

## Original Research Article

# Hip fractures: mortality and correlation with preoperative comorbidities in Indian elderly population

Prashant Pratim Padhi\*, Pankaj Rai

Department of Orthopaedics, 7 Air Force Hospital, Indian Air Force, Kanpur, Uttar Pradesh, India

**Received:** 14 September 2021

**Accepted:** 19 October 2021

**\*Correspondence:**

Dr. Prashant Pratim Padhi,

E-mail: [prashantpratimpadhi@yahoo.com](mailto:prashantpratimpadhi@yahoo.com)

**Copyright:** © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

### ABSTRACT

**Background:** Hip fractures are an emerging health care problem due to increase in the elderly population all over the world and the associated complications, morbidity and mortality. The objective of this study is to find out the mortality rates in Indian elderly population with hip fractures and to establish an association between various related complications pre and post operatively for a better risk stratification.

**Methods:** A prospective observational cohort study, was carried out at a high-volume orthopaedic centre from 2009 to 2018. And all patients managed for hip fractures were followed up till death or 05 years.

**Results:** The age adjusted first-year mortality was found to be 33% with statistically significant increase in the mortality in individuals with three or more pre-op comorbidities. The significantly associated co-morbidities were chronic renal failure (Hazard ratio 2.32 with CI 1.65- 3.24) and diabetes mellitus (Hazard ratio 1.66 with CI 1.25 – 2.21). There has been a significant dip in the cumulative survival rates of these individuals irrespective of age, sex, preop anaemia.

**Conclusions:** A knowledge about the comorbidities/ risk factors and the extent to which they influence the long-term survival in the geriatric hip fracture patients can help treating physician to effectively prioritise and plan management in coordination with allied specialities.

**Keywords:** Mortality, Hip fracture, Pre-operative comorbidity

### INTRODUCTION

Fragility fractures due to osteoporosis has emerged as imminent public health issue due to its association with low energy injuries in the elderly age group. Hip fracture is the most serious of all the osteoporosis related fractures due to its associated complications. In other words, hip fractures are considered as sign of skeletal failure for the patients, after which the general condition and well-being takes a down slope to stage of high morbidity and mortality.

Apart from presenting as a major disabling condition for the patients it imposes a major clinical and financial burden. Osteoporotic hip fracture is an established health

problem in the West and is increasingly recognized as a growing problem in Asia as per the Asian Audit Report, 2009.<sup>1</sup> Hip fracture rates are low in Asian and Latin American populations. But as three-quarters of the world's population live in Asia, it is projected that Asian countries will contribute more to the pool of hip fractures in coming years.<sup>2</sup>

Hip fractures are associated with significant morbidity, mortality, loss of independence, and financial burden.<sup>3,4</sup> In usual care, the reported 1-year mortality after sustaining a hip fracture has been estimated to be 14% to 58%.<sup>5-8</sup> The first year after a hip fracture appears to be the most critical time and the relative hazard decreased substantially over the first 2 years after fracture but never returned to the

mortality rates of the general population.<sup>9,10</sup> The high mortality rates in elderly population are attributed to the culmination of effects of undergoing a major surgery with concurrent comorbidities with a low physiological reserve.<sup>11</sup>

In a developing country like India, with an overburdened public health care system it is even a greater concern. The objective of this study is to find out the mortality rates in Indian elderly population and to establish an association between various related complications pre and post operatively for a better risk stratification.

**METHODS**

This study is a prospective observational cohort study, which was carried out at a high-volume orthopaedic centre from 2009 to 2018. All the patients with age more than 60 years admitted for hip fractures i.e., intertrochanteric fracture femur and fracture neck of femur were included in the study. A total of 496 patients underwent management for hip fractures in our centre and 103 patients were either excluded from the study or lost to follow up leaving behind 381 patients for the study, who were followed up till death or 05 years. Patients with simultaneous bilateral fractures, periprosthetic fractures, pathological fractures, age less than 60 years were excluded out of the study.

All the patients were subjected to similar anaesthesia i.e., Combined Spinal and Epidural. The pre-operative and post-operative antibiotics were given as per hospital antibiotic protocols and thromboprophylaxis was used in form of Inj. LMWH (Enoxaparin- 1 mg/Kg) subcutaneously starting from day of admission and continued 02 weeks postoperatively. The type and the duration of thromboprophylaxis used, was tailored in some cases as per the comorbidities of the patients. All the surgeries were done by surgeons trained in trauma and arthroplasty. The surgical modalities adopted by the surgeons were patient specific and based on the judgement of the attending surgeon. The fractures were managed as per the current orthopaedic practice, the intertrochanteric femur fracture was managed by using Dynamic Hip Screw (DHS), Proximal Femoral Nail, Arthroplasty and external fixators in some of the cases. The mainstay of treatment of fracture neck of femur remains arthroplasty i.e., total hip replacement, hemi-replacement arthroplasty using bipolar prosthesis. All the patients underwent similar post-operative care and rehabilitation protocols based on the fracture type, type of fixation and the stability of fixation. All the patients were followed up and the data collected included demographics, type of fracture, preoperative comorbidities, operative treatment, and complications. Comorbidities on admission were identified from the patient’s history, medication, and medical records. The incidence of 01-year mortality was calculated. In case of death of the patient in the hospital apart from this centre, the cause of death was ascertained on the basis of the death form filled by the attending physician or the hospital records.

**Statistical analysis**

Data were coded and stored in Microsoft excel 2016 and analysed with the Statistical package for social sciences (SPSS) statistical program (version 20.0.1). Cox proportional hazard model determined the association between mortality and comorbidities on admission. The significance level for all statistical tests was set at 5% (p<0.05). Death has been considered as the outcome event and the total survival time as the duration from fracture to death, which is analysed by Kaplan Meier curve.

**RESULTS**

A cohort of 496 patients underwent management for hip fractures in our centre and 103 patients were either excluded from the study or lost to follow up leaving behind 381 patients for the study.

**Table 1: Demographics.**

Age Grp	Total	Female	Male
60-69	268	146	122
70-79	86	38	48
>80	27	15	12

**Table 2: Co-morbidities and post-operative complications.**

Co-morbidity	IT # Femur	#Neck of femur	Total	%
<b>CVD (Anaemia HTN and CAD)</b>	62	41	103	27
<b>Stroke</b>	16	11	27	7.1
<b>CKD</b>	42	18	60	15.7
<b>Malignancy</b>	6	4	10	2.6
<b>COPD/ BA</b>	21	25	46	12
<b>DM</b>	35	32	67	17.6
<b>Post-Operative complications</b>				
Pneumonia	20	13	33	8.7
DVT	8	6	14	3.7
Cardio-vascular event	8	13	21	5.51
SSI	16	10	26	6.8

CVD: Cardiovascular disease; HTN: Hypertension; CAD: Coronary Artery Disease; CKD: Chronic kidney disease; COPD: Chronic Obstructive pulmonary Disease; BA: Bronchial asthma; DM: Diabetes Mellitus; DVT: Deep venous thrombosis; SSI: Surgical site infection

234 patients underwent fixation for intertrochanteric fracture femur and 147 patients were managed for fracture neck of femur. The mean age is 68.2 years (60- 94) with 199 females and 182 male patients. Out of female patients 118 had intertrochanteric fracture femur and 81 had fracture neck of femur. One hundred eighteen and 66 male patients were managed for intertrochanteric fracture femur and fracture neck of femur respectively (Table 1).

**Table 3: Association of mortality with number of co-morbidities.**

Number of co-morbidities	Intertrochanteric fracture group		Fracture neck of femur group		Both groups	
	Total	Mortality	Total	Mortality	Total	Mortality
<b>0</b>	105	15 (14.2)	60	9 (15)	165	24 (14.5)
<b>1</b>	84	27 (32.1)	53	12 (22.6)	137	39 (28.5)
<b>2</b>	36	26 (72.22)	24	18 (75)	60	44 (73.3)
<b>3 or more</b>	9	9 (100)	10	10 (100)	19	19 (100)

\*P value was less than 0.05

**Table 4: Hazard ratio of the preop comorbidities.**

	P value	Hazard ratio	95.0% CI for Hazard ratio	
			Lower	Upper
<b>Sex</b>	0.584	0.941	0.756	1.171
<b>CVD</b>	0.080	1.260	0.973	1.633
<b>Stroke</b>	0.791	1.057	0.701	1.595
<b>CKD</b>	<0.001	2.321	1.658	3.248
<b>COPD/BA</b>	0.831	1.043	0.707	1.539
<b>DM</b>	0.001	1.663	1.248	2.214

CVD: Cardiovascular disease; CAD: Coronary Artery Disease; CKD: Chronic kidney disease; COPD; Chronic Obstructive pulmonary Disease; BA: Bronchial asthma; DM: Diabetes Mellitus

**Table 5: Mean survival time in relation to comorbidities.**

No of comorbidity	Mean*			
	Estimate in months	Std. Error	95% confidence interval	
			Lower Bound	Upper Bound
<b>0</b>	37.342	1.151	35.086	39.598
<b>1</b>	31.502	1.501	28.560	34.444
<b>2</b>	16.715	2.317	12.173	21.257
<b>3</b>	5.032	.729	3.603	6.460
<b>Overall</b>	30.382	.942	28.535	32.230

No of comorbidity	Mean*			
	Estimate in months	Std. Error	95% confidence interval	
			Lower Bound	Upper Bound
0	37.342	1.151	35.086	39.598
1	31.502	1.501	28.560	34.444
2	16.715	2.317	12.173	21.257
3	5.032	0.729	3.603	6.460
Overall	30.382	0.942	28.535	32.230

Co-morbidity and post-op complication are mentioned in the Table 2. Forty-three per cent (165) had no comorbidity; 36% (137) had one, 15.7% (60) had two, and 4.9% (19) had three or more comorbidities. The common comorbidities being cardiovascular disease (27%), Diabetes Mellitus (17%) and Chronic renal disease (15.7). Most common post-operative complication was pneumonia (8.7%) followed by surgical site infection (6.8%) (Table 2)

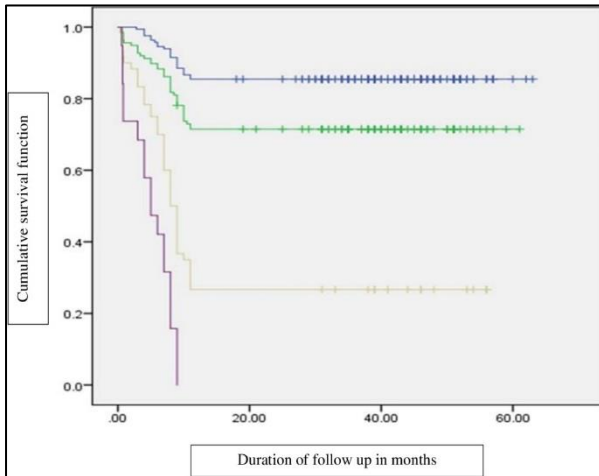
The first-year mortality was found to be 33% (126 patients). The mortality rate was 32 percent (77 patients) in the intertrochanteric fracture group and 33 percent (49

patients) in the fracture neck of femur group. The mortality in each group was compared with number of comorbidities the individual had the results are mentioned in the Table 3.

There has been a rise in the first-year mortality in the patients with increase in the number of co-morbidities which was found to be as high as 100% in patients suffering from 3 or more co-morbidities.

There was no significant correlation of mortality with the age, sex, type of surgery and anaemia of the patient. But the Hb level (Anaemia <8.0 g/dl) showed a significant

correlation with mortality in patients who underwent hemi-replacement hip / total hip replacement even when all the patients were optimised with pre-op blood transfusion and subjecting them to surgery with Hb >10 g/dl.



**Figure 1: Survival function over the follow up period.**

After adjustment for age and sex, the hazard ratio for 1 year mortality was calculated which is mentioned in Table 4.

The survival function over the follow up period has been shown in Figure 1 and Table 5.

## DISCUSSION

Studies have showed that the mortality of hip fracture patients was 3-folds higher than that of the general population.<sup>12</sup> The reported mortality rates after hip fractures vary from 15-40 percent which is further compounded by preop comorbidities and post-operative complications.<sup>12-15</sup> There is a dearth of studies done on Indian population focussing on mortality rates after the hip fractures, any possible association with the preop comorbidities and its overall impact on the survival. The overall mortality in the study was comparable to the rates reported in the western literature and there was no significant association reported with age and sex of the patient. Patients with higher number of comorbidities pre-operatively had increased mortality and higher risk of post-operative complications, which is consistent with previous studies.<sup>16,17</sup>

In this study there has been a significantly higher mortality associated with individuals suffering from diabetes mellitus and chronic renal failure. The higher incidence of mortality in diabetic patients is mainly attributed to advanced age, the presence of postoperative complications and elevated HbA1c levels.<sup>18,19</sup> Patients with chronic kidney disease (CKD) have been reported to have 1-year mortality of 50%–64% after hip fractures, attributed to post-operative complications like hematoma, surgical site infection, failure of fixation, and non-union.<sup>20-23</sup> However,

stage of chronic kidney disease was not taken into consideration in this study.

A fair amount of literature is available suggesting an adverse effect of low haemoglobin on morbidity and mortality after hip fractures.<sup>23</sup> However, in this study no significant correlation was found with preop anaemia which have been reported in earlier.

## CONCLUSION

Many interesting facts were brought forward by this study which have not addressed in earlier studies done on Indian population. An approach of co-management of patients by geriatricians and orthopaedic surgeons, and use of evidence-based treatment protocols, which has been advocated time to time in response to the overall disease burden and considering the associated poor outcomes and ultimately the high cost of hip fracture care. More studies are required to check the effectiveness of different systems of medical care aiming at improvement in the standard of care for elderly patients.

*Funding: No funding sources*

*Conflict of interest: None declared*

*Ethical approval: The study was approved by the institutional ethics committee*

## REFERENCES

1. Mithal A, Bansal B, Kyer CS, Ebeling P. The Asia-Pacific Regional Audit-Epidemiology, Costs, and Burden of Osteoporosis in India 2013: A report of International Osteoporosis Foundation. *Indian Journal of Endocrinology and Metabolism.* 2014;18(4):449-54.
2. Dhanwal DK, Dennison EM, Harvey NC, Cooper C. Epidemiology of hip fracture: Worldwide geographic variation. *Indian Journal of Orthopaedics.* 2011;45(1):15-22.
3. Hirose J, Ide J, Irie H, Kikukawa K, Mizuta H. New Equations for Predicting Postoperative Risk in Patients with Hip Fracture. *Clinical Orthopaedics and Related Research.* 2009;467(12):3327-33.
4. Hommel A, Ulander K, Bjorkelund KB, Norrman PO, Wingstrand H, Thorngren KG. Influence of optimised treatment of people with hip fracture on time to operation, length of hospital stay, reoperations and mortality within 1 year. *Injury.* 2008;39(10):1164-74.
5. Haleem S, Lutchman L, Mayahi R, Grice JE, Parker MJ. Mortality following hip fracture: trends and geographical variations over the last 40 years. *Injury.* 2008;39(10):1157-63.
6. Pedersen SJ, Borgbjerg FM, Schousboe B, Pedersen BD, Jorgensen HL, Duus BR, et al. A comprehensive hip fracture program reduces complication rates and mortality. *Journal of the American Geriatrics Society.* 2008;56(10):1831-8.

7. van den Berg P. Zoledronate, fractures, and mortality after hip fracture. *The New England journal of medicine.* 2008;358(9):967.
8. Abrahamsen B, van Staa T, Ariely R, Olson M, Cooper C. Excess mortality following hip fracture: a systematic epidemiological review. *Osteoporosis international: a journal established as result of cooperation between the European Foundation for Osteoporosis and the National Osteoporosis Foundation of the USA.* 2009;20(10):1633-50.
9. Phy MP, Vanness DJ, Melton LJ, 3rd, Long KH, Schleck CD, Larson DR, et al. Effects of a hospitalist model on elderly patients with hip fracture. *Archives of internal medicine.* 2005;165(7):796-801.
10. Haentjens P, Magaziner J, Colón-Emeric CS, Vanderschueren D, Milisen K, Velkeniers B, et al. Meta-analysis: Excess Mortality After Hip Fracture Among Older Women and Men. *Annals of internal medicine.* 2010;152(6):380-90.
11. Kenzora JE, McCarthy RE, Lowell JD, Sledge CB. Hip fracture mortality. Relation to age, treatment, preoperative illness, time of surgery, and complications. *Clin Orthop Relat Res.* 1984(186):45-56.
12. Panula J, Pihlajamäki H, Mattila VM, Jaatinen P, Vahlberg T, Aarnio P, et al. Mortality and cause of death in hip fracture patients aged 65 or older: a population-based study. *BMC musculoskeletal disorders.* 2011;12:105.
13. Kenzora JE, McCarthy RE, Lowell JD, Sledge CB. Hip fracture mortality. Relation to age, treatment, preoperative illness, time of surgery, and complications. *Clinical orthopaedics and related research.* 1984(186):45-56.
14. Zuckerman JD, Skovron ML, Koval KJ, Aharonoff G, Frankel VH. Postoperative complications and mortality associated with operative delay in older patients who have a fracture of the hip. *JBJS.* 1995;77(10):1551-6.
15. Suh YS, Kim YB, Choi HS, Yoon HK, Seo GW, Lee BI. Postoperative Mortality and the Associated Factors in Elderly Patients with Hip Fracture. *J Korean Orthop Assoc.* 2012;47(6):445-51.
16. Tell GS, Lunde A, Apalset EM, Pedersen AB, Sørensen HT, Ehrenstein V, et al. The Role of Comorbidity in Mortality After Hip Fracture: A Nationwide Norwegian Study of 38,126 Women With Hip Fracture Matched to a General-Population Comparison Cohort. *American Journal of Epidemiology.* 2018;188(2):398-407.
17. Roche JJ, Wenn RT, Sahota O, Moran CG. Effect of comorbidities and postoperative complications on mortality after hip fracture in elderly people: prospective observational cohort study. *BMJ (Clinical research ed).* 2005;331(7529):1374.
18. Gulcelik NE, Bayraktar M, Caglar O, Alpaslan M, Karakaya J. Mortality after hip fracture in diabetic patients. *Experimental and clinical endocrinology & diabetes: German Society of Endocrinology [and] German Diabetes Association.* 2011;119(7):414-8.
19. Puar TH, Khoo JJ, Cho LW, Xu Y, Chen YT, Chuo AM, et al. Association between glycemic control and hip fracture. *Journal of the American Geriatrics Society.* 2012;60(8):1493-7.
20. Karaeminogullari O, Demirors H, Sahin O, Ozalay M, Ozdemir N, Tandogan RN. Analysis of outcomes for surgically treated hip fractures in patients undergoing chronic hemodialysis. *The Journal of bone and joint surgery American volume.* 2007;89(2):324-31.
21. Sunday JM, Guille JT, Torg JS. Complications of joint arthroplasty in patients with end-stage renal disease on hemodialysis. *Clin Orthop Relat Res.* 2002(397):350-5.
22. Sakalkale DP, Hozack WJ, Rothman RH. Total hip arthroplasty in patients on long-term renal dialysis. *J Arthroplasty.* 1999;14(5):571-5.
23. Vochteloo AJH, Borger van der Burg BLS, Mertens BJA, Niggebrugge AHP, de Vries MR, Tuinebreijer WE et al. Outcome in hip fracture patients related to anemia at admission and allogeneic blood transfusion: an analysis of 1262 surgically treated patients. *BMC musculoskeletal disorders.* 2011;12:262.

**Cite this article as:** Padhi PP, Rai P. Hip fractures: mortality and correlation with preoperative comorbidities in Indian elderly population. *Int J Res Orthop* 2021;7:1185-9.