

Original Research Article

Epidemiological analysis of hip fractures at a tertiary care center: a retrospective study

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ABSTRACT

Background: Hip fractures are a leading cause of morbidity and mortality in the elderly population posing significant burden on health care resources. The purpose of this study is to determine the epidemiological analysis of hip fractures at a tertiary care center.

Methods: This was a retrospective study done on patients with hip fractures admitted during the period 2015-2017 in Moradabad district of Uttar Pradesh. Case files and radiographs of patients were reviewed for age, gender, nature of trauma, associated comorbidities, type of fracture and presence of osteoporosis.

Results: During the 2015-2017 period, 2214 patients with hip fractures were admitted, out of which 1180 were males and rest females. The mean age of patients was 56.8 years with 41.6% belonging to age group 60-75 years. In elderly patients, a low energy simple fall accounted for >85% of fractures with presence of significant osteoporosis (Singh's index grade 3). The in hospital mortality was 2.1%. Hip fracture characteristics included intertrochanteric 57.81%, femoral neck 30.26% and sub trochanteric 11.93%. Smoking and medical comorbidities were present in a significant number of patients.

Conclusions: With increased longevity, hip fractures are an increasing health care problem. Various preventive measures for osteoporosis and falls will decline the prevalence of these fractures.

Keywords: Hip fractures, Epidemiology, Osteoporosis

INTRODUCTION

Hip fractures are common injuries contributing to both morbidity and mortality in the elderly. With increasing longevity and urbanization, the number of hip fractures are expected to increase as per epidemiological studies.¹ Incidence of hip fractures is expected to double to 2.6 million by 2025 and to 6.25 million by 2050. The Asian region would account for over half of hip fractures by the end of 2050.² The lifetime risk of sustaining a hip fracture lies in the range of 40% to 50% in women and 13% to 22% in men. The incidence of hip fractures in Asian countries is intermediate with highest incidence seen in

Northern Europe, USA and lowest in Africa and Latin America, which is mostly due to genetic, ethnic and environmental factors.³ In spite of advances in the prevention and treatment of these injuries, hip fractures put-on serious problems for both the health care policy makers and health organizations. Moreover with increased life span, hip fractures will appear at accelerated rates leading to increased morbidity, decreased quality of life, potential risk of further falls and subsequent fractures.⁴ Due to immense monetary costs involved with these injuries including the operative, nursing, rehabilitative and disability costs, various

preventive strategies against hip fractures have been developed.⁵

Hip fractures in elderly are mainly fragility fractures occurring due to osteoporosis and trivial falls. While in young adults, they usually occur due to high energy trauma such as motor vehicle accidents and falls from height. Various studied risk factors for hip fractures include increasing age, females, ethnicity, smoking, alcohol abuse, osteoporosis, steroid intake, low sunlight exposure and recreational activities.^{6,7} India is the second largest populous country in the world but there are only few studies on the epidemiology of hip fractures.^{8,9} About 80% patients with hip fractures in India are vitamin D deficient, a risk factor for osteoporosis. The purpose of our study is to determine the epidemiological analysis of hip fractures in Moradabad district of Uttar Pradesh.

METHODS

The study was performed in the Department of Orthopedics, Teerthanker Mahaveer Medical College and Research center (TMMC & RC), Moradabad, Uttar Pradesh. Out of 71 districts in Uttar Pradesh, Moradabad is the second most populous district with an area of 349 km² and a population of 4,773,138 (2011 census).¹⁰ This hospital is the only tertiary care facility available for the people of Moradabad district and adjoining districts of Rampur, Amroha, Udham Singh Nagar and Budaun. Being the only major orthopedic center in Moradabad, it is likely that patients with hip fractures visit this hospital for treatment. However there is a possibility that patients with hip fractures were not brought for treatment at all or were treated at some other orthopedic center. The department of Orthopedics at TMMC & RC is a dedicated postgraduate department with strength of 120 beds. TMMC & RC has a computerized Medical Records Department (MRD) and the patient files with all records and radiographs are kept in the department itself for easy retrieval.

Our study was a hospital based retrospective study done on patients with hip fractures admitted in the Orthopedics department of TMMC & RC Moradabad from January 2015 to December 2017 after obtaining ethical clearance from the College Research Committee. Hip fractures included fractures of femoral neck, intertrochanteric and sub trochanteric area. From the MRD, we obtained the central registration (CR) numbers of the patients admitted with above fracture diagnosis during the period 2015-2017. Then using the CR numbers, case files including radiographs of each patient were retrieved from the department. Admission registers of the above period were also checked, so that any patient is not missed. Case files of patient were studied for various parameters including age, gender, place of residence, duration of trauma, mechanism of injury, comorbidities, interval between admission and surgery, operation notes. Radiographs were assessed for type of fracture, presence of osteoporosis (Singh's index) and type of implant used.¹¹

The data was entered in Microsoft Excel and statistical analysis was done using SPSS software. We included patients of all ages and pathological fractures also in our study as our main aim was to study hip fracture parameters at a tertiary level institute.

RESULTS

During the period 2015-2017, about 14,286 patients were admitted in the Department of Orthopedics at TMMC & RC Moradabad. Out of these, patients fulfilling our criteria of hip fractures were 2214, including 1180 males (53.3%) and 1034 females (46.7%) (Table 1). The mean age of patients was 56.8 years with a range of 3-96 years. Majority of patients with hip fractures were between 60-75 years (n=921, 41.6%) and lowest number were seen in patients aged >75 years (n=180, 8.1%) (Table 2). In patients aged >60 years, low energy trauma with fall from standing height was the predominant mechanism for causing the fracture in >85% of patients while only 10% of fractures in this age group were caused by high energy mechanism such as road traffic accidents (RTA) and fall from height (FFH). While in patients <60 years old, high energy trauma due to RTA or FFH was the leading cause of fracture in majority of patients >90%. It was observed in our study that elderly patients >65 years old, reported to hospital at an average of 10 days after injury with many patients visiting local quacks initially. The mean interval from admission to surgery in operated cases was 6.7 days (3.8 days in patients <60 years old and 9.6 days in patients >60 years old). The overall in-hospital mortality rate in our study was 2.1% (n=47) with only 8 patients <60 years old and the rest >60 years old.

Table 1: Gender distribution.

Gender	Number of patients (%)
Males	1180 (53.3)
Females	1034 (46.7)

Table 2: Age wise distribution of fractures.

Age (years)	Number of patients (%)
<20	155 (7)
20-40	408 (18.4)
40-60	550 (24.8)
60-75	921 (41.7)
>75	180 (8.1)

Hip fracture characteristics included intertrochanteric fractures (n=1280, 57.8%), followed by neck fractures (n=670, 30.3%) and sub trochanteric fractures (n=264, 11.9%) (Table 3). In the sub trochanteric fracture group, mostly patients were <60 years old (n=179, 67.8%) and had a history of high energy trauma. About 5.3% fractures (n=117) were pathological (excluding osteoporosis), mainly lytic lesions of proximal femur, primary and secondary malignancies. Prior hip fracture in the same or opposite limb was present in 12% of patients

>60 years old. Smoking including cigarette, hukka and tobacco chewing was present in 88% of males and 56% of females. Alcohol consumption on a regular basis was present in 38% of patients. The associated fracture patterns and medical comorbidities are described in Table 4 and 5. In patients >60 years old, diminished vision and neurological problems including old stroke, dementia, Parkinson disease (42.7%) were responsible for the trivial fall and subsequent fracture.

Table 3: Hip fracture location

Fracture anatomy	Number of patients (%)
Intertrochanteric	1280 (57.8)
Neck of femur	670 (30.3)
Sub trochanteric	264 (11.9)

Table 4: Associated fractures.

Fracture location	Percentage of patients (%)
Distal end radius	5.3
Spine fractures	5
Long bone fractures	4.2
Other injuries	9.5

Table 5: Associated comorbidities.

Comorbidity	Percentage of patients (%)
Hypertension	33.6
Diabetes	31.3
Neurological	23.7
Old stroke	
Parkinsonism	
Dementia	
Diminished vision	19
Hypothyroidism	18.3

Grading for osteoporosis according to Singh's criteria was done in patients >50 years old, revealing Grade 3 as most common pattern in fractures of femoral neck and intertrochanteric fractures (definite Osteoporosis) and average grade 5 in sub trochanteric fractures. All fractures were treated as per the standard protocol based on the age of patient and the type and location of fracture.

DISCUSSION

Hip fractures as a result of osteoporosis are a major cause of disability and morbidity in the elderly population causing increased health expenditure and disability adjusted life years. Since life expectancy is increasing in India from 67.4 to 72.6 years, the number of hip fractures are going to increase in coming years, putting a huge burden on India's health resources. The bone mineral density (BMD) starts falling with increasing age especially in postmenopausal women due to loss of protective effect of Estrogen on bone mineralization.¹² Patients aged 85 years old and more, are 10 to 15 times

more likely to sustain a hip fracture than are patients 60 years old, with female patients accounting for 80% of hip fractures.¹³ Simple low energy falls account for 95% of hip fractures.¹⁴ In our study, males predominated hip fractures as in Indian population osteoporosis is also common in males due to lack of awareness about bone health, nutritional factors, smoking, physical inactivity. There is earlier onset of osteoporosis in Indian men demonstrated in a study by Nordin, who found maximum prevalence in age groups 30-39 years (25%) and 50-70-years (25%) as compared to Finnish men in which 56% of hip fractures occurred in 70-90 years group.¹⁵ Similarly Wong from Singapore reviewed hip fracture prevalence among different races and found average age in Indians to be 58 years as compared to 63 years in Chinese people.¹⁶ In our study also, there was 24.84% prevalence of hip fracture in age group of 40-60 years, probably due to low peak bone mass formed during adolescence as a result of low vitamin D and dietary calcium intake.¹⁷

There have been many studies on the various factors leading to falls and subsequent fractures in the elderly.¹⁸ Most hip fractures are caused by stumbling and tripping indoors at a level ground. In the present study also, majority of fractures in elderly were caused by falls from standing height with direct impact on hip. There are a number of factors in elderly people which contribute to falls including neurological impairment, poor balance, diminished vision, multiple drug therapy. We noted a high prevalence of comorbidities including hypertension, diabetes, neurological impairment and diminished vision, which significantly contribute to the falls and fractures in elderly. These risk factors also hamper early surgical intervention thereby contributing to the morbidity and mortality in hip fractures. Rehabilitation after hip fractures play an important role in restoring premorbid functions, with patients mobilized as early as possible after surgery.

Ahuja et al in a retrospective study of risk factors and epidemiological profile of hip fractures in 41 patients concluded that simple measures like high friction bathroom tiles, bedside and wall side railings, trochanteric hip pads, adequate lighting play a significant role in reducing hip fractures.¹⁹ Dhanwal et al described the first hip fracture incidence study from Rohtak district of India and found it to be same as of other Asian countries like china, Iran and South Korea.⁸ Our study did not describe incidence rates as it is unlikely that all patients with hip fractures will visit our hospital for treatment.

In our study we did not do any objective test such as DEXA scan for quantifying osteoporosis as it was retrospective epidemiological study. We classified osteoporosis on the basis of Singh's grading on hip radiographs.¹¹ About 75% of hip fractures in elderly had Singh's grade 3 pattern of trabeculae in proximal femur meaning significant osteoporosis. It signifies the majority

of hip fractures can be prevented if proper precautions and treatment is taken for osteoporosis. The older adults should regularly take Calcium and Vitamin D supplements, do regular weight bearing and strengthening exercises, have regular eye checkups.

CONCLUSION

Within the Indian subcontinent, fractures around hip region are ascending in numbers mainly due to factors specific to Indian population including under nutrition, low calcium and vitamin D intake, low physical activity, smoking, alcohol consumption, low acceptance of hormone replacement therapy for early osteoporosis. Various preventive measures to reduce the prevalence of osteoporosis combined with measures to decrease falls in elderly will in a long way decrease the osteoporotic hip fractures and reduce the burden of healthcare costs for treating these fractures. Also evidence based comprehensive rehabilitation program for hip fractures is needed to prevent the morbidity associated with these fractures.

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