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Original Article

Delay in time from fracture to surgery: A potential risk factor for in-hospital mortality in elderly patients with hip fractures

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ABSTRACT

Purpose: To estimate the Impact of delay in surgery for elderly hip fractures on short term outcome measured in terms of in-hospital mortality.
Methods: Retrospective study involving patients above 60 years of age with a primary diagnosis of hip fracture treated by surgery to analyze the relation between timing of surgery and in-hospital mortality.
Results: There were 144 patients who met the criteria. Delayed surgery more than 48 h was associated with higher in-hospital mortality risk. (OR:8.3, 95% CI 1.04–66.64, p = 0.01).
Conclusions: Delay in hip fracture surgery increases in-hospital mortality risk.

1. Introduction

Hip fracture is one of the most common consequences of a fall in the elderly age group. The incidence of hip fractures in the elderly, especially in elderly women is high. The risk of a 50 year old woman developing a hip fracture in her remaining life is 29%, which is much higher than the equivalent risk of developing a breast cancer, stroke or dementia.[1] In the elderly age group, the usual mechanism of a hip fracture is a low energy trauma caused by a fall. Hip fractures are an important cause of morbidity and mortality in the elderly population, worldwide.[2,3] Mortality in the month following a hip fracture ranges from 5% to 10% and it reaches up to 30% after a year.[4–6] The increase in mortality risk following a hip fracture can persist up to 10 years.[13] The quality of life also deteriorates rapidly following a hip fracture. Literature shows that up to 30% of the survivors of hip fracture have a high grade of disability.[4,5,7] The mortality risk in the immediate months following the fracture is high. The in-hospital mortality rates following a hip fracture varies from 3.7% to 12%.[9,10]

Guidelines by the American Academy of Orthopaedic Surgeons (AAOS) recommend that surgical management of hip fractures within 48 h may provide better outcomes.[8] Time to surgery includes the time from fracture to admission and also the time from admission to surgery. A thorough literature review reveals that most published studies investigating timing of hip fracture study and mortality risk are from the developed world.[14–16] These studies took into account the timing of surgery from the time of admission, without considering the delays in admission. This may be relevant in the developed world, but in developing countries like India, this could be inaccurate due to the delays in admission. To our knowledge, there has not been any previous published studies finding the relation between timing of hip fracture surgery and mortality in the context of developing countries taking into account the delay in admission. Hence we conducted a retrospective observational study to analyze the relationship between timing of surgery from the occurrence of fracture and in-hospital mortality in a tertiary hospital in Kerala, India

2. Materials and methods

Data of patients reporting to a tertiary hospital with a primary diagnosis of hip fracture between January 1, 2005 and December 31, 2009 were collected. Inclusion criteria were age equal or more than 60 years, intracapsular neck of femur fracture and intertrochanteric fracture. The exclusion criteria were age below 60 years, those with other fractures besides a hip fracture, and conservatively treated patients.

We defined timing of surgery as the duration of time from occurrence of the fracture to the surgery. According to this, early surgery was defined as when done within 48 h and delayed surgery when done after 48 h of occurrence of the fracture. Clinical and operative records were reviewed to note demographic parameters, timing of fracture and subsequent surgery, type of surgery performed, co-morbidities, length of hospital stay and cause of death in cases of mortality.

Charlson comorbidity Index (CCI)[21] was calculated to assess the

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Table 1
Patient Characteristics and Timing of Surgery.

Characteristics	Total (n = 144)	Surgery within 48 h Number (%)	Surgery after 48 h Number (%)	p VALUE
Sex				
Male	60 (41.7%)	26 (43.3%)	34 (56.6%)	0.52
Female	84 (58.3%)	32 (38.0%)	52 (61.9%)	
AGE				
60–69 years	32 (22.2%)	14 (43.7%)	18 (56.2%)	0.58
70–79 years	45 (31.20%)	17 (37.7%)	28 (62.2%)	
80–89 years	56 (38.9%)	21 (37.5%)	35 (62.5%)	
90+ years	11 (7.6%)	6 (54.5%)	5 (45.4%)	
Fracture Type				
Neck of Femur	74 (51.4%)	35 (47.2%)	39 (52.7%)	0.77
Intertrochanteric	70 (48.6%)	23 (32.8%)	47 (67.1%)	
Surgery done				
Replacement	62 (43.1%)	24 (38.7%)	38 (61.2%)	0.22
Fixation	82 (56.9%)	34 (41.4%)	48 (58.5%)	
Active medical problems				
Diabetes	60 (41.7%)	22 (36.6%)	38 (63.3%)	0.45
Hypertension	79 (54.9%)	26 (32.9%)	53 (67.1%)	**0.04**
COPD	22 (15.3%)	4 (18.1%)	18 (81.8%)	**0.02**
Chronic kidney disease	8 (5.6%)	3 (37.5%)	5 (62.5%)	0.86
IHD	51 (35.4%)	12 (23.5%)	39 (76.4%)	**0.002**
Malignancy	3 (2.1%)	0 (0%)	3 (100%)	0.15
Charlson comorbidity index score (CCI)				
0	28 (19.4%)	18 (64. 2%)	10 (35.7%)	**0.006**
1	49 (34.0%)	21 (42.8%)	28 (57.1%)	
2	33 (22.9%)	14 (42.4%)	19 (57.5%)	
3	26 (18.0%)	4 (15.3%)	22 (84.6%)	
> 3	8 (5.5%)	1 (12.5%)	7 (87.5%)	

IHD – Ischemic heart disease, CCI – Charlson comorbidity Index score (Higher score means higher comorbidity burden).
Bold figures are statistically significant ($p < 0.05$).

comorbidity burden for each patient. All data were analyzed using SPSS software for windows (version 22, SPSS Inc., Illinois, USA). Pearson Chi-square test was used to find out significant associations. Multivariate analysis with in-hospital mortality as the outcome was performed. No potential confounders were found. The level of α for statistical significance was set at 0.05

3. Results

A total of 173 patients were identified. Out of these, 144 patients fulfilled the inclusion criteria. Table 1 shows patient characteristics. The mean age was 77 years (range 60–98 years) and 58.3% (N = 84) were women. The most common type of fracture was intracapsular fracture neck of femur (51.4%; N = 74) and internal fixation was the commonly employed surgical technique (56.9%, N = 82). 40.2% (N = 58) patients received an early surgery.

With regard to in-hospital mortality, 8.3% (N = 12) patients died during their hospital stay. The causes of death were respiratory failure (N = 4; 33%), heart failure (N = 3; 25%), massive internal bleeding (N = 2; 16%), renal failure (N = 2; 16%), and cardiac asystole (N = 1; 8%). Table 2 shows association of various factors with in-hospital mortality. Multivariate analysis showed that timing of surgery was significantly associated with in-hospital mortality. Delay in surgery caused an 8 fold increase in in-hospital mortality (OR: 8.3, 95% CI 1.04–66.64, p = 0.01), whereas age, gender, fracture type and active medical problems or comorbidity burden as measured by Charlson comorbidity index were not found to be associated with in-hospital mortality (Table 2). Fig. 1 shows the comparison of in hospital mortality in the early and delayed surgery groups. Further, the mean duration of hospital stay was 11.05 days (interquartile range 8–13.25 days) for the early surgery group and 16.21 days (interquartile range 11–17 days) for the delayed surgery group. Early surgery decreased the mean duration of hospital stay by 5 days.

Table 2
Factors relating to in-hospital mortality.

	OR	95% CI	p Value
Sex			
Male	1	0.90–3.31	1
Female	1		
Age	–	–	0.95
Fracture Type			
Neck of Femur	2	0.57–6.96	0.269
Intertrochanteric	1		
ACTIVE MEDICAL PROBLEMS			
Diabetes	1.44	0.44–4.72	0.54
Hypertension	1.16	0.35–3.86	0.8
COPD	1.98	0.49–7.99	0.32
Chronic Kidney disease	4.2	0.74–23.57	0.07
IHD	0.58	0.15–2.25	0.43
Malignancy	5.9	0.49–70.42	0.11
CCI			0.069
Timing of Surgery			
Within 48 h	1		
After 48 h	**8.36**	**1.04–66.64**	**0.01**

IHD – Ischemic heart disease, CCI – Charlson comorbidity Index score (Higher score means higher comorbidity burden).
Bold figures are statistically significant ($p < 0.05$).

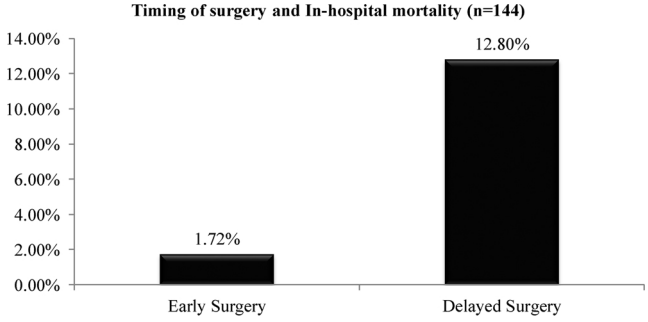

Fig. 1. Timing of surgery and In-hospital mortality (n = 144).

4. Discussion

As we defined timing of surgery as the duration of time from occurrence of the fracture to the surgery, this includes the time from the fracture to hospital admission as well as the time from admission to the surgery. This would be relevant in the context of developing countries like India where there are potential causes for delay in reporting to hospital. These could be poor socioeconomic status, low health literacy and inadequate access to healthcare. In addition, many patients initially admitted to a hospital may require transfer to another hospital due to lack of orthopaedic surgical capability.

Unlike other conditions like a stroke or an acute myocardial infarction, which has much higher public awareness regarding early recognition and management, hip fracture is seldom recognized as an emergency condition. We believe that even in developed countries, many are unaware of the seriousness of a hip fracture and the importance of an early diagnosis in improving survival, despite the high mortality rates following a hip fracture. In a prospective study conducted in New York by Orosz et al 17% of elderly hip fracture patients reported to hospital after 24 h of the fracture and that the most common reason for the delay was underestimating the seriousness of the injury.[12] A similar study in Canada by Vidal et al found out that 10% of