Epidemiology of pelvic fractures in a Swedish county

Björn Ragnarsson and Bo Jacobsson

Epidemiologic features of pelvic fractures from 1976 to 1985 inclusive were studied in Skaraborg County, southwestern Sweden. The county had an average population of 269,000 inhabitants. During the 10-year period, 541 patients with pelvic fractures were treated in the hospital, and the incidence was 20 per 100,000. The incidence increased in the elderly, especially among women. Severe trauma dominated in age groups below 60 years, whereas moderate trauma dominated in older age groups. 81 percent were stable fractures of the pubic rami and 10 percent acetabular fractures. Associated injuries occurred in 21 percent of the patients, predominantly in those with severe trauma. The mean length of hospitalization was 3 weeks irrespective of whether or not the trauma was moderate or severe.

Department of Orthopedics, Uppsala University Hospital, S-751 85 Uppsala, Sweden
Tel +46–18 663000. Fax +46–18 664462
Submitted 91-08-05. Accepted 91-12-04

Pelvic fractures constitute 2–5 percent of all fractures treated in hospital (Westerborn 1928, Wilenius 1943, Huttinen and Slätis 1972). These fractures vary greatly in severity, and often require long hospitalization (Knowelden et al. 1964). There are only a few epidemiologic studies on pelvic fractures. Buhr and Cooke (1959) described the incidence of different fractures in a poorly defined population in Great Britain, as did Knowelden et al. (1964) in a population of 60,000 during the 1950s. Melton et al. (1981) outlined epidemiologic variables of pelvic fractures in an urban population of 50,000 in Rochester, NY, U.S.A.

We have studied the epidemiology of pelvic fractures (incidence, age and sex distribution, external cause, fracture classification, associated injuries, and hospitalization) in Skaraborg County, Sweden.

Material and methods

The population of the Skaraborg County was on an average 269,000 inhabitants during the 10-year period 1976–1985, and was equally divided between the sexes (Table 1). The population was predominantly rural, the four largest cities having between 25,000 and 50,000 inhabitants. In Skaraborg County, all the hospitalized patients have been routinely recorded in a computorized register since 1970. This register has been used for analyzing and evaluating patients with pelvic fractures during the 10-year period.

To estimate the validity of the computorized register, all the hospitalized patients with pelvic fractures were manually identified from the records of the surgical and orthopedic departments at the county hospital in Skövde during 1984 and 1985 and then compared with the computorized register.

The external cause of the fractures was classified according to Alffram (1964). Thus, a moderate trauma was defined as violence equal to or less than a fall to the ground from the standing position. A fall while standing on a chair, in a stairway, or from a building, and all the traffic accidents were considered to be severe traumata.

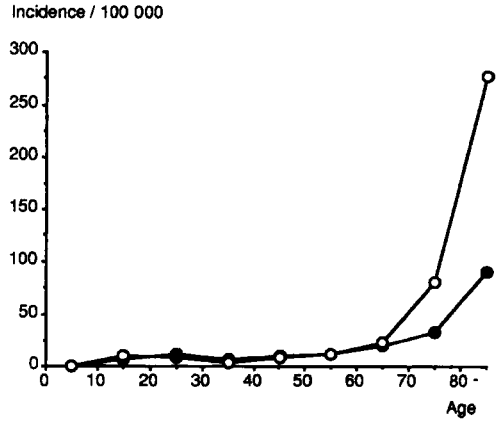

Figure 1. Incidence of pelvic fractures in age groups.
○ women, ● men.

Table 1. Patients with pelvic fractures in the Skaraborg County 1976–1985

	A	B	C	D	E	F	G	H
Men	0–9	18	1	–	1	0.6	–	0.6
	10–19	20	12	–	12	6.0	–	6.0
	20–29	18	21	1	20	11.5	0.5	11.0
	30–39	20	14	–	14	7.1	–	7.1
	40–49	15	15	–	15	10.0	–	10.0
	50–59	15	16	2	14	10.9	1.4	9.5
	60–69	15	28	7	21	19.1	4.8	14
	70–79	10	35	20	15	34	19	14
	> 80	3.9	36	27	9	91	68	23
	All men	135	178	57	121	13.2	4.2	9.0
Women	0–9	17	–	–	–	–	–	–
	10–19	19	19	–	19	9.9	–	9.9
	20–29	17	15	1	14	8.8	0.6	8.2
	30–39	18	7	1	6	3.8	0.5	3.3
	40–49	15	11	–	11	7.5	–	7.5
	50–59	15	18	7	11	12	4.7	7.4
	60–69	15	34	17	17	23	11.3	12
	70–79	12	95	71	24	80	60	20
	> 80	5.9	164	132	32	277	223	54
All women		134	363	229	134	27	17.1	10
All the patients		269	541	286	255	20	11	9.5

A Age group
B Average population in thousands
C Number of patients
D Number of patients with moderate trauma
E Number of patients with severe trauma
F Incidence per 100,000 inhabitants per year
G Incidence per 100,000 inhabitants per year with moderate trauma
H Incidence per 100,000 inhabitants per year with severe trauma

Table 2. Number of fractures according to severity of trauma

Fracture type	Moderate trauma (n 280)	Severe trauma (n 261)
I Stable		
Wing of ileum	4	32
Pubic rami	265	174
II Unstable		
Multiple fractures	0	10
Acetabular fractures	11	45

The fractures were classified from radiographs into four types (Table 2); and, according to Peltier (1965), they were grouped into stable and unstable fractures.

The number of nonhospitalized patients with pelvic fractures was estimated by manually registering these patients at the casualty departments of the hospitals in the county during 2 random months each year from 1980 to 1983 inclusive.

For the statistical evaluation, chi-square tests, *t*-tests, and a binominal test (Kleinbaum et al. 1982) were used.

Results

Incidence

During the 10-year period, 19,800 patients with a fracture diagnosis were hospitalized in Skaraborg County. Among these, 541 (3 percent) had pelvic fractures. The overall incidence in the patients with pelvic fractures requiring hospitalization was 20 per 100,000. The incidence in the men was 13 per 100,000 and in the women 27 per 100,000 (Table 1). There were no differences in the incidence of pelvic fractures between the two sexes up to 70 years of age. In the older persons, the women had a higher incidence ($P < 0.0001$). Both the men and the women showed an increased incidence of pelvic fractures between two age groups: viz., from 60–69 years of age and 70–79 years of age ($P = 0.02$ and 0.03, respectively; Figure 1). There was a tendency towards a higher incidence of severe trauma in the 20–29-year-old age group as compared with the 30–39-year-old age group ($P = 0.03$).

Table 3. Number of patients with associated injuries

	Moderate trauma (n 28)	Severe trauma (n 85)
Head	1	20
Spine	1	5
Chest	2	18
Abdomen	0	7
Extremities		
Upper	18	31
Lower	6	36
Total	28	117

Table 4. Mean length of hospitalization (days) in the patients with pelvic fractures

Type of trauma	No. of patients	Mean length of hospitalization
Moderate		
No associated injury	238	21
Associated injuries	27	25
Severe		
No associated injury	144	18
Associated injuries	75	32
Total	484	22

External cause

Moderate trauma had occurred in 286 cases (mean age 79 years) and severe trauma in 255 cases (mean age 52 years). Of those with severe trauma, 133 (52 percent) were injured in traffic accidents, 81 (32 percent) in falls from heights, 41 (16 percent) in accidents sustained during sports and other recreational activities (from crushing injuries or from being struck by an object). The cause of pelvic fractures in the older age groups was predominantly moderate trauma. Severe trauma was more frequent than moderate trauma in younger age groups between the ages 10 and 59 years ($P < 0.005$). In the males, severe trauma dominated (68 percent) as an external cause in contrast to the females, where moderate trauma (63 percent) was more common (Table 1).

Fracture type

A classification of the fractures was possible in 522 of the 541 patients: 81 percent were stable fractures of the pubic rami and 10 percent were acetabular fractures (Table 2).

Associated injuries

113 of 541 patients (21 percent) had associated injuries. In the group with moderate trauma, 28 of 286 patients (10 percent) had associated injuries, and among the patients with severe trauma, 85 of 255 (33 percent) ($P < 0.001$). The patients with severe trauma often had more then one associated injury; thus, the number of associated injuries was 0.44 per patient sustaining severe trauma versus 0.10 per patient injured by moderate trauma (Table 3).

Length of hospitalization

The length of hospitalization could be determined in 484 of the 541 patients. The mean length was about the same whether or not the trauma was moderate (21 days) or severe (23 days; Table 4). Patients with associated injuries had a longer hospitalization than those without associated injuries (30 versus 20 days, $P < 0.001$).

Validity of the computerized register

All 64 patients with pelvic fractures registered in the records of the orthopedic and surgical departments at the county hospital in Skövde in 1984 and 1985 had been reported to the computerized register. However, a further 8 patients had been registered, and these were discovered in the written records of other medical departments at the hospital. No other patients with pelvic fractures had been registered in the latter departments.

Nonhospitalized patients

During the 2 months chosen at random between 1980 and 1983, 46 patients were diagnosed as having pelvic fractures at admittance to the casualty departments. Of these, 8 patients (2 men and 6 women) were treated as outpatients. All the fractures were stable and permitted mobilization. Six fractures were caused by moderate trauma. Six patients were more than 60 years of age. By extrapolating the number of patients treated as outpatients, the total overall incidence of pelvic fractures was estimated at 24 per 100,000.

Discussion

The incidence of hospitalized patients with pelvic fractures was 20 per 100,000, and the estimated total overall incidence was 24 per 100,000. Thus, pelvic fractures constituted one sixth of the frequency of proximal femoral fractures in Skaraborg County during the same period (Mannius et al. 1987). Several authors have reported a lower incidence of hip fractures in a rural population than in an urban one (Mannius et al. 1987, Sernbo et al. 1988). In our study the population was predominantly rural, and the higher incidence of pelvic fractures (37 per 100,000) reported from the Mayo Clinic (Melton et al. 1981) may thus partly due to the fact that a predominantly urban population was studied. Melton et al. (1981) observed an increasing incidence that was associated with age in both sexes, with a predominance of women, with an incidence of pelvic fractures of 220 per 100,000 in the men and of 450 per 100,000 in the women over 85 years of age. The corresponding values estimated as 95 percent confidence intervals in the present study were 60–120 per 100,000 in the men and 240–320 per 100,000 in the women over 80 years of age, and 60–390 per 100,000 in the men and 290–660 per 100,000 in the women over 90 years of age. Buhr and Cook (1959) and Knowelden et al. (1964) found increasing incidence rates associated with increased age, but no difference between the sexes. However, both Melton et al. (1981) and we found a predominance of female pelvic fractures in the elderly. Melton et al. (1981) also reported an increased incidence among teenagers and young adults, most pronounced in males. This could not be confirmed in the present study despite our larger population, although there was a tendency for a higher incidence in the men who were between 20 and 29 years of age. The majority of pelvic fractures among the elderly was caused by moderate trauma, and we consider osteoporosis to be a major contributing factor.

Huttinen and Slätis (1972) and Bruce and Reckling (1982) found in hospitalized patients with pelvic fractures that two thirds of the fractures were caused by traffic accidents, which contrasts with our 25 percent. This is probably because of a selection of severe trauma patients who were referred to their hospitals. This explanation is supported by the fact that they found associated injuries in 60 percent of the patients in contrast to 20 percent in our investigation.

We found an average length of hospitalization of 22 days irrespective of whether or not moderate or severe trauma was sustained. The probable cause of this was that the typical patient with severe trauma was a young person, often with associated injuries, demanding a long rehabilitation period, whereas the typical patient with moderate trauma was an older person with concomitant geriatric and social complications. Knowelden et al. (1964) found a mean hospitalization time of 21 and 28 days, respectively, in Dundee and Oxford, England. Thus, in contrast to hip fractures (Ceder et al. 1987), the length of hospitalization has not changed very much in the case of pelvic fractures during the last three decades. A more active rehabilitation program, especially of the elderly, would probably reduce the length of hospitalization in the same way as has been enjoyed in patients with hip fractures; indeed, this would mean a considerable saving of money and hospital resources.

References

Alffram P A. An epidemiologic study of cervical and trocanteric fractures of femur in an urban population. Acta Orthop Scand (Suppl 65) 1964; 34: 18–9.

Bruce R P, Reckling F W. Pelvic fractures. A ten-year assessment. J Kans Med Soc 1982; 83 (11): 558–63.

Buhr A J, Cooke A M. Fracture patterns. Lancet 1959; 1: 531–6.

Ceder L, Strömqvist B, Hansson L I. Effects of strategy changes in the treatment of femoral neck fractures during a 17 year period. Clin Orthop 1987; 218: 53–7.

Huittinen V M, Slätis P. Fractures of the pelvis. Trauma mechanism, types of injury and principles of treatment. Acta Chir Scand 1972; 138 (6): 563–9.

Kleinbaum D, Kupper L, Morgenstern H. Epidemiologic research: Principles and quantitative methods. Lifetime Learnings Publications, Belmont 1982: 286.

Knowelden J, Buhr A J, Dunbar O. Incidence of fractures in persons over 35 years of age. Br J Prev Soc Med 1964; 18: 130–41.

Mannius S, Mellström D, Odén A, Rundgren Å, Zetterberg C. Incidence of hip fracture in western Sweden 1974–1982. Comparison of rural and urban populations. Acta Orthop Scand 1987; 58 (1): 38–42.

Melton L J, Sampson J M, Morrey B F, Ilstrup D M. Epidemiologic features of pelvic fractures. Clin Orthop 1981; 155: 43–7.

Peltier L F. Complications associated with fractures of the pelvis. J Bone Joint Surg (Am) 1965; 47 (5): 1060–9.

Sernbo I, Johnell O, Andersson T. Differences in the incidence of hip fracture. Comparison of an urban and a rural population in southern Sweden. Acta Orthop Scand 1988; 59 (4): 382–5.

Westerborn A. Beiträge zur Kenntnis der Beckenbrüche und Beckenluxationen. Acta Chir Scand (Suppl 8) 1928; 63:1–375.

Wilenius R. Über Bechenbrüche. Acta Chir Scand (Suppl 79) 1943; 89: 15–6.