Prefracture syndrome of the hip fracture: a case control study

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ABSTRACT

Background. *Hip fractures result from both bone fragility and trauma, more often a sideways fall. Spontaneous hip fractures have been described; in such cases, patients reported pain ("prefracture" syndrome) in the hip region for weeks before the fracture.*

Objectives. *To identify the proportion of patients who had a pain in the hip region before a hip fracture, to compare this proportion to the one observed in controls and to describe the characteristics of this pain.*

Patients and methods. *For a period of 6 months, each subject (>65 years) treated for hip fracture was prospectively recruited in an orthopaedic surgery department. Exclusion criteria were: alterations of cognitive functions (defined by a mini mental state <20), refusal, and fractures related to bone metastasis or multiple myeloma. Subjects were compared to sex-matched controls consulting in an acute care geriatrics unit. They were asked about the occurrence of pain in hip region before the fracture and its characteristics.*

Results. *Thirty-eight patients (31 women, 7 men, mean age 83.1 [±7.6]) were included and were compared to 38 sex-matched controls (31 women, 7 men, mean age 82.7 [±6.9]). Among the 38 patients with hip fracture, 10 (26.3%) reported a pain in the hip region, compared with 2 (5.3%) in the control group (p=0.01).*

Conclusion. *A better recognition of "prefracture" pain in the elderly may allow adequate management and treatment of patients, in order to avoid a proportion of hip fractures.*

Introduction

Hip fractures are common, and are responsible for the greatest amount of mortality, morbidity and cost attributable to osteoporosis. These fractures account for 10% of all osteoporotic fractures and 40% of total fractures after 80 years (1). Hip fractures result from both bone fragility and trauma, more often a sideways fall. Falls are a major risk factor for the occurrence of hip fracture, but insufficiency hip fractures have been described (2-5). In such cases, the fracture is related to bone fragility alone, and patients report pain in the hip region for days or weeks before the fracture. Actually the frequency of such symptoms is not well known, reported in a range of 3% to 24% of patients (2, 6), mainly because of the lack of specificity of the symptoms; pain in the hip region is frequent in the elderly and prevalence of coxarthrosis after the age of 85 is 26% on average (7). However, early recognition of such symptoms which may announce the occurrence of fracture (*i.e.,* "prefracture syndrome") may allow the prevention of some hip fractures, the consequences of them being devastating.

The aim of this prospective controlled study was to identify the proportion of patients who had pain in the hip region before a hip fracture, to compare this proportion to the one observed in controls, and to describe the clinical characteristics of this pain.

Patients and methods

We conducted a prospective case control study in the orthopaedic surgery department of Orleans Hospital (France). For a period of 6 months, each subject (>65 years) treated for hip fracture was prospectively recruited. The exclusion criteria were: alterations of cognitive functions (defined by a mini mental state <20), the refusal, avoiding the data assessment by questionnary and fractures related to bone metastasis or multiple myeloma. All data were collected by a single geriatrician. The following data were assessed: age, body mass index (BMI), number of prevalent fractures, number of falls in the six previous months, number of concomitant treatments, number of concomitant diseases; cognitive functions were evaluated by the Mini-Mental State Examination (MMS) (8); this test is an usual global test evaluating time and spatial orientation, attention, memory, language and constructional ability: a score less than 25 defined a cognitive impairment, whatever the aetiology. The functional status was assessed with the Lawton index of independence in the instrumental activities of daily living (9): *i.e.*, the patient's need of assistance in managing money, using transportation, using the telephone, cooking, doing housework

Table I. Baseline characteristics of the population.

Characteristics	Patients	Controls
Number of patients (F/H)	38 (31/7)	38 (31/7)
Age (years, mean ± SD)	83.1 (±7.6)	82.7 (±6.9)
BMI (Kg/m^2) (mean ± SD)	22.37 (±4.3)*	24.55 (±3.98)*
Concomitant medication (N) (mean ± SD)	5.58 (2.75)	6.84 (2.79)
Concomitant diseases (N) (mean ± SD)	1.66 (1.48)	1.47 (1.06)
Number of prevalent fractures (N) (mean ± SD)	0.74 (0.76)	0.53 (0.76)
Number of falls during the last 6 months (N) (mean ± SD)	1.24 (2.03)	1.55 (2.42)
Mini Mental State (MMS) (mean ± SD)	26.29 (3.19)	25.76 (3.32)
Instrumental activity of daily living (IADL) (mean ± SD)	13.71 (6.97)	13.79 (6.05)

*p=0.045.

or laundry, taking medications and shopping. Walking and balance difficulties were not assessable in this post-operative period.

We asked for the occurrence of pain in hip region before the fracture and its characteristics: localization, intensity (by a numerical scale from 0 to 10), duration, time between the occurrence of pain and the hip fracture, presence of an unusual limping, reduced walking ability). This information was assessed between 3 and 8 days after the fracture for all patients.

Control patients were included in the Geriatric department of the same hospital and during the same period, whatever the reason of hospitalisation: for each fractured patient a control was selected of similar sex and age (±2 years).

Statistical analysis
A descriptive analysis of variables of the patients was performed. Descriptive results for numerical variables are presented in mean and SD, and qualitative variables in percentage. Clinical variables were compared using chi-square statistics or Fischer's exact test, and Student's *t*-test.

Results
During the study period, 62 consecutive subjects (>65 years) were admitted for an osteoporotic hip fracture and 24 were excluded because of alterations of cognitive functions. Finally, 38 patients (31 women, 7 men, mean age 83.1±7.6) were included and are the basis of the study. They were compared to 38 sex-matched case controls (31 women, 7 men, mean age 82.7±6.9).

Characteristics of the patients are presented in Table I. There was no difference between patients and controls, except BMI, which was lower in patients with fractures. 47.4% and 42.1% of hip fractures were femoral neck and trochanteric fractures, respectively; 10.5% were spiroid fractures.

Among the 38 patients with hip fracture, 10 (26.3%) reported a pain in the hip region before the occurrence of fracture. Such symptoms were reported by 2 (5.3%) in the control group (*p*=0.01). Thirty-five (92.1%) patients reported a fall from standing before the hip facture, 2 (5.3%) a more important trauma and 1 no trauma. For three of the ten patients who reported a pain in the hip region, the acute pain was responsible for the fall, leading to the hip fracture. In the control group, hip osteoarthritis explains pain in the two patients. The prefracture pain was in the inguinal or crural area in nine cases, recent (<15 days) in eight cases, the beginning was progressive in eight cases, gradually worsening in five cases. All the patients reported a hip pain exacerbated by the activities and movements, there was no pain at night or morning; 80% of patients have a reduced walking ability, and 90% reported an unusual limping. No controlateral hip pain was reported in weeks before the fracture. The pain in the hip region was not reported to a trauma occurring in the six previous months.

Discussion
In our study, a quarter of the patients with hip fracture reported a pain in the same hip region up to 15 days before the fracture; and the pain was respon-sible for the fall in 3/10 of patients. The prevalence has been previously reported to be 5 (5) to 45% (2). The difference of frequency can be explained by the difficulties to assess characteristics of pain, especially in the elderly because the alterations of the cognitive functions are known to modify the capacity to indicate pain and symptoms. We carefully selected the patients according to MMS in order to have accurate and relevant questioning. The clinical features of the prefracture pain were similar to those previously reported. Maugars *et al.* stressed on the inguinal and anterior location and Tountas, on the recent onset of the pain, increased by weight-bearing activities (2-4). According to Parker, 2% of patients had a history of pain for up to 8 weeks before the fall and only 2 of the patients, had a history of acute pain in the hip, causing them to fall (5).

Prefracture syndrome, defined as a pain of the hip region can be associated to insufficiency hip fracture related to low bone mineral density (BMD). The lower is the BMD, the weaker are the mechanical forces that are needed to cause the hip fracture; thus, less displacement or more stable fractures can occur in severe osteoporotic patients (10). Falls and low bone density are two independent and additive risk factors for hip fractures (11-13). The risk for falling increases with age; thus, a large proportion of elderly people have 1 or more falls per year (14). However, only 5 to 10% of falls result in a fracture (14), for several reasons. First, the orientation of the fall and the effectiveness of protective responses influence fracture risk in the elderly (12, 13, 15). Second, interaction has been documented between osteoporosis and falls in the occurrence of fractures. In a European prospective cohort study of risk factors for hip fracture, falls and risk factors for falls (low physical activity or disturbed body balance) were related to the occurrence of humerus fractures in patients with osteoporosis but not in subjects with normal bone mineral density (16). In line with these findings, a retrospective study of postmenopausal women showed an increased risk for fractures during the preceding year

in women who reported a fall during that period and had low bone mineral density, but not in women with a history of falling and normal bone mineral density, nor in women who reported no falls irrespective of their bone mineral density (15, 17). These results suggest that the risk for clinical, mainly non-vertebral, fractures is increased only in women with a combination of low bone mineral density and incident falls.

The main limitation of our study is the absence of systematic x-rays, and consequently we did not assess the presence of hip osteoarthritis in the opposite hip.

Moreover, we did not assess biochemical markers, and especially serum 25 (OH) vitamin measurements. Prevalence of vitamin D insufficiency is high in the elderly, including in patients suffering from hip fracture, precluding the use of this parameter to discriminate patients with prefracture syndrome and others (18). However, part of pain may be related to induce osteomalacia in some patients (19).

Late diagnosis of the prefracture pain leads to an increased risk of complete hip fracture, requiring orthopaedic surgery. Prefracture pain is often mismanaged due to the banal or misleading clinical presentation particularly in the elderly. The occurrence of an unusual hip pain in patients with risk factors of osteoporosis should draw physicians' attention on the possibility of prefracture syndrome and lead them to perform bone exams. Radiographs are mostly useless to an early diagnosis. For this purpose, bone scintigraphy and MRI have a much better diagnostic sensitivity although a low specificity (20-21), and can be recommended in osteoporotic elderly people with a prefracture syndrome.

A better recognition of prefracture pain in the elderly may allow adequate management and treatment of patients, in order to avoid a proportion of hip fractures.

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