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A Prospective Observational Study On The Incidence And Risk Factors Of Post-Operative Delirium After Hip Fracture Surgery

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ABSTRACT

Introduction: Delirium is an acute and predominantly reversible condition that may arise from various factors, including underlying illness, pharmacological interventions, toxic exposure, and significant stress. It represents the most prevalent challenge encountered in intensive care units. The purpose of this study is to examine the incidence and risk factors associated with postoperative delirium following hip fracture surgeries conducted within the intensive care setting.

Methods: The institutional ethics committee approved this prospective observational study. Upon admission, the attending physician provided patients or their family members with information regarding their participation in the survey, while the principal investigator secured consent from all individuals involved. A total of sixty-five patients aged 18 years and older were admitted to the Intensive Care Unit (ICU) at SRM Hospital and Research Institute. The study cohort included individuals presenting with trauma, surgical, and medical conditions. The principal investigator systematically collected relevant data by reviewing the patient's medical records. Each patient underwent daily evaluation for delirium by a trained physician utilizing the standardized diagnostic tool, the Confusion Assessment Method for the ICU (CAM-ICU). The data collection process was carried out with careful attention to detail and accuracy.

Results: In a study involving 65 patients, the incidence of delirium among individuals in the intensive care unit (ICU) was found to be 18.4%. The analysis indicated that the risk of developing delirium is significantly associated with both the duration of surgical procedures and the length of hospital stay, with a p-value of less than 0.005 confirming these findings through statistical evaluation.

Conclusion: In our investigation, we identified that the incidence of delirium following hip fracture surgeries is 18.4%. We found a direct correlation between the duration of the surgical procedure and the length of hospital stay with the occurrence of delirium. However, our analysis did not reveal any significant associations with variables such as age, gender, type of anesthesia, total white blood cell count, platelet count, renal function tests, acid-base imbalances, liver function tests, creatinine levels, electrolyte levels, including sodium, potassium, magnesium, and calcium.

Keywords: *ICU, Delirium, CAM-ICU, Risk factors, postoperative, hip fracture*

1. INTRODUCTION

Delirium refers to a state of confusion that arises from the confluence of many disorders, environmental variables, or another risk factors that impair brain function. Adults over 65 are more likely to have it. A disruption in consciousness has resulted in a diminished capacity to focus, redirect, maintain, and change attention. These problems also affect other parts of the brain. Delirium may have a fundamental neurological cause or arise as a physiological side effect of a medical disease. The most prevalent behavioral disturbance in a medical surgical environment is by far delirium. older individuals from 11% to 51% postoperatively, and 80% or more in the intensive care unit (ICU). length of stay in the intensive care unit (ICU), length of stay in the hospital, increased readmission rates, and long-term cognitive impairment. This risk is unaffected by age, the severity of a concomitant disease, or preexisting comorbid illnesses. Delirium represents there are numerous labels used to characterize this illness, including acute brain delirium, exogenous psychosis, metabolic encephalopathy, organic psychosis, toxic encephalopathy, toxic psychosis, acute brain syndrome, acute cerebral insufficiency, acute confusional condition, acute organic syndrome, and others. Defining delirium is one of the challenges in diagnosing illness. A general breakdown of brain metabolism resulting from a wide range of medical disorders affecting the brain is often reflected in delirium. The majority

of delirium in the elderly is a result of dementia; hip fractures in the elderly are associated with a poor functional prognosis and a high rate of post-operative complications, including bleeding, pneumonia, urinary tract infections, deep vein thrombosis, and post-operative delirium (POD) Postoperative delirium is among the most prevalent types of patients with hip fracture. This study aims to observe the incidence of post-operative delirium following hip surgeries.

Methods:

The institutional ethics committee approved this prospective observational study. Patients or their relatives were informed about participation in the study by the physician upon admission, and the principal investigator obtained consent in all cases. We screened 65 patients aged 18 years or older admitted to the SRM Hospital and Research Institute ICU. The patient population included individuals with trauma, surgical conditions, and medical issues. Data were collected by a principal investigator reviewing each patient's case record. A trained physician assessed all patients daily for delirium using a standardized diagnostic tool, the Confusion Assessment Method for the ICU (CAM-ICU).

Inclusion Criteria: Patients aged 18 and older with a hip fracture classified as ASA (American Society of Anesthesiologists) categories 1 to 3.

Exclusion Criteria: Patients with a history of treatment with antipsychotic drugs, a history of dementia, or those suffering from acute alcohol withdrawal syndrome. Additionally, patients who were unable to understand Tamil or English, those who were severely mentally disabled, or who had a terminal illness were excluded from the study. were excluded from the study.

2. RESULTS

In a cohort of 65 patients, the age distribution was identified as follows: two individuals (3.07%) were aged between 18 and 20 years, seven individuals (10.7%) were in the 20 to 30 years age group, eight individuals (12.3%) fell within the 30 to 40 years range, five individuals (7.6%) were aged between 40 and 50 years, ten individuals (15.3%) belonged to the 50 to 60 years category, fifteen individuals (23.0%) were in the 60 to 70 years range, and eighteen individuals (27.6%) were aged between 70 and 80 years. Furthermore, the gender distribution among the 65 patients indicated that 28 (43.08%) were male, while 37 (56.92%) were female.

Comparison of Age and Gender with Incidence of Delirium:

In a study comprising 65 patients, it was observed that 53 patients (81.53%) exhibited a negative CAM ICU score, while 12 patients (18.46%) presented a positive score. The accompanying table illustrates the prevalence of delirium in conjunction with the age range of the participants, whose ages varied between 50 and 80 years. Within this cohort, there was a noted incidence of delirium in 8 patients (12.30%). However, this finding did not reach statistical significance compared to other age groups, as evidenced by a p-value of 0.887, indicating that the results are not statistically significant (**Table-1**). The gender analysis reveals a p-value of 0.592 ($p < 0.05$), indicating statistical insignificance. The gender distribution among the sample shows that 43% are male and 57% are female. Consequently, it can be concluded that there is no correlation between gender and delirium in patients in the Intensive Care Unit. Gender does not appear to have an impact on the occurrence of delirium. The p-value indicates that the results are not statistically significant (**Table 2**).

Table 1: Comparison of Age with Incidence of Delirium

AGE	INCIDENCE OF DELIRIUM		Total	Pearson Chi-Square P-Value
	NEGATIVE	POSITIVE		
18-30	8(12.30)	1(1.53%)	9	0.88
30-50	10(15.38)	3(4.6%)	13	
50-70	20(30.76)	4(6.1%)	24	
70- 80	15(23.07)	4(6.1%)	19	
TOTAL	53(81.53)	12(18.46%)	65(100%)	

Table 2: Comparison of Age with Incidence of Delirium

GENDER	INCIDENCE OF DELIRIUM		Total	Pearson Chi-Square P-value
	NEGATIVE	POSITIVE		
FEMALE	31(47.69%)	6(9.2%)	37	0.59

MALE	22(33.84)	6(9.2%)	28	
TOTAL	53(81.53%)	12(18.46)	65(100%)	

Comparison of Asa Grading with Incidence of Delirium

The ASA grading p-value is 0.37, indicating that it is not statistically significant ($p < 0.05$). Consequently, there is no correlation between ASA grading and the occurrence of delirium in patients within the Intensive Care Unit (ICU). This suggests that delirium does not influence ASA grading. The p-value does not reach the level of significance required for further consideration (**Table-3**).

Table 3: Comparison of Asa Grading with Incidence of Delirium

ASA	INCIDENCE OF DELIRIUM		Total	Pearson Chi-Square P-value
	NEGATIVE	POSITIVE		
I	1(1.53%)	0(0%)	1	
II	23(35.38%)	4(6.1%)	27	
III	27(41.53%)	6(9.23%)	33	0.37
IV	2(3.07%)	2(3.07%)	4	
TOTAL	53(81.53%)	12(18.46%)	65	

Comparison of Duration of Surgery with Incidence of Delirium

The p-value for the duration of surgery is 0.0143 ($p < 0.05$), indicating statistical significance. As a result, there is a correlation between the duration of surgery and the occurrence of delirium in patients within the Intensive Care Unit (ICU). This finding suggests that delirium has an impact on the duration of surgery **(Table 4).**

Table 4: Comparison of Duration of Surgery with Incidence of Delirium

DURATION OF SURGERY	INCIDENCE OF DELIRIUM		Total	P-value
	NEGATIVE	POSITIVE		
1.30 HOURS	1(1.53%)	0(0%)	1	
2 HOURS	7(10.76)	1(1.53%)	8	
2.30 HOURS	1(1.53%)	1(1.53%)	2	
3 HOURS	38(58.46%)	7(10.7%)	45	0.01
4 HOURS	6(9.2%)	1(1.53%)	7	
4.45 HOURS	0	1(1.53%)	1	
5 HOURS	0	1(1.53%)	1	
TOTAL	53(81.53%)	12(18.46)	65(100%)	

Comparison of Intraoperative Complications with Incidence of Delirium

The p-value for intraoperative complications is 0.63 ($p < 0.05$), indicating that these complications are not statistically significant. Consequently, there is no correlation between intraoperative complications and delirium in patients within the intensive care unit. This analysis suggests that delirium does not have an impact on the occurrence of intraoperative complications **(Table 5)**.

Table 5: Comparison of Intraoperative Complications with Incidence of Delirium

INTRAOPERATIVE COMPLICATION	INCIDENCE OF DELIRIUM		Total	Pearson Chi- Square P-value
	NEGATIV E	POSITIVE		

No	52(80%)	12(18.46%)	64	0.632
yes	1(1.53%)	0(0%)	1	
TOTAL	53(81.53%)	12(18.46%)	65(100%)	

Comparison of Length of Stay with Incidence of Delirium:

The p-value associated with length of stay is 0.000 ($p < 0.05$), indicating that this variable is statistically significant. This result suggests a correlation between the length of stay and the occurrence of delirium in patients within the intensive care unit (ICU). Consequently, the duration of hospitalization influences delirium. The significance of the p-value supports this assertion **(Table 6).**

Table 6: Comparison of Length of Stay with Incidence of Delirium

LENGTH OF STAY	INTRAOPERATIVE ASSIGNMENT		Total	P-value
	YES	NO		
8- 10 DAYS	0(0%)	30(46.15%)	30	0.00
11- 15 DAYS	0(0%)	23(35.38%)	23	
17- 19 DAYS	5(7.6%)	1(1.53%)	6	
20- 22 DAYS	7(10.7%)	0(0%)	7	
TOTAL	12(18.46%)	53(81.53%)	65(100%)	

Comparison of Type of Anaesthesia with Incidence of Delirium

The type of anesthesia yielded a p-value of 0.169, indicating statistical insignificance ($p < 0.05$). Consequently, there is no correlation between the type of anesthesia and the occurrence of delirium in ICU patients. Furthermore, the type of anesthesia does not appear to influence the incidence of delirium**.**

Table 7: Comparisons of Type of Anaesthesia with Incidence of Delirium

TYPE OF ANAESTHESIA	INTRAOPERATIVE ASSIGNMENT		Total	P-value
	NO	YES		
SPINAL ANAESTHESIA	12(18.46%)	0(0%)	12	0.16
GA +BLOCK	1(1.53%)	1(1.53%)	2	
GA +EA	2(3.07%)	5(7.6%)	7	
SA+ EA	5(7.6%)	39(60%)	44	
SA+ BLOCK	4(6.1%)	8(12.30%)	12	
TOTAL	12(18.46%)	53(81.53%)	65(100%)	

3. DISCUSSION

The incidence of delirium was observed to be higher among males (56%) than among females admitted to the Intensive Care Unit (ICU). The study encompassed various characteristics, including patient age, sex, diagnosis, heart rate, blood pressure, oxygen saturation (SPO2), hemoglobin (HB), white blood cell count (WBC), platelet levels, liver function tests (LFT), renal function tests (RFT), electrolyte levels, arterial blood gas (ABG) measurements, and length of hospital stay. The accompanying graph illustrates the prevalence of delirium across different age ranges within the study population of 65 patients, specifically focusing on individuals aged 50 to 80 years. Among these patients, a higher incidence of delirium was noted in eight cases (12.30%). However, this finding was not statistically significant compared to other age groups, as indicated by the p-value of 0.887. The Confusion Assessment Method for the ICU (CAM-ICU) score was employed to evaluate the presence of delirium, which was documented during the postoperative period. This study identified several risk factors predictive of delirium, including age, gender, comorbidities, type of anesthesia, duration of surgery, electrolyte levels,

LFT, RFT, medication usage, and length of stay. The impact of these risk factors on delirium was managed by using antipsychotic medications.

Furthermore, a prospective survey regarding the incidence of delirium was conducted involving 65 inpatients aged 18 to 80 years over one year. The incidence of postoperative delirium at 48 hours was continuously monitored for two days, tracking variations in vital signs, electrolyte levels, visual analog scale (VAS) scores, LFT, RFT, ABG results, and the CAM-ICU assessment. In the ICU, the observed incidence of delirium was 12 cases (18.4%), with 9 cases (13.8%) occurring in females and 3 cases (4.6%) in males.

In a study involving 65 patients, the age distribution was as follows: 2 patients (3.07%) were aged 18–20 years, seven patients (10.7%) were aged 20–30 years, eight patients (12.3%) were aged 30–40 years, five patients (7.6%) were aged 40–50 years, 10 patients (15.3%) were aged 50–60 years, 15 patients (23.0%) were aged 60–70 years, and 18 patients (27.6%) were aged 70–80 years. Among these, patients in the 50–80 years age group had a higher incidence of delirium, with 8 cases (12.30%). However, this finding was not statistically significant compared to other age groups, as indicated by a p-value of 0.887. A study by Azeem Tariq Malik et al. in 2019 examined the incidence, risk factors, and clinical impact of postoperative delirium following open reduction and internal fixation (ORIF) for hip fractures. This study included a total of 7,859 patients. The adjusted analysis results revealed several significant factors, including an increased risk associated with age 65 years and older ($p < 0.001$).

Of 65 patients, 28 (43.08%) are male, while 37 (56.92%) are female. The p-value associated with gender is 0.592 ($p < 0.05$), indicating that the difference between the male (43%) and female (57%) cohorts is statistically insignificant. Consequently, it can be concluded that there is no correlation between gender and the occurrence of delirium in patients within the intensive care unit, suggesting that gender does not influence the rates of delirium. A study conducted by Theoccharis Chrysafides et al. in 2006 investigated postoperative delirium following hip fracture management in older adults. This research highlighted that hip fractures are linked to increased mortality rates, diminished quality of life, and persistent physical morbidity. The findings indicated that the incidence of hip fractures is 11% for men and 22% for women.

The ASA grading p-value is 0.375, indicating that the results are not statistically significant at the $p < 0.05$ level. Consequently, there is no correlation between ASA grading and the occurrence of delirium in patients within the Intensive Care Unit (ICU). This finding suggests that delirium does not correlate with ASA grading. A study conducted by Azeem Tariq Malik et al. in 2019 examined the incidence, risk factors, and clinical implications of postoperative delirium following open reduction and internal fixation (ORIF) for hip fractures. The study included a total of 7,859 patients and found that preoperative delirium ($p < 0.001$) and an ASA grade greater than II ($p < 0.001$) were significant risk factors.

The analysis of the duration of surgery revealed a p-value of 0.143, indicating that it is not statistically significant ($p < 0.05$) about SPO2 levels. This finding suggests that the duration of surgery does not correlate with the incidence of delirium among ICU patients. Consequently, it can be concluded that delirium does not influence the length of surgical procedures. A study by Zhe Chu, Yixuan Wu, and their colleagues investigated the risk factors associated with postoperative delirium in patients undergoing general anesthesia for hip fractures. The study encompassed a total of 462 postoperative patients with hip fractures, among whom 74 patients experienced an episode of delirium, resulting in an incidence rate of 16.02%. The findings indicated no statistically significant difference in the duration of surgery between the delirious and non-delirious patient groups (all p-values > 0.05).

The analysis indicates that the type of anesthesia has a p-value of 0.169 ($p > 0.05$), which suggests that it is statistically insignificant. Consequently, there is no correlation between the type of anesthesia and the incidence of delirium among patients in the Intensive Care Unit (ICU). Thus, the type of anesthesia does not have a discernible impact on the occurrence of delirium. In the study by Mark D. Neuman et al., titled "Spinal Anesthesia or General Anesthesia for Hip Surgery in Older Adults," 1,600 patients were enrolled. Among these participants, 795 were assigned to receive spinal anesthesia, while 805 were assigned to

general anesthesia. The mean age of the cohort was 78 years, with 67.0% female patients. From those assigned to spinal anesthesia, 666 patients (83.8%) adhered to their assigned treatment, whereas 769 patients (95.5%) who were assigned to general anesthesia also received the designated anesthesia.

The p-value for intraoperative complications is 0.632 ($p < 0.05$), indicating that these complications are not statistically significant. Therefore, there is no correlation between intraoperative complications and delirium in Intensive Care Unit (ICU) patients. This suggests that delirium does not have an impact on the occurrence of intraoperative complications.

The p-value associated with the length of stay is 0.000 ($p < 0.05$), indicating that the length of stay is statistically significant. This finding suggests a correlation with delirium in intensive care unit (ICU) patients, implying that the duration of stay influences the incidence of delirium. In the systematic review and meta-analysis conducted by Ruiqi Zhu et al. 22, titled "Effect of Enhanced Recovery After Surgery on the Prognosis of Patients with Hip Fractures," nine studies involving 10,359 patients were analyzed. The results demonstrated that the enhanced recovery after surgery group significantly reduced the length of stay compared to the control group ($p < .0001$).

4. CONCLUSION

In our investigation, we found that the incidence of delirium following hip fracture surgeries was 18.4%. It was established that both the duration of the surgical procedure and the length of the hospital stay are positively correlated with the occurrence of delirium. In contrast, we did not find any significant correlations between the incidence of delirium and a variety of factors, including age, gender, type of anesthesia, total white blood cell count, platelet count, renal function tests, acid-base balance, liver function tests, creatinine levels, and levels of sodium, potassium, magnesium, and calcium.

5. LIMITATIONS

The study included individuals aged between 18 and 80 and was conducted as a single-center trial with a relatively small sample size

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