



A MULTICENTRIC STUDY ON PREDICTIVE FACTORS FOR SHORTER SURVIVAL RATES AFTER PRIMARY HEMIARTHROPLASTY IN UNSTABLE INTERTROCHANTERIC HIP FRACTURES IN ELDERLY PATIENTS.

Orthopaedics

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ABSTRACT

Treatment of UNSTABLE intertrochanteric hip fracture remains controversial for decades. In comparison to conventional fixation methods traditional, primary hip arthroplasty has given the promising result of early Mobilisation and lower failure rates. The primary purpose of the present Study is to evaluate and discuss various factors which predict one-year mortality rates after primary hip arthroplasty. A total of 55 patients have been studied in 3 different centers and considered for factors responsible for the early mortality in elderly patients with primary hip arthroplasty

KEYWORDS

Primary Hip Arthroplasty, Mortality rate, Osteoporosis, Intertrochanteric femur fracture

INTRODUCTION-

Due to increased life expectancy, An estimated 2-7 million hip fractures occurred in 2010 worldwide; India accounts for 2,38,415 in people older than 50 years of age, out of which 25.3% of hip fracture in the male are preventable (1). Intertrochanteric femur fracture, the most common type of hip fracture (42% of all incident hip fracture), accounts for 2.63 USD billion indirect costs in the one year following hip fracture. (2)

The AO/OTA classified AO 31A2.3 trochanteric hip fractures as multi-fragmentary pertrochanteric hip fractures with two or more intermediate fragments, considered unstable pertrochanteric fracture patterns. (3)

Optimal treatment for osteoporotic unstable intertrochanteric femur fracture in the elderly is always debatable, as Internal fixation is associated with nonunions and loss of fracture fixation, related with defect of calcar and severe Osteoporosis and comminution leads to prolonged bed rest as compared to hip arthroplasty, which leads to early Mobilisation and lower failure rates. (4,5,6)

As per a recent study, Cemented arthroplasty in elderly osteoporotic unstable intertrochanteric fractures associated 9.1% to 32.6% mortality rates at one-year Duration with ten folds increased in mortality rates after acute fractures (7,8,9,10,11,12). This prospective multicentric cohort study focuses on Predictive factors for shorter survival Rates after primary hemiarthroplasty in UNSTABLE INTERTROCHANTERIC HIP FRACTURES in elderly patients at one-year follow-up at different centers.

MATERIAL AND METHOD-

This is a prospective multicentric study conducted by independent researchers (VMD, RIM, AND JD) at three different tertiary care centers in India, after institutional approvals, between 2010 to 2018 on 55 patients, with the following inclusion criteria; All patients with age more than 60 years, unstable intertrochanteric femur fracture AO 31A2.3 ONLY, and severe Osteoporosis (Singh index 4).

All Patients With age less than 60 years, Stable AO intertrochanteric fractures, pathological fractures, patients with metabolic bone diseases, who had previous hip surgery or trauma on either ipsilateral or contralateral hip, patients treated with anticoagulants, and who lost follow up were excluded.

In all studies, we have performed cemented Hemi replacement arthroplasty on all included patients

Following data collected with and categorized accordingly BMI were catwegerside as <18.5 mg/kg², 18.5 mg/kg² BMI Postoperative mobilisation is categorised as mobilisation within 2 days or more than 3 days.

Lengths Of Hospital Were Calculated From Days Of Admission And Categorised As Less Than 7 And More Than Equally To 7 Days.

TOTAL Charlson Comorbidity Index, Predicts 10-year survival in patients with multiple comorbidities calculated adding the number of comorbidities with the patient's age. The higher the score, the more likely the predicted outcome will result in mortality or higher resource use. American Society of Anesthesiology (ASA Score) categorized BY ASA SCORE LESS THAN 3 Or ≥ 3 . Modified BI Index assessed the patient's prior functional status At discharge.

We defined death after discharge as an endpoint, and the time from discharge to death was calculated. All analyses were conducted with the SPSS statistic software (SPSS, Chicago, IL, USA)

RESULTS

Table No. 1: Comparison of the Patients Who Survived >1 year and Died

Variable	Survivor group (n=41)	Deceased group (n=14)	p-value
Gender (F/M)	24/17	8/6	0.927
Postoperative Mobilization time ^b (2or ≥ 3 Days)	31/10	1/13	0.000
Total hospitalization time ^a	8.324.03 (5-19)	14.214.32 (8-21)	0.003
Length of hospital stay (days) (<7 ≥ 7 LOS)	18/23	0/14	0.003
ASA SCORE ^b (<3 ≥ 3)	26/15	3/11	0.007
Estimated blood loss ^a (mL) (150-350)	223.0562.14	263.93131.56 (170-650)	0.523
Time from injury to surgery ^a (Surgical delay (days))	5.732.27 (3-13)	5.502.21 (3-11)	0.569
Time from injury to surgery (Surgical delay (days)) Delay <2	0	0	0.569
2 $\leq$ delay <4	7	2	
4 $\leq$ delay <6	14	7	
Delay ≥ 6	20	5	
Number of systemic comorbid diseases (<3 ≥ 3)	40/1	5/9	0.000
Comorbidity ^b (Yes/No)	18/23	13/1	0.001
SMOKING ^b (Yes/No)	19/22	8/6	0.485
ALCOHOL ^b (Yes/No)	5/36	6/8	0.013
TCCI ^b (<3 ≥ 3)	17/24	2/12	0.065
Age ^a	72.548.88 (61-91)	75.078.66 (61-93)	0.586

60-69	19	5	0.638
70-79	12	6	
≥ 80	10	3	
BMI	24.581.83 (20.5-29.6)	25.581.71 (22.8-28-2)	0.105
BMI <18.5	0	0	0.105
18.5≤BMI<25	22	4	
BMI ≥25	19	10	
BARTHEL INDEX AT DISCHARGE	0	0	NA (Due to zero entries)
30<BI <70	0	0	
BI <30	41	14	
BARTHEL INDEX ^a	182.80 (9-20)	14.363.10 (9-20)	0.000

^a mean ± standard deviation (range).

^b Ratio of the patients.

The mean follow-up time was 15.40 ± 8.40 months (range, 0.17-28 months). Fourteen patients (25.45%) died within the first postoperative year. The remaining 41 patients survived >1 year. Age, gender, estimated blood loss, time from injury to surgery (Surgical delay), smoking, TCCI, age, BMI had no significant correlation with a 1-year mortality rate ($P > 0.05$).

Statistically significant differences were observed between the patients who died within the first year and the ones who survived >1 year in the mean values of Postoperative Mobilization time (2 vs. ≥3 Days), Length of hospital stay (<7/≥ 7 LOS), ASA score (<3/≥3), Number of systemic comorbid diseases (<3/≥3), Comorbidity (Yes/No), alcohol (Yes/No), BARTHEL INDEX AT DISCHARGE ($p < 0.05$; Table 1).

Table 2. Log-rank test toward each variable of 55 consecutive patients.

	MALE (n=23)	FEMALE (n=32)
Variables	p-value	p-value
AGE	0.072	0.031
BMI	0.008	0.004
SURGICAL DEALAY	0.862	0.738
TCCI total Charlson comorbidity index	0.289	0.000
SMOKING	0.016	0.289
ALCOHOL	0.052	0.007
LENTH OF HOSPITAL STAY	0.001	0.000
BARTHEL INDEX	0.059	0.000

The relationships between 1-year mortality and each variable were also elucidated by the methods. Log-rank test revealed that BMI ($p = 0.008$), smoking ($p = 0.016$) and length of hospital stay (LOS) ($p = 0.001$) were significantly associated with 1-year mortality for male patients. On the other hand, ag ($p = 0.031$), BMI ($p = 0.004$), TCCI ($p = 0.000$), alcohol ($p = 0.007$), LOS ($p = 0.000$) and Barthel index ($p = 0.000$) were significant risk of mortality for female patients (Table 2).

The final Cox models included the following variables:

BMI, smoking, and Length of hospital stay (LOS) for male patients and age, BMI, TCCI, alcohol, LOS, and Barthel index at discharge for female patients (Table 3).

In male patients, BMI, smoking, and Length of hospital stay (LOS) were not associated with mortality. In female patients, TCCI ≥ 3 and BI < 30 were the pre-existing predictive variables for 1-year mortality (HR 5.30, 0.75, and $p = 0.008$, 0.001, respectively).

Those who are significant in Table 2 Male, Female wise variables

Table 3: Multivariate analysis among selected categories based on the results of the log-rank test using Cox proportional hazard models

For Male patients (n=23)			
	HR	95% CI	p-value
18.5≤BMI<25	2.05	0.258-16.228	0.497
BMI<18.5	Reference		
BMI≥25	1.26	0.574-2.782	0.561
Smoking No	Reference		

Yes	Reference		
LOS <7	Reference		
≥	1.105	0.954-1.279	0.182
For Female patients (n=32)			
Age 60-69	1.15	0.752-1.772	0.512
70-79	0.64	0.304-1.353	0.243
≥ 80	0.88	0.592-1.308	0.527
18.5≤BMI<25	1.02	0.318-3.259	0.977
BMI<18.5	Reference		
BMI≥25	1.17	0.648-2.096	0.608
TCCI <3	Reference		
≥3	5.30	1.536-18.292	0.008
Alcohol No	Reference		
Yes	Reference		
LOS <7	Reference		
≥7	1.21	0.994-1.479	0.058
BI ≥70	Reference		
30<BI <70	Reference		
BI <30	0.75	0.638-0.884	0.001

Reference: means not applicable, data not sufficient or all values are equal. i.e., no variation.

Survival Function at mean of covariates

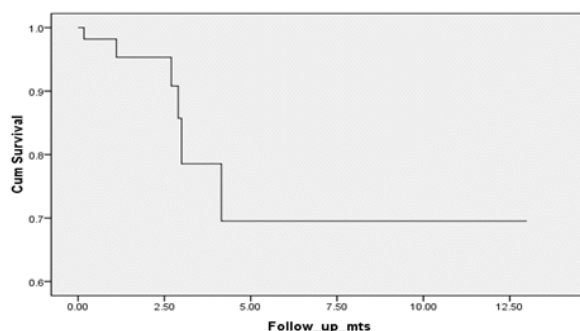


Fig. 1: Patients' 1-year survival graph according to Cox-regression survival analysis

Hazard Function at mean of covariates

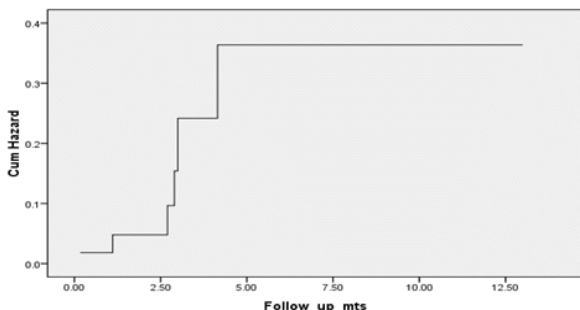


Fig. 2: Patients' 1-year hazard graph according to Cox-regression survival analysis

DISCUSSION

On analysis Results of this prospective Study from 3 different centers, the presence of 3 or more comorbid systemic illnesses before the injury, Higher BMI, higher ASA Scores are closely associated with mortality in <1 YEAR after Hemi replacement arthroplasty.

On a search review of literature, According to gieger et al., Study⁷ age, gender, and comorbidities were the significant factors for mortality in elderly patients after Hemi replacement surgery.

Talsnes et al., in their Study of 302 elderly patients, suggest a 19.5% mortality rate in 3 months due to that increased age, male gender, and comorbidity.

Mortality. Holvik et al. Study also emphasized that advanced age, male gender, an increased number of comorbid medical conditions were the predictors of 1-year mortality after hip fracture.

As per our Study, the presence of 3 or more comorbid systemic

illnesses before the injury, Higher BMI, higher ASA Scores are closely associated with mortality in <1 YEAR after Hemi replacement arthroplasty.

Vosoughi et al.¹⁵ mentioned that age, BMI, and smoking were the significant predictors for 3-month and 1-year mortality in their prospective Study on 1015 patients with hip fractures. In this Study, a significant correlation between the BMI of the patients and 1-year mortality was observed.

Time from injury to operation duration is also an important factor as in our Study, and all survived patients were operated on within two months. But all patients who not survived having more than seven days. But estimated blood loss was not an essential factor for mortality. Iosifidis et al.¹⁶ reported that early walking ability after hip fracture of elderly patients was the most significant predictive factor in their long-term survival study with 230 patients. Postoperative immobilization was not identified as one of the considerable predictors according to multivariate analysis in the present Study

CONCLUSIONS-

As per this Study, the presence of 3 or more comorbid systemic illnesses before the injury, Higher BMI, higher ASA Scores are closely associated with mortality in <1 YEAR after Hemi replacement arthroplasty.

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