Fractures of the pubic rami
EPIDEMIOLOGY AND FIVE-YEAR SURVIVAL
R. M. F. Hill, C. M. Robinson, J. F. Keating
From the Royal Infirmary of Edinburgh, Scotland

We reviewed 286 consecutive patients with a fracture of a pubic ramus. The overall incidence was 6.9/100 000/year in the total population and 25.6/100 000/year in individuals aged over 60 years. The mean age of the patients was 74.7 years and 24.5% suffered from dementia. Women were affected 4.2 times more often than men. After injury, geriatric rehabilitation was frequently required and although most surviving patients returned to their original place of residence, their level of mobility was often worse. The overall survival rates at one and five years were 86.7% and 45.6%, respectively. Multiple logistic regression analysis showed that age and dementia were the only independent significant factors to be predictive of mortality (p < 0.05).

Patients with a fracture of a pubic ramus had a significantly worse survival than an age-matched cohort from the general population (log-rank test, p < 0.001), but this was better than patients with a fracture of the hip during the first year after injury, although their subsequent mortality was higher. Five years after the fracture there was no significant difference in survival between the two groups.

Received 7 September 2000; Accepted after revision 4 May 2001

Fractures of a pubic ramus commonly occur in the elderly, and there is evidence that their incidence is increasing. Rehabilitation of such patients requires a multidisciplinary approach and places considerable demands on the restricted resources available. Currently, there is limited information about the epidemiology and prognosis of this injury. Expansion of this knowledge may be of value when planning health care for these patients. We have therefore documented the epidemiology and outcome of a consecutive series of patients with a fracture of the pubic ramus who were treated in our Unit. We also attempted to identify factors associated with a poor prognosis after this injury.

Patients and Methods

Patients with a fracture of a pubic ramus in the Lothian area are initially admitted for assessment to the acute orthopaedic wards of Edinburgh Royal Infirmary. The Unit has a well-defined adult catchment population and provides all the trauma care for it. Between January 1988 and December 1994, details of all patients with a fracture of a pubic ramus were recorded prospectively on a computer database. We subsequently reviewed all the medical records of these patients to obtain more detailed information about their functional status. This included the presence of dementia, the level of mobility before and after injury and their residential status. We also determined the duration of acute hospital stay and the requirement for geriatric orthopaedic rehabilitation. Radiographs were also analysed to verify the presence and configuration of the fracture.

Surviving patients were telephoned and interviewed to assess their residential status and their level of mobility at the time of follow-up. The mortality of those who had sustained a fracture of a pubic ramus was compared with that during the same period for two control groups. These comprised an age-matched cohort of Edinburgh residents from the general population (14,838 individuals of mean age 74.7 years) and residents who had sustained a fracture of the hip (4311 individuals of mean age 79.9 years). The data on mortality for all groups were obtained from the General Register Office for Scotland.

Statistical analysis. We compared the clinical details of the subgroups using one-way analysis of variance and Student’s t-test for numerical parametric data. We used the Mann-Whitney U test for numerical non-parametric and the chi-squared test for categorical data. We undertook a comparison of the information on mortality between the study group and the two control groups using a life-table analysis, with censorship at the end of the follow-up. The log-rank test was used to assess whether there were significant differences in survivorship between the groups. Hazard
ratios (HR) and 95% confidence intervals (95% CI) were calculated to assess the extent of the difference between the groups. For all statistical analyses significance was set at p < 0.05.

Results

General epidemiology. During the period of the study, 286 patients of mean age 74.7 years (17 to 97) were admitted with a fracture of a pubic ramus. Simple falls accounted for 250 (87.4%) fractures of which 139 (55.7%) were the result of a simple fall at home, 70 (27.9%) were in a public place and 41 (16.4%) a fall in an institution. Road-traffic accidents accounted for 36 cases, of which 20 were in pedestrians. Simultaneous fractures of other anatomical sites occurred in 67 patients (23.4%). The most common associated bony injuries were fractures of the distal radius (14 cases), stable wedge fractures of the lumbar spine (8), two-part fractures of the proximal humerus (7), clavicular fractures (5) and subcapital fractures of the hip (5). Fractures of a pubic ramus were evenly distributed between left and right and were bilateral in ten cases (3.5%). The superior ramus was injured in 35.7%, the inferior ramus in 21.3%, and both in 43.0%.

The overall incidence of a fracture of a pubic ramus in the general population during this period was 6.9/100 000/year. Most occurred in patients aged over 60 years (Fig. 1) with an incidence of 25.6/100 000/year. They were more common in women of all age groups over the age of 60 years (overall male to female ratio, 1:4.2) and women were significantly older at presentation than men (mean ages 77.4 and 63.4 years, respectively, p < 0.0001). Seventy patients (24.5%) were suffering from dementia on admission and were significantly older than the remainder of the population (mean age 84.0 years versus 71.6 years, p < 0.0001).

Twenty-seven patients (9.5%) were subsequently re-admitted with other fractures. The mean age of this group was 81.2 years. There were 25 women and ten patients were suffering from dementia. The most common subsequent bony injury was a subcapital fracture of the hip.

Survival analysis. Thirteen patients in the cohort were censored during the follow-up period. Of the remainder, 134 had died and 139 were alive. Of these, 20 (7.0%) had died in hospital after admission. The overall rates of survival during the first year after injury and at five years were 86.7% (95% CI 82.7 to 90.6) and 45.6% (95% CI 38.9 to 52.3), respectively (Fig. 2). There was no difference in rates of survival between men and women. Patients with dementia had a significantly higher mortality, with rates of survival at one and five years of 80.0% (95% CI 70.6 to 89.4) and 27.8% (95% CI 16.3 to 39.3), respectively. The mean age of the survivors was 66.8 years, but for those who died it was 82.5 years. Using multiple logistic regression the influence on mortality of age, gender, dementia, the level of mobility and residential status before injury was analysed. This identified age and dementia as the only significant factors to be predictive of mortality (p < 0.05).
The mortality was higher in patients who sustained a fracture of a pubic ramus when compared with the survival of an age-matched population of Edinburgh residents (log-rank test, p < 0.001). This was most obvious during the first year after injury (HR 2.6, 95% CI 1.9 to 3.5), but remained significant after five years (HR 1.8, 95% CI 1.5 to 2.1). During the first year, the survival was significantly less in patients with a fracture of the hip, compared with those with a fracture of a pubic ramus (HR 0.5, 95% CI 0.3 to 0.7). Survival was subsequently less for the pubic ramus group, so that at five years after injury there was no significant difference between the two groups.

Rehabilitation and destination after discharge. Of the 286 patients, 226 (79.0%) had been admitted from their own homes, 22 (7.7%) from sheltered housing and 38 (13.3%) from nursing homes; 191 (66.8%) were independently mobile on admission, 52 (18.2%) used sticks, 39 (13.6%) used a walking frame and 4 (1.4%) were only capable of bed-to-chair transfers.

The mean length of acute stay was 9.3 days (1 to 64). From the acute ward, 225 (78.7%) patients were discharged to their original residence, 41 (14.3%) to a nursing home and 20 (7.0%) died before discharge. Of those who were discharged to their original residence, 127 (56.4%) left directly from the acute ward and 98 (43.6%) were discharged via the geriatric orthopaedic rehabilitation unit. The mean time spent in this unit was 41.1 days (4 to 258). Patients who were discharged directly home were significantly younger (p < 0.001) than those who required rehabilitation, or whose ultimate destination was a nursing home (Table I). Only 48 (31.4%) patients aged over 80 years were discharged directly home compared with 79 (59.4%) under the age of 80 years (chi-squared test, p < 0.0001) and only 134 (46.9%) had returned to their previous level of mobility by the time of discharge.

The level of mobility deteriorated from before injury to the final follow-up. This was most marked in patients over the age of 80 years. Of the 139 still alive at follow-up, 84 (60.4%) had regained their previous mobility and 113 (81.3%) were resident in the same level of accommodation. Only 71 (51.1%) patients were independently mobile, 54 (38.8%) were using walking aids, and 14 (10.1%) were immobile or using a wheelchair. Social dependency in the community had also increased for those who were still alive at the end of follow-up; 97 (69.8%) were living in their own homes, 11 (7.9%) required residential or sheltered accommodation and 31 (22.3%) were resident in nursing homes.

Discussion

A fracture of a pubic ramus is the commonest fracture of the pelvis although little has been written regarding its outcome. Our study is the largest reported series and is the only one to document the epidemiology and five-year survival, using reliable data on mortality from the General Register Office for Scotland. Previous studies have involved smaller numbers and a shorter follow-up. 

The incidence of fracture of a pubic ramus in our population is lower than that reported by Melton et al, although their study encompasses all fractures of the pelvis. Koval et al published a series of 63 patients with a fracture of a pubic ramus, but did not estimate the absolute incidence of fracture in their population. In these studies, the details of the population with fractures of a pubic ramus were similar to those in our study, with a high number being sustained during simple falls by elderly women.

The prognosis after fracture of a pubic ramus has not previously been studied. In our review the mortality at one year was 13.3%, and only 45.6% of patients were alive five years after injury. Gender did not influence survival rates. Age and dementia were the only independent factors to be predictive of mortality. Survival analysis revealed a poor prognosis in individuals who had fractured a pubic ramus when compared with those of similar age without a fracture in the general population. The reasons for this are probably multifactorial. Poor preinjury physiological status, a susceptibility to falls and an increased level of social dependency after injury are likely to be important factors. It is clear from subgroup analysis of the survival data that the patients who fare worst are the elderly and those suffering from dementia.

Although the mortality in patients with a fracture of the hip was significantly higher than for those with fracture of a pubic ramus during the first year after injury, the survival in the latter group was subsequently worse. Five years after injury there was no significant difference between the two groups. The higher mortality in the group with fractures of the hip is understandable given the need for surgical rather
than conservative treatment. The excess mortality mostly occurred during the first three months after injury. The higher mortality in those with a fracture of a pubic ramus after the first year is harder to explain. These patients were almost five years younger than those with a fracture of the hip and would have been expected to have comparable mortality rates once the initial effects of the injury had subsided. It is possible that their subsequent survival was compromised by their greater frailty or susceptibility to further falls although comparison of the relative importance of these factors was not possible in our study.

Although most patients did not change their residential status after discharge, there was a significant decline in their mobility. Only 46.9% had reached their preinjury levels by discharge; 60.4% of surviving patients had regained their previous mobility by the final follow-up. In the only other study to assess this, there was a better return to the prefracture level of mobility.

More than 80% of our patients had no other orthopaedic injury and required no other specialist orthopaedic treatment. This raises the issue of which specialty should be caring for these patients. The main demands, particularly for older patients, are for the services of geriatricians, physiotherapists, and occupational therapists working within the framework of a geriatric orthopaedic rehabilitation unit. It would seem sensible for patients with an isolated fracture of a pubic ramus to be admitted to a geriatric unit, with orthopaedic treatment being limited to those with additional fractures.

No benefits in any form have been received or will be received from a commercial party related directly or indirectly to the subject of this article.

References