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Original Research Article

Study of Hospitalized Cases of Fractured Neck Femur for Risk Factors that May Affect Recovery

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Abstract

Hip fracture is a major public health problem with significant consequences. Recent worldwide estimates are in the order of 1.7 million hip fractures annually and are expected to reach 6 million by the middle of this century. More than one-third of elderly fall annually, with an estimated 1% of those who fall sustain a hip fracture. Because of high levels of frailty, multimorbidity, polypharmacy, and coexisting cognitive impairment, people with hip fractures are at particularly high risk of developing delirium. Therefore, present study has been conducted to study hospitalized cases of fractured neck femur to look for risk factors that may affect recovery of the patient.

Materials and Methods: A cross sectional Observational study was done on 100 Geriatric patients hospitalised with fractured neck femur admitted in the orthopedics ward who fulfilled the eligibility criteria from Dec. 2019 to Dec.2021 have been included in the study, with the approval of the institutional ethic committee and informed written consent.

They were seen daily. A detailed history was taken, comorbidities recorded, and patients examined thoroughly, including the use of the following assessment tools:

- Mini Mental Status Examination
- Geriatric Depression Scale-4
- Barthel's Index
- J.H. Fall Risk Assessment Tool
- Delirium Observation Screening Scale (DOSS)
- Confusion Assessment Method-4 (CAM-4)

Parameters for Delirium and Barthel Index were studied at the time of the end of hospitalization. Three or more points on the DOSS were considered highly indicative of delirium. The diagnosis was confirmed based on the CAM-4 criteria.

Results & Conclusion: Age, history of comorbidities, time of surgery after fall, hyponatremia, and polypharmacy were statistically significant risk factors associated with the post operative delirium that may affect the recovery of fracture neck femur in geriatric patients.

Patients of age \geq 75 years were 25.06 times at risk for delirium as compared to those of the age group 60-75 years. Patients who were operated on \geq 7 days after the fall were 13.35 times at higher risk of developing delirium as compared to those operated on within 7 days. Patients having hyponatremia were 57.84 times at risk as compared to their counterparts.

The association between delirium and mortality is statistically significant.

The greatest service a geriatrician can do for his patients is to counsel them for preventing falls. **Keywords:** Fracture femur, Geriatrics, Delirium.

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Introduction

Hip fracture is a major public health problem with significant consequences. Recent worldwide estimates are in the order of 1.7 million hip fractures annually and are expected to reach 6 million by the middle of this century. [1]

Approximately half of all hip fractures occur in the area of the femoral neck called "intracapsular fractures", and the other half occur in the area between the greater and lesser trochanters called "intertrochanteric" or "extracapsular fractures". Fractures that occur within 5 cm below the lesser trochanter ("subtrochanteric fractures.") are far less common [1,2]

More than one-third of elderly fall annually, with an estimated 1% of those who fall sustain a hip fracture. Because of high levels of frailty, multimorbidity, polypharmacy, and coexisting cognitive impairment, people with hip fractures are at particularly high risk of developing delirium. 26 publications reported that the incidence of postoperative delirium of 4–53.3% in hip fracture samples. [3]

The development of delirium after hip fracture surgery was found to be a significant predictor of admission to a nursing home and mortality after 1 year. [4,5] **Causes of delirium** are stroke and seizure, but most treatable contributors lie outside the brain:

- 1) **Electrolyte disturbance** especially dehydration, sodium imbalance, and thyroid abnormalities.
- 2) Withdrawal of drugs- Withdrawal symptoms can occur from long-term use of sedatives, including alcohol and sleeping pills; poorly controlled pain (lack of analgesia).
- 3) **Infection** urinary tract, respiratory tract, and soft-tissue infections.
- 4) **Reduced sensory input-** vision and hearing.
- 5) **Myocardial and pulmonary disorder**myocardial infarction, arrhythmia, heart failure, hypotension, severe anemia, exacerbation of chronic obstructive pulmonary disease, hypoxia, and hypercarbia. [6]

While every hour of delay in managing delirium increased mortality risk, the association with mortality only became statistically significant when delaying over 24 hours. [8]

Cognitive and neurological alterations, cardiopulmonary affections (alone or in combination), venous thromboembolism, urinary tract complications, perioperative anemia, electrolytic and metabolic disorders, gastrointestinal tract bleeding and pressure scars are the most important medical complications after hip surgery in terms of frequency, an increase of the length of stay and perioperative mortality. [9]

Factors that may affect the recovery of fracture neck femur are-

- Gender
- Age
- BMI
- ASA Score
- Time of surgery
- Length of hospitalization
- Type of fracture
- Pre-op Hemoglobin level
- Social status
- Rehabilitation
- Dementia
- Comorbidities. [5]

Operations should be performed on medically fit patients as early as possible. [10]

Geriatrics consultation reduced delirium by one-third, and severe delirium by over onehalf [11]

Aims and Objectives

To study risk factors that may affect recovery in fracture neck femur in the geriatric age group.

Materials and Methods

Study design- Observational study.

Inclusion criteria: -

All patients age 60 years and above were admitted to the Orthopaedics ward with a fracture neck femur due to a fall.

Exclusion criteria:

- 1) The patient refuses to give consent.
- 2) Fracture of neck femur due to road traffic accident.
- 3) Fracture of neck of femur due to assault.

Detail Procedure of study:

Method of Collection of Data:

Geriatric patients (age 60 years and above) with fracture neck femur from the orthopedics ward who fulfilled the eligibility criteria from Dec. 2019 to Dec.2021 have been included in the study, with the approval of the institutional ethic committee and informed written consent.

They were seen daily. A detailed history was taken, comorbidities recorded, and patients examined thoroughly, including the use of the following assessment tools:

- Mini Mental Status Examination
- Geriatric Depression Scale-4
- Barthel's Index
- J.H. Fall Risk Assessment Tool
- Delirium Observation Screening Scale (DOSS)
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Parameters for Delirium and Barthel Index were studied at the time of the end of hospitalization. Three or more points on the DOSS were considered highly indicative of delirium. The diagnosis was confirmed based on the CAM-4 criteria.



Graph 1: Age distribution of the study population



Graph 2: Sex distribution of the study population



Graph 3: Place of residence







Graph 6: Diet history in the study population



Graph 7: calorie intake in the study population



Graph 8: Drug history in the study population



Graph 9: History of medications in the study population





Graph 11: Polypharmacy in the study population



Graph 12: When was the patient brought to the hospital



Graph 13: Reasons for delay in hospitalization



Graph 14: Mode of fall



Graph 15: Fracture neck femur in the study population



Graph 16: Management in the study population



Graph 17: Type of surgery in the study population



Graph 18: Type of anesthesia in the study population Time of surgery (after fall) 50 45 (45%) 45 40 (40%) 40 35 30 25 20 15 9 (9%) 10 6 (6%) 5 0 Within 5 days Within 24 hours Within 15 days Within 1 month

Graph 19: Time of surgery (after fall)



Graph 20: Duration of hospital stay



Graph 21: Level of consciousness in the study population



Graph 22: Orientation in the study population



Graph 23: Vision in study population



Graph 24: Hearing in the study population



Graph 25: Mini-mental status examination (MMSE) in the study population



Graph 26: John hopkins fall risk assessment tool (JHFRAT) in study population



Graph 27: Barthel index (before fall) in the study population



Graph 28: Barthel index (after fall) in the study population



Graph 29: Geriatric depression score 4 (GDS-4) in the study population



Graph 30: Delirium observation screening scale(DOSS) in study population



Graph 31: Confusion assessment method-4(CAM-4) in study



Graph 32: Hyponatremia in the study population



Graph 33: Postoperative complications in the study population



Graph 34: Outcome (after 1 month follow-up) in the study population



Graph 35: Outcome (after 3 months follow up) in study population



Graph 36: Age distribution of delirium patients



Graph 37: Sex distribution of delirium patients







Graph 39: Drug history in delirium patients



Graph 39: Drug history in delirium patients



Graph 41: Outcome (after 3 months follow up) in delirium patients

Discussion

A. Risk Factors-

- Significant risk factors associated with postoperative delirium that may affect the recovery of fracture neck femur in geriatric patients found in our study are:
 - 1. Age more than or equal to 75 years.
 - 2. Presence of comorbidities.
 - 3. Polypharmacy (taking 5 or more medications).
 - 4. Time of surgery: surgery carried out on or after 7 days of the fall.
 - 5. Hyponatremia.

B. Drugs History-

- Polypharmacy is patients taking five or more than 5 medications. It also increases the risk of falls. We found that polypharmacy is present in 38% of patients and is a significant risk factor associated with postoperative delirium that may affect recovery.
- Out of 45 patients who were taking medications, 41 patients were on high-risk drugs (Psychoactive drugs, anti-

hypertensive, laxatives, anti-diabetic, diuretics, anticonvulsant) and only 4 patients were taking calcium and vitamin D supplements.

C. Falls-

• We found giddiness was the most common mode of fall in 38% of patients followed by wet floor in 28% of patients. A study conducted by Jaiben George et al found RTA was the most common mode of fall in 60% of patients because this study is carried out in a tertiary trauma center, therefore it appears to be RTA was the most common mode of fall. We excluded cases of RTA.

D. Surgery-

Most of the patients were managed by surgical method (90%) and only 10 % were managed by the conservative method of skin traction. Conservative management was done in patients who were not fit for surgery and where the risk of surgery outweighs the prognosis without surgery. Nonoperative treatment can lead to poor functional results and is associated with a high risk of further fracture displacement and pain.

- Treatment with hemiarthroplasty involves the removal of the femoral head and most of the femoral neck including the fracture and inserting a femoral stem with a femoral head the same size as that of the patients.
- In surgical management, bipolar hemiarthroplasty was the most frequently performed surgery in the present study as well as in the other two studies also.
- Patients undergoing surgery within 24 hours had good prognoses in different studies than those who operated after 24 hours. But because of the delay in hospitalization due to various reasons (mentioned above), only 9 % of patients got operated within 24 hours. A study carried out by Louis de Jong et al found that 27 % of patients got operated within 24 hours.
- In the present study we found that if surgery is carried out on or after 7 days of the fall, it is a significant risk factor associated with the post-operative delirium that may affect recovery of fracture neck femur in geriatric patients.
- In the present study, combined anesthesia was administered to 62% of patients. First spinal anesthesia was given, and then anesthesia was maintained by an epidural catheter. General anesthesia is said to be associated with delirium. But in the present study, we found that combined anesthesia was also commonly associated with delirium in 76.9%. In our study, only two patients received general anesthesia, and both of them developed delirium.
- We found that the mean duration of hospitalization was 15 days, which is similar to a study carried out by Erik Zachwieja et al. Length of hospital stay increases due to postoperative complications like delirium.

E. Delirium-

- Risk of delirium increases with age. We found that age more than or equal to 75 years is found to be a significant risk factor associated with postoperative delirium. Binary logistic regression showed that patients of age ≥ 75 years were 25.06 times at risk for delirium as compared to those in the age group 60-74 years.
- We found that delirium after a fracture neck femur was slightly more commoner in females (54%) as compared to males (46%).
- We observed that hypertension and the presence of comorbidities (one or more comorbidity) is a significant risk factor associated with post-operative delirium.
- We found that polypharmacy is a significant risk factor to develop delirium.
- In surgical management, bipolar hemiarthroplasty was the most frequently performed surgery.
- We found that surgery on 7 th day or after was a significant factor for delirium. Binary logistic regression found that patients who were operated on≥ 7 days after the fall were 13.35 times at higher risk of developing delirium as compared to those operated on within 7 days.
- Normal serum sodium is between 135-145 Mm. Hyponatremia is defined as a plasma Na+ concentration <135 Mm. We found that hyponatremia was present in 4% of our 100 patients and in 15% of patients who developed delirium.
- Binary logistic regression carried out to identify the major risk factors found that those with hyponatremia were 57.84 times at risk as compared to their counterparts. (OR= 57.84, CI:3.01-1108.42).
- The risk of delirium is increased by the presence of dementia. We found that

delirium developed in patients who had dementia (46%) before surgery.

F. Outcome-

- Out of 7 patients who succumbed, it was seen that 4 (57.1%) had developed delirium in their postoperative period, while out of 93 patients who survived after one month, 84 (90.3%) patients did not develop delirium in their postoperative period. The association between delirium and mortality was statistically significant.
- Other studies carried out by Muaaz Tahir et al and Louis de Jong et al found 1month mortality in delirium patients was 10 %.
- After a telephonic follow-up of 70 patients out of 100, 10% of patients died at 1 month. (Similar to the study by Louis de Jong et al and <u>J J W Roche et al.)</u>
- After telephonic follow-up of 53 patients at the end of 3 months, 12% of patients were found to have died between 31-90 days. A study conducted by Pedro Rodriguez-Fernandez et al had 6.6% mortality during this period.

Summary

Observational prospective study

Demography-

- Male to female ratio is 1: 1.127.
- Maximum number 31% (31) belonged to the age group of 65-69

years.

- The most common comorbidity in the patients was hypertension (31%).
- The most common addiction was tobacco chewing in 25% of patients followed by smoking in 17%.

Risk factors-

• Many of the patients (64%) had inadequate calorie intake before the fall.

- 38 % of patients were on polypharmacy. Overall, out of 45 patients, 41 patients were on high-risk drugs and only 4 patients were taking calcium and vitamin D supplements.
- Out of 100 patients, 76 (76%) had vision impairment and 53% patients had hearing impairment.
- Out of 100 patients studied, 36% of patients had normal cognition. 53 % of patients had mild to moderate cognitive impairment and 11 % of patients had severe cognitive impairment.
- The maximum number of patients (81%) had moderate fall risk to John Hopkins fall risk assessment tool.
- The maximum number of patients (81%) had a normal Barthel index before the fall and 81% were severely dependent on a caregiver after the fall.
- The majority of patients (66 %) were brought in after 24 hours of the fall.
- The most common mode of fall was giddiness (38%) followed by wet floor (28%).

Management-

Out of 100 patients, 90% patients were managed by surgical method and 10% were managed conservatively by skin traction.

- The maximum number of patients (62%) were given combined anesthesia (spinal + epidural) followed by 27 % spinal anesthesia only.
- Only 9 % of patients got operated within 24 hours after admission. 40 % within 5 days, 45% within 15 days, and 6 % within 1 month of admission.
- Reasons for delay in surgery were patients being brought late to the hospital, OTs being limited during covid period, and time was required for optimizing comorbidities before surgery.
- 40 % of patients were depressed after surgery.

- 13 % of patients were delirious in their hospital stay.
- The most common post-operative complication was UTI (16%)

Delirium-

- Patients of age ≥ 75 years were 25.06 times at risk for delirium as compared to those of the age group 60-75 years.
- Hypertension was more commonly associated with comorbidity in delirium patients.
- Out of 13 delirium patients, in 23 % of patients recent changes in medications, and in 46 % of patients, a recent change in dosage was carried out.
- Out of 13 delirium patients, 77% of patients were taking more than 4 drugs.
- Only 4 (30.7 %) delirium patients were brought to the hospital within 24 hours, the rest 69.2 % were brought after 24 hours.
- The time of surgery after a fall was also strongly associated with delirium. Patients who were operated on≥ 7 days after the fall were 13.35 times at higher risk of developing delirium as compared to those operated on within 7 days. (OR= 13.35, CI: 1.14 156.25). Patients having hyponatremia were 57.84 times at risk as compared to their counterparts. (OR= 57.84, CI:3.01- 1108.42)

Outcome

- Out of 100 patients studied, after a follow-up of 70 patients for 1 month, 90 % of patients were alive and 10 % were dead.
- Out of 100 patients studied, after a follow-up of 53 patients for 3 months, 64.15 % of patients were alive and 35.84 % were dead.
- Age (p value-0.014), history of comorbidities (p-value < 0.001), time of surgery after fall (p-value < 0.001),

hyponatremia (p-value < 0.001), and polypharmacy (p value-0.002) were found to be significant factors. When an association was seen between these factors and delirium, it was found to be statistically significant.

- The time of surgery after a fall was also strongly associated with delirium. Patients who were operated on≥ 7 days after the fall were 13.35 times at higher risk of developing delirium as compared to those operated on within 7 days. (OR= 13.35, CI: 1.14 156.25). Patients having hyponatremia were 57.84 times at risk as compared to their counterparts. (OR= 57.84, CI:3.01- 1108.42)
- Out of 7 patients who succumbed, it was • seen that the majority of them 4(57.1%)developed delirium in their postoperative period, while out of 93 patients who survived after one month, 84 (90.3 %) patients did not develop delirium in post-operative their period. The delirium association between and mortality was found to be statistically significant.

Conclusion

Age, history of comorbidities, time of surgery after fall, hyponatremia, and polypharmacy were statistically significant risk factors associated with the post operative delirium that may affect the recovery of fracture neck femur in geriatric patients.

Patients of age \geq 75 years were 25.06 times at risk for delirium as compared to those of the age group 60-75 years. Patients who were operated on \geq 7 days after the fall were 13.35 times at higher risk of developing delirium as compared to those operated on within 7 days.

Patients having hyponatremia were 57.84 times at risk as compared to their counterparts. The association between delirium and mortality is statistically significant. The greatest service a geriatrician can do for his patients is to counsel them for preventing falls.

<u>X- RAYS</u>

Representative X-Rays of Patients



Figure 1: Showing fracture of the neck of the femur on the left side.



Figure 2: Showing bipolar hemi prosthesis on the left side after fracture of neck of femur.



Figure 3: Showing bipolar hemi prosthesis on the left side after fracture of neck of femur.

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