SECONDARY PREVENTION OF OSTEOPOROSIS IN PATIENTS WITH OSTEOPOROTIC HIP FRACTURE

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ABSTRACT
Objective: *To evaluate secondary prevention of osteoporosis in patients having osteoporotic hip fractures.*
Study Design: *Prospective study.*
Setting & Duration: *Hamdard University Hospital, Karachi and Abbasi Shaheed Hospital, Karachi Medical and Dental College, Karachi from May 2005 to April 2009.*
Methodology: *A total of 176 patients treated for osteoporotic hip fractures were included in this study. The demographic and reproductive characteristics of all patients were recorded. Type of antiresrptive drugs prescribed, degree of compliance, time and reasons for discontinuation were studied and analyzed.*
Results: *The mean age of patients was 73±11 years and their duration of follow up was up to 12 months period. 5 Patients were on estrogen, 16 were using calcium and vitamin D therapy and only 8 patients have been using Bisphosphonate medication on admission. BMD score was significantly lower among women than men ($p<0.05$). Increasing age was associated with a significant ($p<0.05$) decrease in previous BMD. Bone mineral density score during the inpatient period revealed all patients to have femoral neck osteoporosis on the non-fracture site. We observed a significant decrease in vitamin D ($p<0.001$) and Calcium ($p<0.01$) compared to discharge after 6 weeks period but all patients remained compliant with Bisphosphonate therapy. At 12 months follow up only 82 patients remained on Bisphosphonate therapy, so patients' compliance for this drug also significantly dropped ($p<0.001$).*
Conclusion: *We found that majority of the patients who had suffered an osteoporotic fracture were not taking recommended treatment at admission or 12 months after discharge. Older age, impaired functional independence and mobility seemed to be related to lower likelihood of patients being maintained on osteoporosis treatment at 12 months. Our findings suggest an opportunity to improve the quality of osteoporosis care in orthopaedic practice.*

KEYWORDS: *Osteoporosis, Antiresorptive Therapy, Compliance, Vitamin D and Calcium*

INTRODUCTION

Osteoporosis is a chronic and progressive disease characterized by decreased bone mass and increased risk of fractures, is a significant public health concern. This disease can lead to fractures, disability, pain and even death.[1] Fragility fractures are the clinical consequence of osteoporosis. While vertebral fractures can cause back pain, loss of height and disability hip, hip fractures have a more significant impact on quality of life leading to loss of function and admission to long term care.[2] Vertebral and non vertebral fractures are the most frequent fractures in patients presenting to the emergency room of the hospital with a fracture.[3] Patients are at increased risk for subsequent fractures after such fractures and guidelines on osteoporosis advocate to evaluate patients presenting with a fracture and consider treatment to reduce the risk of subsequent fractures.[4]

One aspect in the management of fracture patients is the identifications of existence of contributors to secondary causes of bone loss.[5] Those contributors need to be recognized and when present, managed appropriat-

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ely.[5,6] If these conditions are not recognized, treatment may be suboptimal or ineffective.[7,8]

Apart from bone mineral density (B.M.D) many risk factors are related to fracture risks, such as clinical risk factors[9], fall risks[10], prevalent morphometric vertebral fractures (M.V.F)[11] and secondary osteoporosis.[12]

It is estimated that 1 in 5 people who suffer a hip fracture will die during the first year and less than one third gain their prefracture level of function.[1] Given that the proportion of people aged 65 years and older is increasing, this will likely lead to even more significant burden of the disease.[13]

METHODOLOGY

This prospective study was conducted by the department of Orthopaedics, Hamdard University Hospital, Karachi and Department of Orthopaedics, Abbasi Shaheed Hospital, Karachi Medical and Dental College, Karachi from May, 2004 to April 2009 on 176 patients treated for hip fractures. Both men and women who were admitted in these hospitals with hip fractures were included in this study. Reasons for exclusion from the study included refusal to consent, documented intolerance to bisphosphonate therapy, elective arthroplasty, concurrent medical illness requiring intensive therapy, multiple trauma beyond the single hip fracture and cancer. Medical histories of the patients were reviewed for their ability to fulfill the selection criteria as well as history of current medical problems, concomitant medication and body mass index (BMI). We also determined whether osteoporosis treatment was received including calcium and vitamin D, bisphosphonate or selective estrogen receptor modulators (SERM) and whether previous bone mineral density (BMD) had been done. All patients were prescribed one of the treatment regimen (Table I) at discharge and during rehabilitation.

Adverse events were reported and recorded at each measurement period (postoperative follow ups, 6 weeks, 3 months, 6 months and 12 months period). The overall frequency of osteoporosis therapy during the year following the date of discharge were used to estimate the compliance. A BMD was also done during the in patient period and at 12 months follow up.

The data was analyzed on SPSS (Statistical Package for Social Sciences, Version-12). Statistical significance of the differences was tested using Pearson Chi Square Statistics and Mantel-Haenzel test for linear association. Logistic regression was used to estimate the strength of the association between patient characteristics and the use of treatments for osteoporosis following discharge.

RESULTS

We identified 176 patients (52.3 % female) with a mean age of 73±11 years (Table II), who were diagnosed and treated for osteoporotic fractures of the hip during the study enrolment and followed for one year post discharge. 5 Patients were on estrogen, 16 were using calcium and vitamin D therapy and only 8 patients have been using Bisphosphonate medication on admission. None of them were using Calcitonin, Selective estrogen receptor modulator (SERM) or parathormone analogue Teriparatide.

Only 12 patients had a previous BMD, 113 patients had BMD estimation done during admission or at the beginning of the treatment. BMD score on admission was significantly lower among women than men ($p<0.05$). 23 patients had a previous documented fracture while 8 patients had evidence of vertebral osteoporotic fractures. Increasing age was associated with a significant ($p<0.05$) decrease in previous osteoporosis treatment or absence of previous BMD. Similarly, increasing age was associated with higher number of comorbid conditions and the number of concomitant medications. The most common diagnosis was that of hypertension (42%) followed by Diabetes Mellitus (23%). No adverse events were recorded during the rehabilitation period. 53 patients were discharged on DVT prophylaxis with instructions to maintain the prophylaxis for a six weeks post fracture period. Bone mineral density score during the inpatient period revealed that all patients had femoral neck osteoporosis on the non fracture site.

103 patients were discharged as full weight bearing on affected hip while remaining patients were at least 75% weight bearing. All patients were prescribed a walking aid on discharge. All patients returned for follow up assessment after 6 weeks post discharge and 86 patients were found regularly using a prescribed gait aid. We

Table I. Treatment regiments prescribed

Drugs	Dosage
Calcium	2500 mgm/day
Vitamin D	400 I.U/day
Alendronate Sodium	10 mgm/day
Alendronate Sodium	70 mgm/day
Risendronate	5 mgm/day
Risendronate	35 mgm/day

	Admission (n=176)	Discharge (n=176)	6 Weeks (n=176)	12 Months (n=123)
Age (Years)	73 ± 11	--	--	
Gender				
Male (%)	84(47.7%)	--	--	58(47.1%)
Female (%)	92(52.3%)	--	--	65(52.9%)
Body mass Index (kg/m2)	24 ± 3	--	--	23 ± 5
B.M.D (Femoral T-Score)				3.19 ± 1.17
B.M.D (Femoral T-Score)				
Those complaint with bisphosphonate	3.32 ± 1.74	--	--	2.63 ± 1.13
at 12 months (n=73)	3.38 ± 1.64	--	--	(p<0.05)
Calcium (2500mgm) (No. patients)	16	176	111(p<0.01)	6(p<0.01)
Vitamin D (400 I.U./day) (No. patients)	16	176	123(p<0.001)	32(p<0.01)
Bisphosphonate (No. patients)	8	176	176	82(p<0.001)

Table II. Caracteristics of the study population

observed a significant decrease in vitamin D ($p<0.001$) and calcium ($p<0.01$) compared to discharge (Table II) after 6 weeks period, but all patients remained compliant with bisphosphonate therapy. None of the patients were using DVT prophylaxis therapy in that period.

At 12 months follow up only 82 patients remained on bisphosphonate therapy (Table II), so patients' compliance significantly dropped ($p<0.001$). Reasons for discontinuing bisphophonate included nonspecific side effects and constitutional symptoms including constipation and lack of perceived efficacy. Only 18 patients regularly used a gait aid in last 12 months period. Bone mineral density T-scores showed no significant change from discharge among participants who has discontinued bisphosphonate. Those who remained on a bisphosphonate therapy significantly improved their femoral neck BMD T-scores ($p<0.05$) as shown in Table II.

DISCUSSION

In this cohort of patients admitted with hip fractures very few previously had a B.M.D or received a recommended osteoporosis therapy, while all patients continued recommended bisphosphonate treatment at 6 weeks, most had discontinued calcium and vitamin D. Further, most had discontinued bisphosphonate therapy by 12 months while continued calcium or vitamin D. This was despite documented osteoporosis in 113 patients, who had B.M.D estimation done during admission or at the beginning of the treatment. Patients who were taking osteoporosis treatment or had previous B.M.D on admission tended to be younger and functionally more independent. Being functionally more independent, there was higher likelihood of remaining on recommended therapy at 12 months post discharge after hip fracture.

Conversely, patients at higher risk of functional dependence in terms of co-morbidities and previously history of fall were less likely to have been on recommended osteoporosis treatment at 12 months. Age as a risk factor for inadequate treatment has been previously documented for many conditions[14], including osteoporosis.[15-17] Given the fact that osteoporosis is itself an age related condition and that increasing age is a powerful independent risk factor for fracture as well as second fracture. A 75 year old man has, on average, a life expectancy of 12 years and the benefits of osteoporosis treatment, in terms of increasing bone marrow density and decreased fracture risk are seen with in a year.[16,18] Ensrud[19] has rightly suggested that it may be never too late, in life or in the disease process to prevent fractures with appropriate treatment.

Overall, our results are in accordance with those in previous studies.[13,16,20-23] The problem of under treatment o osteoporisis in patients with symptomatic fracture has been documented using different health care delivery systems. Certainly in our cohort there was problem with access to treatment, in case of those patients who had neither health coverage, nor having sufficient financial support to continue antiresorptive therapy for a period of 12 months.

An element of clinical inertia may be present as shown in previous studies.[17] Clinical inertia or the failure of health care provides an opportunity to initiate or change the treatment when the health status of a patient indicates that such a condition is necessary. It has been described for several other chronic medical conditions including diabetes, hypertension and hyperlipidaemia.[21,22,24,25]

Further, patients may have misconceptions regarding the importance of ongoing treatment of chronic diseases.[26] The recommended strategies to avoid clinical inertia have included systematic, targeted reminders and feed back from practice performance and the development guidelines to address important quality of care problems in these clinical conditions.[22]

CONCLUSION

In conclusion, we found that the majority of the patients who had suffered an osteoporotic fracture were not taking recommended treatment at admission or 12 months after discharge. These findings were despite improvement at 12 months among those adhered to the prescribed therapy at discharge. Older age, impaired functional independence and mobility seemed to be related to lower likelihood of patients being maintained on osteoporosis treatment at 12 months. Our findings suggest an opportunity to improve the quality of osteoporosis care in orthopaedic practice.

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