Geriatric patients with 2 episodes of hip fracture form a special subgroup deserving further investigation and research to meet the challenges of a progressively ageing population.

REFERENCES