

# Correlation of preoperative co-morbidities with post-operative outcomes in patients operated for hip fractures

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## Abstract

**Introduction:** As the population ages, disability and death is becoming more common in which hip fracture is one of the commonest cause. The purpose of this study is to analyse the effect of preoperative co-morbidities on postoperative outcomes in patients operated for hip surgery. This would also provide a reference for improved treatment and perioperative planning in order to have better survival chances in postoperative periods. **Methods:** This is an observational study in elderly patients ranging from 50-110 years of age for isolated hip fractures operated at a tertiary care hospital in Ahmedabad from January 2015 to January 2016. Patients were analyzed for one month mortality after hip fracture fixation. The co-morbidities encountered were then co-related with mortalities and conclusion drawn. **Results:** A total of 376 patients (54 percent males, 46 percent females) were taken for study. Analysis for one month mortality after hip fracture fixation showed that 7.7 percent deaths (45 percent males, 55 percent females) occurred within one month of operation. 51.7 percent of patients expired in first week. 17.2 percent in second week and 31.1 percent in later half of month. **Conclusion:** Study showed that postoperative mortality was directly proportional to the number of pre-operative co-morbidities. Patients who had  $\geq 3$  comorbidities had higher mortality risk, with two co-morbidities moderate risk and those having one or no comorbidity had higher survival chances in postoperative period. The presence of 3 or more comorbidities is the strongest preoperative risk factor for postoperative outcome.

**Keywords:** Hip Fractures; Pre-operative co-morbidities; Post-operative mortality

## Introduction

Trauma will be third leading cause of death in developing countries by 2020 as per recent WHO report. As the population ages, disability and death is becoming more common following hip fractures. Due to increase in geriatric population, cost of health care is also increasing [1]. Hip fractures are one of the most common orthopedic injuries adding to this cost. These fractures are very common in elderly and occur mainly however is unclear. As age increases, bone density and eye sight starts decreasing and bone becomes weak.

Hence, the elderly are more prone to fall and get the fractures. Hip fractures substantially increase the risk of death and major morbidity in old aged people.

A recent systematic epidemiologic review showed that patients who had hip fracture were at higher risk of premature death [2]. Increased mortality following hip fracture can be linked to complications like cardiac failure [3, 4], infections [3, 4] and pulmonary embolism [5]. Following hip fracture, excess mortality may also be due to individual characteristics of the person [6]. Several studies have been conducted which showed that increased mortality in hip fracture patients compared to controls in developed nations[7]. Though the issue still

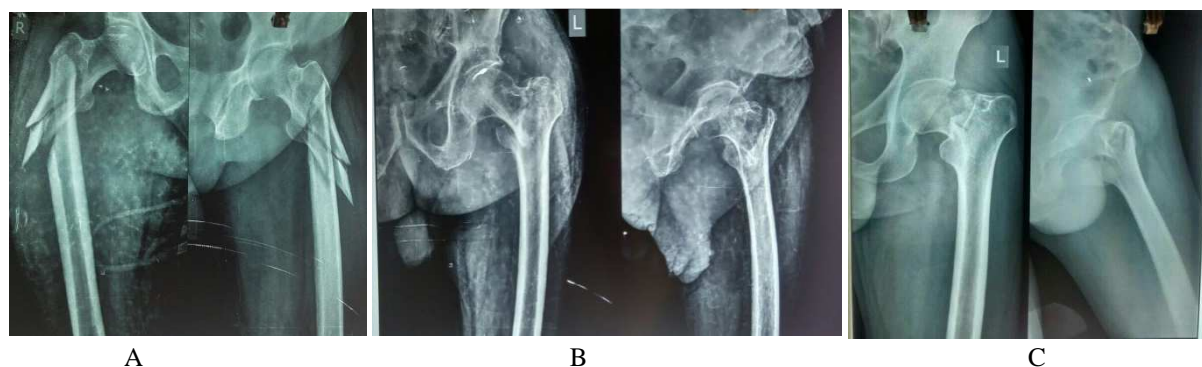
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is less recognized in developing countries like India. Also cause and gender specific mortality following hip fracture has not been investigated extensively. The combination of trauma associated medical comorbidities and major surgery may lead to high mortality in initial one month of fixation of hip fracture [8]. In developing countries like India, patients who are at higher risk of developing complications and death

have never been examined on a large scale. The aim of this observational study was to evaluate pattern of death by hip fracture type, gender and its co-relation with preoperative co-morbidities. This study would further act as a prediction model, which may be used to decide the surgical timings in patients with associated comorbidities by keeping the principles of damage control orthopedics in mind.

## Materials and Methods

This study included all those patients who underwent primary surgery for hip fracture. Hip fractures were divided on the basis of radiological findings into inter-trochanteric fractures and sub-trochanteric fractures and neck of femur fracture [Figure 1].



**Figure 1: Types of hip fractures**

Hip fractures were classified on the basis of radiographical findings. Hip fractures included were A) sub-trochanteric fracture B) inter-trochanteric fracture C) neck of femur fracture

Patients included in this study were both males and females with traumatic hip fractures requiring surgery in age more than 50 years. Patients with peri-prosthetic fractures, pathological fractures, fractures treated without surgery, those who died before surgery and age less than 50 years, polytrauma patients and all those who could not be contacted in follow up were excluded from the study. At the end of one month after surgery, evaluation was done and detailed examination of hospital medical records along with regular follow ups of patient for initial one month was carried on. Patients' records were collected from the statistics office of the hospital. At the time of admission to the hospital, on the basis of history given by patients, medications and medical records comorbidities were identified. Data collected included patients who were operated in tertiary care hospital in Ahmedabad from January 2015 to January 2016. All the operated patients were included in the study irrespective of their native place. Total 422 patients were operated in this period out of which 46 patients were excluded as per the exclusion criteria.

The data collected included age of patient, gender, type of fracture(inter-trochanteric, sub-trochanteric, neck of femur fracture),preoperative comorbidities, operation performed (intramedullary nailing or arthroplasty), peri-operative complications, time of hospital stay, number of days spent in intensive care unit, survival period and mortality in initial one month.

## Results

422 patients were operated for hip fracture in the time period selected. 46 were excluded on the basis of exclusion criteria so only 376 patients were eligible for the study. Study comprised of 54 percent of male patients and 46 percent of female patients. As per our study, 30 percent of the patients had neck of femur fractures, 65 percent of patients had inter-trochanteric fractures, 5 percent of patients had sub-trochanteric fractures. The data collected for the study showed that

neck of femur fracture was more common in patients more than 70 years of age while inter-trochanteric fractures were found to be more common in age group of 50-70 years. Numbers of sub-trochanteric fractures were found to be very less in this age group. Overall inter-trochanteric fractures were more common in patients above 50 years of age. Neck of femur fractures were more common in males, similarly inter-trochanteric fractures had higher incidence in male patients. Incidence of sub-trochanteric fracture was almost similar in both genders in this age group.

Results of the study showed that mortality at the end of one month of hip surgery was more common in females (55 percent) as compared to males (45 percent). 51.7 percent of total deaths occurred in first week of surgery out of which 6.9 percent of deaths occurred on first day of surgery. 17.2 percent of deaths occurred in second week and 31.1 percent of deaths in later half of the month [Table 1].

Our study showed that patients having inter-trochanteric fractures were at higher risk of death in postoperative period. 55 percent of patients who died had inter-trochanteric fracture, 41 percent of patients had neck of femur fracture and 4 percent of patients had sub-trochanteric fracture [Table 2].

The factors associated with mortality were determined as increasing age, cardiac disease, respiratory problems and metabolic disorders including diabetes and altered kidney and liver function, others [Table 3].

The higher mortality was determined by numbers of preoperative co-morbidities.[Table 4].

**Table-1: One month postoperative mortality**

Postoperative day	Percentage of death occurred in time period
0 day (same day of operation)	6.9%
1-7 days	44.8%
8-14 days	17.2%
>= 15 days	31.1%

Total 7.7 % deaths occurred in postoperative one month. 51.7% of total deaths occurred out of which 6.9% on same day of operation. 17.2% of deaths occurred in second week and 31.1 % of deaths occurred in later half of month.

**Table-2: Association of radiological fracture pattern with mortality**

Radiological fracture pattern	Percentage mortality associated with fracture type
Inter-trochanteric fracture	55%
Neck of femur fracture	41%
Sub-trochanteric fracture	4%

Our study showed that patients having inter-trochanteric fractures were at higher risk of death in postoperative period. 55 % of patients who expired had inter-trochanteric fracture, 41 % of patients had neck of femur fracture and 4% of patients had sub-trochanteric fracture.

**Table 3:- Percentage association of comorbidities in hip fracture patients in preoperative period**

Comorbidities	Percentage of patients having comorbidities in preoperative period
Cardio-respiratory diseases	31%
Metabolic diseases	5%
Others	1%
None	63%

Study showed that cardio-respiratory diseases (31%) had higher incidence as associated comorbidities in preoperative period followed by metabolic diseases (5%), diabetes mellitus being commonest in metabolic disorders.

**Table-4: Association of number of pre-operative comorbidities with mortality risk in postoperative period**

Number of associated comorbidities	Week In which patient expired	Mortality risk
≥3	On same day of operation	Very high
2	First week	Moderate
≤1	Later half of month	Low

All those who died in early postoperative period were found to have  $\geq 2$  medical comorbidities and patients who died on first day were having  $>3$  medical comorbidities suggesting that these patients were at very high risk for postoperative mortality and those who were having  $\leq 1$  medical comorbidity were at lesser risk and were having better survival rates.

## Discussion

With increasing age there is decrease in eye sight and loss of balance which leads to fall down resulting in hip fracture and also with rapid development of roadways and technology there is increase in motor vehicle accidents resulting in increased amount of trauma, mainly to lower limb. Quite a few studies have observed the epidemiology and patterns of injuries in lower limbs and have found injuries around the hip to be very common in elderly group [9]. However, very little information is available regarding the mortality predictive model with hip injuries and co-morbidities. This is a unique study which discusses the predictability of mortality in an elderly with hip injuries, depending upon the co-morbidities present.

Our study showed that male patients had higher incidence of hip fracture as compared to female patients. Isolated hip fractures were more common in right side as compared to left side as previously shown in the study conducted by Goel et al [9]. As a cause of injury, 91.7 percent of patients had history of fall down and 8.3 percent of patients had history of road traffic accident. Mortality at the end of one month after fixation of hip fracture was seen in 7.7 percent of patients and 92.3 percent of patients survived after initial one month after surgery. Study showed that 37 percent of patients had associated medical comorbidities in preoperative period.

Mortality in postoperative days was more in females as compared to males. Three or more associated comorbidities were associated with higher mortality risk. These results were consistent with the study conducted by Roche JJ in University Hospital in Nottingham [3]. At the time of admission those patients who had more number of associated medical comorbidities were at greater risk of mortality. This is consistent with the other studies conducted [10, 11]. As per our study post operative mortality was found to

directly proportional to the number of co-morbidities in the pre-operative period. Patients who had three or more comorbidities were at higher risk of death on same day of surgery. Those who had two co-morbidities were at moderate risk and majority of them expired within one week of surgery. Those having one or no comorbidity had higher survival chances in postoperative period. The presence of 3 or more comorbidities is the strongest preoperative risk factor for postoperative outcome [Table 4].

Patients with hip fractures are at higher risk of persistent hypoxia from the time of admission that may even continue in postoperative period [12] and patients with ischemic heart disease are at higher risk of myocardial infarction in postoperative period [13]. Therefore continuous oxygen saturation monitoring and arterial blood gas analysis in perioperative period may help in reducing mortality. Proper optimization of medical problems in preoperative period is mandatory in order to reduce postoperative complications and to reduce mortality. If optimization is done properly then chances of survival increases and quality of life improves. This study would further act as a prediction model, which may be used to decide the surgical timings in patients with associated comorbidities by keeping the principles of damage control orthopedics in mind in order to improve postoperative outcome.

There is a need for further studies concerning whether those patients who have higher co-morbidities should be operated or managed conservatively in view of their higher risk for death. Full consideration of medium and long term risk factors in the treatment of hip fractures in the elderly, selection of appropriate treatment methods and improved pre-surgical health conditions would reduce postoperative mortality and enhance surgical efficacy. To reduce the incidence of mortality and to

improve the standard of care, different systems of medical care need to be established.

## Conclusion

The results of the study showed that higher mortality was found in patients having higher number of associated comorbidities. More the associated medical comorbidities, higher is the risk. Presence of three or more comorbidities is the strongest preoperative risk factor for postoperative mortality.

Treatments of all these patients require multidisciplinary approach including meticulous preoperative planning. Old aged people having hip fractures have complex medical, surgical and rehabilitation needs. As per orthogeriatric model of care, orthogeriatrician should care these patients in an integrated services and if patient is medically fit for surgery then early surgery should be planned within 24 hours [14].

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