Incidence of pelvic fractures in Finland in 1988

Peter Lüthje[1], Ilona Nurmi[2], Matti Kataja[3], Markku Heliövaara[4] and Seppo Santavirta[5]

In 1988, 1212 patients with an acute pelvic fracture were registered in Finnish hospitals for primary treatment. The overall incidence in women was 29/10^5 and in men 20/10^5. The female to male ratio was 2.9 in patients who were over 49 years of age, while in younger age groups the ratio was 0.5. Half of the cases were pubic fractures.

In half of the cases the mechanism of injury was a fall and in one quarter a traffic accident. Slightly more than half of the cases were stable and half of the cases were of moderate severity. The average length of hospital stay varied from 17 days in men to 21 days in women.

[1]Department of Surgery, Kuusankoski Regional Hospital, Finland. Tel +358 51-4081. Fax -4082434, [2]Department of General Practice and Primary Health Care, University of Helsinki, [3]the National Public Health Institute, [4]Social Insurance Institution, Helsinki, [5]Orthopedic Hospital of the Invalid Foundation, Helsinki, Finland.
Submitted 94-05-12. Accepted 95-02-20

In the Nordic countries, pelvic fractures constitute 3–5 percent of all fractures treated in hospitals (Huittinen and Slätis 1972, Ragnarsson and Jacobsson 1992). The severity of these fractures varies. Minor fractures are common in the elderly, whereas young people have more often severe fractures. Although pelvic fractures are common, there are only three reports on the incidence of these fractures (Knowelden et al. 1964, Melton et al. 1981, Ragnarsson and Jacobsson 1992).

We assessed the incidence of pelvic fractures in Finland (population of 5.0 million). Particular emphasis was placed on describing age and sex distributions, type of injury and anatomical classification.

Patients and methods

All the patients registered in hospitals in Finland in 1988 for primary treatment of a pelvic fracture were selected from the National Hospital Discharge Register. This means all the diagnosed patients whose first 3 numbers were 808. Using the personal identification number, multiple admissions caused by transfers between hospitals or hospital departments and readmissions due to complications were identified and only the first admission was included in our analysis. Patients who had suffered a second acute pelvic fracture of a type different from the first one during the study year were included as two cases.

The validity of the hospital discharge codes indicating pelvic fractures was controlled in every 10th patient (n 121). Their medical records were compared with the data in the discharge register.

The hospital discharge records include 5-digit diagnosis codes according to the 9th revision of the International Classification of Diseases (ICD) indicating type of fracture and data on age, sex, hospital, admission, discharge and duration of the stay in hospital. The following codes for subtypes of pelvic fractures were used: 8080A and 8081A for acetabular fracture, 8082A and 8083A for pubic fracture, 8084A and 8085A for sacro-iliacal injury and for iliacal, ischial and pelvic avulsion fractures, and 8088X and 8089X for a type of fracture different from those mentioned above. The codes 8080A and 8081A include acetabular fracture combined with traumatic hip dislocations, 8083A includes traumatic rupture of the symphysis and codes 8084A and 8085A include sacro-iliacal luxation.

The fractures were classified according to both main and secondary diagnoses. The main diagnosis was the patient's first diagnosis in the hospital discharge records. According to the directives given by the National Board of Health, the first diagnosis describes the main reason for the patient's hospital stay. The second, third and fourth diagnoses indicate other possible diseases or injuries, as well as E-codes for external causes of the injuries. In this study, secondary diagnoses included the second, third and fourth diagnoses.

The external causes of the injury were classified by the E-codes, according to the 9th revision of the ICD. Furthermore, the external causes of the fractures of the 10 percent random sample were classified according to Alffram (1964). Thus, a moderate trauma was

Table 1. Incidence of pelvic fractures by sex and age in Finland in 1988

Age	Women				Men				Ratio of fractures W/M	Ratio of incidences W/M	95% CI for ratio of incidences	P-value
	Population[a]	n	%	I	Population[a]	n	%	I				
0–9	311	9	1	3	325	6	1	2	1.50	1.57	0.56–4.41	n.s.
10–19	307	36	5	12	321	50	11	16	0.72	0.75	0.49–1.16	n.s.
20–29	363	32	5	9	378	76	16	20	0.42	0.44	0.29–0.66	< 0.001
30–39	394	28	4	7	415	60	13	15	0.47	0.49	0.32–0.76	< 0.01
40–49	348	31	4	9	360	78	16	22	0.40	0.41	0.28–0.62	< 0.001
50–59	271	42	6	16	260	57	12	22	0.74	0.71	0.47–1.05	n.s.
60–69	262	95	13	36	198	38	8	19	2.50	1.89	1.30–2.73	< 0.001
70–79	201	193	26	96	109	66	14	61	2.92	1.58	1.20–2.01	< 0.01
80–89	87	228	31	263	33	36	8	108	6.33	2.44	1.73–3.42	< 0.001
90–	8.7	39	5	449	2.1	6	1	285	6.50	1.58	0.67–3.70	n.s.
Total	2552	733	100	29	2401	473	100	20	1.55			

[a] Population in thousands; from the Central Statistical Office of Finland.
I Incidence, number of cases per 100,000 population per year.
6 patients of unknown sex excluded.

Table 2. Hospital discharge diagnoses, main and secondary diagnoses and external causes of injury in patients with pelvic fractures in Finland in 1988

Hospital discharge data	Women n (%)	Men n (%)	Total n (%)
Type of pelvic fracture (n 1206)			
Acetabular			
uncomplicated (8080A)	71 (10)	117 (25)	188 (16)
complicated (8081A)	9 (1)	16 (3)	25 (2)
Pubic			
uncomplicated (8082A)	390 (53)	128 (27)	518 (43)
complicated (8083A)	19 (3)	19 (3)	38 (3)
Other			
uncomplicated (8088X)	224 (30)	172 (37)	396 (33)
complicated (8089X)	20 (3)	21 (4)	41 (3)
Ranking of discharge diagnosis (n 1206)			
Main	563 (77)	55 (75)	918 (76)
Secondary	170 (23)	118 (25)	288 (24)
External cause of injury (n 1206)			
Transport traffic accidents (E800A–830)	168 (36)	160 (22)	328 (27)
Falls (E880A–889A)	182 (38)	439 (60)	621 (51)
Other accidents (E870–879A, E920A–928A, E960A–969X, E970A–979A)	60 (13)	21 (3)	81 (7)
No E-code or no accident	63 (13)	113 (15)	176 (15)

defined as violence equal to or less than a fall to the ground from a standing position (fall on a level). A trauma as a result of a fall while standing on a chair, in a stairway, or a fall from a building were considered to be severe; all traffic accidents were considered as severe trauma.

The fractures included in the 10 percent random sample were classified into four types and, according to Peltier (1965), were divided into stable and unstable fractures. This classification was chosen to allow comparisons with an earlier Scandinavian report (Ragnarsson and Jacobsson 1992).

Results

During 1988, 1212 patients with an acute pelvic fracture were registered in Finnish hospitals for primary treatment (Table 1), 61 percent were women. The incidence was 1.5-fold higher in women than in men. The women-to-men ratio was 2.9 in patients who were over 49 years of age. In younger age groups the ratio was 0.5. 62 percent of women and 23 percent of men were over 69 years of age.

The total incidence rates were $29/10^5$ in women, and $20/10^5$ in men. The incidence increased abruptly

Table 3. Accuracy of the data of the National Hospital Discharge Register in the random sample

Variable	No. of cases correct / all	Percent
Diagnosis	111 / 114	97
Main diagnosis	88 / 92[a]	96
Secondary diagnosis	16 / 20[a]	80
Subtype of main diagnosis	88 / 92	96
Sex	111 / 111	100
Age	111 / 111	100
Hospitalization time	108 / 111	97
Month of injury	106 / 111	95
E-code	97 / 103[b]	94
Place of injury	70 / 93[c]	75

[a] In 1 patient the pelvic fracture was recorded both as main and as secondary diagnosis.
[b] In 8 / 111 cases, the E-code was missing.
[c] In 18 / 111 cases, the information about the place of injury was missing.

Table 4. Number of fractures[a] according to severity of trauma in the random sample of hospital records

Fracture type	Moderate trauma, n 57	Severe trauma, n 50	Total n 107
I Stable	47	16	63 (59%)
wing of ileum	5	2	7
pubic rami	42	14	56
II Unstable	10	34	44 (41%)
multiple	1	31	32
acetabular	9	3	12

[a] 4 patients with a stress fracture are not included in this table.

in women after 59 years of age, and in men after 69 years. The women to men incidence ratio showed that women in age groups 20–49 years had a lower relative risk of a pelvic fracture than men of the same age. In age groups 60–89, on the contrary, their risk was higher than that of men.

The pelvic fracture was recorded as the main diagnosis in 76 percent of all the patients (Table 2). The total of the hospital in-patient treatment days for patients with pelvic fractures as the main diagnosis was 17.901, and the mean duration of hospital stay was 17 days in men and 21 days in women. Of all the cases, 46 percent were pubic fractures, the figure in women was 56 percent pubic fractures.

The most frequent cause of injury was a fall (51 percent) which was commoner in women (60 percent) than in men (38 percent). The proportion of traffic accidents was higher in men than in women (36 percent vs. 22 percent, respectively). Moreover, the proportion of other injuries was higher in men (13 percent) than in women (3 percent). The E-code for injury mechanism was not given or it had remained unknown in 15 percent of the cases among women and in 13 percent among men.

In the random sample, the medical records and the radiographs of 7 patients could not be found. The accuracy of the rest of the data was good (Table 3). We found a high accuracy regarding the diagnosis, the main diagnosis and its subtypes, sex and age of the patients and the month of injury. The accuracy was poorer regarding the E-code and the place of injury. In the latter factors, the accuracy was decreased because of missing information and incorrect recording (Table 3).

In the random sample, 59 percent were stable fractures and half of the fractures were due to a moderate trauma (Table 4). In the random sample, the fractures occurred in relatively equal numbers during all the months of the year and there were no differences between the seasons.

Discussion

The hospital discharge register kept by the National Board of Health covers all the hospitals in Finland since 1967, with the exception of mental hospitals (Nikiforov 1984). According to a recent Swedish study, 17 percent of all patients with pelvic fractures were treated as out-patients (Ragnarsson and Jacobsson 1992). The aim of our study was to analyze the patients treated in hospitals. In Finland the proportion of the pelvic fracture patients treated as out-patients is unknown.

In our study, the agreement between the discharge register data and hospital patient files was good. The annual coverage of the Finnish National Hospital Discharge Register is also good concerning severe injuries, such as pelvic fractures (Salmela and Koistinen 1987, Aro et al. 1990). Thus, the Hospital Discharge Register is a reliable source for epidemiological studies concerning fractures requiring hospital treatment.

The Finnish discharge register includes foreign citizens. However, the number of foreign citizens who lived in Finland in 1988 was below 0.5 percent. Our 10 percent random sample included 1 foreign citizen.

Further, the register does not report pathological pelvic fractures. These, however, are easily found with 3-digit codes 140–239 and do not interfere with registration of acute pelvic fractures (3-digit code 808), a finding which was confirmed in our random sample, as no pathological pelvic fracture was recorded as an acute pelvic fracture.

We found the incidence of pelvic fractures treated in hospitals to be $24/10^5$ inhabitants, the incidence of women being $29/10^5$ and of men being $20/10^5$. In south-west Sweden, the corresponding total incidence during the years 1976–1985 was $20/10^5$, and for women $27/10^5$ and men $13/10^5$ (Ragnarsson and Jacobsson 1992). In Rochester, Minnesota, U.S.A., during the years 1968–1977, the total incidence was $35/10^5$, for women $48/10^5$ and for men $24/10^5$. This study included patients who were treated as out-patients for minor pelvic fractures (Melton et al. 1981).

In the discharge register data, 27 percent of the pelvic fractures were sustained in traffic accidents. In Sweden in 1976 to 1985, 25 percent of the pelvic fractures resulted from traffic accidents (Ragnarsson and Jacobsson 1992). The situation has changed very much during the past 2 or 3 decades; in Finland during 1962–1966, 66 percent of the pelvic fractures were sustained in traffic accidents (Huittinen and Slätis 1972). This change is partly explained by the introduction of obligatory seat belt-wearing and general speed limits and by a major increase in the number of osteoporotic fractures. Generally, improved driving behavior is reflected in the decreased numbers of traffic deaths: in 1968 973 deaths (Hantula 1984), in 1988 653 deaths (Liikenneturva 1991) and in 1992 601 deaths (Liikenneturva 1993), while from 1968 to 1993 the number of motor vehicles had increased 2.9-fold (Statistical Yearbook of Finland 1993).

In our study, half of the patients had sustained the pelvic fracture as a result of a fall. In the discharge register material, 46 percent of the cases were fractures of the os pubis and in women this figure was 56 percent. These data and the fact that the incidence of pelvic fractures in older women was much higher than in men of corresponding age, indicate that pelvic fractures in older women usually results from osteoporosis (Melton et al. 1981, Ragnarsson and Jacobsson 1992).

In our study, the average length of an in-patient hospital stay for acute pelvic fractures was like that in previous reports: 22 days in Sweden (Ragnarsson and Jacobsson 1992), 21 days in Dundee and 28 days in Oxford (Knowelden et al. 1964). In none of the studies did the severity of the pelvic fractures affect the average length of the hospital stay.

Acknowledgements

The authors wish to thank the Foundation of Orthopedics and Traumatology of Finland and the Yrjö Jahnsson Foundation for financial support.

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