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Case Report

Surgery Section

Postoperative Malignant Hyperthermia- A Medical Emergency: A Case Report and Review of Literature

AMIT KUMAR SINHA[1], POONAM KUMARI[2], MAHESHKUMAR MANILAL VAGHELA[3], CHANDNI SINHA[4], BINDEY KUMAR[5]

ABSTRACT

Malignant hyperthermia is a rare life threatening pharmacological disorder. Preoperative clinical diagnosis is not possible. Due to its rarity and severity, it must be taken as an important differential diagnosis for postoperative hyperthermia. We hereby report a case of postoperative malignant hyperthermia in a four-year-old female child, who was operated for type 1 choledochal cyst and had difficult postoperative sequel. We lost that child due to unavailability of Dantrolene sodium in emergency drug cart.

Keywords: Dantrolene sodium, Myoglobinuria, Postsurgery

CASE REPORT

A four-year-old female child weighing 15 kg with diagnosis of choledochal cyst was scheduled for cyst excision and Roux-en-Y Hepatico-Jejunostomy under general anaesthesia. Her preoperative routine investigations were within normal limits. Before induction of anaesthesia, her blood pressure was 100/60 mm Hg, heart rate 84 beats/min, body temperature was 36.7°C and respiratory rate was 18 breaths/minutes. Anaesthesia was induced with 20 mcg of fentanyl sevoflurane followed by 2 mg of vecuronium bromide for endotracheal intubation. No abnormal muscular signs were observed during the induction of the anaesthesia.

Anaesthesia was maintained with 70% nitrous oxide, 30% oxygen, and isoflurane. After intubation, CVP triple lumen was inserted in right subclavian vein for monitoring of CVP and epidural catheter was inserted into L3-L4 epidural inter space to enable analgesia. Intraoperatively 0.125% bupivacaine 4 ml and morphine 0.5 mg was given. The patient's body temperature ranged between 36.2°C and 36.8°C during the operation. Her blood pressure and SpO_2 was normal and stable intraoperatively but heart rate was 95-120 beats/min. Her intraoperative End Tidal Carbondioxide ($ETCO_2$) and oxygen saturation were within the normal ranges. Urine output was fair and clear. After surgery, glycopyrrolate 0.3 mg and neostigmine 0.75 mg was given to reverse the muscle relaxant and patient was extubated. At this time, shivering, tremors, muscle rigidity, excitement and other abnormal signs were not visible. The anaesthesia lasted 4 hours and the surgical time was 3 hours 30 minutes. The blood loss was 200 ml, and the total fluid infusion was 500 ml. Immediately after arrival in the postoperative ward, the patient's blood pressure was 90/52 mm Hg, heart rate was 80 beats/min and body temperature was 36.7°C. No abnormal neuromuscular signs were visible. After three hours, the patient's body temperature had increased to 37.2°C. Tachypnea was present. At this time 225 mg of paracetamol was given and surface cooling was started.

Despite aggressive measures temperature and heart rate of patient kept on increasing. After eight hours of surgery patient started gasping, oxygen saturation gradually decreased so patient was intubated and put on ventilator. In the absence of dantrolene sodium, we could not administer it. We lost that patient in due course of management. Hence in view of above clinical scenario, dantrolene sodium must be included in the emergency drug list.

DISCUSSION

Malignant hyperthermia is an uncommon inherited life threatening pharmacological disorder of muscle catabolism having almost 70% mortality. Diagnosis is difficult due to lack of precise defining characteristics. Known triggering agents of malignant hyperthermia are catabolism, infection, toxicity, drugs etc. Common sign and symptoms of malignant hyperthermia are tachycardia, arrhythmia, elevated systolic blood pressure, tachypnoea, muscle rigidity with elevated body temperature. The important laboratory findings are myoglobinuria, raised serum level of calcium, potassium, serum enzymes (creatine phosphokinase, glutamate pyruvate transaminase) and elevated level of serum myoglobin [1]. Due to greater muscle mass, older patients show higher body temperature and raised potassium level whereas metabolic acidosis is a predominant symptom of young children [2].

A scoring system to predict the possibility of suspected hypermetabolic crisis due to malignant hyperthermia was devised by Larach MG et al., [3]. Susceptibility of malignant hyperthermia cannot be predicted by clinical examination. Drug of choice for the treatment of malignant hyperthermia is dantrolene sodium. Dantrolene sodium is a muscle relaxant and effective in treating different form of muscle spasticity and also useful for prophylaxis and treatment of malignant hyperthermia. It acts mainly on skeletal muscle but also have effect on smooth muscle [4]. Dose of dantrolene sodium must be individualized with starting dose of 1mg/kg or more as per clinical situation.

In the present case, the child had only tachypnoea and severe hyperthermia to suspect malignant hyperthermia. The case did not exhibit other features of malignant hyperthermia like circulatory abnormalities, cyanosis, tremor, muscle rigidity, convulsions etc. There was no evidence of hypoxia, hypercapnia, acidosis or biochemical imbalances. On further investigation, there was elevated level of serum myoglobin (156 nanograms/ml). Other serum enzymes like creatine phosphokinase (130 micrograms per liter), and lactate dehydrogenase (360 IU/L) was also increased. The common causes of elevated serum myoglobin and serum enzymes are fever, surgery or strenuous physical activity resulting in increased muscle breakdown. Preoperatively this patient was afebrile. The cause of these changes here was postoperative hyperthermia. Volatile anaesthetic agents and succinylcholine are known triggering agents of malignant hyperthermia but in this case bupivacaine was used. A case report of lidocaine induced hyperthermia is present where it was injected intramuscularly, as we know local anaesthetics are myotoxic [5].

Environmental stresses have been reported as triggering agent of malignant hyperthermia in swine [6]. Most cases of malignant hyperthermia occur during intraoperative period. Cases of delayed postoperative malignant hyperthermia are rare [7]. Some cases of

delayed postoperative hyperthermia have also been reported [8]. They managed it conservatively with Dantrolene sodium, surface cooling and ventilation with 100% oxygen. Fukayama H et al., reported benign hyperthermia after propofol administration [9].

The hyperthermia in the present case might be due to rapid muscle catabolism due to surgical stress. Although measures to decrease body temperature were taken but unavailability of dantrolene sodium made management difficult. Evidence suggests use of dantrolene sodium for such situations [10].

CONCLUSION

Due to rarity, severity and unpredictability of the condition, an accurate differential diagnosis of postoperative malignant hyperthermia is essential. For any postoperative rise of body temperature we must be suspicious of malignant hyperthermia. Dantrolene sodium must be available in postoperative wards as emergency drug to combat this dreaded clinical entity.

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PARTICULARS OF CONTRIBUTORS:
1. Senior Resident, Department of Pediatric Surgery, AIIMS, Patna, Bihar, India.
2. Senior Resident, Department of Anesthesiology, AIIMS, Patna, Bihar, India.
3. Senior Resident, Department of Pediatric Surgery, AIIMS, Patna, Bihar, India.
4. Assistant Professor, Department of Anesthesiology, AIIMS, Patna, Bihar, India.
5. Professor and Head, Department of Pediatric Surgery, AIIMS, Patna, Bihar, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:
Dr. Amit Kumar Sinha,
Department of Paediatric Surgery, AIIMS, Phulwarisarif, Patna, Bihar, India.
Email: dr_amits@yahoo.com

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