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CASE REPORT

Self-limiting Skin Rash Found in a Patient with Suspected Malignant Hyperthermia Attack - A Case Report

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Malignant hyperthermia (MH), a life-threatening complication during general anesthesia, primarily triggers hypermetabolism and skeletal muscle damage. The common MH signs include elevated body temperature, tachycardia, hypercapnia, muscle rigidity, rhabdomyolysis, hyperkalemia, and metabolic acidosis. However, MH-related skin lesions are rarely documented. Here, we present a case of a 3-year-old patient experiencing self-resolving skin rash during an MH episode. A healthy 3-year-old girl underwent strabismus surgery under general anesthesia, displaying the MH episode during the procedure. The significant vital signs included hypercapnia, tachycardia, and hyperthermia, peaking 120 min postinduction. Prompt measures, including sevoflurane discontinuation, hydration, cooling, and alternative anesthesia, swiftly stabilized the patient. Intriguingly, an hour later, an isolated skin rash emerged on the right calf and toes, which gradually resolved without intervention. Postoperative examinations revealed no adverse effects. Despite its rarity, the occurrence of MH-associated skin rashes emphasizes the need for vigilance, especially in pediatric strabismus surgeries, despite minimal documented incidents. In summary, our case highlights the self-limiting nature of MH-related skin rash, occurring post-MH resolution. Its causative mechanisms warrant further investigation. Proactive avoidance of MH trigger agents remains crucial for optimal care during pediatric strabismus surgeries.

Key words: Malignant hyperthermia, skin rash, pediatric, sevoflurane, strabismus surgery

INTRODUCTION

Malignant hyperthermia (MH) is a classic emergent condition during general anesthesia that causes hypermetabolism and skeletal muscle injury. The typical signs of MH include elevated body temperature, tachycardia, hypercapnia, muscle rigidity, rhabdomyolysis, hyperkalemia, and metabolic acidosis. However, very few reports have mentioned MH-related skin lesion.[1] Here, we present the case of a patient who developed self-limiting skin rash during an MH episode.

CASE REPORT

A 3-year-old female patient (13.6 kg weight and 97 cm height) without a significant medical history was scheduled for strabismus surgery. The patient's parents denied any family history of anesthesia complications and MH. We performed general anesthesia with laryngeal mask airway and anesthesia induction drug of 2% 1.5 mg/kg lidocaine and 2.5 mg/kg propofol. Sevoflurane was delivered through spontaneous breathing for maintenance. Initially, the surgery proceeded without issues, but we observed a gradual increase in heart rate (HR), respiratory rate, and body temperature, leading to tremendous hypercapnia ($EtCO_2$: 55–102 mmHg), hyperventilation (minute ventilation above 10 L/min), tachycardia (HR 150–190 bpm), and hyperthermia (body temperature 40°C) 120 min after induction. The sevoflurane

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was then turned off, and we replaced the air-delivery circuit with only oxygen ventilation, initiated intravenous hydration and active cooling, and administered propofol through intravenous pump as an alternative anesthetic. Blood tests revealed metabolic acidosis (pH 7.26 and base excess - 9.1 mmol/L), with a serum potassium level of 3.76 mEq/L. Then, 10 min later, under initial supportive treatments, the vital signs and general condition improved (130 bpm of HR, 25 mmHg of $EtCO_2$, and 37.6°C of body temperature). Due to improved clinical conditions, dantrolene was not prescribed.[2] Thus, the surgery was concluded, and the patient was transferred to the recovery room for postanesthetic care and continuous monitoring. Interestingly, skin lesion appeared only on the right calf and toes 1 h later [Figure 1] in the postanesthesia care unit, developed into scattered skin rash, and disappeared gradually without treatment about 5 h later. Subsequent laboratory examination up to the 2nd day after the operation revealed a normal range of serum electrolytes, creatinine phosphokinase level, and renal function. Meanwhile, the patient's overall condition indicated no significant sequelae. The strabismus surgery was rescheduled for 3 months later, and the perioperative course proceeded smoothly under total intravenous anesthesia. Although a muscular biopsy for MH was suggested, the family refused.

DISCUSSION

In our case, the unexplained presence of tachycardia, hypercapnia, hyperthermia, and metabolic acidosis aligns with the diagnostic criteria outlined in the guideline from the Association of Anesthetists for MH in 2020.[3]

MH should be strongly suspected if there is a notable rise in $EtCO_2$ levels, even with a substantial increase in minute ventilation. The confirmation of the diagnosis is further substantiated by, though not mandatory, the presence of muscle rigidity (whether generalized or prolonged masseter muscle rigidity) or an otherwise unexplained metabolic acidosis. It is imperative to consider the diagnosis in all patients displaying clinical signs, particularly those who have been exposed to triggering agents, irrespective of their family history or past uneventful anesthetics. Interestingly, more than 90% of patients experiencing acute MH episodes do not have a positive family history for MH.[4]

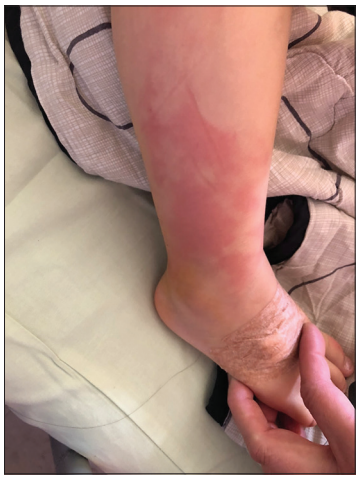

Figure 1: The skin rash over right calf and toes

Skin lesions in the context of MH have rarely been discussed in previous reports. Nelson and Litman analyzed the data of North American MH Registry, they reported that the incidence of skin mottling was 7.6% (20/264) in children with MH.[5] In addition, the skin mottling more often appeared in younger children than older children. Akinturk Eroglu and Eroglu first reported MH and MH-related skin lesions with cutis marmorata and skin mottling in a 40-year-old male undergoing elective testicular surgery under general anesthesia.[1] He had localized maculate lesions on his chest and arms as well as localized papules on his legs. It is believed that the cutis marmorata and skin mottling may be associated with hypoxia or peripheral circulatory insufficiency, while the localized macula and papules on his chest, arms, and legs may have been associated with MH or drug-induced factors. Interestingly, all of the above skin lesions disappeared as the patient' health improved. In our case, the self-limiting skin rash without developed skin mottling approximately an hour after the acute episode of MH was adequate and effective treated.

Strabismus surgery is one of the most common pediatric ophthalmic procedures. The preoperative assessment is important because patients undergoing strabismus surgery may have associated neuromuscular disorder, congenital syndrome, or cardiac disease. Many case reports have documented MH cases during strabismus surgery.[6,7] While Rodgers and Cox reported that MH is no longer considered an issue associated with strabismus,[8] our case, along with the previous report, highlights the association between MH and strabismus.

CONCLUSION

Skin rash related to MH attack is self-limiting with the progression of the event. The true mechanism underlying MH-related skin rashes is still lacking in evidentiary studies. Therefore, it is important to avoid MH trigger agents to provide optimal care for pediatric patients undergoing strabismus surgery.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the legal guardian has given

his consent for the images and other clinical information of the patient to be reported in the journal. The guardian understands that the name and initials of the patient will not be published and due efforts will be made to conceal the patient's identity, but anonymity cannot be guaranteed.

Data availability statement

Data sharing not applicable to this article as no datasets were generated or analyzed during the current study.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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