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Case Report

Delayed recovery from General anesthesia in a patient with severe Hyponatremia

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Abstract

Delayed recovery can occur following general anesthesia and is one of the biggest challenges for Anesthesiologists. It may be due to different causes; could be drugs or non-drugs related. We report a case of delayed recovery following repair of large epigastric hernia of a 70 kg weight patient of 40 years and had no comorbidities. Pre operatively, all routine clinical findings and investigation reports were within normal limit; however, he had delayed recovery. Prompt assessment was essential to explore the causes for correction and early recovery to save the life of the patient.

Key words : Delayed recovery, Hyponatremia, Assessment, Diagnosis, Treatment, Early recovery.

Introduction

Ideally after completion of surgery and anesthesia, the patient should be awake or easily arousable, protecting the airway, maintaining adequate ventilation and with their pain under control¹. Delayed recovery refers to abnormally slow pace of regaining consciousness after General Anesthesia is characterized by persistence of somnolence². Delayed recovery from anesthesia remains a cause of concern, both for Anesthesiologist and Surgeon. The principal factor for delayed awakening from anesthesia is assumed to be the medications and anesthetic agents used in perioperative period. Time to emerge from anesthesia is very variable depends on many factors related to the patient, type of anesthetic given and length of surgery³. Although delayed emergence from anesthesia is not uncommon, recognizing the cause and instituting timely treatment is imperative in condition where delayed therapy can increase morbidity and mortality.

Case presentation

A 40 years old male patient weighing 70 kg was scheduled for epigastric herniotomy & herniorrhaphy with hernioplasty. On reviewing the history, he had multiple episode of pain and repeat vomiting. On examination, his pulse rate was 115 beat/minute and

Blood pressure, temperature, respiration rates were within normal limit. He had no anemia, Cyanosis, jaundice, engorged neck vein, neck swellings. On auscultation, his breath sound was normal and he had no abnormal heart sound. X-Ray chest (P/A view) reveals no abnormality. ECG findings were within normal limit. Haemoglobin level was 12g/dl. Plasma glucose (Random) was 6.8 mmol/L. Serum creatinine was 1.1 mg/dl. Ultrasonogram findings were consistent with anterior parietal wall hernia in epigastric region. The patient was premedicated with intravenous Omeprazole 40 mg and 5 mg intravenous Midazolam 1 hour before surgery. In the operation room, pulse and SPO₂ were monitored through pulse oximeter and Blood pressure was measured manually through sphygmomanometer and stethoscope. After 10 minutes pre oxygenation, Anesthesia was introduced with intravenous fentanyl (100ug), intravenous thiopental sodium (350mg), intravenous Suxamethonium (140mg), atropine intravenous (700ug). Trachea was intubated with cuffed endotracheal tube size of 8.00mm ID. Lungs were ventilated manually through Bain circuit. Anesthesia was maintained with Halothane 0.5%, O₂ 3L/minute and nitrous oxide 4 L/minute. After 10 minutes of

intubation, intravenous Vecuronium bromide (7mg) was given. Surgery was started and continued for about 2 and half hours. Blood loss was minimum and volume was maintained with Hartmann solution and 0.9% NaCl at a rate of 2 ml/kg. After completion of surgery, all anesthetic drugs were discontinued and Residual neuromuscular blockade was reversed with neostigmine 3.5 (mg) and atropine (1.4mg) but respiratory effort and consciousness were not appeared. Considering inadequate reversal, neostigmine 1.5 mg and atropine 0.5 mg was repeated but yet patient respiratory effort was not appeared. 5ml of blood was collected and sent for serum electrolytes and thyroid function test. Report was available after 2 and half hours and serum electrolytes report revealed that patient was severe hyponatremic (Na^+ -117mmol/L) and Thyroid function test was within normal limit. Total Na^+ concentration requirement was calculated about 546 mmol. 3.5L of 0.9% NaCl was administered over 3 hours though this correction should be done over 24 hours. After about 3 hours, patient respiratory efforts were improved and trachea was extubated. After extubation, post oxygenation was done with 100% oxygen for 10 minutes and patient began to respond on verbal command. Then patient was sent to ward and 100% oxygenation was continued. Volume of the patient was maintained with 0.9% NaCl and Hartmann at a rate of 1.5ml/kg. After 8 hours, serum electrolyte was repeated (134mmol/L). Then the patient became fully awake. The patient was discharged after 7 days after fulfillment of discharge criteria.

Discussion

Delayed recovery of varying degree is not uncommon after anesthesia, and may have a number of different causes, individual or combined, which may be both drug or non drug related^{4,5,6,7}. Drug related factors like overdose, duration and type of anesthetic given, potentiation by other drugs, prolong neuromuscular blockade (as seen in acidosis, renal failure) is known⁸.

Induction agents, inhalational anaesthetics, 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 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 depressant, 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 can related to delayed recovery^{4,5,6,7}. Neurological complications like cerebral hypoxia, intracerebral events like hemorrhage, embolism or thrombosis is known cause of 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). 0.7 mg vecuronium and 0.5% Halothanes were given for maintenance of anesthesia in surgical procedure lasting 2 and half hours in a 70 kg male can not be considered as over-dose for him. IV furosemide 10 mg was given for excretion of active metabolites of the drugs. Also IV calcium Gluconate 10ml (10%) was given slowly over 10 minutes to improve the muscle tone. We ruled out hypothermia as a patient was adequately kept warm and temperature was 37⁰ and hypoglycemia, hyperglycemia by estimation of blood sugar levels and hypothyroidism by estimation of T3, T4, TSH levels. He was not suffering from renal, hepatic and lung diseases. Respiratory factors such as chronic obstructive pulmonary disease who do not breathe effectively during or after anesthesia may become hypercarbic (raised CO_2) to a level that may produce sedation or even unconsciousness, leading to

prolong recovery⁸. He was not suffering from chronic lung diseases. We estimated serum electrolytes to rule out electrolyte imbalance. Serum Na⁺ level was 117 mmol /L. Attendant of our patient also had given the history of repeated vomiting. Na⁺ deficit is estimated from the following equation, as $\text{Na}^+ \text{ deficit} = \text{Total body weight} \times (\text{Desired } [\text{Na}^+] - \text{present } [\text{Na}^+]) \times 0.6$ ¹⁵ = 546 mmol ¹⁵. 0.9% NaCl contain 154 mmol/L, so the patient should need (546/154)=3.54L of 0.9% NaCl. Total Na⁺ concentration requirement was calculated about 546 mmol. 3.5L of 0.9% NaCl (154mmol/L) was administered over 3 hours though this correction should be done over 24 hours. After about 3 hours, patient respiratory efforts were improved and trachea was extubated. We repeat serum Na⁺ level and it was 134 mmol/L. Hyponatremia is one of the most common electrolyte abnormalities concentrated in clinical practice. It is associated with many different disease states such as, congestive heart failure (CHF), Liver cirrhosis, chronic kidney disease (CKD) and acquired immune deficiency syndrome^{9,10}. Other risk factors of Hyponatremia are age factors, advanced age¹¹, diabetes, low body weight^{12,13}. Also it occurs in Diarrhea, vomiting, sweating, burn¹⁴. For mild symptoms, correction rate have been suggested at a rate of 0.5mmol/L/hour; For moderate symptoms, correction rate have been suggested at a rate of 0.1 mmol /L/hour and for severe symptoms, correction rate have been suggested at a rate of 1.5mmol /L/hour¹⁴. Hence, The probable cause of delayed recovery in our patient was due to Hyponatremia followed by repeated vomiting.

Conclusion

The causes of delayed recovery are multifactorial. Drug or non drug related factors like metabolic, neurological, respiratory and renal failure could affect recovery following anesthesia. Common causes are electrolyte imbalances, hypothermia, hypoglycemia, hyperglycemia, uremia and also on the type of anesthesia received, duration of surgical procedure and

therefore the anesthesia time, individual patient's response to the anesthetic drug, patients age and general condition and associated co-morbidities. In our patient, the probable cause of delayed recovery was incidental Hyponatremia, as a result of repeated vomiting which returned to nearly normal value after replacement with NaCl infusion. The primary management is always support of airway, breathing and circulation, whilst cause is sought and treated.

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