POST-OPERATIVE MORTALITY IN INTERTROCHANTERIC FRACTURES IN ELDERLY

Sameer Muhammed M[1], Tomichan M. C[2]

[1]*Senior Resident, Government Medical College, Kottayam, Kerala.*
[2]*Additional Professor, Department of Orthopaedics, Government Medical College, Kottayam, Kerala.*

ABSTRACT

BACKGROUND
Mortality after surgical treatment of hip fracture at the end of one-year ranges from 5- 50% according to western literature. Very few studies on this issue have been done in India. This study aims to answer these questions in addition to whether ASA score, pre-operative co-morbidities, type of anaesthesia, early mobilisation and post-operative complications affect mortality and morbidity.

A prospective observational study of 122 consecutive patients aged > 65 years who underwent surgery for intertrochanteric fractures of hip in Government Medical College, Kottayam from August 2015 to April 2016 was done. Follow up was done at 1, 3, 6 months and one year. Morbidity was assessed by Harris Hip Score.

1 month, 3 months, 6 months and one-year mortality were 11%, 20%, 24% and 30% respectively. Factors affecting mortality were age above 80 years, multiple co-morbidities, high ASA score, history of coronary artery disease and presence of postoperative complications. Average Harris hip score at 6 months was 84 (good outcome). Factors affecting poor outcome (low Harris hip score) were higher age group, female sex, higher ASA score and associated co-morbidities. Cardiac arrest and pneumonia were the leading causes of death.

We recommend early surgical intervention and early mobilisation of the patients with intertrochanteric fractures especially females. Special care and attention should be given to those patients whose age is above 80 years with multiple co-morbidities to prevent mortality and morbidity.

MATERIALS AND METHODS
This is a prospective observational study of 122 patients with intertrochanteric fractures admitted in Government Medical College, Kottayam, Department of Orthopaedics, from August 2015 to April 2016. All patients were informed about the study in all respects and informed written consent was obtained.

RESULTS
The mean age of the study population is 75.7±9.2 years, ranging from 65 to 102 years. Majority are females (55%). Mechanism of injury in majority of them is due to trivial fall like slip and fall occurring in and around home (78%). According to Boyd & Griffin classification, most of the patients were type 1 and type II (34% and 35%). Average preoperative hospital stay is 9 days, ranging from 4 days to 32 days.

CONCLUSION
Post-Operative Mortality rate at 1 year is 30%. Factors affecting mortality are age above 80 years, multiple co-morbidities, high ASA score, history of coronary artery disease and the presence of postoperative complications.

KEYWORDS
Mortality, morbidity, intertrochanteric fracture, ASA score, Harris Hip Score.

BACKGROUND
Hip fractures in elderly are associated with high mortality rate. Cumulative studies over years have strengthened this notion with National Health Survey of UK projecting average mortality rates at 1, 4 & 12 months in the year 2006-7 as 10%, 20% & 30% respectively.

Of all hip fractures in elderly, 50% are accounted by Intertrochanteric fractures Until operative treatment involving the use of various implants was introduced in the 1950s, hip fractures were managed using conservative methods based on traction and bed rest resulting in very high mortality. The primary goal of treatment with surgery is early mobilisation to avoid secondary complications which can result in high mortality. This can be achieved by dynamic hip screw which is operative treatment of choice for intertrochanteric fracture as it allows early weight bearing and lower complication than other implants. Intramedullary nails are also used increasingly to stabilise unstable fractures and fractures with subtrochanteric extension.

Fractures of the hip might not result in immediate result but can induce a progressive deterioration in the patient's health, leading to an increased risk of mortality over a period of time. Hip fractures also associated with significant morbidity which includes reduced hip function and loss of independence.

A study on hip fracture treatment helps to evaluate the degree of health care provided to the elderly both by the institution and by the community. Because of their dependency, these patients also exert an immeasurable degree of social and psychological burden on the society. Multiple studies from different geographical area have yielded varied results on this topic and not many studies have come out from India on this topic. For these reasons, the relevance of such studies remains unquestioned.

Here is an effort to study the post-operative outcome of intertrochanteric fractures in patients above 65 years of age in terms of mortality and morbidity in our hospital and compare with other studies.

MATERIALS AND METHODS
This is a prospective observational study of 122 patients with Intertrochanteric fractures admitted in Government Medical College, Kottayam, Department of Orthopaedics, from August 2015 to April 2016. All patients were informed about the study in all respects and informed written consent was obtained. The patients were evaluated and analysed preoperatively and underwent operation and were assessed both clinically and radiologically during follow up which was done at 1 month, 3 months, 6 months and 1 year.

Inclusion Criteria
Inclusion Criteria were patients equal to or above 65 years of age, patients fit for surgery, patients willing to participate in study and patients ambulatory prior to fracture.

Exclusion Criteria
Exclusion Criteria were patients less than 65 years of age, patients unfit for surgery, patients admitted for revision procedure, patients with pathological fractures and patients with other fractures of the same limb.

Procedure
The study was approved by the Ethical and Research Committee of Government Medical College, Kottayam, Kerala. After finding the suitability as per inclusion and exclusion criteria, patients were selected for the study, briefed about the nature of the study, the interventions used and written, informed consent were obtained.

Further, descriptive data of the participants like name, age, sex, detailed history, were obtained by interviewing the participants and by clinical examination and were recorded on predesigned Proforma. Preoperative anaesthetic assessment was done after basic and other relevant investigations. Prophylactic antibiotic usually a third-generation cephalosporin was given within one hour prior to incision. The implant to be used was decided by the chief surgeon. Regular follow up during hospital stay and thereafter in outpatient department were recorded. Duration of hospital stay prior to and post-surgery were recorded. All preoperative diseases and postoperative complications were recorded. Mortality rate was calculated for each category. Morbidity rates, being less easy to quantify were studied based on Harris Hip Score.[1]

Statistical Analysis
Data is entered in Microsoft Excel software, and analysis done using SPSS version 20.0 software. The level of significance will be p value <0.05 and high significance p value <.001. Data collected using the proforma. Reviews are done at 1 month, 3 months and 6 months. Functional outcome is measured using Harris hip score. The results are analysed at the end of the study and observations made.

RESULTS
The mean age of the study population is 75.7±9.2 years, ranging from 65 to 102 years. Majority are females (55%). Mechanism of injury in majority of them is due to trivial fall like slip and fall occurring in and around home (78%). According to Boyd & Griffin classification, most of the patients were type 1 and type II (34% and 35%). Average preoperative hospital stay is 9 days, ranging from 4 days to 32 days.

Multiple co morbidities are present for many patients and the most common co morbidities are hypertension and diabetes mellitus. 25% of patients had 3 or more co morbidities. Most of the patients are ASA grade 2 and Grade 3 (34% and 54%). 95% of the patients underwent surgery under spinal anaesthesia and most commonly used implant was dynamic hip screw and proximal femoral nail (64% and 33%). in majority of the patients, surgery completed within one hour (68%). Antibiotics were given to the patients for an average period of 5 days. Most common post-operative complication were bedsore that was present in 36 patients in which 6 patient had deep bedsore and 30 patients had superficial bedsore. Other complications were wound site infection (5 patients), heart failure and chest infections.

37 patients died at 12 months follow up. Mortality rate at 1 month, 3 months, 6 months and 12 months follow up are 11%, 20 %, 24 % and 30 % respectively (figure 1). Most of the deaths occurred within first month (30%) and most common cause for death was cardiac event (45.8%) and chest infection (33.3%). Among the patients who died, most patients died at home. Harris hip score was calculated at 1, 3 and 6 months visit to assess the outcome of the treatment. Average Harris hip score at 1 month, 3 months and 6 months were 39(24-49), 65(27-91) and 84(27-97) respectively. Based on the criteria of Harris hip score, results in 30% people were excellent, 33% good, 19% fair, 8% poor and 9% failed.

Parameter	Frequency	Percentage
Age Group (Years)		
65-80	84	69
> 80	38	31
Gender		
Male	55	45
Female	67	55
Mechanism of Injury		
Low Energy Fall	96	78
Road traffic accidents	14	12
Fall from height	12	10
Side of Injury		
RIGHT	55	45
LEFT	67	55
Boyd and Griffin Classification		
Type 1/type 2/type 3/ type 4	42, 43, 11, 26	34, 35, 9, 22
Preoperative hospital stay (days)	9 (Mean)	
Number of co-morbidities		
0, 1, 2	92	75
≥3	30	25
ASA Score		
1, 2	55	45
≥3	67	55
Type of anaesthesia		
Spinal/ General Anaesthesia	116, 6	95, 5
IMPLANT used		
DHS/ PFN/ others	78, 40, 4	64, 33, 3
Duration of Surgery		
< 1 hour / > 1 hour	83, 39	68, 32
Table 1. Patients' Demographic Characteristics (N=122)		

ASA - American society of anaesthesiologist, DHS-Dynamic hip screw, PFN- Proximal femoral nail.
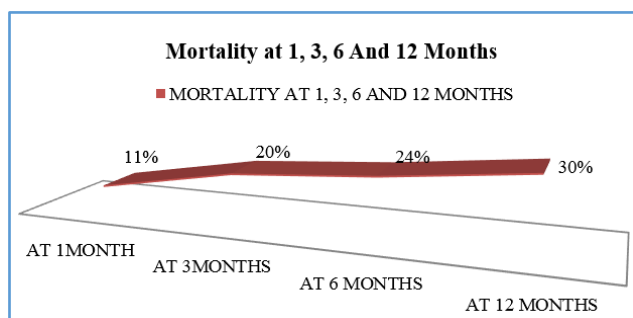

Figure 1. Cumulative Frequency of Mortality at 1 month, 3 months, 6 months and 12 months

DISCUSSION

Hip fractures are common injury in elderly population usually arising from trivial falls which lead to the most severe health problems and reduced quality of life thus causing the greatest number of deaths. Early operations on patients with intertrochanteric fractures improved the ability to return to independent living and complications of prolonged immobilisation are prevented. The study shows the post-operative outcome in terms of mortality and Harris hip score.

The age of the patients ranged from 65 to 102 years mean being 75.7 ± 9.7 years which is comparable to Karl Lunsp et al[2] with mean age 81 years and Eckriffner et al with mean age 75.1 years. Average preoperative hospital stay is 9 days. The delay was in obtaining fitness for surgery as there was thorough pre-operative evaluation of the patients considering the pre-operative co-morbid conditions and long pending list for surgery. Most of the patients are ASA grade 3 and it may be due to the fact that study was done in a tertiary referral centre.

Mortality rate at 1 month, 3 month, 6 months and 12 months were 11%, 20%, 24% and 30% respectively which is comparable to other studies.[3,4,5,6] Age was determined to be a risk factor for mortality and morbidity in our study. There is an increased Mortality in patients aged more than 80 years compared with the younger age group[7] and this relation was found to be statistically significant (p value= 0.001). Figure 2 shows Kaplan-Meier survival plot for patients aged more than 80 years and below or equal to 80 years. Survival time is the period from surgery to death in months.
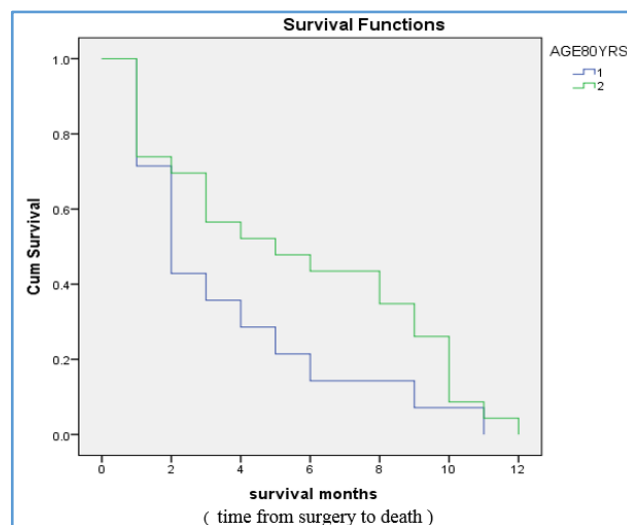

Figure 2. Kaplan-Meier Survival Curves for Patients Aged over 80 Years (BLUE) and Below 80 Years (GREEN) following Surgery for Fracture of the Hip

Some studies show that though females suffer more than males through hip fractures[8], males have a higher mortality. However, in this study, there is no significant difference in mortality pattern between males and females. Similarly, no association is found between mechanism of injury and mortality. The type of fracture is also found to be having no association with mortality.

The increase in number of co morbidities is found to be a major risk factor for death in this study and is statistically significant. As the number of co morbidities increase, the percentage of deaths also increases. Hypertension was the most common co morbidity in the study, with diabetes closely behind. However, no significant correlation was found between these co morbidities and mortality. But

coronary artery disease is found to have significant relation with mortality. A higher grade in ASA is also found to be a risk factor for increased mortality after surgery. This is also found to be statistically significant and comparable to other studies.[9,10]

There has been a recent increase in research over whether pre-operative duration of hospital stay has an adverse effect on mortality. It is well established that operation is to be delayed till patient is medically evaluated and stabilized.[11,12] This study also wanted to assess its significance. In this study, there were no association between preoperative duration of stay and mortality. Similarly duration of surgery is also found to be having no association with post-operative mortality. The type of anaesthesia and the type of implants are not found to be having any statistically significant association with Post-operative Mortality.[13] However Post-operative complications such as bedsore, chest infection and heart failure are found to have significant association with mortality.

Parameters	Chi-square Value/t test	df*	P Value
Age group 65-79 and ≥80	10.161	1	0.001
Gender	0.009	1	0.925
Mechanism of injury	2.365	2	0.306
Side of fracture	0.263	1	0.608
Boyd and griffin classification type	2.663	3	0.447
Number of comorbidities	15.981	4	0.003
Coronary artery disease	7.023	1	0.008
ASA score	13.397	3	0.004
Preoperative days	0.328 (independent t test)		0.747
Duration of Surgery	2.602	1	0.107
Type of anaesthesia	0.977	1	0.323
Type of implant	5.620	3	0.132
bedsore	6.836	1	0.009
Post op pneumonia	15.717	1	0.001
Post op heart failure	5.942	1	0.042
Table 2. Predictors of Mortality			

Based on the 10 criteria, Harris hip score showed 30% people falling in excellent category, 33% in good, 19% in fair, 8% in poor and 9% in failed category. This study was comparable to Wadia et al.[14] A lower age group is found to be associated with a better Harris hip score after 12 months and this relation is statistically significant. Male patients are found to be having a higher number of excellent or good Harris hip score compared to females. This difference in Harris hip score between males and females is statistically significant. Even though the Harris hip score after 12 months are found to be higher among those patients with lesser number of co morbidities, this finding has no statistical significance.

Patients with hypertension and previous Cerebro vascular accidents has got a poor Harris hip score and this association is significant. There is a strong positive correlation between the ASA Score and Harris hip score which is statistically significant also. Mechanism of injury, side of fracture, type of fracture, preoperative hospital stay, type of Anaesthesia and duration of surgery has got no significant association with Harris hip score.

We looked into various factors and found that Age above 80 years, history of coronary artery disease, number of co morbidities, high ASA score and presence of post-operative complications are statistically significant to the outcome in terms of mortality and Age, Gender, hypertension, previous CVA, high ASA score and the type of implants are statistically significant to the outcome in terms of Harris hip score.

CONCLUSION

Post-Operative Mortality rate at 1 year is 30%. Factors affecting mortality are age above 80 years, multiple co-morbidities, High ASA score, history of coronary artery disease and the presence of postoperative complications. We recommend an earlier surgical intervention and earlier mobilisation of the patients with intertrochanteric fractures especially females. Special care and attention should be given to those patients whose age is above 80 years with multiple co-morbidities to prevent mortality and morbidity.

REFERENCES

[1] Harris WH. Traumatic arthritis of the hip after dislocation and acetabular fractures: treatment by mold arthroplasty. An end-result study using a new method of result evaluation. J Bone Joint Surg Am 1969;51(4):737-755.

[2] Lunsjö K, Ceder L, Thorngren KG, et al. Extramedullary fixation of 569 unstable intertrochanteric fractures, a randomized multicenter trial of the Medoff sliding plate versus three other screw plate systems. Acta Orthop Scand 2001;72(2):133-140.

[3] Kannus P, Parkkari J, Sievanen H, et al. Epidemiology of hip fractures. Bone 1996;18(1 Suppl):57S-63S.

[4] Miyamoto RG, Kaplan KM, Levine BR, et al. Surgical management of hip fractures: an evidence-based review of the literature. I: femoral neck fractures. J Am Acad Orthop Surg 2008;16(10):596-607.

[5] Hannan EL, Magaziner J, Wang JJ, et al. Mortality and locomotion 6 months after hospitalization for hip fracture: risk factors and risk-adjusted hospital outcomes. JAMA 2001;285(21):2736-2742.

[6] Roberts SE, Goldacre MJ. Time trends and demography of mortality after fractured neck of femur in an English population, 1968-98: database study. BMJ 2003;327(7418):771-775.

[7] Keene GS, Parker MJ, Pryor GA. Mortality and morbidity after hip fractures. BMJ 1993;307(6914):1248-1250.

[8] Costain DJ, Whitehouse SL, Pratt NL, et al. Perioperative mortality after hemiarthroplasty related to fixation method. Acta Orthop 2011;82(3):275-281.

[9] Daugaard CL, Jørgensen HL, Riis T, et al. Is mortality after hip fracture associated with surgical delay or admission during weekends and public holidays? A retrospective study of 38,020 patients. Acta Orthop 2012;83(6):609-613.

[10] Bombaci H, Erdogan O, Çetinkaya F, et al. Preoperative indicators affecting postoperative mortality in elderly patients with hip fractures. Acta Orthop Traumatol Turc 2012;46(6):425-429.

[11] Zuckerman JD, Skovron ML, Koval KJ, et al. Postoperative complications and mortality associated with operative delay in older patients who have a fracture of the hip. J Bone Joint Surg Am 1995;77(10):1551-1556.

[12] McGuire KJ, Bernstein J, Polsky D, et al. The 2004 Marshall Urist award: delays until surgery after hip fracture increases mortality. Clin Orthop Relat Res 2004;428:294-301.

[13] Pugely AJ, Martin CT, Gao Y, et al. A Risk calculator for short term morbidity and mortality after hip fracture surgery. J Orthop Trauma 2014;28(2):63-69.

[14] Walia JPS, Gupta AC, Kumar R, et al. Comparative study between standard dynamic hip screw (DHS) and cemented bipolar arthroplasty in trochanteric fracture of femur in elderly patients. Journal of Orthopaedics 2012;13(1):40-44.