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## Hip fragility fractures: Anaemia, calcium and vitamin D supplementation

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### Abstract

**Objective:** To assess the burden of anaemia and osteoporosis in hip fracture patients, to determine the rate of blood transfusion per-operatively, to assess the use of calcium and vitamin D supplements and the use of anti-osteoporotic medications postoperatively.

**Methods:** A retrospective study was conducted at Aga Khan University and Hospital (AKUH) between June 2009 and May 2011, and comprised record of patients treated for intertrochanteric and femur neck fractures. Patients with associated pathological, open or long bone fractures were excluded. The main study outcome measures were the use of pre-operative and post-operative calcium, vitamin D, bisphosphonates and management of anaemia pre- and post-operatively. Demographic data was also collected including age, gender, and co-morbidities. Statistical analysis was performed using SPSS 19.

**Results:** Of the 129 patients, 65(50.4%) were women. The overall mean age was 67.2±15.5 years. Mean pre-operative haemoglobin level was 12.3±1.5 gm/dl and 39(30%) patients were anaemic, while post-operative haemoglobin was 10.2±1.71 with 90(70%) anaemic patients, but only 14(10.9%) patients received per-operative blood transfusion. Pre-operative and post-operative vitamin D supplementation was advised in 3(2.3%) and 18(14%) patients respectively, whereas pre-operative and post-operative bisphosphonate supplementation was advised in 3(2.3%) and 1(0.8%) patients.

**Conclusion:** There is a strong need to pay attention to the management of peri-operative anaemia and calcium, vitamin D and bisphosphonate supplementation in the discharge medications of patients with hip fragility fractures.

**Keywords:** Osteoporosis, Hip fragility fractures, Bisphosphonates, Vitamin D, Anaemia. (JPMA 65: S-55 (Suppl. 3); 2015)

### Introduction

Hip fragility fractures constitute a major clinical and economic burden worldwide. These fractures are considered amongst the most fatal fractures for elderly people and can potentially result in impaired functioning with increased morbidity and mortality.<sup>1</sup> This challenges the clinicians in identifying patients at risk of worse outcome in order to optimise and intensify treatment in these patients. Conventional risk factors for osteoporosis include advancing age, female gender, smoking, alcohol intake, physical inactivity, low body mass index (BMI), steroid use, and low calcium and vitamin D intake. A variety of factors including pre-fracture functional and health status, anaemia and age have shown to influence patient outcome.

Fragility fractures are a strong indicator of underlying osteoporosis and provide an opportunity for their appropriate management, including osteoporosis assessment and treatment, in order to prevent future

fractures. Current evidence-based guidelines for osteoporosis recommend vitamin D sufficiency as the initial mainstay of osteoporotic fracture prevention. However, more than two-third patients with such fractures do not receive osteoporosis evaluation and treatment.<sup>2</sup>

It is well known that patients who suffer a hip fracture are two to four times more likely to have a recurrent fracture.<sup>3</sup> More than 40% hip fracture patients were reported to have sustained another osteoporotic fracture in the preceding years.<sup>4</sup> Despite that, in the United States only 2% of all hip fracture patients are prescribed ideal drug therapy, including calcium, vitamin D3 and an anti-resorptive or bone-forming medication.<sup>5</sup> Data from Italy shows that 78% of patients received a medication for osteoporosis after a hip fracture<sup>6</sup> whereas data from Netherlands shows that only 19% women beyond 50 years of age were treated with medications for osteoporosis in the year after a low-trauma fracture.<sup>7</sup> In Belgium only 6% postmenopausal women received a bisphosphonate or hormone therapy after a hip fracture.<sup>8</sup> Studies from Germany and Sweden showed that only 11-16% of all female patients and 3.4% of male patients with osteoporosis are currently receiving an appropriate anti-resorptive or bone-forming treatment.<sup>9,10</sup>

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Literature has shown that haemoglobin levels are related to outcome of patients with hip fractures. A study conducted in Japan showed that 72% (92/128) patients without anaemia were ambulatory compared to 50% (130/260) patients with anaemia after hip fracture surgery.<sup>11</sup> Another study conducted in New York showed that hospital length of stay and mortality rate at 6 and 12 months of surgery were significantly higher for patients who were anaemic on admission.<sup>12</sup> One study showed that anaemia was an independent risk factor for patients not being able to walk on 3rd post-operative day.<sup>13</sup>

A retrospective study conducted in Asian countries among postmenopausal women who suffered a fragility fracture showed that only 33% received a prescription of medications to treat osteoporosis after being discharged from the hospital.<sup>14</sup>

The present study was conducted to examine the prescribing practices of orthopaedic surgeons in relation to insufficiency hip fractures treated at a tertiary care hospital.

## Patients and Methods

A retrospective study was conducted at Aga Khan University Hospital (AKUH) between June 2009 and May 2011, and comprised record of patients treated for intertrochanteric and femur neck fractures. Patients with associated pathological, open or long bone fractures were excluded as were bed-bound patients. The main study outcome measures were the use of pre-operative and post-operative calcium, vitamin D and bisphosphonates, and the management of anaemia pre- and post-operatively. Demographic data was also collected, including age, gender and co-morbidities.

Statistical analysis was performed using SPSS 19. Categorical data was presented as frequency and percentage, and numerical data as mean and standard deviation.

## Results

A total of 163 patients had been managed for hip fractures, but 34(21%) had to be excluded for missing data, and the final study sample was 129(79%) patients. The mean age was  $67.2 \pm 15.5$  years and 65(50.4%) were women (Table-1). Besides, 83(64.3%) patients had one or more comorbidities, the most common being diabetes mellitus 39(30.2%), hypertension 29(38%) and heart disease 15(12%). The mean pre-operative haemoglobin level was  $12.3 \pm 1.5$  gm/dl, and post-operative haemoglobin was  $10.2 \pm 1.7$ . Overall, 39(30%) patients had anaemia pre-operatively and 90(70%) post-operatively with only 14(10.9%) (95% confidence interval [CI]: 6.1-

**Table-1:** Demographic characteristics.

Age (years)	No.	%
≤ 59	29	22.5
60-69	33	25.6
70-79	40	31.0
≥ 80	27	20.9
<b>Gender</b>		
Male	64	49.6
Female	65	50.4

**Table-2:** Details of 25 hydroxy-Vitamin D blood levels, pre-operative and post-operative prescriptions of Vitamin D and bisphosphonates.

Variable	Number of patients	%
Pre-op Vit D levels checked	6	4.7
Post-op Vit D levels checked	22	17.1
Pre-op Vit D supplementation	3	2.3
Post-op Vit D supplementation	18	14.0
Pre-op osteoporosis medications	3	2.3
Post-op osteoporosis medications	1	0.8

17.5) patients receiving peri-operative blood transfusion.

Pre-operative vitamin D levels were checked in 6(4.7%) patients (95% CI: 1.7-9.8) either during the current admission or prior to it, whereas post-operative levels were checked in 22(17.1%) (95% CI: 11.0-24.7). Pre-operative and post-operative vitamin D supplementation were advised in 3(2.3%) (95% CI: 0.5-6.6) and 18(14%) patients (95% CI: 8.5-21.2), whereas pre-operative and post-operative bisphosphonate supplementation were advised to 3(2.3%) (95% CI: 0.5-6.6) and 1(0.8%) patients (95% CI: 0.02-4.2) (Table-2).

## Discussion

According to an estimate, by 2050, 50 per cent of hip fractures would be occurring in Asia.<sup>15</sup> Administration of zoledronic acid to patients suffering from a low-trauma hip fracture, two or more weeks after surgical fixation, increases hip bone mineral density (BMD) and induces significant reductions in the risk of subsequent clinical vertebral, non-vertebral and hip fractures.<sup>16</sup> There is high prevalence of osteoporosis in Pakistan with 97% women aged 75-84 years and 55% women aged 45-54 years being predisposed to osteoporosis.<sup>17</sup> According to a study conducted on premenopausal healthy women of urban areas of Pakistan, vitamin D deficiency was present in 82.8% and insufficiency in 16.1% while only 1.1% had normal vitamin D levels which leads to higher risk of osteoporosis.<sup>18</sup> Another study conducted among postmenopausal women of rural areas in Pakistan showed

that vitamin D deficiency and low intake of dietary calcium was the main risk factor for osteoporosis. Despite this, our study showed that pre- and post-operative vitamin D levels were checked only in 4.7% and 17.1% patients respectively. Only 2.3% patients were taking vitamin D pre-operatively and only 14% were advised to take it post-operatively.

Literature has shown that anaemia adversely affects ambulatory status as well as length of hospital stay and mortality of patients after hip fracture surgery.<sup>11-13</sup> Our study showed a 30% pre-operative prevalence of anaemia and 70% post-operatively with only a 10.9% transfusion rate.

A retrospective analysis of hip fragility fracture patients from King Fahad Hospital, Saudi Arabia, showed that post-surgery 60.8% patients did not receive any osteoporotic medications.<sup>19</sup> Similarly, our study also showed a low prescription rate of bisphosphonate of 2.3% in pre-operative patients and 0.8% in post-operative patients. Patients after hip fracture surgery are usually discharged in two weeks from orthopaedic care and in order to improve the management one way could be to start osteoporosis treatment before discharge from hospital along with calcium and vitamin D supplementation.<sup>20</sup> Another way could be to work together with family physicians and strengthen our primary care services for follow-up of patients with hip fragility fractures and monitor administration of anti-osteoporotic drugs.

A retrospective cohort study done in tertiary care hospitals of Ontario which included 354 patients of age >50 with diagnosis of hip fragility fractures showed that only 21% were started on anti-bone-resorptive medications and it was mostly in those who were transferred to rehabilitation and geriatric units.<sup>21</sup> Though we do not have well developed geriatric and rehabilitation services, if we work in collaboration with our family physicians or set up multidisciplinary clinics, we can close this gap in continuity of care.

A meta-analysis showed that there was no clinically detectable delay to fracture-healing following bisphosphonate treatment and therefore secondary prevention should be implemented soon after fragility fracture.<sup>22</sup> Other than bisphosphonates, hormonal options include calcitonin, selective oestrogen receptor modulators (SERMS), and teriparatide with their specific clinical indications. A creatinine clearance of lower than 35 ml/min is a contraindication to all available drugs except denosumab.<sup>23</sup> Also, there should be a life expectancy of at least 6 months to justify beneficial effects of anti-osteoporotic medications since their effects

are expected months after starting the treatment.

There is strong need to inculcate peri-operative management of anaemia, and calcium and vitamin D supplementation in the discharge medications of patients with hip fragility fractures. Osteoporosis diagnosis and management should also be part of this treatment protocol. These pathways could also be considered for other fragility fractures.

## Conclusion

Correction of anaemia, Vitamin D and calcium supplementation, in addition to anti-osteoporosis treatment after surgery or conservative treatment can ensure optimal recovery and survival, especially in hip fracture patients.

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