The Clinical Profile and Association of Delirium in Geriatric Patients with Hip Fractures in a Tertiary Care Hospital in India

Anugrah Chrispal*, K Prasad Mathews**, V Surekha**

Abstract
Introduction: Delirium is common in hospitalized geriatric patients with hip fractures. A number of peri-operative predisposing and postoperative precipitating factors have been identified in Western literature but data regarding this problem within the Indian context is scarce.

Method: The objectives of the study were to ascertain the incidence of delirium in geriatric patients admitted for the treatment of hip fractures in the Department of Orthopaedics of a tertiary care referral centre in South India, to delineate their clinical profile and identify probable contributing factors for development of delirium in this group of patients. The study was a prospective, cohort study design that was conducted on patients above the age of 60 years, admitted to the orthopaedic ward with hip fracture and who underwent hip surgery. A total of 81 patients were recruited from May 1st 2004 to April 30th 2005 (total duration of one year).

Results: Of the 81 patients 17 (21%) of the patients developed post-operative delirium. On multivariate analysis the presence of underlying dementia (OR16.97), duration of surgery > 2.5 hrs (OR 8.23) and preoperative packed cell volume < 25 (OR 8.07) were found to be independent predisposing risk factors that were associated with the development of postoperative delirium. Postoperative infections, metabolic abnormalities and vascular events were found to be important detected medical causes for precipitating post-operative delirium. Patients who had delirium had longer hospital stays and poor ambulation at discharge.

Conclusions: Delirium in geriatric patients undergoing hip fracture surgery results in poor postoperative outcomes and increased cost. The etiology of delirium is multi-factorial. A number of potentially modifiable factors have been identified as risk factors for delirium. Appropriate intervention strategies involving physicians and geriatricians need to be implemented within the Indian context to reduce the incidence of delirium.

Introduction

Delirium is a neuropsychiatric disorder of acute onset and fluctuating course characterized by disturbances in consciousness, orientation, memory, thought, perception, and behaviour. It may occur in hyperactive, hypoactive and mixed forms in up to 50% of geriatric inpatients. Delirium is independently associated with significant increases in mortality, functional disability, length of hospital stay, rates of admission to long-term care institutions, and healthcare costs.1 Potentially modifiable risk factors for delirium are common and usually multiple, including fluid and electrolyte abnormalities, infection, underlying dementia, drug toxicity and metabolic disorders.2,3 Though the pathophysiology of delirium is incompletely understood, it is evident that a combination of metabolic insults and neurochemical imbalances disrupt neuronal functioning in various areas of the brain.4 In geriatric inpatients, cognitive impairment can occur due to a variety of factors, including dementia, delirium, delirium superimposed on dementia, and psychiatric disorders like depression or psychosis. Despite the benefits of prompt recognition and early management of delirium this entity continues to be misdiagnosed, undetected or undertreated.

Hip fracture is an excellent clinical model for the study of delirium because hip fractures are common in the geriatric population and the prevalence of delirium is high in this group, ranging from 9% to 65% in literature.1–3 Delirium in geriatric patients with hip fractures has been extensively studied in the West, but data from India is scarce.4–6 Although surgical repair of the fractured extremity is the cornerstone of therapy, available data suggests that the factors crucial to optimal functional recovery in hip fractures are, to a large extent, related to pre-fracture conditions and post-fracture complications, including delirium.2,11 The physician’s role is integral to the management of these patients, both for evaluation and stabilization of patients before surgery as well as prevention and management of post-operative complications. Through this study we planned to identify predisposing pre-operative and intra-operative risk factors as well as precipitating post-operative causes of postoperative delirium in geriatric hip fracture patients.

Methods

A cohort of 81 consecutive patients aged 60 years and above, with hip fractures was recruited prospectively after consent and studied in the orthopaedics department of a tertiary-care hospital over a period of one year between May 1st 2004 and April 30th 2005. Pre-operative assessment was made within 48 hours of admission with regard to pre-operative delirium, prior functional status (Barthel’s Index), existing dementia, pre-morbid illness and drug history through interview of the
patient and relatives, and review of previous medical records if present. A pre-operative Mini Mental Status Examination (MMSE) was performed. Since the baseline MMSE could be falsely erroneous in the presence of delirium, an assessment for existing dementia was also made by interviewing the attending relative using the Community Screening Interview for Dementia (CSI'D') questionnaire.

The presence of delirium was defined using the Confusion Assessment Method (CAM) score. The CAM score involves evaluating the patient for 1) acute and fluctuating changes in mental status, 2) inattention, 3) disorganized and incoherent thinking and 4) altered level of consciousness. Delirium (a positive CAM score) is present if criteria 1, 2 and 3; or 1, 2 and 4; or all of the criteria are fulfilled. A 24 and 48 hour post-operative assessment for delirium was done. Data regarding the surgery and anaesthesia was collected. Patients detected to have delirium were subsequently investigated for possible precipitating factors including infections.

A statistical comparison was done between the patients with and without delirium regarding the various predisposing factors. The presence of delirium was defined using the Confusion Assessment Method (CAM) score. The CAM score involves evaluating the patient for 1) acute and fluctuating changes in mental status, 2) inattention, 3) disorganized and incoherent thinking and 4) altered level of consciousness. Delirium (a positive CAM score) is present if criteria 1, 2 and 3; or 1, 2 and 4; or all of the criteria are fulfilled. A 24 and 48 hour post-operative assessment for delirium was done. Data regarding the surgery and anaesthesia was collected. Patients detected to have delirium were subsequently investigated for possible precipitating factors including infections.

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Table 1: Patient Characteristics

<table>
<thead>
<tr>
<th>Post Operative</th>
<th>Post Operative</th>
<th>P Value</th>
<th>Adjusted Odds Ratio (95% Confidence Interval)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delirium Absent</td>
<td>Delirium Present</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N=64</td>
<td>N=17</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sex – Male</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>38 (59.4)</td>
<td>11 (64.7)</td>
<td>0.689</td>
<td></td>
</tr>
<tr>
<td>Age – Mean (Years)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>71.3</td>
<td>73.7</td>
<td>0.319</td>
<td></td>
</tr>
<tr>
<td>Dementia - MMSE (mean score)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24.88</td>
<td>22.29</td>
<td>0.002</td>
<td></td>
</tr>
<tr>
<td>Dementia present (CSI'D')</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 (15.6)</td>
<td>4 (23.5)</td>
<td>&lt;0.001</td>
<td>16.97 (1.2 – 239.8)</td>
</tr>
<tr>
<td>Pre-fracture Barthel's Index score</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>90.16</td>
<td>86.47</td>
<td>0.136</td>
<td></td>
</tr>
</tbody>
</table>

1IHD was determined based on history of effort or rest angina or angina equivalent, past history of myocardial infarction, coronary revascularization procedures, symptoms and ECG evidence of myocardial ischemia as corroborated by a cardiologist.

2Occasional alcohol consumption defined as consumption of alcohol <1 time a week; There was no alcohol dependence detected in this population.

3A Packed cell Volume (PCV) cut-off was set at 25% on the basis of ROC curve analysis.

4An intra-operative time duration cut-off was made at 2.5 hours based on ROC curve analysis (this value was calculated for the multivariate analysis).

5ASA – American Society of Anaesthesiologists (grading of risk of Surgery)

6Anaesthesia classified as General Anaesthesia vs. others (Spinal and Epidural Anaesthesia)

7Type of Surgery classified as Dynamic Hip Screw Fixation vs. others (Hemiarthroplasty, Total Hip replacement, bipolar hemiarthroplasty, Gamma Nail Fixation)
factors. Statistical analysis was done using the SPSS software version 11.0. Univariate analysis was done using the chi square test or Fisher's 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.

Results

Patient characteristics are delineated in Table 1. The mean age of the study population was 71.8 years. 61.7% of the patients were women. 7 (8.6%) patients had pre-operative delirium. 17 (21%) patients had immediate (within 48 hours) post-operative delirium. 3 of these 17 patients also had delirium detected at admission. Patients with low pre-operative MMSE scores had a higher incidence of post-operative delirium (p 0.002). This group included patients with pre-operative delirium, pre-existing dementia or both and hence was not included in multivariate analysis. 11 (13.6%) patients had existing dementia on the basis of the CSI (D) questionnaire which was significantly associated with the development of post-operative delirium (p <0.001). Patients with ischemic heart disease (p 0.006), past cerebrovascular accident (p 0.014) and the presence of visual impairment based on history (p 0.013) were associated with the development of post-operative delirium.

The mean waiting period for all patients from admission to surgery was 2.72 days. On univariate analysis patients that had a >2 days preoperative wait for surgery had a higher risk of developing post-operative delirium (p 0.014). The duration of admission was 3 days longer in patients with post-operative delirium. The mean operating time was 2.53 hours. There was no association with the type of surgery or the type of anaesthesia used and the development of post-operative delirium, which is similar to previously published data.5, 13

A number of possible precipitating medical diagnoses were made among patients with detected post-operative delirium (Figure 1). Often the causes were multi-factorial. However, among patients with delirium, 5 patients had no obvious detectable cause. Possible infections (febrile episodes, urinary and respiratory infections) and metabolic abnormalities (hypoglycaemia, hyponatremia, renal failure and dehydration) were detected in 5 cases respectively. Myocardial events, pulmonary embolism and cerebrovascular accidents were the next most common (4 patients each) medical diagnoses in patients with immediate post-operative delirium.

On multivariate analysis the independent risk factors for post-operative delirium were presence of underlying dementia (OR 16.96), duration of surgery > 2.5 hours (OR 8.23) and the pre-operative packed cell volume (PCV) < 25% (OR 8.07). There was one death in the cohort. The presence of post-operative delirium was also associated with poor ambulation at discharge as compared to patients without delirium (p 0.007).

Discussion

Of the cohort, 17 patients (21%) were detected to have post-operative delirium within the first 48 hours. Several possible reasons can be enumerated for the lower incidence of post-operative delirium in the studied population as compared to Western data. Delirium is a fluctuating disorder that may occur at any time during the day - hence point assessments of delirium performed in this study would have underestimated the incidence of delirium. The follow-up period of 48 hours excludes patients who would have developed later-onset delirium. The relatively higher emphasis on familial support and care in the Indian setting plays an integral role in environmental reorientation for the patient, the beneficial effect of which would decrease the incidence of delirium. Other factors include younger age group of the study population, and less use of multiple drugs especially anticholinergics and psychotropic drugs prior to the fracture.

On multivariate analysis, three factors were found to have significant association with the development of post-operative delirium – existing dementia, prolonged duration of surgery and low preoperative haemoglobin. Dementia has been consistently found to be the strongest risk factor for delirium: 25-75% of patients who develop delirium, having underlying dementia.14
Table 2: Ten Pronged Approach to Reduce and Treat Delirium in Geriatric Patients with Hip Fractures (Adapted from Marcantonio ER, et al Reducing delirium after hip fracture: a randomized trial) 17

1. Ensure adequate CNS oxygen delivery
   a. Supplemental oxygen to maintain saturation >95%
   b. To maintain systolic blood pressure >2/3 baseline or >90 mmHg
   c. Transfusion to keep the hematocrit >30%
2. Fluid and electrolyte imbalance monitoring and correction
3. Aggressive treatment of pain using NSAIDs and opioid analgesics.
4. Elimination of unnecessary medications
5. Regulation of bowel and bladder function
   a. Bowel movement by post operative day 2 and every 48 hours
   b. Discontinue urinary catheter by 2nd post operative day
   c. Skin care program for patients with incontinence
6. Adequate nutritional intake – supplements and nasogastric feeds if necessary.
7. Early mobilization and rehabilitation
   a. Out of bed on post operative day 1 and several hours daily
   b. Daily physical therapy and occupational therapy
   c. Aggressive ambulation
8. Prevention, early detection and treatment of major postoperative complications – Myocardial ischemia, atrial fibrillation, supraventricular tachycardia, pneumonia, COPD, Pulmonary embolus, Urinary Tract Infection.
9. Appropriate environmental stimuli
   a. Appropriate use of glasses and hearing aids
   b. Provision of clock and calendar
   c. If available use of radio, tape recorder, and soft lighting
10. Treatment of Agitated Delirium
    a. Appropriate diagnostic workup/management
    b. For agitation, calm reassurance, family presence
    c. If necessary low dose Haloperidol, or if contraindicated Lorazepam at 0.25 – 0.50 mg every 4 hours.

The limitation of the study is that it is a descriptive study with a small cohort of patients and hence it is only possible, at best, to claim association for the various factors and delirium. The Indian patient differs in a number of factors – social support systems, limited use of long term care facilities, lack of use of polypharmacy and psychotropic drugs including anticholinergic drugs, and probably a younger population base than that of the West. There is likely to be a selection bias in the Indian population as very sick patients and those from poorer socioeconomic backgrounds may not seek medical attention. We believe that encouraging the accepted Indian behaviour of strong familial support in the hospital, and using the family as the primary care-givers for rehabilitation and reorientation of the elderly patient would be integral to further lowering the incidence of delirium in the Indian population.

Multifactorial intervention including adequate pain control measures, elimination of unnecessary medications, strict monitoring of fluid, electrolytes and oxygenation, regulation of bowel and bladder functions, nutrition, early mobilization and rehabilitation, appropriate environmental stimuli, and early detection and treatment of postoperative complications have been shown to reduce the incidence of delirium and benefit acutely delirious patients (Table 2). 17 Training towards detection of delirium and combination of nursing and geriatric/medical intervention seems so far to be the most beneficial interventions with regard to the incidence of delirium and the rehabilitation outcome. 18 If applied, combined intervention programs could probably reduce suffering and the care and treatment costs for elderly people with hip fracture.19,20

In conclusion, delirium is a common problem in geriatric patients undergoing hip fracture surgery and results in poor post-operative outcomes and increased cost. Culturally appropriate interventional programs with involvement of physicians, geriatricians and trained nursing staff would reduce the incidence of delirium and hence improve immediate and long term outcomes.

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References