

Original Article***The Prevalence and Current Status of Patients with Delayed Recovery from General Anesthesia Suffering from Severe Hyponatremia***

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For Correspondence*Abstract**

Background: One of the most challenging issues that an anesthesiologist faces is delayed recovery from anesthesia. Anesthetic drugs and medications used during the perioperative period are the main causes of delayed recovery after anesthesia.

Objective: In this study, our main goal is to assess patients' prevalence and current status with delayed recovery from General anesthesia suffering from severe Hyponatremia.

Method: This cross-sectional study was carried out at Tertiary Medical college and hospital, Dhaka, for 12 months, from 2019 to 2020. A total of 40 adult patients with moderate-to-severe Hyponatremia of both genders were included in the sample.

Results: In this study, maximum patients (50%) belong to the 40-49 years age group, 32.4% were female, and 67.6% were male. Here, 51% of patients had no comorbidities, 25% had hypertension, 5% had congestive cardiac failure, 9% had diabetes, and 10% had ischemic heart diseases. The serum sodium levels were <120 mEq/L (severe Hyponatremia) in 54% of the patients, and 46% of the patients had serum sodium levels (moderate Hyponatremia) between 120 and 125 mEq/L. When symptoms were correlated with severity, confusion was significantly high in patients with severe Hyponatremia than moderate Hyponatremia (80% vs. 20%; $P < 0.001$). Postoperatively patients' volume was maintained with 0.9% NaCl, and 90% of patients were discharged after seven days.

Conclusion: The probable cause of delayed recovery was incidental Hyponatremia, as a result of repeated vomiting, which returned to nearly average value after replacement with NaCl infusion.

Keywords: General anesthesia, Hyponatremia.

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Introduction

"Recovery from anesthesia may be defined as a state of consciousness of an individual when he is awake or easily arousable and aware of his surroundings and identity"¹⁻². Awakening results from eliminating anesthetic agents from the brain. Patients usually respond to verbal stimuli when alveolar anesthetic concentration is decreased to about 30% of minimum alveolar concentration (MAC) (MAC awake) if unimpeded by other factors². Recovery from intravenous (IV) opioids and hypnotics may be more variable and difficult to quantify than recovery from inhalational and neuromuscular blocking agents. Patients should not leave the operating room unless they have stable hemodynamic parameters, a patent airway, have adequate ventilation and oxygenation.

A higher incidence of early postoperative respiratory complications is noted when the patient returns unresponsive in the recovery room irrespective of age or the American Society of Anesthesiologist category³. The most crucial monitor is a well-informed and skilled person with immediate access to anesthetic assistance. Since day-care surgery is gaining tremendous popularity daily, adequate recovery time and a high vigilance to rare side effects become more critical.

In this study, our main goal is to assess the prevalence and current status of patients with delayed recovery from general anesthesia suffering from severe Hyponatremia.

Objective- To evaluate patients' prevalence and current status with delayed recovery from general anesthesia suffering from severe Hyponatremia.

Methodology

Study type:

- This study was an observational cross-sectional study

Place and period of study

- The study was carried out at the Tertiary Medical College and Hospital, Dhaka, for 12 months, 2019 to 2020.

Sample size:

- A total of 40 adult patients with moderate-to-severe Hyponatremia of both gender were included in the sample.

Detailed procedure:

- Data collection was done after taking informed written consent from each patient or from a legal guardian who fulfilled the criteria. Initial evaluation by a thorough history and detailed clinical examination was done and recorded in a pre-designed structured form.

Statistical analysis

Collected data were analyzed using software SPSS (Statistical Package for Social Sciences) version 23 for windows. Descriptive statistics (frequency, percentage) and inferential statistics were used to analyze the data. The level of significance was considered as a "P" value less than 0.05 and double-checked before analysis. Analyzed data were presented in tables and charts with due interpretation.

Results

The demographic profile like age, sex, and the patients' socioeconomic status are shown in (Table 1). Here most of the patients (50%) belong to the 40-49 years age group, 32.4% were female, and 67.6% were male. Maximum patients (54.06%) were from lower middle class family.

Table 1: Socio-demographic profile of the patients

Age	Percentage (%)
30 to 39	8.1%
40 to 49	50%
50 to 59	21.6%
60 to 69	20.3%
Total	100 %
Sex	Percentage (%)
Male	67.6%
Female	32.4%
Total	100 %
Socio economic status *	Percentage (%)
Upper	5.40%
Upper middle	13.52%
Lower middle	54.06%
Lower	27.02%
Total	100 %

Table-2: Associated comorbidities of the patients

Associated comorbidities	Percentage (%)
Hypertension	25%
Congestive Cardiac Failure	5%
Diabetes	9%
Ischemic Heart Disease	10%
None	51%

Table-2 shows the associated comorbidities of the patients where 51% had no comorbidities, followed by 25% had hypertension, 5% had a congestive cardiac failure, 9% had diabetes, 10% had ischemic heart diseases.

Figure-1 shows serum sodium levels of the patients where the serum sodium levels were <120 mEq/L (severe Hyponatremia) in 54% of the patients and 46% of the patients had serum sodium levels (moderate Hyponatremia) between 120 and 125 mEq/L.

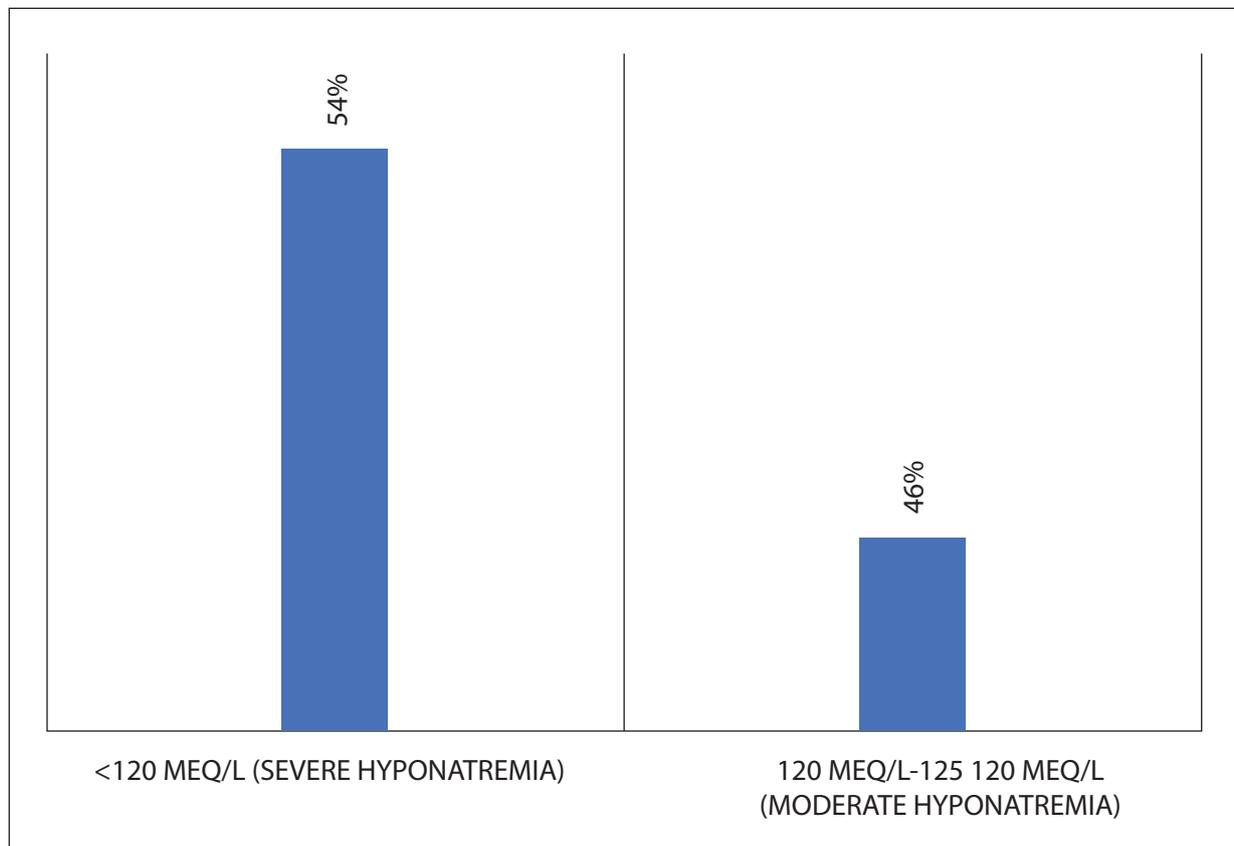


Figure-1: Serum sodium levels of the patients.

Table-3: Association of clinical presentation with severe and moderate Hyponatremia.

Clinical presentation	Severe	Moderate	P-value
Vomiting :			0.824
Yes	57 %	42 %	
No	52 %	47 %	
Confusion :			<0.001
Yes	80 %	20 %	
No	40 %	60 %	
Seizure :			0.170
Yes	33 %	77 %	
No	56 %	44 %	

Table-3 shows the association of clinical presentation with severe and moderate Hyponatremia. When symptoms were correlated with severity, confusion was significantly higher in patients with severe hyponatremia than moderate Hyponatremia (80% vs. 20%; $P < 0.001$).

Table-4: Postoperative status of the patients

Postoperative status	Percentage (%)
Continue oxygenation	100 %
NaCl balance	0.9%
Hospital duration :	
Seven days	90%
1-5 days	10%

In table-4 shows the patients' postoperative status where the patient's volume was maintained with 0.9% NaCl, and 90% of patients were discharged after seven days.

Discussion

Delayed recovery of varying degrees is not uncommon after anesthesia. It may have several different causes, individual or combined, which may be both drug or non-drug related^{4,7}. Drug-related factors like an overdose, duration, and type of anesthetic given, potentiation by other drugs, prolonged neuromuscular blockade (as seen in acidosis, renal failure) is known⁸. Induction agents, inhalational anesthetics, narcotic opioids and sedatives used for general anesthesia can affect the recovery when their action gets prolonged (drug-related factor). This can be seen when the drugs' metabolism, excretion, redistribution, and or elimination of the drugs are affected due to age, renal, hepatic, metabolic diseases, or cumulative effects due to prolonged surgery. Drug interaction with other medications like central nervous system depressants, narcotic analgesics, alcohol, and residual neuromuscular blockade can also affect the recovery time. Non-drugs related causes like metabolic, neurological, and respiratory failure can affect recovery from anesthesia. Metabolic causes hypoglycemia, severe hyperglycemia, hypothyroidism, hepatic and renal diseases, acid-base and electrolyte imbalances, and hypothermia related to delayed recovery^{4,7}.

Anesthetic recovery can be prolonged occasionally, and in most cases, this is due to residual anesthetic drug-related overdose⁵. Neurological complications like cerebral hypoxia, intracerebral events like hemorrhage, embolism, or thrombosis cause delayed recovery. Anesthesia was introduced with intravenous (IV) midazolam (5mg), intravenous fentanyl (100ug), intravenous thiopental sodium (350mg), intravenous Suxamethonium (140 mg), intravenous atropine (700 ug). We ruled out hypothermia as a patient was adequately kept warm, and the temperature was 37°C and hypoglycemia, hyperglycemia by estimation of blood sugar levels,

and hypothyroidism by assessment of T3, T4, TSH levels. Respiratory factors such as chronic obstructive pulmonary disease who do not breathe effectively during or after anesthesia may become hypercarbic (raised Co) to a level that may produce sedation or even unconsciousness, leading to prolong recovery⁸.

In this study, the serum sodium levels were <120 mEq/L (severe Hyponatremia) in 54% of the patients, and 46% of the patients had serum sodium levels (moderate Hyponatremia) between 120 and 125 mEq/L. A multicenter investigation of patients with serum sodium concentrations of 105 mmol/L or below found that a two-day definition of over correction best-differentiated patients with post therapeutic neurologic sequelae from those who had a straight forward course⁹. In every patient with hyponatremia, treatments that reliably enhance serum sodium concentration should be used.

Conclusion

The probable cause of delayed recovery was incidental Hyponatremia, as a result of repeated vomiting, which returned to nearly average value after replacement with NaCl infusion. The primary management always supports airway, breathing, and circulation while the cause is sought and treated.

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