Clinical Risk Factors for Hip Fracture in Young Adults Under 50 Years Old

Kenneth Cheng[1,2], Sandy Montgomery[1], Sarah Housley[1], Eugene Wheelwright[1]

Abstract

Background: Established risk factors for hip fracture exist for older individuals. Young adults (less than 50 years old) presenting with hip fractures have received little attention.

Methods: The records of all adults, presenting over a 5-year period (1999–2004), to a large inner city teaching hospital, with a diagnosis of hip fracture, were reviewed. Of the 2,778 subjects, 196 involved people less than 65 years of age, limiting this to those less than 50 years old left 42 subjects [30 F/12 M, median (IQR) age 43 (37–47) years old]. Stepwise logistic regression analysis was performed to examine for clinical risk factors.

Results: In this cohort regression analysis revealed a history of high impact trauma (β = 0.219, p = 0.002) and intravenous drug abuse (β = 0.206, p = 0.003) as predictors for risk of hip fracture.

Conclusions: Our data suggest that intravenous drug abusers under 50 are a particular group that we should be targeting for intervention strategies.

Key Words

Hip fracture · Hip · Under fifties · Drug abuser

Eur J Trauma Emerg Surg 2009;35:40–2

DOI 10.1007/s00068-008-7177-y

Introduction

Previous research has demonstrated a prevalence rate for hip fractures in young adults (i.e., less than 50 years old) at roughly 3% [1–4]. Despite this, little attention has been directed at ascertaining the pathophysiology behind these fractures. Our centre (as is the case in many) only offers follow-up review to those over 50 years of age presenting with a fragility fracture [5]. This is due to the exponential increase in hip fracture observed in those over 50 years of age. It is already known that after 50 years of age increased bone breakdown by osteoclasts and disruption of bone microarchitecture (osteoporosis) leads to an age related bone loss [5] but it is not known if younger subjects have risk factors which may result in a similar process. The substantial public health and cost implications of osteoporotic fractures along with the extensive evidence, which exists concerning the effectiveness of pharmacological intervention for osteoporosis post fracture has lead to the development in many centers of a specialist osteoporosis service. However, in our centre (as with many) this service is only offered to those over 50 years of age presenting with a fragility fracture [6]. This is due to the assumed low risk of osteoporosis in this age group and hence those subjects presenting with a hip fracture under 50 years of age receive relatively little attention concerning the pathophysiology behind the fracture.

The aim was to evaluate factors contributing to the occurrence of hip fracture in young adults to find out which subjects should be targeted for interventional measures.

Patients and Methods

Between the periods of 1999 and 2004, a total of 2,778 patients attended Glasgow Royal Infirmary (a large inner city teaching hospital) with a diagnosis of hip fracture. Of these, 42 were less than 50 years of age (1.5%). The case notes of this cohort [30 females/12 males, median (IQR) age was 43 (37–47) years old] were reviewed. All subjects underwent surgery as an emergency procedure via spinal or general anesthesia

[1]Department of Orthopaedic Surgery, Glasgow Royal Infirmary, Glasgow, Scotland, UK,
[2]7 Dalkeith Avenue, Dumbreck, Glasgow, UK.

Received: December 5, 2007; revision accepted: April 17, 2008;
Published Online: July 22, 2008

with standard antibiotic prophylaxis in all cases. From the case notes baseline patient demographics were recorded: age, sex, comorbid medical conditions such as the presence of diabetes, hypertension, hyperthyroidism and hyperparathyroidism. Particular attention was placed on the prescription of the following medications: oral glucocorticoids, thiazide or frusemide diuretics, estrogen, antipsychotics and anticonvulsants. Data were also captured concerning the fracture; type (intracapsular or extracapsular), side (left or right), energy of the trauma required to produce the fracture and the presence of polytrauma. The time elapsed from the fracture to attendance at hospital was recorded as well the time taken from admission to operative intervention and the presence of any postoperative complications.

Statistical Analyzes

All analyzes were performed using SPSS version 12.0 for Windows. The Kolmogorow–Smirnov test was applied to check the normality of the variables. Logistic regression analysis was performed to assess for statistically significant risk factors for hip fracture. The following variables were entered into the model: alcohol intake, number of cigarettes consumed per day, a history of intravenous drug abuse, presence of hypertension, history of asthma/chronic obstructive pulmonary disease, use of anticonvulsants and antipsychotics. A p value ≤ 0.05 was considered to be significant. All results are reported as mean (SD) unless otherwise stated.

Results

High-impact fractures were observed in 95.2% of the cohort, with nil involved in polytrauma. Those who presented with low-impact fractures tended to be medically frail with multiple comorbidities. Just over three quarters of the cohort (76.9%) presented to accident and emergency within 24 h although nearly one quarter (21.4%) had a delayed presentation at greater than 48 h from initial event. About 97.6% underwent operative intervention within 48 h of admission. Nineteen percent (n = 8) suffered postoperative complications. These were mainly medical complications with lower respiratory tract infections observed in four individuals, thromboembolic disease in two subjects, heart failure in one and the avascular necrosis of the hip in one subject. Examination of social factors revealed consumption of alcohol above the national average was prevalent in 69% of the cohort as was cigarette ingestion. Review of the subject's medical history revealed asthma/chronic bronchitis in 16.7%, hypertension in 14.3%, diabetes mellitus in 4.5% and no subjects were found to have either hyperthyroidism or hyperparathyroidism. Prescription of the following regular medications were observed: oral glucocorticoids (2.4%), thiazide (2.4%)/frusemide diuretics (4.8%), estrogen (2.4%), antipsychotics (7.1%) and anticonvulsants (12%).

In this cohort logistic regression analysis revealed a history of high impact trauma ($\beta = 0.219$, $p = 0.002$) and intravenous drug abuse ($\beta = 0.206$, $p = 0.003$) as predictors for risk of hip fracture.

Table 1. Baseline characteristics of subjects.

	Subjects less than 50 years old
Number (%)	42
Age (years) (median, IQR)	43 (37–47)
Gender (male/female)	12/30
Smoking (%)	29 (69)
Excess alcohol intake (%)	29 (69)
Intravenous drug abuse (%)	5 (12)
COPD/asthma (%)	7 (16.7)
Steroid use (%)	1 (2.4)
Diabetes mellitus (%)	2 (4.5)
Hypertension (%)	6 (14.3)
Frusemide use (%)	2 (4.8)
Thiazide diuretic use (%)	1 (2.4)
Hyperthyroidism (%)	0 (0)
Hyperparathyroidism (%)	0 (0)
Estrogen supplementation (%)	1 (2.4)
Antipsychotic use (%)	3 (7.1)
Anticonvulsant (%)	5 (12)

Table 2. Fracture etiology, time to initial presentation with fracture and times to operative intervention.

	Subjects less than 50 years old
Number of subjects	42
Intracapsular fractures (%)	21 (50)
Extracapsular fractures (%)	21 (50)
High/low trauma fractures	40/2 (95.2/4.8)
Polytrauma (%)	0
Time to presentation at accident and emergency (< 12 h)	26 (61.9%)
Time to presentation at Accident and Emergency (12–24 h)	6 (14.3%)
Time to presentation at Accident and Emergency (24–48 h)	1 (2.4%)
Time to presentation at Accident and Emergency (> 48 h)	9 (21.4%)
Time to operation (< 24 h)	24 (57.1%)
Time to operation (24–48 h)	17 (41.5%)
Time to operation (> 48 h)	1 (2.4%)
Postoperative complications (%)	8 (19%)

Discussion

This study is the first to examine and demonstrate clinical risk factors for hip fractures in the under 50s. Our research suggests that intravenous drug abusers are a particular group that should be singled out for further investigation. What remains unknown and hence is a limitation of our study are the pathophysiological reasons behind this group being identified in this study as a high-risk for sustaining hip fractures. While the lifestyles observed in this group lead to numerous risk factors for osteoporosis such as excess consumption of alcohol, cigarettes, low calcium intake and lack of exercise, but as assessment of BMD was not performed, this remains, however, at this stage purely speculative. The subjects (n = 5) were invited for further specialist review, but did not attend the follow-up appointments.

As mentioned previously, osteoporosis is believed to be relatively uncommon in the under 50s, except in cases of secondary osteoporosis such as Cushings disease, hyperthyroidism, hyperparathyroidism or gonadal deficiency. Boden et al. [7] examined the relationship between hip fractures sustained in those less than 50 years old and BMD in 20 otherwise age-matched healthy subjects. They demonstrated that 90% of the group had a BMD below the mean for that age group and that 75% were greater than 1 SD below the mean. A direct correlation was also demonstrated between BMD and number of risk factors for osteoporosis (Tables 1 and 2)

The prevalence of hip fractures in subjects under 50 years of age in our study, at 1.5% of the total population is lower than previously documented. This area, however, has largely been ignored for the past 20–30 years, hence the figure obtained in our study may simply represent the change in patient demographics observed the past 20–30 years [1, 8]. Increasing life expectancy leading to an aging population, whose risk of fractures significantly increases over 75 years of age may simply alter the ratio of young/elderly subjects presenting with hip fractures.

We would, therefore, recommend that a low threshold for referral onto specialist services for analysis of BMD and/or treatment should be observed in those under 50 years of age presenting with low-impact fractures or even those presenting with high-impact fractures with numerous risk factors for osteoporosis, particularly intravenous drug abusers.

References

1. Aitken M. Aetiology of osteoporosis. In: Aitken M (Ed.Osteoporosis in clinical practice. J Wright and Sons Ltd, Bristol 1984, pp 49–70.
2. Askin SR, Bryan RS. Femoral neck fractures in young adults. Clin Orthop 1976;114:259–64.
3. Barnes R, Brown JT, Garden RS, Nicol EA. Subcapital fractures of the femur. A prospective review. J Bone Joint Surg 1976;58B:2–24.
4. Zetterberg CH, Irstam L, Andersson GBJ. Femoral neck fractures in young adults. Acta Orthop Scand 1982;53:427–35.
5. Compston JE. Sex steroids and bone. Physiol Res 2001;81:419–47.
6. McLellan AR, Gallagher SJ, Fraser M, McQuillian C. The fracture liaison service: success of a program for the evaluation and management of patients with osteoporotic fracture. Osteoporos Int 2003;14:1028–34.
7. Boden SD, Labropoulos P, Saunders R. Hip fracture in young patients: is this early osteoporosis? Calcif Tissue Int 1990;46:65–72.
8. Robinson CM, Court-Brown CM, McQueen MM, Christie J. Hip fractures in adults younger than 50 years of age. Epidemiology and results. Clin Orthop Relat Res 1995;312:238–46.

Address for Correspondence
Mr. Kenneth Cheng
7 Dalkeith Avenue
Dumbreck
Glasgow
UK
Phone (+44/78) 03203888
e-mail: kennethcheng@nhs.net