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Letter to Editor

Intra-Operative Hyperthermia in a Paediatric Patient for Duhamel's Pull through Surgery

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A 14 month old female child weighing 10 kg, known case of hirschsprung disease with transverse loop colostomy was scheduled for Duhamel's pull through surgery under general anaesthesia. On preanaesthetic evaluation, the patient had no fresh complaints. The patient was previously operated for sigmoid perforation on day 11 of life. Transverse loop colostomy was done for the same under general anaesthesia. She also underwent rectal biopsy under general anaesthesia after 6 months. Any associated congenital anomalies (including cardiovascular anomaly) could not be ruled out; moreover, previous two general anaesthesia exposures were uneventful.

She was born out of a non consanguineous marriage at term via caesarean section, cried immediately after birth. There was no significant family history. The preoperative laboratory investigations showed a hemoglobin of 8.5 g/dL, total leucocyte count of 8600 /mm3, platelet count of 6.35 lac/mm3. The serum electrolytes were within normal limits. The patient was transfused 100ml of packed cells 24 hours prior to surgery. Post blood transfusion hemoglobin was within normal limits. Injection ceftriaxone 50 mg/kg intravenously was given as antibiotic prophylaxis.

After completing anaesthesia safety checklist, the patient was taken in pre-warmed operation theatre. Prior to induction of anaesthesia, the child was active and crying with a heart rate of 180 beats per minute (bpm), blood pressure of 79/54 mmHg, 100% oxygen saturation and a body temperature of 36.6 C. After preoxygenation, inhalational induction was done with sevoflurane. A 24G intravenous cannula was secured. The patient was given 20 mcg fentanyl and 1 mg vecuronium. The trachea was intubated with a 3.5 sized cuffed endotracheal tube. Post intubation, caudal block was given with 8 ml 0f 0.25% bupivacaine and 500mcg morphine. Throughout the procedure, ECG, NIBP, spO2, temperature and urine output was monitored.

Intraoperatively, 120 ml blood was lost. The fasting deficits, third space losses and maintenance fluids were replaced with 800ml crystalloid. 20 ml colloid and 100 ml blood was transfused. Towards the end of surgery, a gradual increase in temperature from 36.6 C to 38.3 C was observed. It was associated with tachycardia from post induction heart rate of 154 bpm to 190 bpm. However, end tidal CO2 remained steady at 38mmHg. Injection paracetamol 15mg/kg i/v was given and tepid sponging was done but there was minimal decrease in temperature. Injection hydrocortisone 2 mg/kg given to rule out blood transfusion reaction.

When the patient awaited tracheal extubation postoperatively, anaesthetic agent was discontinued. However, a further rise in temperature was noticed peaking upto 39.4 C along with a heart rate of 220 bpm. Gastric lavage was done with cold saline. The blood pressure dropped to 64/45 mmHg. The arterial blood gas (ABG) analysis was performed. It depicted a pH of 7.18, pO2 of 211mmHg, pCO2 of 38.9 mmHg and 14 meq/l bicarbonate and a lactate of 2.8 mmol/L. 18mEq NaHCO3 given over 20 minutes to correct metabolic

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acidosis. Repeat ABG analysis showed ph of 7.344, pCO2 of 41.1mmHg, bicarbonate of 23.2 mEq/l. Lactate level further increased to 3.5 mmol/L. The blood pressure decreased to 50/32 mmHg. The capillary refill time was more than 5 seconds. A differential diagnosis of septic shock was made. Three boluses of 20 ml/kg normal saline were given over 1 hour. Injection piperacillin - tazobactum 100 mg/kg given intravenously after test dose. Adrenaline infusion was started at 0.3 mcg/kg/min.

The patient's hemodynamics improved over a period of half an hour. Heart rate was 178 bpm with blood pressure of 90/51 mmHg on adrenaline infusion. The temperature dropped from 39.4 C to 38 C. However, the trachea was not extubated in view of peri operative hemodynamic instability. The patient was sedated, paralysed and shifted to the ward (due to non availability of ICU bed) for postoperative mechanical ventilation and management. She was put on pressure control mode of ventilation (inspiratory pressure of 16, respiratory rate of 20, PEEP of 4, 100 % FiO2). Oxygen saturation, NIBP, ECG, temperature and urine output were monitored in the ward and found to be within normal limits. However, adrenaline infusion could not be tapered as mean blood pressure was borderline. Within a few hours of transfer, the patient passed away.

Discussion

Refractory hyperthermia is an unusual presentation in patients with Hirschsprung disease, undergoing Duhamel's pull through procedure. Hyperthermia results in increased oxygen consumption, thrombin generation, impairs fibrinolysis thereby increasing the peri operative adverse events [1].

Hirschsprung disease, also known as congenital aganglionic megacolon, results from congenital aganglionosis in the rectum and extending proximally into distal colon [2]. Hirschsprung associated enterocolitis (HAEC) is a leading cause of morbidity and mortality in children suffering from Hirschsprung disease [3]. HAEC occurs due to intestinal inflammation characterized clinically by fever, abdominal distension, diarrhoea and sepsis. The treatment strategies include timely fluid resuscitation, colonic decompression and antibiotics [4-5].

Malignant hyperthermia was also a differential diagnosis. However, no confirmed cases have been reported in India. There was a lower chance of malignant hyperthermia in our case because administration of the anaesthetic agents was discontinued. The anaesthesia workstation was changed. There was no increase in end tidal carbon dioxide perioperatively. Moreover, the arterial blood gas analysis depicted paCO2 within normal range [6].

In our case, the refractory hyperthermia and hemodynamic stability associated with increased capillary refill time and raised lactate levels were suggestive of septic shock probably due to? endotoxemia or enterocolitis. The fluid resuscitation, antibiotic administration and ionotrope initiation improved the patient's condition transiently. Proper workup of the patient post operatively could not be done due to untimely demise of the child. The investigations including blood culture, procalcitonin levels and endotoxin assays would have helped to identify the definitive diagnosis of refractory hyperthermia and septic shock peri operatively.

Limitations

Any associated congenital anomaly could not be ruled out. ICU bed was not booked as such elective surgeries are done routinely in our institute and usually are uneventful. Ideally, the blood samples should have been sent from operation theatre intra operatively for prompt diagnosis. There was inadequate postoperative monitoring.

Conclusion

Intraoperative hyperthermia during anaesthesia is a serious event associated with various complications. Thus, the anaesthesiologists and paediatric surgeons must be aware of the possibility of hyperthermia in patients undergoing Duhamel's pull through surgery.

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