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Research Article

The study of incidence of post operative delirium in geriatric patients with hyponatremia undergoing coronary artery bypass grafting procedure in a tertiary care hospital

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Abstract: Delirium, defined as an acute disorder of attention and global cognitive function is a common, serious and potentially preventable source of morbidity and mortality in hospitalized elderly patients. Different studies have shown that existence of hyponatremia in perioperative period can contribute to delirium.To assess the incidence of post operative delirium in elderly patients with peri operative hyponatremia undergoing coronary artery bypass grafting (a major cardiac surgery).Prospective cohort study, Study Period: 1 ½ years. Using a prepared questionnaire after obtaining fully informed written consent. 3 visits for each patient: 1) before surgery, 2) in the ICU: 48 hours after surgery, 3) In ward after shifting out from ICU. Details from patients, care givers and nursing staff regarding features of delirium are obtained. Patients were classified into two groups, one group included patients with normal/mild hyponatremia (serum sodium>/= 130 mEq/L) and other group with moderate to severe hyponatremia (serum sodium</=129.9) for convenience of analysis.Out of total 250 patients included in the study, 43 (17.2%) patients developed post operative delirium. Patients with moderate- severe hyponatremia had more chance for development of post operative delirium. Out of 146 patients with moderate- severe hyponatremia 37 (25.34%) patients developed post operative delirium compared to 6 (5.77%) patients with normal or mild hyponatremia (p:<0.001). Hyponatremia in peri operative period is a risk factor contributing to post operative delirium and patient's sodium levels should be closely monitored in peri operative period.

Keywords *:* Hyponatremia, Delirium,Geriatrics

Background

Delirium is an important geriatric syndrome with devastating consequences. It is a fluctuating disorder of consciousness of acute onset characterized by profound alteration in the mental state of the affected person and manifests as impairments in arousal, attention, orientation, thinking, perception and memory. It commonly occurs in the setting of multiple physical illnesses and affects the person's normal function so that there is increased risk for susceptibility to adverse events, increased functional dependence, impairment of mobility, occurrence of falls, fractures and development of pressure sores. Certain risk factors that predispose to delirium have been identified. These include older age, male gender, visual and hearing impairment, pre-existing cognitive impairment, depression, functional dependence, dehydration, hyponatremia, drugs, alcoholism, existence of multiple comorbid conditions and previous stroke.[1] Based on state of arousal, three types of delirium has been described which include hyperactive, hypoactive and a mixed form[2]. Morbidity and mortality associated with delirium can be minimized by prevention or early detection and management of the condition.

Coronary artery bypass grafting surgery (CABG) is being increasingly performed in elderly patients for management of coronary artery disease in recent years with successful revascularization. Improved surgical techniques and perioperative care has resulted in better outcomes from the procedure and has resulted in increased longevity in such patients. But postoperative delirium continues to be one of the grey areas in surgical field due to under recognition of its occurrence especially in elderly patients. It was found to be mainly due to lack of preoperative mental status assessment and delay in detection of development of delirium. Delirium has been found to be associated with increased hospital stay, morbidity, poor functional outcomes and increased mortality. It is also one of the preventable complication, if detected and managed early which can improve the outcome from procedure and the patient's quality of life[3]

We decided to study the incidence of post operative delirium

in patients with peri operative hyponatremia since it is one of the most commonly seen electrolyte abnormality in elderly. Coronary artery bypass graft surgery patients were chosen since it is mostly a planned procedure which is increasingly being done in elderly population.

Materials and Methods

The study was a prospective cohort study, which was done over a period of 1 ½ years. All patients >/= 65 years getting admitted for coronary artery bypass graft surgery in the hospital were included in the study.

But patients taken up for surgery on emergency basis, those who were too sick to undergo assessment or in whom the assessment could not be completed in full due to death or any adverse events in perioperative period were excluded from the study.

The study was conducted in 5-3 ward and 6-1 (CVTS-SURGICAL ICU) in Amrita institute of Medical Sciences, Kochi, Kerala, India. A total of 250 patients who underwent coronary artery bypass graft surgery fulfilling the above mentioned criteria were included in the study

Method of study

Prior approval from the hospital ethics committee was obtained.

Three visits were conducted for each patient during the hospital stay for assessment. During the first visit which was conducted after admission at bedside of the patient, a pre-operative mental status assessment using mini mental state assessment (MMSE)[4], delirium screening using confusion assessment method (CAM)[5] and depression assessment using geriatric depression scale (GDS)[6] were done.

The second visit was conducted 48-72 hours after the surgery in the intensive care unit.. Assessment was done to detect presence of delirium by using the modified version of confusion assessment method (CAM-ICU), which can be used to detect delirium even in intubated patents.

The third visit was conducted in the ward after the patient was shifted out from the ICU. CAM and MMSE were done. Details of mental state of patient, its fluctuations during different periods of the day, episodes of agitation, abnormal behaviour, sleep disturbance which could point to development of delirium were obtained from reliable reporters such as nursing staff and patient care givers.

The patient's peri operative sodium levels were assessed and based on the sodium values, patients were categorized into two groups. First group included patients with normal or mild hyponatremia (>/=130 mEq/L) and second group included patients with moderate- severe hyponatremia (serum sodium</=129.9 mEq/L).

Statistical methods

Sample size was calculated based on incidence rate of delirium in geriatric patients from an earlier Indian publication from CMC, Vellore by Anugrah Chrispal et al [7] . Taking average incidence rate (REF) and with 20% allowable error and 95% confidence, minimum sample size came to 225.

A total of 250 cases were studied during the time period of 1 ½ years.

Statistical Analysis

Percentage incidence rate of delirium was computed. Chi square test was applied to test the statistical significance of various factors (variables) associated with development of post operative delirium.

Results

43 (17.2%) patients out of total 250 developed post operative delirium.

Patients with moderate- severe hyponatremia were found to have more chance for development of post operative delirium

Out of 146 patients with moderate- severe hyponatremia, 37 (25.5%) developed post operative delirium compared to 6 (5.77%) patients out of 104 patients with normal or mild hyponatremia.

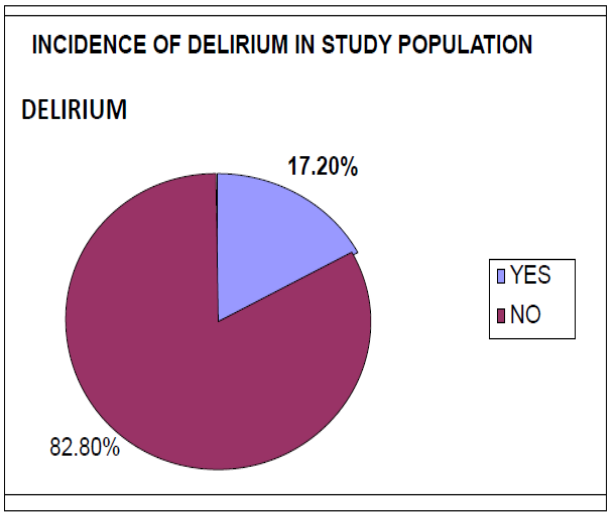

Fig 1: Incidence of Delirium

FACTOR	CATEGORY	DELIRIUM		p Value
		YES	NO	
HYPONATREMIA	NORMAL/ MILD >/= 130 mEq / L	6 **5.77%**	98 94.23%	<0.001
	MODERATE / SEVERE 129 to <124	37 **25.34%**	109 74.66%	

Table 1: **incidence of delirium and peri operative hyponatremia**

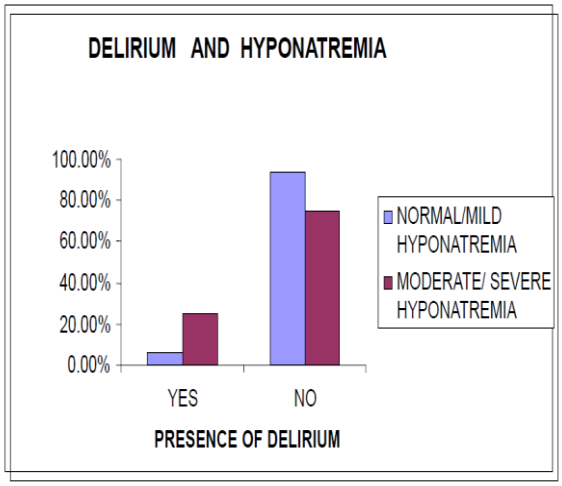

Fig 2: incidence of delirium and peri operative hyponatremia

The incidence of delirium from our study was found to be 17.2%. This is lower than comparable studies. The reasons could be multiple. Our patients, were admitted to the hospital for Coronary artery bypass grafting procedure (CABG) came on a planned basis after stabilization of risk factors and other comorbid conditions. Also, we did not include sick patients or the patients who underwent coronary artery bypass graft surgery on an emergency basis, due to the possibility of confounding factors. The protocol, pre anesthetic work up and better postoperative care all could have minimized incidence of infections and metabolic abnormalities, thereby incidence of post operative delirium.

Many studies report that fluid and electrolyte abnormalities especially hyponatremia increase the risk of development of post operative delirium. The study by Aldemer et al [8] reports moderate to severe hyponatremia (<130mEq/L) to be an independent risk factor for development of post operative delirium. The study by Ziechang T et al[9] found incidence of delirium in patients with moderate to severe hyponatremia to be 22.7% (vs 8.5%).

The mechanism of hyponatremia contributing to delirium is not completely understood. It has been postulated that both pre disposing and precipitating factors in the form of "insults" contribute to development of delirium in individual patients[10,11]. The elderly patients being vulnerable in many aspects who are exposed to an insult like major cardiac surgery hence have more chance for development of delirium.

Hyponatremia is a common electrolyte abnormality found in elderly patients in post operative period the risk factors being excess intravenous fluid administration, infections, sepsis or due to use of medications like diuretics[11]. Hyponatremia can be detected easily by close monitoring of serum sodium values. Preventive measures to avoid hyponatremia related complications include adherence to strict fluid management protocols, careful use of diuretics and psychotropic medications[12].

Hyponatremia which is a common occurrence in elderly due to multiple factors contributes to delirium in post operative patients. Early detection of hyponatremia and prevention of post operative delirium is a good intervention to reduce morbidity and mortality in elderly undergoing major surgical procedures.

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