

# Relationship of Preoperative Surgical Delay to Mortality after Hip Fracture in Elderly Patients

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## ABSTRACT

- Objective** To determine whether a delay in surgery for hip fractures affects postoperative mortality among elderly patients.
- Study design** Descriptive case-series
- Place & Duration of study** Orthopedic department KGMC/PGMI Hayatabad Medical complex Peshawar, from January 2010 to December 2010.
- Methodology** This is a retrospective study of 160 patients who underwent surgical treatment of a hip fracture. Postoperative mortality rates were measured in relation to the delay in the surgery and the acute medical comorbidities on admission.
- Results** Total mortality following the hip fracture surgery was 16.3%, (in-hospital 5.6% and 30-days 10.6%). When compared pre-operative delay in patients who had surgery within 2 days, those who were operated within 2-4 days and those who waited >4 days, the mortality rates were 1.3%, 5.6% and 9.4% respectively (with significant p value of 0.042). In patients with acute medical comorbidities, the 30-days mortality was 2.5% in those operated between 2-4 days and 3.7% in those where surgery had been delayed >4 days (insignificant p value 0.56).
- Conclusions** Patients with acute medical comorbidities that required treatment prior to the surgery had 1.6 times risk of death in 30-days as compared to those patients who had been initially considered fit for surgery. Mortality was increased when surgery was delayed for more than 2 days for patients who were otherwise fit for hip fracture surgery.
- Key words** Hip fracture, Mortality, Comorbidity.

## INTRODUCTION:

Hip fractures in elderly are becoming a growing medical and social concern. There are estimates that the lifetime incidence of hip fractures is 18% in women and 6% in men.<sup>1</sup> Among elderly patients, hip fractures are associated with an in-hospital mortality rate of 7–14%,<sup>3</sup> and 30-day all-cause mortality of 41%.<sup>4</sup> As the elderly population increases, the number of hip fractures globally is expected to exceed 7–21 million annually over the next 40–50 years, with significant cost to health care systems.<sup>5</sup>

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The Royal College of Physicians' guidelines indicate that surgeons should perform surgery for a hip fracture within 24 hours of injury because earlier surgery is associated with better functional outcome and lower rates of perioperative complications and mortality, however, the effect of operative delay on mortality remains controversial.<sup>6</sup> The importance of delay in operation (the time between admission to hospital and corrective operation) is inconclusive.<sup>2</sup> In older patients, a valid reason for delay is the need to stabilize concurrent medical conditions. Organization for Economic Co-operation and Development (OECD) has included a 48 hours waiting time to surgery in elderly patients with hip fracture in its national quality indicator list.<sup>7</sup> Although routine surgery within 48 hours after admission is hard to achieve in most facilities, anesthesiologists

must be aware of the fact that an undue delay may be harmful to hip fracture patients, especially those at relatively low risk or those who are young.<sup>4</sup> This retrospective observational study was conducted to determine whether operative delay increases mortality of elderly patients with hip fracture.

#### **METHODOLOGY:**

This is a retrospective study of patients with primary diagnosis of hip fracture, admitted to Orthopedic and Trauma department of Postgraduate Medical Institute Hayatabad Medical Complex, between January 2010 to December 2010. The Hospital Information System database and ward monthly surgical audit data were used to identify cases of hip fracture, the selected outcomes and coexisting medical co-morbidities. Hospital discharge abstracts included information on patients' characteristics, discharge diagnoses and procedure codes according to the International Classification of disease (ICD-10-CM).

All patients older than 55 years with primary diagnosis of hip fracture were included. Cases admitted after motor vehicle accidents were excluded. Four types of operation for hip fracture were identified: dynamic hip screw fixation, hemiarthroplasty, total hip replacement and AO screws fixation. The outcome variables were: total hospital mortality, in-hospital mortality and mortality within 30 days (30-days mortality) of hospital arrival, waiting time for surgery and presence of medical co-morbidities. Waiting time for surgery was defined as the number of calendar days between admission and surgery and grouped as follows: <2, 2–4 and >4 days. Total length of stay and stay after surgery were similarly calculated. All data were compiled and calculated with SPSS version 10. Frequency and percentage were calculated for categorical variables. The descriptive measure, like mean  $\pm$  standard deviation were calculated for continuous variables. Chi-square test was applied to compare categorical variables. P value <0.05 was considered significant.

#### **RESULTS:**

There were a total of 160 patients. The mean age was  $70.26 \pm 8.71$  year (range 55 to 96 year). Males were 74 (46.3%) and females 86 (53.7%). Types of operation for hip fracture were distributed as follows: dynamic hip screw 65%, hemiarthroplasty 16.3%, total hip replacement 10% and closed reduction and AO Screws fixation 8.8%. Two (1.3%) patients were operated within 2 days, 72 (45%) patients waited for 2-4 days and 86 (53.7%) waited for > 4 days. The mean pre-operative stay was  $4.84 \pm 2.00$  days (range 1–12 days). Surgery delay time was not

affected by the admission day of the week: patients hospitalized on Sunday (weekend) were operated within the same time-frame as those admitted on the week-days.

The total mortality following the hip fracture surgery was 16.3% (n=26). Of these 26 patients, 16 (10%) were females and 10 (6.3%) males. Mortality rate increased as the age increased. Mortality in age group 55 – 64 year, 65 -74 year and 75 -84 year was 1.9%, 6.3% and 7.5% respectively (n=3,10,12). Patients who were admitted with an acute medical comorbidity and required treatment prior to the surgery had a total mortality of 10%, which was nearly 1.6 times greater than that for patients who had been initially considered fit for surgery. The total mortality in patients who had surgery within 2 days, those who were operated within 2 to 4 days and those who waited for more than four days were 1.3%, 5.6% and 9.4% respectively (p=0.042).

The in-hospital mortality in patients who had surgery within 2 days, those who were operated within 2-4 days and those who waited for >4 days were 0.6%, 1.3% & 3.8% respectively (p=0.058). Patients who had been admitted with an acute medical comorbidity had in-hospital mortality of 4.4%, which was nearly 4 times greater than that for patients who had been initially considered fit for surgery. Thirty days mortality in patients who had surgery within 2 days, those who were operated within 2-4 days and those who waited for >4 days were 0.6%, 4.4% and 5.6% respectively (p=0.433). In patients with acute medical co-morbidities, those operated on between 2-4 days had a 30-days mortality of 2.5% and those for whom the surgery had been delayed for >4 days had 30-days mortality of 3.7% (p=0.56).

Of the patients who had been declared fit for surgery, those operated on without delay had a total mortality of 0.6% and those for whom the surgery had been delayed between 2-4 days had a total mortality of 1.9%. The total mortality for patients for whom the surgery had been delayed for >4 days was 3.1% p=0.048.

#### **DISCUSSION**

In this series only 1.3% of patients were operated within 2 days, which is much lower than that reported by studies from Western countries where 33- 93% of patients were operated within 2 days.<sup>7</sup> Patients who had surgery within 2 days had lower mortality (in-hospital, 30-days and total mortality) compared to those who waited for surgery >4 days. This study confirms the previous reports on the association between delayed hip surgery and increased mortality

in elderly patients with hip fracture.<sup>1,2,8,9</sup> This may be due to the increased risk of prolonged immobilization, increased length of hospital stay and increase risk of complications.

The effects of preoperative delay in hip surgery on mortality outcomes are generally borderline or insignificant. Weller et al estimated that over 5000 subjects would be required to detect an odds ratio of 1:2 (80% power; alpha=0.05) favoring early surgery.<sup>10</sup> Even more patients would be required if adjustments for confounding were to be made, because small studies are at substantial risk of producing invalid results as a result of having so few events and patients relative to the number of predictors considered in the analyses. A systematic review on the effect of preoperative timing on mortality, which included 257,367 patients across 16 prospective and retrospective studies, found that a surgical delay of more than 48 hours was associated with increased mortality in hip fracture patients, but noted that "potential residual confounding factors in observational studies may limit definitive conclusions."<sup>4</sup>

The current evidence suggests that while surgical delay of more than 24 hours may not unequivocally impact mortality, there is no theoretical benefit for healthier patients to wait for surgery. Rather, there is the potential for increased complications and poor outcome.<sup>10</sup> In the case of medically unfit patients, this effect is less clear. However, most of the studies are flawed by heterogeneity and a retrospective design. In the absence of a randomized prospective study comparing delayed and expeditious surgery, it is difficult to know whether surgical delay adversely affects outcomes directly or whether delay in surgery is simply a reflection of underlying morbidities that adversely affect the complications.<sup>5</sup>

The management of hip fractures requires complex yet cohesive care from presentation to the emergency unit, through to the departments of radiology, anesthesia, orthopedic surgery, medicine, and rehabilitation. Techniques to expedite preoperative care can shorten operative delays, especially for those patients that have been medically cleared for surgery. For example, a recent systematic review as well as a prospective study of 116 patients found that dedicated trauma coordinators or hospitalists have been shown to be effective at fast-tracking patients with hip fractures to surgery by organizing operating room lists, perioperative care, securing hospital beds, and acting as a liaison agent with the radiology department and porting services.<sup>11,12</sup>

A retrospective analysis of 139 patients found that a dedicated trauma operating room not only reduced the time to dynamic hip screw but also allowed more of these surgeries to be performed during day time hours, which may reduce postoperative complications.<sup>13</sup>

Evidence suggests that in efficient systems, hospital management variables may not significantly affect patient mortality and morbidity. The Scottish Hip Fracture Audit collected data related to 18,817 hip fracture patients and analyzed, through multiple logistic regression models, for factors which were potentially associated with postoperative mortality.<sup>9</sup> Significant factors included increased age, male gender, extra-capsular fractures, and poor pre-fracture health and function. Variables that could be modified by preoperative medical interventions, such as surgeon or anesthesiologist expertise and time to surgery, had no significant relationship with postoperative mortality assessed at 30 or 120 days.

The most common reasons for operative delay include the unavailability of the operating room and/or surgical personnel (administrative), and investigation and stabilization of the patient's preoperative medical condition.<sup>5,12,14-16</sup> While stabilization of the patients with medical comorbidities is understandably a necessity, it should be done in such a way that optimize time to surgery. Operational delays, on the other hand, should be addressed differently, using management tool such as fast tracks, increase operating time and incentives to surgical and anesthetics teams to meet targets.

Our study has several potential limitations due to small sample size and retrospective study design. Time to surgery was computed based on the dates of admission and surgery, and was not refined to actual hours of surgery, and time from injury to hospital admission were not calculated, which might introduce bias into the estimation of the operative delay effect. We lacked data on socio-economic and functional status prior to hip fracture, and comorbid conditions were recorded from hospital discharge notes. These factors may affect patient selection for surgery, time to surgery and outcome of these elderly patients.

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