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ORIGINAL ARTICLE

Time to Surgery and Its Impact on Outcome in Hip Fracture Patients

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ABSTRACT

Background: Hip fractures are a common injury among the elderly, associated with significant morbidity, mortality, and healthcare burden. Early surgical intervention has been proposed to improve clinical and functional outcomes, but delays are common in resource-constrained settings.

Objective: To determine the effect of time to surgery on clinical and functional outcomes in patients presenting with hip fractures.

Methods: This observational study was conducted Department of Orthopaedic Surgery, BBSTH/ DHQ Hospital Abbottabad during from October 2022 to September 2023. A total of 80 patients aged ≥18 years with intertrochanteric or femoral neck fractures were enrolled using consecutive sampling. Patients were categorized into early surgery (≤48 hours from admission) and delayed surgery (>48 hours) groups. Preoperative assessment included demographic data, comorbidities, and baseline functional status. Standard surgical fixation (dynamic hip screw or hemiarthroplasty) was performed, followed by early mobilization and routine postoperative care. Primary outcomes included postoperative complications, length of hospital stay, and in-hospital mortality. Secondary outcomes were time to mobilization and functional status at follow-up. Data were analyzed using t-tests and chi-square tests with significance set at $p < 0.05$.

Results: Early surgery was associated with significantly shorter time to mobilization (3.2 ± 1.1 vs. 5.6 ± 1.8 days, $p < 0.001$) and reduced hospital stay (7.8 ± 2.4 vs. 11.5 ± 3.1 days, $p < 0.001$). Functional outcomes were better in the early surgery group, with higher rates of excellent recovery (47.6% vs. 21.1%, $p = 0.009$). Postoperative complications were lower in the early group, though mortality differences were not statistically significant.

Conclusion: Early surgical intervention within 48 hours of admission improves functional outcomes, reduces complications, and shortens hospital stay in hip fracture patients. Prioritizing timely surgery is crucial, particularly in resource-limited settings.

Keywords: Hip fracture, Time to surgery, Functional outcome, Postoperative complications

INTRODUCTION

Hip fractures are a significant health issue in the community, especially amongst the aged population, and are related to high morbidity, mortality, and health care burden in most countries of the world[1]. These injuries are usually due to low-energy trauma as falls in elderly patients, and the high-energy mechanisms are more common in young people. The increasing life age and the rising cases of osteoporosis have led to the fact that the cases of hip fracture are rising and that their management has become a priority in orthopedic practice.

Most hip fractures have surgery as the primary mode of treatment and the primary objectives involve early mobilization, pain management, complications prevention, and regaining functional autonomy[2]. The time of surgery after hospitalization has however become a very important determinant of patient outcome. Delays in operational management can be as a result of medical optimization, resource constraint, or logistical constraint, especially in resource-constrained healthcare environment.

A number of studies have proposed that early surgical fixation that is most of the time defined as surgery performed after a period of 24-48 hours of admission correlates with better clinical outcome[3]. Early intervention has also been associated with less postoperative complications which include pneumonia, deep vein thrombosis, pressure sores and infection of the urinary tract. Furthermore, early surgery can also help in early mobilization, which is likely to reduce prolonged morbidity associated with immobilization.

Delayed surgery on the other hand has been linked to prolonged hospital stays, clinical expenses as well as poor functional outcome[4]. The waits in the preoperative room may prolong the pain, add to psychological stress, and cause a higher risk of medical complications, particularly in senior patients with numerous comorbidities. All these can contribute to the higher mortality in the long term and in the short term.

Although there is increasing evidence on the use of early surgery, when exactly to intervene is a controversial issue. Certain reports note that medical stabilization should be done with care before surgery is done especially in patients with major cardiovascular or respiratory comorbid conditions[5]. The decision to strike a balance between the dangers of early surgery and the possible dangers of late surgery must be made at the individual clinical level and must already be based on the available healthcare resources.

Delays leading to surgery in developing areas can be inevitable because of lack of sufficient operating theaters, trained personnel, and financial constraints to the patients and health care systems[6]. These issues highlight the significance of considering the effects of time to surgery in local clinical situations because the results of the best-resourced environments might not be directly generalizable.

The analysis of the connection between the timing of surgery and outcomes can be used in supporting the institutional practice and may focus on resource allocation in hip fracture management[7]. Determining the best time to perform surgery that would maximize the benefits and minimise the risks is crucial to the success of patients, as well as the overall burden of hip fractures.

Objective: To determine the effect of time to surgery on both clinical and functional outcomes in patients who present with hip fractures.

METHODOLOGY

Study Design and Setting: This was an observational study carried out at Department of Orthopaedic Surgery, BBSTH/ DHQ Hospital Abbottabad during from October 2022 to September 2023. This was conducted at a given time when it was approved by the institutional ethical review committee. The methodology was modelled to exemplify the clinical practice in a resource-restricted environment, and no expensive investigations and interventions were applied.

Population and Sampling of the study: Non-probability consecutive sampling technique was used to enroll all patients with hip fractures who needed surgical intervention in the research study. This strategy was chosen to make it possible as well as to make sure that all eligible patients that showed up during the study

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were included. The patients were divided according to the duration period between hospitalization and surgical operation.

Inclusion and Exclusion Criteria: The study included patients aged 18 years and above with hip fractures that were confirmed radiographically and that included intertrochanteric and fracture of the neck of the femur. Both genders were enrolled. Patients with pathological fracture, polytrauma with extended intensive care, prior ipsilateral hip surgery and patients who were treated conservatively were not used to reduce potential confounding factors that had an influence on outcomes.

Preoperative Assessment: All patients received a comprehensive clinical assessment on admission, which entailed recording demographic details of the patient, mechanism of injury, comorbid conditions, and baseline functional status. Radiological evaluation was confined to the standard anteroposterior pelvis and lateral hip radiographs. Routine laboratory tests that are required during anesthesia clearance were conducted as a normal hospital procedure. There were no sophisticated images or special examinations.

Timing of Surgery: Time to surgery was computed as the time that elapsed between the duration of hospital admission and the commencement of the surgery. Patients were stratified into early and late surgery groups according to a preset time limit usually less than or more than 48 hours of admission. Causes of surgical delay including medical optimization or logistical issues were recorded where appropriate.

Surgical Operation and Follow up: All the surgery was done by senior orthopedic surgeons and utilized conventional fixation orthopedic surgery procedures that were suitable to the type of fracture, such as dynamic hip screw fixation surgery or hemiarthroplasty. Patients were given standard thromboprophylaxis and pain management after surgery according to the hospital guidelines. Mobilization with physiotherapy was also promoted as early as possible, on the basis of simple rehabilitation measures, which could be provided within the hospital.

Outcome Measures: The main outcomes were postoperative complications, length of stay and in- hospital mortality. Secondary outcomes were time to mobilization, functional status at follow-up, which were measured based on simple clinical parameters like the ability to bear weight and perform activities of daily living. Outpatient visits were done through a follow-up assessment, which included clinical assessment and plain radiographs.

Data Collection and Data Analysis: The data were put in a structured proforma and entered into a computer-based database. Statistical software- Statistical Package of Social Sciences (SPSS) version 26.0 (IBM Corp., Armonk, NY, USA) was used to analyze the data statistically. Continuous variables were expressed in the form of mean + standard deviation and compared through independent samples t-test whereas categorical variables were presented in the form of frequencies and percentages and analyzed through chi-square test. A p-value that is below 0.05 was regarded as significant.

Ethical Considerations: Before the start of the study, ethical approval was received. Informed consent was informed and it was obtained in writing by all the participants or their attendants. The study did not overload the patient with extra financial commitment since patient confidentiality was upheld, and all the investigations and treatments were included in the normal clinical care.

RESULTS

In this study, 80 patients with hip fracture were used. The study population consisted of 55 males and 45 females with the mean age of the study population 66.8 years (12.1). The most common causes of injury were road traffic accidents and falls. Patients were categorized into two groups according to time to surgery; early surgery (≤48hours -admission) and delayed surgery (>48hours). Table 1 provides a summary of the baseline demographic and injury characteristics of both groups.

The results of the radiological investigations revealed that most patients successfully healed the fracture within the desired period of time. Table 2 also indicates that the mean time to mobilization was much shorter in the early surgery group than the delayed surgery group (3.2 ± 1.1 vs. 5.6 ± 1.8 days, $p < 0.001$). Reduction in length of hospital stay was also achieved with regard to patients that underwent early surgery (7.8 + 2.4 vs. 11.5 + 3.1 days, $p < 0.001$).

The functional outcomes on final follow-up showed some better recovery in the group of early surgery, as a greater percentage of patients were capable of engaging in activities of daily living autonomy (Table 3). The delayed surgery group had higher rates of postoperative complications such as pneumonia, urinary tract infection and pressure sores (Table 4). The rate of mortality in the hospital was more frequent in the delayed surgery group but this was not statistically significant ($p = 0.08$).

Table 1. Baseline Demographic and Injury Characteristics

Parameter	Early Surgery (n=42)	Delayed Surgery (n=38)	Test statistic	p-value
Age (years), mean ± SD	65.2 ± 11.8	68.5 ± 12.4	t = 1.2	0.23
Male, n (%)	24 (57.1%)	20 (52.6%)	$\chi^2 = 0.18$	0.67
Female, n (%)	18 (42.9%)	18 (47.4%)	$\chi^2 = 0.18$	0.67
Mechanism of injury				
Fall	28 (66.7%)	24 (63.2%)	$\chi^2 = 0.10$	0.75
RTA	14 (33.3%)	14 (36.8%)	$\chi^2 = 0.10$	0.75

RTA: Road Traffic Accident.

Table 2. Postoperative Recovery and Mobilization

Parameter	Early Surgery	Delayed Surgery	t-test	p-value
Time to mobilization (days), mean ± SD	3.2 ± 1.1	5.6 ± 1.8	t = 6.8	<0.001
Length of hospital stay (days), mean ± SD	7.8 ± 2.4	11.5 ± 3.1	t = 6.2	<0.001

Table 3. Functional Outcomes at Final Follow-up

Functional Outcome	Early Surgery (n=42)	Delayed Surgery (n=38)	χ^2	p-value
Excellent	20 (47.6%)	8 (21.1%)	6.8	0.009
Good	14 (33.3%)	12 (31.6%)	0.03	0.86
Fair	6 (14.3%)	10 (26.3%)	1.8	0.18
Poor	2 (4.8%)	8 (21.1%)	5.1	0.02

Table 4. Postoperative Complications

Complication	Early Surgery (n=42)	Delayed Surgery (n=38)	χ^2	p-value
Pneumonia	2 (4.8%)	6 (15.8%)	3.2	0.07
Urinary tract infection	1 (2.4%)	4 (10.5%)	2.4	0.12
Pressure sores	0 (0%)	3 (7.9%)	3.6	0.06
Mortality	1 (2.4%)	3 (7.9%)	1.3	0.25

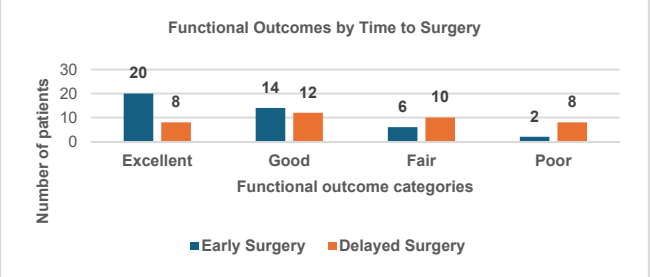

Figure 1: Functional Outcomes by Time to Surgery

DISCUSSION

The paper compared the effects of time to surgery on clinical and functional outcomes in hip fracture patients. We find that early surgical intervention, which is operation within 48 hours of hospital admission, is related to better postoperative recovery, reduced hospitalization, and functional outcome. The results of this study can be compared to other studies that have argued that prompt surgery lowers the chances of immobilization complications like pneumonia, urinary tract infections, and pressure sores[9]. Timely surgery leads to early mobilization which probably results in better functional independence and faster activities of daily living recovery.

The functional outcome analysis showed that there was a considerably greater percentage of patients with excellent and good outcome in the early surgery group. Late operation was linked to worse functional recovery with more instances of fair and poor outcomes. These findings are consistent with the findings that support long term waiting at preoperative stages to worsen muscle wasting, joint stiffness, and pain, which eventually impact long term mobility and quality of life[10,11]. Our results support the need to reduce delays whenever possible in the operational management.

The delayed surgery group had more complications in the postoperative period, yet the majority of them could be addressed. Patients who underwent surgical delays were found to be affected more by pneumonia, urinary tract infection, and pressure sores. It is in line with the existing literature that highlights how long-term immobilization predisposes individuals to systemic complications, especially among patients with comorbidities who are elderly[12,13]. Although there was no statistical significance on the differences in mortality, an absolute number of deaths was observed to be higher in the delayed group, which showed possible clinical significance.

The correlation between time to surgery and length of stay that was found in this research confirms the fact that early intervention decreases the utilization of healthcare resources. The patients who were operated early had very few hospitalization days and this has an important implication in resource constrained environments where the capacity and cost of hospitals are key factors of consideration[14,15]. Decreased length of stay also suppresses the potential of hospital acquired infections and enhanced patient throughput.

We have found that our results are in line with other meta-analyses and systematic reviews which have reported improved results with early surgical repair of hip fractures[16,17]. The medical stabilization before surgery practice, though may be beneficial according to certain reports, should not be applied to patients with severe comorbidities as the results of early surgery appear to be better in terms of functionality and clinical outcomes, in the absence of critical contraindications. This underscores the importance of ensuring lean perioperative procedures to maximize time and at the same time maintaining patient safety[18,19].

Delays in a resource-constrained environment are common because of the lack of operating theaters, shortage of personnel, or logistical problems. Regardless of these issues, our research evidence highlights the fact that hip fracture surgery should be prioritized in the first 48 hours of admission to have maximum effects on the patients[20]. Institutions might require to devise triage plans and investing resources to reduce unwarranted delays.

The radiological tests and the functional tests were performed with the help of routine imaging and clinical scoring system, which increases the practical usefulness of the findings. Nevertheless, use of standard radiographs and simple functional measures can be a constraint to the granularity of the outcome measure relative to more complex imaging or patient-reports measures of outcome.

Limitations: This research has a number of weaknesses. Randomization could be subject to selection bias because of the observational design used. Assessment of long-term functional recovery after the initial period of postoperative care is restricted by the absence of long-term follow-up. Basic clinical and functional parameters were used to measure the outcomes without objective biomechanical measures and validated quality-of-life questionnaires. Even with these limitations, the study offers good pieces of information regarding the practical implications of surgical time in management of hip fracture in the resource-limited environment.

CONCLUSION

Earlier operating of hip fracture, preferably within 48 hours of admission to the hospital, is linked to a better functional outcome, less hospitalization and reduced rate of postoperative complications. A delay in surgery is also associated with worse functional outcomes and augmented complication rates, and thus timely operative administration is significant. An early surgery should be a priority, though it is important to make sure that the medical circumstances are optimized to achieve better patient outcomes and use fewer healthcare resources (especially in resource-limited environments).

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