Diagnosis and treatment incidence of osteoporosis in patients with distal radius fractures

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ABSTRACT

Introduction: Distal radius fractures in elderly patients are an indicator of osteoporosis. The aim of this study was to determine osteoporosis diagnosis and treatment rates in patients with distal radius fractures treated surgically at our institution between 2012 and 2014. **Materials and Methods:** Information of 41 patients who underwent surgical intervention for distal radius fracture was obtained through telephone interviews. There were several variables evaluated—age, sex, smoking, comorbidities, previous fractures, preoperative and postoperative osteoporosis treatment, specialty of the physicians prescribing osteoporosis treatment, and DEXA scans performed. **Results:** The study included 41 patients (32 women). Twenty-six of them had a DEXA scan performed before the fracture (15 patients evidenced osteoporosis), and 11 had suffered previous fractures secondary to osteoporosis. Only 7 patients were under osteoporosis treatment at the moment of the fracture. After surgery, only 4 patients continued treatment. Pathological DEXA scan results had certain degree of association with the presence of type 2 diabetes, but not with other comorbidities. The annual incidence rate of osteoporosis, calculated using all patients served at our institution in 2014, was about 1%. Orthopedic surgeons accounted for only 1.5% of the total number of DEXA scans prescribed that year. **Conclusions:** Our study suggests that there is poor prevention by orthopedic surgeons of secondary osteoporotic fractures, which is why a national prevention protocol for fractures secondary to osteoporosis would be necessary.

Keys words: Osteoporosis, DEXA, distal radius fractures.
Level of evidence: IV

Incidencia de diagnóstico y tratamiento de la osteoporosis en pacientes con fractura de radio distal

RESUMEN

Introducción: Las fracturas de radio distal en pacientes mayores son un indicador de osteoporosis. El objetivo de este estudio fue determinar el diagnóstico y el tratamiento de la osteoporosis en pacientes con fractura de radio distal, operados en nuestra institución, entre 2012 y 2014. **Materiales y Métodos:** Los datos se obtuvieron de entrevistas telefónicas a 41 pacientes mayores, operados por fracturas de radio distal. Las variables evaluadas fueron: sexo, edad, enfermedades asociadas, tabaquismo, fracturas previas, tratamiento antiosteoporótico previo o posterior a la fractura en cuestión, especialidad del médico que solicitó el tratamiento y realización o no de densitometría mineral ósea**. Resultados:** La muestra incluyó a 41 pacientes (32 mujeres). Veintiséis contaban con una densitometría antes de la fractura (15 con osteoporosis), 11 habían sufrido una fractura por osteoporosis, y sólo 7 recibían tratamiento antiosteoporótico cuando ocurrió la fractura. Luego de la cirugía, solo 4 de ellos continuó con el tratamiento. Se encontró cierta asociación entre una densitometría patológica y la presencia de diabetes tipo 2, no así con otras comorbilidades. La tasa de incidencia anual de osteoporosis, calculada entre todos los pacientes que se atendieron en nuestra institución, en 2014, fue alrededor del 1%. Los traumatólogos solicitaron el 1,5% de todas las densitometrías prescritas dicho año. **Conclusiones:** Este estudio sugiere que los traumatólogos que se desempeñan en nuestra institución tienen nula o poca participación en la prevención secundaria de la osteoporosis; por esta razón, se consideraría necesario un protocolo de prevención de fracturas secundarias a la osteoporosis.

Palabras clave: Osteoporosis; densitometría mineral ósea; fractura; radio distal**.**
Nivel de Evidencia: IV

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INTRODUCTION

Osteoporosis is a condition characterized by the progressive loss of bone density, which causes weakness in the human skeleton, promoting fractures.[1] It currently affects more than 200 million people, and it is estimated that 30-50% of postmenopausal women will suffer from it.[2]

Approximately 40% of white women and 13% of men >50 years suffer at least one osteoporotic fracture (hip, wrist or spine) throughout their lives. These fractures are associated with a significant increase in the risk of a new fracture; however, evaluation rates to screen for osteoporosis after this type of fracture remain low.[2] Their importance lies, among other factors, in the morbidity and mortality that it results in, the economic cost and the demand for healthcare.[2] Therefore, evaluating this condition is important to prevent fractures due to bone fragility.[1]

Currently, the preferred method for diagnosing osteoporosis or osteopenia are DEXA scans. According to the latest guidelines for osteoporosis diagnosis, prevention and treatment, DEXA scans should be ordered in women ≥65 years, postmenopausal and <65 years, and in men from 70 years old onwards, but with related risk factors (smoking, sedentary lifestyle, fractures due to previous osteoporosis, malnutrition, diseases and disorders associated with low bone mass or bone loss, prolonged treatment with corticosteroids, etc.) (Table 1).[2]

Table 1. DEXA scan indications

- Women ≥65 years.
- Postmenopausal women <65 years with risk factors for fractures.
- Women in transition to menopause with clinical risk factors for fractures, such as low weight, previous fractures or use of high-risk medications.
- Men ≥70 years.
- Men <70 years with risk factors for fractures.
- Adults with a history of fragility fractures.
- Adults with diseases and conditions associated with low bone mass or bone loss.
- Anyone treated or in whom the possibility of pharmacological treatment is considered to monitor the effectiveness of the treatment.
- Anyone not treated if evidence of bone loss will determine treatment.
- Women who stop treatment with estrogen.

The hypothesis of this research is that osteoporosis is underdiagnosed, and that there is a low treatment rate for this condition in the population of adults operated by orthopedic surgeons belonging to this institution.

In order to prove this hypothesis, the objective was to quantify the diagnosis and treatment rates of osteoporosis in patients with distal radius fractures undergoing surgery in our institution, from January 2012 to December 2014.

MATERIALS AND METHODS

A retrospective, observational and descriptive study was carried out in the population of patients treated in our institution. The instrument was based on a questionnaire completed by a telephone survey of patients surgically treated due to post-traumatic distal radius fractures, between January 2012 and December 2014. All of them were treated by the same surgical team.

Patients were selected according to the following inclusion criteria: women ≥50 years and men ≥60 years (assessment of women began 10 years earlier, since around that age they become menopausal), low-energy distal radius fracture, patients undergoing surgery and with a minimum follow-up of two years.

Diagnosis and treatment of osteoporosis are not related to patients' surgical procedure or its follow-up. These two criteria would be appropriate if we were evaluating the outcome of the surgical treatment.

We excluded women and men <50 and <60 years, respectively, with high-energy fractures, orthopedically treated fractures and pathological fractures.

The sample included 41 patients who completed a telephone survey to collect data, such as age, sex, comorbidities, smoking, previous fractures, anti-osteoporotic treatment before or after the fracture, specialty of the physician ordering the treatment, and performance of a DEXA scan. Patients who had not received post-surgical treatment were referred for follow-up with the Rheumatology Service for evaluation of bone quality.

On the other hand, in order to obtain a value of the baseline incidence of osteoporosis, which can be used as a reference for comparative purposes, the records of the institution and the medical records of the patients who came for a DEXA scan during 2014 (from January 1 until December 31) were also reviewed.

Linear logarithmic models were adjusted to identify associations and estimate odds ratios (OR) corresponding to the covariates age and presence of comorbidities, and logistic regression was applied when the response was dichotomized (DEXA scan result: normal or pathological). To define the association pattern *a priori*, the database was expanded via the Monte Carlo simulation. All routines and analyses were processed in the Stata 14.0 software (Statacorp LP, College Station, TX, USA, 2014).

RESULTS

The study population consisted of 32 women and nine men, with an age ≥65 years (standard deviation [SD] 8.5) and ≥63 (SD 7.3) years, respectively (p = 0.67). More than half (26 patients) of them had comorbidities: six had type 2 diabetes, 12 had high blood pressure and only two had hypothyroidism. Nine referred to be smokers. Likewise, 11 patients had suffered fractures secondary to osteoporosis.

Regarding anti-osteoporotic treatment prior to the fracture, only seven were receiving it, and five of them had a previous DEXA scan performed. For this subgroup of subjects, all female, this was positively associated with age, so that, for each year older, the probability of receiving such treatment increased by 10% (OR = 1.10; = 0.062). In this regard, it is important to note that 23 patients had a previous DEXA scan performed, 15 with a pathological result. After the intervention, only four patients continued anti-osteoporotic treatment. This decrease was highly significant (p = 0.002) (Table 2).

Table 2. Frequency distribution of patients according to anti-osteoporotic treatment before and after a distal radius fracture

Previous treatment	Postoperative treatment No	Yes	Total (%)
No	31 (75.61)	3 (7.32)	34 82.93
Yes	3 (7.32)	4 (9.76)	7 (17.07)
Total	34	7	41

Pathological results of the DEXA scan were not associated with smoking (p = 0.32) or comorbidities, such as hypertension and hypothyroidism (p = 0.58 and p = 0.82, respectively), although it was related to diabetes. Indeed, although six patients in the sample suffered from type 2 diabetes, three of them had a pathological DEXA scan result, unlike healthy subjects without said chronic condition, of whom only 12 had osteoporosis or osteopenia. When this is analyzed in combination with age, results indicate an increased probability (OR = 2.10, p = 0.049) for those with diabetes compared to healthy subjects.

The estimated value for the annual incidence of osteoporosis, registered in our institution from the data of 2014, is 1%, which indicates that every 100 people who seeks care at the institution, one has an osteoporosis diagnosis.

Given the nature of the sample studied here, it is worth noting that DEXA scans allow to capture a high prevalence of the disease and, thus, study associations with comorbidities and risk factors, which would render this imaging test more important. Regarding characterization of this case series, it was based on the analysis of the DEXA scans performed at the institution. Ninety seven percent of those scans are requested by women, and only 22% of results are normal. The remaining 78% (pathological results) is composed of osteopenia (55.6%) and osteoporosis (22.4%).

It is important to note that, of all the DEXA scans ordered in 2014, the Departments of our institution that ordered most of the tests were: Gynecology (25%), Rheumatology (14%) and Endocrinology (10%); only 1.5% of the scans corresponded to Traumatology.

DISCUSSION

This study aims to describe the current scenario on the prevalence, diagnosis and treatment of osteoporosis in our institution.

In a study carried out by Earnshaw *et al.* in 1998, it was observed that Colles' fractures in postmenopausal women were an indicator of osteoporosis; more than 50% had osteopenia; more than one third, osteoporosis; and only 9% had normal DEXA scan results in all tested areas. Likewise, a third of the patients studied by these authors had already suffered an osteoporotic fracture.[3] In this regard, and despite the fact that the main limitation of our research was the size of the sample, it supports the idea that the condition is related to age.[4]

It should be borne in mind that osteoporosis is not only a disease of postmenopausal women, but it can also affect men.[5] For this reason, evaluation and treatment should also be aimed at them.

A remarkable result of our study is the low prescription of DEXA scans by the Traumatology Department (only 1.5%). One hypothesis for this trend is based on the fact that physicians could consider that this test is ordered too late to change the natural evolution of osteoporosis in advanced ages, that is, once a fracture due to bone fragility has occurred.

However, it worth noting some evidence that supports treatment in these patients. First, there is evidence that a distal radius fracture may precede a hip fracture in 10 or 15 years, and that the latter is associated with comorbidities, and prolonged prostration that can lead to the death of the patient[4-6]. We know that the increase in the risk of hip fractures after a distal radius fracture is higher in women 70 years of age or older, compared with that of younger patients at the time of the wrist fracture.[7]

Second, it has also been shown that the risk of hip fractures increases with older age.[8] Third, even small changes in bone density due to the treatment of osteoporosis can lead to a substantial reduction in the risk of fractures.[8,9]

In the same direction, population aging is directly related to the number of patients with osteoporosis, this means a greater number of fractures due to bone weakness, which increases the final cost of healthcare for its treatment.[10,11]

In our study, there was a high percentage of pathological DEXA scan results (78% of those performed in 2014). In Argentina, one in four women >50 years old suffer from osteoporosis.[2] However, despite access to evaluation and treatment of osteoporosis, there is still a significant deficit in its diagnosis and treatment.[12]

Based on this and considering the risk factors that each patient could have—such as previous fractures, early menopause, delayed menarche, predisposition to trauma, comorbidities—it becomes relevant to adopt appropriate treatments for osteoporosis. The most commonly used is bisphosphonates (ibandronate, risendronate, zoledronic acid) along with calcium and vitamin D, a treatment accepted and recommended by the National Osteoporosis Foundation of the United States (Table 3).[8]

For more than 20 years, attempts have been made to achieve prompt diagnosis and treatment of osteoporosis in order to avoid a large number of fractures caused by bone weakness, which imply an increase in morbidity and mortality up to six times greater if compared with a healthy adult. Likewise, among other factors, public economic and social costs, which increase as the age of the population increases, are reduced.[13,14]

CONCLUSIONS

Starting in 2016, and based on the results of this research, our institution hosts an osteoporosis campaign to screen for the largest number of patients who come to the office for fractures secondary to bone weakness. These patients are advised on osteoporosis, and a referral is made to rheumatology. Pharmacological treatment (bisphosphonates and supplements) is also prescribed, and a DEXA scan and subsequent follow-up are ordered. The objective, like that of the work of Benzvi *et al.*[15], is to reduce fractures secondary to this condition and its complications.

Table 3. Guide to prevention and treatment of osteoporosis of the National Osteoporosis Foundation

DEXA scan	Physicians must diagnose osteoporosis using DEXA scans to confirm it and determine the severity of the disease in all postmenopausal women who suffer a fracture.
Diet	- An adequate intake of calcium in the diet (at least 1200 mg/day, including supplements if necessary). -Vitamin D: sun exposure should be repeated 2 or 3 times a week (400-800 IU/day for people at risk of deficiency). - Protein intake (1 g of protein/kg/day) and other nutrients (vitamins and minerals).
Exercise	Due to its biomechanical demand, it is the mechanical stimulus for optimum adaptation of mass and body and skeletal structure, and also reduces the risk of falls that can lead to fractures.
Fall prevention	- Sedatives, hypotensives, hypoglycaemic agents that may slow down reflexes or affect neuromuscular coordination. - Visual disorders. - Obstacles in the house, such as carpets, loose cables, lack of handles in bathrooms and handrails on stairs, bad lighting, etc. - Domestic animals.
Pharmacological treatment	- Anticatabolic agents (reduce remodeling): bisphosphonates (alendronate, ibandronate, zoledronic acid), hormone replacement therapy, raloxifene, calcitonin, denosumab. - Anabolic agents (increase remodeling, but with a positive balance in favor of training): teriparatide. - Mixed-action agents (inhibit remodeling, reducing resorption and increasing bone formation): strontium ranelate.

Considering the results of our study and despite the size of the sample, we could point out the similarity with the results of studies in larger populations, for example, that of Baba *et al.*[16], in which only 9% of patients with distal radius fractures were ordered a DEXA scan.

If this is the case, the Traumatology Department of the institution would be the same as other trauma services in which osteoporosis is an underrated issue.[17,18] However, this research aims to influence, in a favorable way, the prevention and treatment of this condition that is so common in adults and the elderly.

Conflict of interests: Authors claim they do not have any conflict of interests.

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