Improving Secondary Prevention in Fragility Fracture Patients: The Impact of a Simple Clinical Information Procedure

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ABSTRACT

Patients with fragility fractures are at high risk of future fractures. The low prevalence of osteoporosis diagnosis and treatment in this population is well known. We examined the effect of a simple information-procedure on post-fracture osteoporosis diagnosis and consecutive treatment in a prospective cohort study.

During a one-year period, 299 patients, who fulfilled the inclusion criteria, were treated for fragility fractures in one department of traumatology. Follow-up was possible for 231 patients, at least 6 months after the fracture event. The mean age of the 231 participants was 68 years for female patients and 65 for male patients; 73.6% of the participants were female. Only 12% of the patients with fragility fractures underwent further diagnostic evaluation by DEXA screening, and 14.6% received specific osteoporosis treatment following their low-trauma fracture.

It is concluded that a simple information procedure does not improve the management of osteoporosis efficiently. The rate neither of diagnostic nor therapeutic procedures for osteoporosis is increased in fragility fracture patients managed in a fracture clinic. The reasons for the insufficient secondary prevention measures are discussed.

BACKGROUND

Osteoporosis as a major public health problem not only leads to fracture interventions, functional disability, and increased mortality, but also to an individual, and often sustained, loss of quality of life.[1,2] Although concomitant diseases are important, increased mortality has been documented in recent studies for patients with vertebral fractures, as well as for patients with hip fractures.[3,4] The tremendous effects of osteoporosis on health care resources

are well recognized and expected to rise because of increased life expectancy. The annual costs of fragility fractures are estimated at about 2.5 to 3 billion Euros in Germany,[5] and about 450 million Euros in Switzerland, respectively.[6]

The preclinical asymptomatic course of osteoporosis as a systemic skeletal disease can be compared to dyslipidemia and hypertension. Osteoporosis becomes clinically apparent by fragility fractures. However, unlike preventive measures in cardiovascular disease, secondary prevention of osteoporosis, in patients with fragility fractures, is commonly neglected. Bone mineral density (BMD) testing is a reliable means of estimating fracture risk, but it is too expensive for general screening. Therefore, patients at high risk should be identified as early as possible. After the first fragility fracture, the increased risk of further fractures is well documented. Black et al documented a five-fold increase of further vertebral fractures in a large study population after a mean observational period of 3.7 years.[7] In these patients, the relative risk was 2.8 for hip fractures and 1.9 for all nonvertebral fractures. These results have been confirmed by several other studies.[8-11] However, it is well recognized, that osteoporosis is investigated in less than one third of fragility fracture patients.[12-19] Given the fact that bisphosphonates proved to reduce vertebral and non-vertebral fracture incidence in these patients, improved awareness may lead to a substantial reduction of morbidity and mortality.[20-22]

MATERIALS AND METHODS

A prospective cohort study (named OsteoCare) was undertaken from January 2001 to June 2001, and again for the same period in 2002 in a single large urban fracture clinic (Lucerne, Switzerland). During a 3-month prestudy phase, informative and educational lectures were given for physicians and surgeons of the hospital and general practitioners involved in trying to improve the awareness of further osteoporosis investigation in patients with fragility fractures. During the first 6-month study period, all surgeons involved in fracture care were asked to: inform eligible patients about osteoporosis as a possible underlying cause of fracture; and hand out a prepared information brochure, which included the presentation of the OsteoCare project and a recommendation to contact their general practitioner for further evaluation of osteoporosis. Patients aged 50 to 80 years were included in the study, if the fractures resulted from a fall from standing height or a similar degree of trauma. Any kind of traffic accidents, sport injuries, and malignancy-associated fractures were excluded. At least 6 months after the fracture event patients were contacted by phone and an interview was performed using a checklist. During the second study period, an identical information set was sent to general practitioners caring for the elected patients. General practitioners were informed about the OsteoCare project and asked to initiate the diagnostic procedure of osteoporosis. Again, after at least 6 months, the patients were contacted by the study nurse to evaluate whether information, diagnostic, and therapeutic procedures were performed. The study protocol was approved by the local ethics committee, and written consent was obtained from all participants.

The proportion of osteoporosis associated fractures, in our cohort population, was calculated using the fracture-attribution-rate of Melton.[23] Statistical analysis were performed using the SigmaStat, Statistical Analysis System, version 1.0. $P < 0.5$ was considered statistically significant. The Student t test was used to compare groups with normally distributed data.

RESULTS

One hundred seventy patients were eligible in the 2001 study period and 136 (80%) were included (8 patients died and 26 patients lost to control). In the 2002 study period, 129 patients were eligible, 95 (74%) of them were included (4 patients died, and 30 were loss to follow-up). Of a total of 299 patients, 231 could be evaluated. The mean ± SD age of the women was 68 ± 8 years, and 65 ± 7 years for the men. The proportion of women in the study was 73.6% (75.5% in the first study period and 70.5% in the second). The typical osteoporotic fracture sites accounted for 74% of all fracture sites and were distributed as following: wrist fractures accounted for 34%; hip fractures, 19%; fractures of proximal humerus, 16%; vertebral fractures, 3%; and pelvis fractures, 2%.

The proportion of forearm fracture and pertrochanteric femur fracture was significantly different in women and men (40% vs 18%, $P = 0.002$, and 13% vs 26%, $P = 0.01$, respectively). Seventy eight percent of the patients were hospitalized for fracture treatment (76% of the females and 83% of the males). A surprisingly high proportion of of the patients with forearm fracture (65%) needed hospitalization.

Osteosynthetic treatment was performed in 72% of the patients (87% of inpatients and 18% of outpatients). Fifty three percent of all fractures resulted from in-house falls with no difference between age tertiles and sex. The reasons for falls were stumbling (54%), slipping (28%), false steps on stairways (10%), and vertigo (8%). Stumbling was the most frequent cause in the age group 70 to 80 years ($P = 0.03$ compared to patients aged 50 to 59 years), whereas false steps and slipping was more frequent, but not statistically significant in the younger population. Two thirds of the out of house falls occurred on firm ground, and one third on loose ground; in more than half of them the ground was dry, in 22% there was a snowy/icy ground. In less than 10% of all cases insufficient light was a possible contributing factor.

Forty two percent of all patients received information about osteoporosis from the responsible physician (38% in 2001 and 49% in 2002). A further DEXA scan was performed only in 29 patients (12.6%); osteoporosis was diagnosed in 21 of 29 patients (72%), and osteopenia in the remaining patients. In 12 patients the diagnosis of osteoporosis was made on clinical findings only. Osteoporosis was treated in 33 of 231 patients (14.6%); bisphosphonates were given to 30 patients, and estrogen replacement therapy to 3 patients. According to the fracture-attribution rate of Melton,[30] the rate of osteoporotic fracture in our cohort population was calculated at 57% for females and 34% for males, corresponding to a total number of 120 osteoporosis patients.

DISCUSSION

Secondary prevention of osteoporosis was performed only in a small proportion of our 231 patients with fragility fractures, ie, a DEXA scan in 29 patients (12,6%) and specific osteoporosis treatment in 33 patients (14.6%). An increasing number of studies confirm that secondary prevention of osteoporosis in patients with fragility fractures is neglected.[12-19] In different study populations of less than 100 to over 20,000 patients, the proportion of patients who received a specific diagnostic and/or therapeutic procedure varied from less than 1% to a maximum of 7%. Surprisingly, this awareness could not be improved by the involvement of a consultant of internal medicine in fracture clinics.[16,17] The evidence that osteoporosis is underdiagnosed, even in rehabilitation hospitals, is

underscored by a recent study showing that the additional diagnosis of osteoporosis was made in only 1.5% of seniors with hip fractures (9.7% on admission and 11.2% on discharge).[18] Although, the total number of treated patients with osteoporosis is steadily increasing; the proportion of patients who received treatment after fragility fractures remained low, at 3.1% after hip fractures and 1.6% after forearm fractures, over a 6-year period.[19]

The individual and socioeconomic impact of the missed diagnosis of osteoporosis is well documented in a number of studies:[7-11] in 9704 women with a mean age of 75 years, the incidence of a second hip fracture, over a period of 3.7 years, is four times greater than the first one.[7] Over a 12-year period, a similar relative risk of 9.7 for refracture of the hip was documented in a large prospective cohort study.[10] There was also a strong correlation to every other fracture site after a low energy index fracture, resulting in a relative risk of 3.89 for any new fracture. This increase in risk is independent of age and bone density, pointing to other risk factors not measured by DEXA scan, such as deterioration of bone microarchitecture and increased risk of falls.[24]

In our prospective cohort study, we evaluated the effects of a simple information strategy involving patients, surgeons, and general practitioners. Although 42% of all patients were provided with some information about osteoporosis by their treating physicians, a further investigation by DEXA scan was performed in only 12% of patients, and a specific osteoporosis treatment received in only 14.6 %. If the fracture-attribution-rate of Melton[23] is applied to our study population, the calculated rate of fractures due to osteoporosis amounts to 59%. Thus, less than a quarter of our patients with presumed osteoporotic fracture received adequate diagnostic and therapeutic management. This lack is also underlined by the fact that in our patients who received a DEXA scan, osteoporosis was diagnosed in over 70%, and osteopenia in the remainder.

Different reasons may explain the insufficient awareness of osteoporosis in patients with fragility fractures: a low perception of the epidemiologic dimension of osteoporosis is widespread among physicians and patients. Additionally, the individual refracture risk, after fragility fractures, is usually underestimated. Surgical treatment of osteoporotic fractures concentrates mainly on the development of new implants to improve stability in osteoporotic bone.[25] Only very recently has the importance of secondary prevention been underscored in the orthopedic literature.[26] The lack of an algorithm establishing the interdisciplinary management of osteoporotic fractures adds to forgetting the proper treatment.[14]

The costs for diagnostic procedures and long-term medical treatment of osteoporosis are relatively low. Non-pharmacological measures to reduce the risk of fractures comprise—besides the control of drug-compliance—recording the risk of falls, physiotherapy to support muscular balance and muscular strength, as well as the investigation of patients surroundings at home. Although these measures are time consuming and labor intensive, they are highly effective in fracture prevention even in very old patients.[27] However, all these preventive measures are rarely applied.[28] Eventually, public information should emphasize the frequency of osteoporosis as an underlying disease in fragility fracture patients.

In a recently published comparable study from Canada,[29] the rate of patients with fragility fractures who underwent diagnostic procedures was significantly higher than in our study population, however, the rate of treated patients was

not different. More promising results showed a multidisciplinary approach with a complete algorithm including information, education, diagnostic, and therapeutic pathways.[30] The authors reported that about 2/3 of the suggested osteoporosis treatments were prescribed and continued 6 months after low-trauma fracture.

In conclusion, our information strategy involving responsible physicians and patients was not successful, eventually leading to further diagnostic and therapeutic procedures in a very small proportion of the patients with fragility fractures. The awareness of osteoporosis in patients with fragility fractures needs to be improved among treating surgeons, as well as among consulting internists and general practitioners.

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