Neila Calvo S, Nan Nan D, García Ibarbia C, Olmos Martínez JM, González Macías J, Hernández Hernández JL
Unidad de Metabolismo Óseo - Servicio de Medicina Interna - Hospital Marqués de Valdecilla-IFIMAV - Universidad de Cantabria - RETICEF - Santander

The reality of osteoporosis in patients hospitalized in Internal Medicine

Correspondence: Sara Neila Calvo - Unidad de Metabolismo Óseo - Departamento de Medicina Interna - Hospital Universitario Marqués de Valdecilla - Avda. Valdecilla, s/n - 39008 Santander (Spain)
e-mail: i491@humv.es

Summary

Purpose: a) to know the prevalence of previous osteoporosis and vertebral fractures in patients admitted to an Internal Medicine department from a third-level hospital; b) to determinate the proportion of patients discharged with a diagnosis of osteoporosis, and the percentage of those receiving treatment; c) to quantify the risk of fracture by applying the FRAX calculation tool; and d) to know the serum levels of 25OHD in these patients.

Patients and methods: Retrospective study, based on the review of clinical charts of all the patients admitted to the Internal Medicine department of Marqués de Valdecilla University Hospital, during April 2012. The information was gathered by a standardized protocol, including demographic, clinical, radiological and laboratory variables.

Results: Three hundred patients were studied (mean age, 80 years). Thirty-four (11.3%) had a previous diagnosis of osteoporosis and 14 (4.8%) of them were, or had been, on treatment. A diagnosis of osteoporosis, in the hospital discharge report, was noted in 14 patients. No treatment was prescribed in one of them. According to the FRAX calculation tool, mean risk for major osteoporotic fracture was 10.5%, and mean risk for hip fracture was 5.4%. Mean serum 25OHD level was 16 ng/ml, and more than 80% of patients had values below 20 ng/ml.

Conclusion: Osteoporosis is an underdiagnosed and undertreated disease, in patients admitted to an Internal Medicine Department, whatever the reason. Moreover, we have observed a high prevalence of 25OHD deficiency among these patients. Hospitalization can represent an excellent opportunity for the internists and other clinicians, to pay attention to the presence of osteoporosis and its related complications.

Key words: *vertebral fracture, osteoporosis, diagnosis, chest-X-ray, 25OHD, Internal Medicine.*

Introduction

Osteoporosis is a disease characterised by a reduction in bone mass and by alterations in the micro-architecture of bone tissue, which leads to an increase in its fragility and, consequently, a higher risk of suffering fractures[1]. The prevalence of osteoporosis increases with age, from 15% in women between 50 and 59 years of age to more than 80% in those over 80[2].

The principal osteoporotic fractures are vertebral, hip, wrist, humerus and pelvis. These fractures bear significant health and social implications. Furthermore, in a high percentage of patients they lead to significant morbidity, such as loss of mobility, loss of ability to carry out independently basic activities of daily living, chronic pain and even depression[3,4]. Similarly, osteoporotic fractures, above all hip fractures, are associated with a significant increase in mortality[5], this fact is especially important, since it has been estimated that the annual incidence worldwide of hip fractures in women will have increased by 3.5 times between 1990 and 2050[6].

In the last few decades, in hospitals in general, and in general internal medicine services in particular, an increase has been seen in the average age of patients being hospitalised who, in addition, usually have multiple comorbidities and are polymedicated. In fact, the prevalence osteoporosis, as a disease linked to aging, is increased in these individuals[7]. Admission to hospital represents on many occasions an opportunity to diagnose, initiate treatment and programme appropriate monitoring in those patients with osteoporosis, with the aim of attempting to prevent the complications of the disease, mainly fractures. We have carried out this work with the aims of: a) ascertaining the prevalence of previous osteoporosis and of vertebral fractures in patients admitted to the internal medicine service of a tertiary hospital; b) determining the proportion of patients discharged with a diagnosis of osteoporosis and the percentage of those who are treated; c) quantifying the risk of fracture by applying the FRAX® tool, and; d) finding out the blood levels of 25-hydroxyvitamin D (25OHD) in these patients.

Material and methods

A retrospective descriptive study was designed, based on a review of the clinical histories of all patients admitted to the internal medicine service of the Marqués de Valdecilla University Hospital during the month of April 2012. This centre serves as a health referral centre for a population of 350,000 inhabitants of Cantabria. The internal medicine service has approximately 130 hospital beds.

The variable data for the study were gathered using a standardised protocol in a computerised database management system. These variables were: risk factors for osteoporosis, comorbidities, drugs with an influence on bone metabolism, results of X-rays of thorax and/or dorso-lumbar spine, blood levels of 25OHD and prescribed treatments, differentiating between treatments at time of hospital admission and at discharge. Also recorded was the presence or not of family history of hip fracture and personal history of fractures.

Menopause was defined as being early if it had occurred before the age of 45. It was considered that a patient had clinical osteoporosis if they had suffered a typical osteoporotic fracture (hip, vertebral, humerus, forearm) earlier or had a vertebral fracture in the radiological study requested on admission, in the absence of other causes which may have accounted for it (high impact trauma, bone metastasis, myeloma or other bone diseases).

The comorbidities analysed were: chronic obstructive pulmonary disease –COPD– by means of a diagnosis based on tests of compatible respiratory function); ischemic cardiopathy or cardiac insufficiency, cerebrovascular accident, dementia, Parkinson's disease; active neoplasia, or in remission; venous thromboembolism; cataracts; rheumatoid arthritis; diabetes *mellitus* type 1 or 2 (HbA$_{1c}$ ≥6.5% or two tests for glycemia in fasting ≥126 mg/dl or a casual glycemia of 200 mg/dl or more than one patient with cardinal symptoms); arterial hypertension (through measurement and confirmation of levels of TAS > 140 mmHg and/or TAD >90 mmHg persistently); dyslipemia; hyperthyroidism and hypothyroidism; hyperparathyroidism; hypogonadism; intestinal malabsorption syndrome; malnutrition, urolithiasis; chronic hepatopathy; chronic renal insufficiency (defined as a glomerular filtrate <60 ml/min/m² according to the four variable MDRD equation, maintained for at least 3 months). The drugs evaluated were: corticoids, beta-blockers, anticonvulsives, statins, proton pump inhibitors (PPIs), serotonin re-uptake inhibitors, oral anticoagulants, opiates, hypnotics and benzodiazepines. Treatments for osteoporosis recorded in the discharge reports included: denosumab, selective estrogen receptor modulators (SERMs), strontium ranelate, teriparatide, PTH 1-84, calcitonin or bisphosphonates.

Blood levels of 25OHD were determined using electrochemiluminescence (Elecsys 2010, Roche Diagnostics, GMBH, Mannheim, Germany).

A vertebral fracture was defined as a reduction in height of the vertebral body greater than or equal to 20%, assessed through a review of lateral X-rays of the thorax and/or thoracic-abdominal spine. The X-rays were reviewed independently by the two authors and disagreements (<5%) were resolved by consensus. All the patients diagnosed with osteoporosis had had at least one laboratory study which included biochemistry, haemogram and VG, thyroid hormone, proteinogram and 24 hour calciuria.

Results

300 patients were included in the study of whom 157 (52.3%) were women and 143 were men. The average age was 80 years. The average body mass index (BMI) was 29.3 kg/m².

In terms of the risk factors related to osteoporosis or fragility fracture, the most frequent was the presence of cataracts (76 patients), followed by malnutrition (33), hypothyroidism (26), malabsorption syndrome (24) and chronic hepatopathy (24). Seven patients had history of hypogonadism and hyperparathyroidism, and it was only possible to confirm 4 women with history of early menopause.

In tables 1 and 2, respectively, are shown the comorbidities of the patients included in the study and their consumption of drugs.

A total of 34 subjects (11.3%) had had a previous diagnosis of osteoporosis (5 men and 29 women), although only 14 of these (4.8%) were receiving or had received treatment for the disease (zoledronic acid in one patient, other bisphosphonates in eight patients, three patients were receiving denosumab and teriparatide and strontium ranelate had been subscribed in one case each). Of the 34 cases of osteoporosis, in 6 cases the patients were receiving oral corticoids, in one case for rheumatoid arthritis, and in five cases with chronic obstructive pulmonary disease (it was not possible to quantify the exact doses of the glucocorticoids administered). In one case there was history of early menopause, and in another long-term hyperthyroidism. Treatment had been prescribed in only two of these case.

On the other hand, of the 34 patients with diagnosis of osteoporosis, in 16 of them it was confirmed that they had suffered at least one vertebral fracture.

All the patients had an X-ray of the thorax taken during their admission and in 31 there was also an X-ray taken of the thoracic-lumbar spine. 50 patients were identified as having vertebral fractures. Taking into account the total of all the patients studied and given that only 16 had history of radiological vertebral fractures, in 12% of all patients the presence of vertebral fractures had passed unnoticed by the clinician responsible. On the other hand, 68% of all fractures had passed unnoticed. Of the 50 patients with vertebral fractures, in only one case was this attributed to multiple myeloma.

Overall, and in accord with earlier data, 74 cases of clinical osteoporosis (defined by vertebral, hip humerus or wrist fracture) were identified. Therefore, 40 subjects had not had a diagnosis of osteoporosis. At the time of discharge, in only 14 patients was the diagnosis of osteoporosis confirmed in the clinical record, and of these, in one case no treatment was programmed.

On the other hand, the average risk of major osteoporotic fracture (vertebral, hip, humerus or wrist) measured by application of the FRAX® scale was 10.5% (SD: 8.7) and the risk of hip fracture 5.4% (SD: 5.5). According to the FRAX® tool developed for Spain, there were 27 patients with a risk higher than 20% of major osteoporotic fracture, and 118 patients had a risk higher than 3% for fracture of the hip. The risk of fracture using the FRAX® tool could only be calculated in 174 patients, due to a lack of information in the clinical histories of the other subjects of the study, while those treated for osteoporosis were excluded.

The average blood value of 25OHD was 16 ng/ml, although this was only obtained from 45 patients, this being a test which was not included in the protocol of requests for laboratory tests on admission. More than 80% of the patients had values below 20 ng/ml, and more than 50% (26 patients) had serious hypovitaminosis (≤10 ng/ml). Only two patients with hypovitaminosis D did not receive oral supplements at discharge.

Discussion

Osteoporosis is a process which generally develops asymptomatically over a long period of time, a fracture being the first sign in the majority of cases. A predisposition to the development of fractures is, from a clinical point of view, the central phenomenon of the disease. Among these fractures, of greatest significance is fracture of the hip, which preferentially affects older people, is frequent in women and which varies greatly in its incidence, its mortality and in length of stay in hospital[8].

Vertebral fractures are another complication characteristic of osteoporosis, although more than 50% of them pass unnoticed[9,10]. It is important to remember that the presence of an osteoporotic fracture, independently of the densitometry value, increases even more the risk of subsequent fractures, which means that the diagnosis is as important as the monitoring of the disease. In a study published by Sosa et al.[11], it was concluded that the presence of vertebral fractures increased the risk of new fractures. Furthermore, the authors observed this type of fracture in 62.6% of patients hospitalised or treated for fracture of the hip. Although there is no universally accepted definition of vertebral fracture, the majority of authors are in agreement in considering that there must be a loss of height of the vertebral body of at least 20%[12]. We know that lateral X-rays of the thorax are a very useful tool in enabling the identification of vertebral fractures[9]. In our work 50 patients were identified with fractures of this type, mostly unnoticed by the clinician (in our service, thoracic X-rays are not analysed by a radiologist unless specifically requested) and as a consequence, are not reflected in the discharge notes.

On the other hand, according to the definition of clinical osteoporosis which we have used, 74 cases were identified, which shows that almost 50% were not recorded in the clinical record (there being 34 patients with a previous diagnosis of osteoporosis). Furthermore, only 13 patients in whom their discharge notes reflected a diagnosis of osteoporosis received treatment, which indicates once more that, although osteoporosis is a highly prevalent chronic disease, it continues to be underdiagnosed and undertreated.

In respect of the results obtained using the FRAX® tool, it is known that the Spanish version of

Table 1. Comorbidities in the patients in the study

Disease	N	%
Hypertension	200	67
Dementia	112	37
Heart failure	111	37
Dyslipidemia	93	31
Diabetes *mellitus*	91	30
COPD	78	26
Ictus	72	24
Ischemic heart disease	68	23
Neoplasia	67	22
Chronic renal failure	60	20
Alcoholism	35	12
Thromboembolic disease	34	11
Smoking	28	9
Parkinson's disease	17	6

COPD: chronic obstructive pulmonary disease

Table 2. Consumption of drugs in hospitalized patients

Drug	N	%
PPIs	154	51
Hypnotics	126	42
Statins	90	30
Anticoagulants	56	19
Beta-blockers	36	12
Opiates	33	11
Thyroid hormone	23	8
Corticosteroids	18	6
Anticonvulsants	9	3

PPIs: proton pump inhibitors

FRAX® underestimates by 50% the number of major fractures[13]. So, we could take into account the recommendations of NOF, which is to treat patients if their risk of major fracture is ≥20% and of hip fracture ≥3%. Thus in our work, more than 30% of patients (for major fracture) and more than 80% (for hip fracture) had indications to receive treatment, although it should be borne in mind that this guide recommends starting treatment when there is a diagnosis of osteoporosis, whatever the FRAX® indicates. This makes us think that patients admitted to the internal medicine service usually have a high risk of osteoporotic fracture.

In terms of the determination of the level of 25OHD in the blood, it seems that, while this is not normally requested routinely during hospital admission, the staff do usually prescribe treatment when there is a deficit.

When dealing with a multifactorial disease in which are involved, among others, genetic and environmental factors, one of the keys to diagnosis is to identify its risk factors[2]. Hospitalisation may be an opportunity to diagnose osteoporosis and vertebral fracture. However, in line with the data provided in this work the risk factors for fracture are not generally evaluated during admission and osteoporosis continues to be forgotten by the clinician despite its known epidemiological, health and social significance. Furthermore, it is a highly prevalent disease in older patients, in whom, with increasing frequency, are associated malnutrition, comorbidities and polymedication (a notable finding in this work is the significant consumption of hypnotics) which themselves pose additional risk of falls and, therefore, of fracture[2].

However, there are highly efficacious and easy methods of treatment for osteoporosis, especially in polymedicated patients, which ensure therapeutic compliance, and which may be considered, when indicated, during admission to hospital[14].

Our study has various limitations. Firstly, those inherent in any retrospective study. In addition, not all the patients had X-rays of the lumbar spine, which means that it was not possible to determine the true prevalence of vertebral fractures in this section of the spine. Finally, the determination of 25OHD in the blood was carried out in a small sub-group of hospitalised patients, which means that we cannot generalise the results to all the patients studied. However, our work group has studied levels of 25OHD in a broad sample of patients hospitalised in our internal medicine service (approximately 400 individuals) and the results were similar (data not published).

In conclusion, osteoporosis is a disease rarely considered by the clinician in patients hospitalised due to other causes, in spite of its having a prevalence similar to other diseases such as diabetes mellitus, dyslipemia or dementia. As a consequence, it continues to be a condition which is underdiagnosed and secondarily undertreated, in spite of there being many therapeutic options. In the light of the findings of our work we suggest that the internist, and in general, any clinician, should

maintain a high level of suspicion of this disease in hospitalised patients, in order to try to reduce associated complications, especially fractures.

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Drs Manuel Muñoz Torres, Estebán Jódar Gimeno and Manuel Sosa Hénriquez on behalf of SEIOMM. This collaboration has continued at each year´s congress to the present day.

The number of members increased, reaching 447 in this period.

In November 2008 the congress was held in Oviedo in October 2009 the XIV congress in Santander, and in 2010 in Salamanca. In 2008 the congress of the European Calcified Tissue Society took place in Barcelona, A new course for accreditation in "Techniques for the Measurement of Bone Mass" was organised, led by Luis del Río and Xavier Nogués.

At the Salamanca congress Juan José García Borrás requested that it be put on record that: "support be given to retired members who, due to the lack of support from the pharmaceutical industry do not attend the congresses. Given the favourable financial policy which has been put in place by the board of directors and the creation of the Foundation, and since some funding has been requested for basic research, I ask that the interests retired members be taken into account, and that they are brought to the congresses, and that at the next executive meeting considers this plea and brings its decision to the next Assembly".

During this period the FAES FARMA-SEIOMM prizes were awarded. Seven ASBMR grants continued and a new Amgen-SEIOMM prize established. At the Santander congress of 2009, the Italfármaco Laboratories were honoured for having supported the prizes for the best oral and poster communications at the SEIOMM congresses for more than 15 years without interruption.

Carlos Lozan Tonkin, Jordi Farrerons Minguella and Juan José García Borrás were awarded honorary membership.

From October 2010

The board of directors during this period is made up of Javier del Pino Montes (President), Josep Blanch Rubió (Vice President), María Jesús Moro Álvarez (Secretary) and Carmen Valero Díaz de Lamadrid (Treasurer).

It was stated at the congress in Coruña in 2011 that FEIOMM had responsibility for the income and expenditure of the congresses, which means that some of the benefits which are obtained from them should be used to accomplish the action plans of FEIOMM, as well as funding its internal functions.

At this congress it was agreed to increase the membership fee which had remained unchanged for 15 years. After a number of interventions, the change from 27 to 35 euros in 2012, and then to 40 euros in 2013, was approved. At a meeting during this period some working committees were established in accord with the objectives developed using the Metaplan method, a method of group moderation for problem-solving. The following groups were approved: economic management, training and congresses, research committee, external relations and working groups. Based on these objectives a strategic plan was developed with a horizon of 2014.

In addition, a group of senior members of SEIOMM was formed on the initiative of, and in collaboration with, Dr Juan José García Borrás who was appointed as coordinator of the group.

Relationships with other scientific societies continued. In collaboration with the Spanish Society for Osteoporotic Fractures (SEFRAOS) and other related societies the "Blue Book on Osteoporotic Fractures in Spain" was produced. A collaboration agreement was signed with AEEM to collaborate in scientific activities related to postmenopausal osteoporosis. SEIOMM maintained its relationships as part of SIBOMM and the IOF. In relation to the IBMS, due to a change in its communication strategy, it swapped its relationship with Elsevier for one with Nature, and stopped receiving Bone, this being substituted by BoneKey.

With regard to research, the ASBMR grants continued to be given and a revision was announced of SEIOMM´s Guides to Clinical Practice, coordinated by Jesús González Macías.

In this period the SEIOMM congresses were held in La Coruña (2011), Cuenca (2012) and in Tarragona (2013). In 2012 a SIBOMM congress was held in Madrid.

During this period improvements were made to information systems and information technology in relation to Web 2.0, including restructuring and redesigning the SEIOMM-FEIOMM and Review (Review of Osteoporosis and Mineral Metabolism) web site, and the creation of SEIOMM groups on Facebook and Linkedin. A cloud computing service was initiated for the use of members. The BIDI code was incorporated in the documents of the congresses and other SEIOMM documents. SEIOMM and FEIOMM were put on a sound footing, with the establishment of their own headquarters (Paseo de la Castellana 135, Madrid) and an executive secretary (Dª Lorena Herrero).

A group of senior members and a young researchers group have been formed, with meetings being organised post ASBMR.

The Cuenca congress approved the modification of the articles of association which would introduce the following changes:

1. A new home for SEIOMM headquarters.

2. Change to the closure of the accounts to enable the most up to date financial report to be given to the Assembly on June 30th each year.

3. An addition to the board of directors of two voting members was proposed, as well as creating the position of President Elect (the future President) to be incorporated into the board of directors, so that the strategy and activities of the Society may be planned with a horizon of two periods of office.

Note: this historical summary will be updated with the passage of time and as new data becomes available.