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The incidence and trauma mechanisms of acetabular fractures: A nationwide study in Finland between 1997 and 2014

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ABSTRACT

Purpose: Information on the incidence of acetabular fractures of the pelvis is limited. Epidemiological data is often based on specific trauma registers, individual trauma centres or on trends of all pelvic fractures grouped together. The primary aim of this study was to determine the incidence and trends of hospital-treated acetabular fractures in the Finnish population from 1997 to 2014. The secondary aim was to assess the trauma mechanisms involved.

Methods: The Finnish National Hospital Discharge Register collects inpatient data from all public and private medical institutions in Finland and covers the entire Finnish population of 5.5 million. For this study, we selected all persons 18 years of age or older who were admitted to hospital for the treatment of an acetabular fracture between 1997 and 2014. The main outcome variable was the annual number of patients hospitalised with a main or secondary diagnosis of acetabular fracture of the pelvis.

Results: The overall crude incidence of acetabular fractures increased slightly (from 6.4/100 000 persons/year to 8.1/100 000 persons/year) from 1997 to 2014 while the age-standardised incidence rate remained at a similar level (7.1/100 000/persons/year in 1997 and 7.2/100 000/persons/year in 2014). An incidence increase was observed in the elderly population, whereas the incidence of acetabular fractures in the younger population (mostly high energy traumas) remained stable. The most frequent trauma mechanism for acetabular fractures was fall on the same level (47%).

Conclusions: The incidence of acetabular fractures increased slightly in Finland between 1997 and 2014. This increase was observed especially in the elderly population and the ageing of the population largely explains the rise. The incidence of acetabular fractures in the younger population decreased. The most common trauma mechanism was falling on the same level.

Introduction

Pelvic fractures are relatively uncommon in the general population. Such fractures have a great impact on the sufferer, however, due to significant injury-induced morbidity and mortality. The incidence of pelvic fractures has varied between 17 and 35/100000 person-years and fractures constitute about 3%–8% of all fractures treated in hospitals [1–6]. During recent decades, the number and incidence of pelvic fractures in elderly people have increased [1,2,7–12].

Low energy pelvic fractures mostly occur in elderly patients, and approximately 70% of low energy fracture patients are over 80 years of age [4,11]. High energy pelvic fractures are, in turn, mostly seen in younger persons aged between 10 and 40 years. Anatomically, pelvic fractures are divided into pelvic ring disruptions and acetabular fractures [13]. Combined fractures of the acetabulum and pelvic ring have been reported to constitute 5%–16% of all pelvic fractures [13].

From 1998 to 2003, the incidence of acetabular fracture remained at a level of 3 fractures/100000 persons/year [14]. There is, however, only limited epidemiological data available concerning these fractures. Data for the frequency and incidence of acetabular fractures are often based on trauma registers, individual trauma centres or on trends for all fractures combined [15–19].

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The primary aim of this study was to determine the incidence of acetabular fractures leading to hospitalisation in Finland from 1997 to 2014. A secondary aim was to assess the trauma mechanisms of such fractures.

Material and methods

The Finnish National Hospital Discharge Register (NHDR) provides an opportunity to investigate descriptive numbers of hospital-admitted injuries and diseases that cover the whole Finnish population. The register is the responsibility of the National Institute for Health and Welfare – a research and development institute under the Finnish Ministry of Social Affairs and Health. The registering of data in the NHDR is mandatory for both public and private healthcare providers.

The NHDR contains data on age, sex, domicile of the patient, length of hospital stay, primary and secondary diagnoses, the surgical operations performed during the hospital stay and trauma mechanisms. Hospitals in Finland receive financing based on this information, and thus the motivation to register all patient data is enhanced. Since 1996, diagnoses in the NHDR, have been coded according to the 10th revision of the International Classification of Diseases (ICD).

The main outcome variable for this study was the number of patients hospitalised in Finland with a main or secondary diagnosis of acetabular fracture of the pelvis (ICD-10 code S32.4) from 1997 to 2014. All patients 18 years of age or older were included in the study.

During the years 1997 to 2014, there were 8941 hospitalisation events with an acetabular fracture diagnosis. In case of multiple hospitalisation episodes of a single patient, only the first episode was included. In total, 5022 patients with acetabular fracture were included in the analysis.

The population was categorised into two groups: 1. younger patients including adults under general retirement age (18 to 64 years) and 2. elderly patients over the general retirement age (over 65 years).

Trauma mechanisms were analysed and three groups of trauma mechanisms based on the ICD-10 external causes were formed. The group 'fall on the same level' included the ICD-10 diagnosis codes W00 (fall on the same level involving ice and snow) and W01 (fall on the same level from slipping, tripping and stumbling). The group 'fall from one level to another' included the ICD-10 codes W10 (fall on and from stairs and steps), W11 (fall on and from ladder), W17 (other fall from one level to another) and W19 (unspecified fall). Motor car (V49.9) and motor bike (V29.9) crashes were included in the third group entitled 'motor vehicle crashes'.

Statistical analysis

To compute the incidence ratios of acetabular fractures leading to hospitalisation, the annual mid-population was obtained from Official Statistics of Finland, a computer-based national population register. Crude and age-standardised incidence rates of acetabular fracture were calculated for both genders and were expressed as the number of cases per 100,000 persons per year. In the calculation of the age-standardised incidence rates, age adjustment was carried out by direct standardisation using the mean population of Finland between 1997 and 2014 as the standard population. For the entire time period, one person was counted only once. Since the study was nationwide and comprised the entire adult Finnish population and the incidence of acetabular fractures, the results were true final numbers of frequency and incidence – not estimates based on sampling or cohort. Thus, in full agreement with our previous investigations [7,20], 95% confidence intervals were not calculated.

Results

During the study period between 1997 and 2014, a total of 5022 patients were hospitalised due to acetabular fracture. The annual number of fractures was 256 in 1997 and 357 in 2014 (Fig. 1). The age distribution of the patients was bimodal (Fig. 2). The major mode comprised older patients (mostly low energy injuries) and the minor mode comprised younger patients (mostly high energy injuries).

The overall crude incidence of acetabular fractures increased slightly (from 6.4/100 000/persons/year to 8.1/100 000/persons/year) from 1997 to 2014, while the age-standardised incidence ratio remained at a similar level (7.1/100 000/persons/year in 1997 and 7.2/100 000/persons/year in 2014) (Fig. 3). The incidence of acetabular fractures in elderly patients over 65 years of age

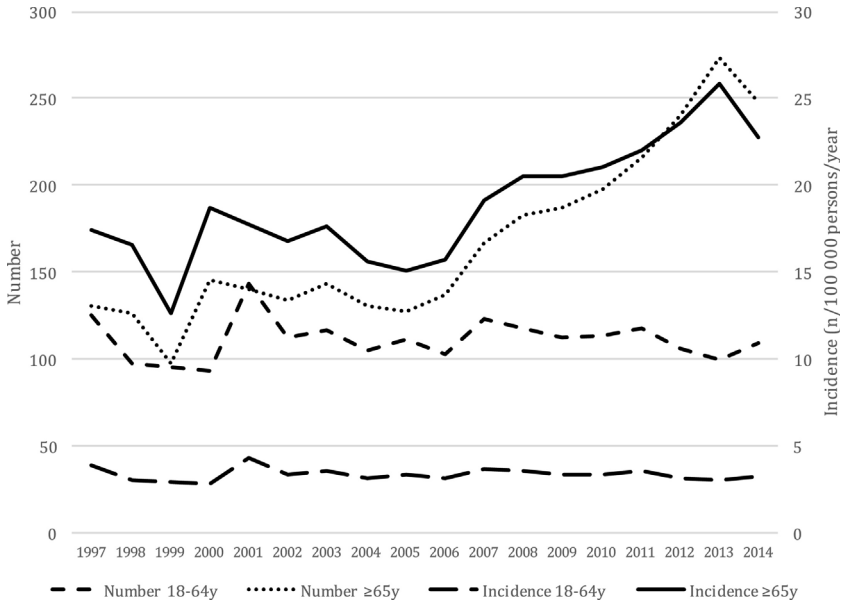

Fig. 1. The age specific number and incidence of acetabular fractures in Finland from 1997 to 2014.

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