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Original Research Article

A HOSPITAL BASED PROSPECTIVE STUDY TO DETERMINE THE INCIDENCE OF POST-OPERATIVE DELIRIUM AMONG GERIATRIC PATIENTS FOR THE TREATMENT OF HIP FRACTURE AT NEWLY ESTABLISHED TERTIARY CARE CENTER

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Abstract

Background: Hip fracture patients are at increased risk of confusion or delirium due to the trauma associated with the injury. The Indian patient differs in a number of factors – social support systems, lack of long-term care facilities, lack of use of polypharmacy and psychotropic drugs, and probably a younger population base than that of the West. Hence, it is necessary to study the patient profile, incidence and the factors that are responsible for the development of delirium in our population which will then lead to effective interventional programmes that are applicable to the Indian scenario. **Materials and Methods:** A hospital based prospective study done on forty patients who had been admitted with hip fracture and planned for surgery to establish the important clinical associations seen with post-operative delirium in PDU Medical College, Churu, Rajasthan, India during one-year period. A preoperative cognitive assessment was done using the Confusion Assessment Method (CAM) score for existing delirium. A Mini Mental Status Examination (MMSE) was also done. In view of the fact that the MMSE could be falsely erroneous in the presence of existing delirium an assessment for dementia was made by interviewing the attending relative using the Community screening interview for dementia (CSI'D') questionnaire. **Result:** The incidence of POD was 8 (20%), including 3 males and 5 females, ranging in age from 60 to 80 years with an average of 78.24 ± 5.3 years old. There were significant differences between the two groups in diabetes, coronary heart disease, preoperative hospitalization, blood transfusion volume, preoperative MMSE score and CSI (D) questionnaire. Patients with low MMSE score preoperatively tended to have higher incidence of delirium (P value=0.0023). On multivariate analysis the independent risk factors for post-operative delirium were presence of underlying dementia, duration of surgery > 3hours and the preoperative Packed Cell Volume < 25. The presence of IHD also was approaching significance. **Conclusion:** Postoperative delirium in geriatric patients with hip fractures is significantly related to high short and long-term mortality as well as poor functional and cognitive recovery. The concrete mechanism of POD is still elusive, and early identification of patients with POD risks is imperative.

INTRODUCTION

Delirium is a mental disorder characterized by disturbances in consciousness, orientation, memory, thought, perception, and behavior, of acute onset and fluctuating course. It occurs in hyperactive, hypoactive, or mixed forms, in up to 50% of elderly hospital inpatients, many with pre-existing dementia, and appears to be independently associated with significant increases in functional disability, length of hospital stay, rates of admission to long-term care institutions, rates of death, and healthcare costs.[1]

Despite its clinical importance, delirium is often not detected or is misdiagnosed as dementia or other

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psychiatric illness even though there are potential strategies (e.g., screening by nurses, risk factor assessment) and instruments that can improve detection and diagnosis. Although there has been limited progress in understanding etiology, pathogenesis, assessment, and specific treatment of delirium, systematic detection and treatment programs appear to be beneficial for elderly surgical patients, as are preventive programs for elderly medical and surgical patients. Even now, there is probably enough evidence to recommend implementation of these two types of programs in acute-care hospitals.

The typical hip fracture patient is a woman over the age of 65, and the primary risk factor is trabecular bone loss and diminished bone strength related to postmenopausal osteoporosis. Hip fracture is a good clinical model for the study of delirium because it is a common disease in the geriatric population and the prevalence of delirium is high in this group, ranging from 38% to 65% in published studies.[1-3] Hip fracture patients are at increased risk of confusion or delirium due to the trauma associated with the injury and the rapid progression to hospitalization and surgery, in addition to the pain and loss of function experienced.[4] Although surgical repair of the fractured extremity is the cornerstone of therapy, available data suggest that the factors crucial to optimal functional recovery in hip fracture are independent of fracture repair and are instead related to pre-fracture conditions and post fracture complications.

Findings of the study by Brauer et al, suggest that delirium in patients with hip fracture may be a different syndrome from that observed in the medically ill, including a different spectrum of causes and a different clinical course, which may in turn have an important bearing in the management of these patients. Several studies have identified specific patient characteristics, medical conditions and iatrogenic interventions that place individuals at increased risk for the development of delirium. Once delirium develops, the cornerstone for management is treatment of the underlying cause.[1]

A study conducted by Marcantonio et.al, revealed that pure hypoactive delirium accounted for 71% (34/48) of cases and was less severe than was delirium with any hyperactivity. In this cohort, patients with pure hypoactive delirium had better outcomes than did those with any hyperactivity.[5] Delirium at admission (i.e., prior to surgery) was associated with poorer functioning in physical, cognitive, and affective domains at 6 months post fracture and slower rates of recovery.[4]

A number of studies have been conducted in the West regarding delirium in geriatric patients with hip fractures but there have been no studies that have been done in India. The Indian patient differs in a number of factors – social support systems, lack of long term care facilities, lack of use of polypharmacy and psychotropic drugs, and probably a younger population base than that of the West. Hence, it is necessary to study the patient profile, incidence and the factors that are responsible for the development of delirium in our population which will then lead to effective interventional programmes that are applicable to the Indian scenario.

MATERIALS AND METHODS

A hospital based prospective study design to establish the important clinical associations seen with post-operative delirium in orthopaedic ward at PDU Medical College, Churu, Rajasthan, India during one-year period.

Inclusion criteria

1. Patients above the age of 60 years of age
2. Admitted to the orthopedic ward with hip fracture – either neck of femur fracture or intertrochanteric fracture.
3. Undergoing hip fracture surgery

Exclusion criteria

1. Patients under the age of 60 years
2. Those not undergoing hip fracture surgery

Methodology: 40 patients who had been admitted with hip fracture and planned for surgery were enrolled in the study after consent. A preoperative assessment was made within 48 hours of admission with regard to existing delirium, prior functional status, existing dementia, and premorbid illness and drug history through interview of the patient and relatives and review of previous medical records if present.

A preoperative cognitive assessment was done using the Confusion Assessment Method (CAM) score for existing delirium. A Mini Mental Status Examination (MMSE) was also done. In view of the fact that the MMSE could be falsely erroneous in the presence of existing delirium an assessment for dementia was made by interviewing the attending relative using the Community screening interview for dementia (CSI'D') questionnaire.

A post-operative assessment was done with a CAM (Confusion Assessment method) score done on 2 consecutive days (24 and 48 hours post operatively). Data regarding the type of surgery, anesthesia records and duration of surgery was collected.

A statistical comparison was done between the patients with and without delirium regarding the various factors that may have predisposed a patient to the development of delirium.

In those patients in whom delirium was detected a clinical examination and investigations to identify the precipitating factor was done. The investigation included Hemoglobin, total WBC count, serum creatinine, serum electrolytes (sodium, potassium), Arterial Blood Gas, urinalysis, and other details such as presence of fever, drugs used at the time and any evidence of infection. The ongoing event that was diagnosed by the treating orthopedician and physician at the time of delirium was considered as the probable cause of delirium for that particular patient.

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Analysis was done to determine the incidence of delirium in the postoperative period and a univariate analysis was done using the chi square test or fishers exact test (cell size <5) for discrete variables and paired t test for continuous variables. A multivariate analysis was subsequently carried out using a logistic regression model. Statistical analysis was done using the SPSS software version 20.0v.

RESULTS

The incidence of POD was 8 (20%), including 3 males and 5 females, ranging in age from 60 to 80 years with an average of 78.24 ± 5.3 years old. Thirty-two cases had no delirium, including 10 males and 22 females, ranging in age from 60 to 85 years, with an average 72.69 ± 6.75 years old. We compared the various factors between the two groups [Table 1]. There were significant differences between the two groups in diabetes, coronary heart disease, preoperative hospitalization, blood transfusion volume, preoperative MMSE score and CSI (D) questionnaire. Patients with low MMSE score preoperatively tended to have higher incidence of delirium (P value=0.0023). The presence of dementia as assessed on the basis of the CSI (D) questionnaire done preoperatively was significantly associated with the development of post-operative delirium (OR 10.5). There was no significant association with premorbid functional status as per the Barthel's index and the development of post op delirium.

The factors post operatively that were seen to be associated with delirium was the presence of a high respiratory rate and tachycardia in the first 48 hours. The presence of fever was also strongly associated with the development of delirium postoperatively (p value <0.001). There were 4 patients that developed fever post op. There was a range of biochemical parameters but on average the values were in the normal range with no definite trend that indicates the development or association with delirium.

On multivariate analysis the independent risk factors for post-operative delirium were presence of underlying dementia, duration of surgery > 3hours and the preoperative Packed Cell Volume < 25. The presence of IHD also was approaching significance [Table 2].

Table 1: Incidence and risk factors of postoperative delirium in the elderly patients with hip fracture.

Variables	Delirium (N=8)	Non-delirium (N=32)	P-value
Age (Mean±SD)	78.24±5.3	72.69±6.75	>0.05
Gender (M/F)	3/5	10/22	>0.05
Diabetes Mellitus	5	25	<0.05*
Hypertension	4	19	>0.05
Coronary heart disease	5	24	<0.05*
Alcohol	1	3	>0.05
Smokers	2	6	>0.05
Pre-operative hospitalization	5.3±2.86	3.6±1.98	<0.05*
Blood transfusion volume	1.42±1.76	0.78±1.02	<0.05*
Operative time	88.6±40.24	78.3±25.2	>0.05
Preoperative MMSE Score	22.31±2.08	24.78±2.62	0.0023
CSI (D) questionnaire (Yes/No)	5/3	3/29	<0.05*
Barthel's index score	86.32±9.153	90.25±6.92	>0.05

Table 2: Multivariate Analysis (Logistic Regression Model)

	B	S.E.	PVALUE.	ODDS RATIO	95.0% C.I	
					Lower	Upper
Presence of Dementia (CSID)	2.831	1.351	.036	16.967	1.200	239.809
Presence of IHD	1.922	1.056	.069	6.832	.863	54.087
Past History of CVA-	-.097	1.211	.936	.907	.084	9.745
Existing Visual Impairment	-.003	1.130	.998	.997	.109	9.128
Preoperative packed cell volume <25	2.088	.939	.026	8.065	1.279	50.848
ASA Class >2	-.162	.931	.862	.850	.137	5.270
Duration of intra-operative time >2.5hours	2.108	.989	.033	8.228	1.184	57.200
Delay in Surgery From	.083	.121	.490	1.087	.858	1.377
Admission	-4.488	1.053	.000	.011		

DISCUSSION

Delirium is an important postoperative complication which can cause delayed recovery, prolonged hospitalization, and the waste of medical resources.[6] The incidence of POD in our research was 20% compared with the incidence rate of 13 to 48% reported by other research.[7,8] Inouye SK reported that the occurrence of delirium following hip surgery is 12–51%.[9] A variety of diagnostic criteria may be the cause of a significant difference in the incidence of POD. A review of 25 studies showed that 11 instruments have been used to identify the delirium and the CAM was the best choice.[10] Furthermore, small simple size, inclusion criteria, surgery procedures, and anesthesia may lead to variations in incidence rates and risk factors.[11,12]

Various studies have shown conflicting views on age and the development of delirium in the elderly. Kagasky et al,[13] found a lower incidence of delirium in patients over the age of seventy-five which is different from most reports which support the theory

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that in a more elderly population a higher incidence of delirium is exhibited. Our study showed no association between age and the development of postoperative delirium. However, it appears that in the Indian setting, the elderly geriatric population, especially from rural areas, may not have sought care at a tertiary care hospital such as ours. This is probably due to socio-cultural and financial reasons. Hence, it is possible that the incidence of delirium may have been underestimated due to the slightly younger study population.

67.5% of the population in the study was female. Contributory factors would be the presence of postmenopausal osteoporosis, the lack of use of hormone replacement therapy, calcium supplements and the tendency of women to be housebound, resulting in them being more prone for hip fracture after trivial falls. However, there was no significant association between sex and the development of acute confusional states in this population of patients.

Other factors, which need to be considered as possible reasons for the lower incidence of delirium, are the younger age group of the population, less use of multiple drugs as well as anticholinergics and psychotropic drugs prior to the fracture, lack of admission into old age homes and the presence of active familial support and care during the in-hospital period. The causes for preoperative delirium were not analyzed in the study. However, the presence of preoperative delirium is a confounding variable for the assessment of underlying dementia if only the Mini Mental State Examination (MMSE) is used. To eliminate this error the CSID questionnaire was administered to the attending relatives of the patients. The MMSE was also administered preoperatively but in some instances, gave falsely low scores because of underlying delirium. In most cases, it seemed to correlate with the CSID assessment of existing dementia. However, both scores had their drawbacks when administered in the present population. Illiteracy was an issue when administering the MMSE and certain tasks involving reading, writing and calculation, could not be assessed accurately. The CSID questionnaire was administered to the attending relatives of the patients at the time when the initial assessment was made.

However, it is possible that relatives of patients tended to underestimate or belittle existing behavioral changes and functional disability of the patient, hence altering our estimates of dementia in the study population. In this study there were 8 patients who were found to have dementia. The degree of dementia was not assessed in this study.

On analysis, it was found that a low MMSE score was associated with the development of postoperative delirium (P value 0.0023). This was further confirmed by the fact that presence of dementia based on the CSID questionnaire was also strongly associated with postoperative delirium (Odds Ratio 10.5, 95% CI 2.592-42.539). This finding is in keeping with previous studies which have shown that underlying cognitive impairment predisposes patients to post-operative delirium. Functional impairment as measured by the Barthel's index did not have an association with postoperative delirium.

The presence of preoperative delirium did not affect the duration of admission or delay the time from admission to surgery in this population of patients. Treatment of the underlying disease and delirium was the primary reason for prolonged admission in patients who developed postoperative delirium. Dimensional and categorical measures of delirium and dementia have shown associations with prolonged length of stay (LOS) and greater use of medical services in a number of studies. Cognitive impairment, measured early in a hospital admission, predicts extended stays even in analyses that control for severity of medical illness, functional impairment, and other potentially confounding variables. Elderly patients with dementia have longer general hospital stays, require more intensive nursing care, and incur higher costs, compared to elderly patients without dementia.[14]

Delirium has been associated with impairments in motivation and compliance. Agitation caused by postoperative delirium has anecdotally been linked to early dislocation of hip prostheses and trochanteric separation, as well as wound separation and wound hematomas. Cognitive disturbances and delirium in medical settings have been associated with falls and urinary incontinence, the latter of which might contribute to bedsores or result in urinary tract infections related to the introduction of indwelling catheters. Dehydration, aspiration, pneumonia secondary to immobility, congestive heart failure, and myocardial infarction secondary to psychomotor agitation have been cited as possible consequences of delirium and dementia in medical settings. These have also been cited as possible contributors to delirium. Similarly, confinement to bed, restraints, urinary catheters, and sedatives has been cited as both causes and consequences of delirium which in turn prolong hospital stay.

Diabetes is thought to increase the risk of dementia and mild cognitive impairment, as well as an accelerated cognitive decline.[15] The cause of susceptibility to delirium in diabetic patients is that there is a general change in the microvascular structure of the brain: the decrease in the number of capillaries, the thickening of the basement membrane, and the increase of the arteriovenous short circuit, which makes the brain tissue more vulnerable to hypoxic damage when the perfusion pressure drops or the blood flow is not smooth.[16]

The comorbidities such as diabetes, hypertension, and preoperative cognitive impairment have been previously proved to be the risk factors of delirium in elderly patients,[17,18] and our results corroborated this finding. Multiple comorbidities probably increase baseline vulnerability in older adults, contributing to POD, if combined with other precipitating factors such as major hip surgery. However, Brouquet et al,[19] believe ASA classification (> 3 level) is more likely to lead to POD in elderly patients undergoing

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major abdominal surgery. The reason may be due to the difference of age criteria for inclusion in the population. All consecutive patients aged 75 years or more were included in Brouquet's study, while we focused on elderly patients aged 65 years or more.

CONCLUSION

Postoperative delirium in geriatric patients with hip fractures is significantly related to high short and long-term mortality as well as poor functional and cognitive recovery. The concrete mechanism of POD is still elusive, and early identification of patients with POD risks is imperative. On multivariate analysis the presence of underlying dementia (OR16.97), duration of surgery > 2.5hrs (OR 8.22), preoperative packed cell volume < 25 (OR 8.07) and underlying ischemic heart disease (OR 6.83) were found to be independent risk factors that were associated with the development of postoperative delirium.

REFERENCES

1. Brauer et al. The cause of delirium in patients with hip fracture. Archives of Internal Medicine.2000(Jun26);160:1856-60.
2. Marcantonio ER. Reducing delirium after hip fracture: a randomized trial. J Am Geriatrics Soc. 2001 May; 49(5):516-22.
3. Morrison RS. The medical consultant's role in caring for patients with hip fracture. Ann Intern Med. 1998 Jun 15; 128(12 Pt1):1010-20.
4. Dolan MM. Delirium on hospital admission in aged hip fracture patients: prediction of mortality and 2-year functional outcomes. J Gerontol A Biol Sci Med Sci. 2000 Sep;55(9):M527-34.
5. Marcantonio E. Delirium severity and psychomotor types: their relationship with outcomes after hip fracture repair. J Am Geriatrics Soc. 2002 May; 50(5):850-7.
6. Brooks PB. Postoperative delirium in elderly patients. Am J Nurs. 2012;112(9):38–49. quiz 51, 50.
7. Oh ES, Sieber FE, Leoutsakos JM, Inouye SK, Lee HB. Sex differences in hip fracture surgery: preoperative risk factors for delirium and postoperative outcomes. J Am Geriatr Soc. 2016;64(8):1616–21.
8. Scholtens RM, van Munster BC, van Faassen M, van Kempen MF, Kema IP, de Rooij SE. Plasma melatonin levels in hip fracture patients with and without delirium: a confirmation study. Mech Ageing Dev. 2017;167:1–4.
9. Inouye SK, Westendorp RG, Saczynski JS. Delirium in elderly people. Lancet. 2014;383(9920):911–22.
10. Wong CL, Holroyd-Leduc J, Simel DL, Straus SE. Does this patient have delirium?: value of bedside instruments. Jama. 2010;304(7):779–86.
11. Bruce AJ, Ritchie CW, Blizard R, Lai R, Raven P. The incidence of delirium associated with orthopedic surgery: a meta-analytic review. Int Psychogeriatrics. 2007;19(2):197–214.
12. Dasgupta M, Dumbrell AC. Preoperative risk assessment for delirium after noncardiac surgery: a systematic review. J Am Geriatrics Soc. 2006;54(10):1578–89.
13. Kagansky et.al. Low Incidence of Deliriumin Very Old Patients after Surgery for Hip Fractures. Am J Geriatric Psychiatry. June 2004;12:306-14.
14. Saravay et.al. How Do Delirium and Dementia Increase Length of Stay of Elderly General Medical In patients?. Psychosomatics, June2004;45:235-242
15. Cukierman T, Gerstein HC, Williamson JD. Cognitive decline and dementia in diabetes-systematic overview of prospective observational studies. Diabetologia. 2005;48(12):2460–9.
16. Shaw S, Wang X, Redd H, Alexander GD, Isales CM, Marrero MB. High glucose augments the angiotensin II-induced activation of JAK2 in vascular smooth muscle cells via the polyol pathway. J Biol Chem. 2003;278(33):30634–41.
17. Dyer CB, Ashton CM, Teasdale TA. Postoperative delirium. A review of 80 primary data-collection studies. Arch Intern Med. 1995;155(5):461–5.
18. Hassanzadeh H, Jain A, Tan EW, Stein BE, Van Hoy ML, Stewart NN, et al. Postoperative incentive spirometry use. Orthopedics. 2012;35(6):e927–31.
19. Brouquet A, Cudennec T, Benoist S, Moulias S, Beauchet A, Penna C, et al. Impaired mobility, ASA status and administration of tramadol are risk factors for postoperative delirium in patients aged 75 years or more after major abdominal surgery. Ann Surg. 2010;251(4):759–65.

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