

CASE REPORT

Perioperative anaphylaxis in a patient with a solitary mastocytoma

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Abstract

Children with more extensive cutaneous mastocytosis have a higher risk for symptoms secondary to release of mast cell mediators. However, the remote possibility of anaphylaxis in patients with a solitary lesion suggests the need for cautious use of general anesthesia in these children. We describe an unusual case of a patient with a solitary mastocytoma who experienced an anaphylactic reaction during a surgical procedure and make recommendations to reduce the risk of intraoperative anaphylaxis in mast cell disease.

KEYWORDS

anaphylaxis, solitary mastocytoma

1 | CASE REPORT

A 2-year-old girl underwent posterior sagittal anorectoplasty for correction of anorectal atresia. She had no history of drug allergy or other symptoms of allergic reactions. She also had no history of prior surgery or prior exposure to any anesthetic agents. The patient was premedicated with intravenous midazolam and fentanyl, and general anesthesia was induced with lidocaine and propofol. During the immediate postoperative period, she received a continuous perfusion of dexketoprofen for pain control. In the post-anesthesia care unit, about 1 hour after the start of dexketoprofen administration, the patient suffered an episode of bronchospasm, apnea, and hypotension, accompanied by an erythematous, edematous, and bullous lesion on her shoulder. The anaphylactic reaction subsided with noninvasive ventilation, fluid resuscitation, and salbutamol. After discharge, subsequent workup, including specific Immunoglobulin E (IgE) levels, skin prick tests, and intradermal tests, ruled out allergy to latex, dexketoprofen, fentanyl, midazolam, propofol, lidocaine, and procaine. Tryptase levels were not measured during or after the acute anaphylaxis episode.

Subsequently, physical examination revealed a well-circumscribed, 1.5 × 1 cm, oval, yellow-brown patch on the right shoulder. This lesion was present at birth, and urticated and blistered spontaneously or after rubbing. Systemic symptoms such as spontaneous hives, flushing, wheezing, unexplained diarrhea, or bone pains were absent. Stroking of the lesion evoked subtle swelling within seconds,

signifying a positive Darier sign. No dermatographism was observed after stroking uninvolved skin. Serum tryptase level was normal (2 ng/mL). There were no other remarkable skin lesions. Based on the presence of a lesion clinically highly suggestive of solitary mastocytoma and a positive Darier sign, a diagnosis of solitary mastocytoma was made. A skin biopsy was not performed due to the risk of anaphylaxis during its performance and the strong clinical suspicion of mastocytosis based on the clinical appearance and positive Darier sign, which are considered sufficient for diagnosis in most cases.

2 | DISCUSSION

We have described herein what we believe to be the first case of perioperative anaphylaxis in child with solitary mastocytoma. Although solitary mastocytoma is a frequent form of cutaneous mastocytosis in children, the occurrence of anaphylaxis with solitary mastocytoma is rare and it has not, to our knowledge, been previously reported in children.

Pediatric cases of anaphylaxis have been associated with extensive cutaneous mastocytosis.¹ There are two reported cases of anaphylaxis in affected children during general anesthesia: a 13-year-old girl with mastocytosis who developed an anaphylactic reaction during general anesthesia with midazolam, fentanyl, lidocaine, and

propofol,² and a 7-month-old boy with bullous mastocytosis who developed anaphylactic shock during general anesthesia.³

In the case of adult systemic mastocytosis, those without cutaneous involvement are more commonly affected than patients with typical skin lesions.⁴⁻⁷ We have only found one case of anaphylaxis occurring in an adult with a solitary mastocytoma,⁸ a 30-year-old woman presenting as a subcutaneous scalp nodule who developed anaphylaxis triggered by either exercise, stress, heat, or scalp friction.

The most common elicitors of anaphylaxis in mastocytosis appear to be wasp stings (hymenoptera venom), and less commonly, reactions without clear trigger, that is, idiopathic.⁵ Hymenoptera venom stings can cause a fatal anaphylactic reaction in patients with mastocytosis. Wagner et al⁹ reported a case of a 33-year-old female patient with indolent systemic mastocytosis and urticaria pigmentosa who died of an anaphylactic reaction after a yellow jacket sting.

Mast cell mediator release during surgery may be associated with mechanical irritation of tissues, stress, or drugs such as neuromuscular blockers, opioids, hypnotics, analgesics, and colloids¹⁰⁻¹⁵ (Table 1). Drugs have been implicated as triggers in 18%-30% of cases in adults and 0%-9% in the pediatric population.^{4,16-18} Most drugs that produce anaphylaxis in mastocytosis are also associated with general anesthesia¹⁶ (Table 1).

The frequency of anaphylaxis related to anesthetic procedures reported in pediatric mastocytosis series ranges from 0% to 2%.^{14,19-21} The frequency of perianesthetic anaphylaxis is significantly higher in adult patients with mastocytosis who have previously suffered anaphylaxis, or who underwent major surgeries with general anesthesia and were not given prophylactic antimediation therapy 1 hour before the anesthesia.²¹ The only pediatric patient who presented with anaphylaxis in these series²¹ had neither extensive skin involvement nor elevated serum basal tryptase levels; allergy to latex and drugs administered was ruled out, and he underwent an uneventful anesthetic procedure later, using prophylactic antimediation therapy and the same previously involved drugs.

Atracurium, mivacurium, rocuronium, and succinylcholine are muscle relaxants that are most commonly associated with anaphylactic reactions. Opioids such as morphine and codeine have been

associated with anaphylaxis in patients with mastocytosis and should be avoided, if possible.²²

All patients with mastocytosis are at risk for anaphylaxis during anesthesia, and treatment for those events should be readily available. However, fear of anaphylaxis should not prevent the use of opioids or muscle relaxant deemed beneficial during the perioperative period.¹⁴

There are reports on anaphylaxis in patients with mastocytosis triggered by antibiotics, especially β -lactams (amoxicillin, ampicillin, penicillin V), but also with aminoglycosides. In addition, anaphylactic reactions to NSAIDs in patients with mastocytosis have been observed, mostly to aspirin and pyrazolones, but also to diclofenac, ibuprofen, and naproxen.⁴ Bilo et al²³ described two patients with mast cell disease who developed anaphylaxis related to interoperatively given medications (fentanyl, remifentanyl, propofol, rocuronium, ampicillin, and ketorolac).

Since the anaphylactic reaction in our patient occurred in the first hour after commencing administration of dexketoprofen, it was suspected that it was the main trigger of anaphylaxis. However, opioids such as fentanyl and hypnotics such as midazolam were also being administered and could have also been triggers for the anaphylaxis in the context of this solitary mastocytoma. It is important to keep in mind that, although many of the cases of anaphylaxis in patients with mastocytosis are related to medications used in general anesthesia, nonsteroidal antiinflammatory drugs (NSAIDs), opioids, contrast media, β -lactams, or other drugs, as well as surgical trauma, can trigger anaphylaxis in mast cell disorders (Table 1).

A careful individual risk evaluation for perioperative management of patients with mastocytosis is mandatory; surgery in these individuals should be considered a high-risk procedure. Potential trigger factors such as temperature changes, infusion of cold solutions, trauma to tissue, friction and other mechanical factors, and anxiety must be controlled.^{21,24} In addition, some authors recommend prophylactic antimediation therapy in all cases²¹ (Table 2).

The use of premedication protocols in mastocytosis decreases the probability of suffering perioperative anaphylaxis²¹ (Table 2). Administration of H1 and H2 antihistamines and/or benzodiazepines 1 hour before anesthesia reduces histamine-mediated reactions and is

TABLE 1 Causes of intraoperative and perioperative anaphylaxis

Mechanical irritation of tissues, surgical trauma, and friction	
Stress and anxiety	
Temperature changes	
Infusion of cold solutions	
Contrast media	
Drugs	Muscle relaxants: atracurium, mivacurium, rocuronium, and succinylcholine
	Opioids: morphine and codeine
	Hypnotics: thiopental
	Antibiotics: β -lactams (amoxicillin, ampicillin, penicillin V) and aminoglycosides
	NSAIDs: aspirin and pyrazolones others: diclofenac, ibuprofen, and naproxen

TABLE 2 Recommendations for preventing intraoperative and perioperative anaphylaxis

Avoid potential environmental triggers	Temperature changes Infusion of cold solutions Trauma and friction to tissue
Use premedication 1 h before anesthesia	H1 and H2 antihistamines Benzodiazepines
Use anesthetic drugs with lower risk of eliciting mast cell degranulation ¹⁶	Opioids: fentanyl, sufentanil, remifentanyl, alfentanil Hypnotics: midazolam, propofol, etomidate, ketamine Muscle relaxants: cis-atracurium, pancuronium, vecuronium Volatile anesthetics: desflurane, sevoflurane, enflurane, isoflurane

strongly recommended.²¹ Anxiety can promote mast cell degranulation²⁰ and hence premedication with benzodiazepines should be considered. Potential environmental triggers include fluctuation of temperature and friction hence control of ambient temperature and care with handling is prudent. Anesthetic technique should exclude any known trigger factors, and a careful drug history should be taken to elicit sensitivity, for example, to NSAIDs.²⁰ Histamine-releasing benzylisoquinoline (eg, atracurium and mivacurium) and nefopam, a non-sedative benzoxazocine analgesic, are not recommended in mastocytosis.¹⁴ Anesthetic drugs in every pharmacological group (eg, rigid neuromuscular blockers, synthetic opioids with short-acting, and rapid offset, and amide derivatives) with lower risk of eliciting mast cell degranulation are preferred.²¹

In our case, there was inadequate treatment of anaphylaxis as the patient only received fluid resuscitation, noninvasive ventilation, and salbutamol but not epinephrine, despite having hypotension. If acute anaphylaxis occurs, especially with hypotension such as in our patient, epinephrine is the drug of choice and the first drug that should be administered, preferably immediately upon diagnosis.

Patients with mastocytosis who are at high risk of anaphylaxis would benefit from carrying or having rapid access to autoinjectable epinephrine. Risk factors for anaphylaxis have been determined in a recent study:⁵ male sex, presence of atopy, IgE level of 15 kU/L or more, baseline tryptase levels of < 40 ng/mL, and absence of mastocytosis in the skin. Brockow et al¹ had previously reported that higher baseline tryptase levels are associated with a higher prevalence of anaphylaxis in patients with systemic mastocytosis. A possible explanation for this discrepancy between the two studies could be that in the study by Brockow et al,¹ patients with cutaneous mastocytosis without proven systemic involvement were included, whereas in Gülen et al's study⁵ all patients had systemic mastocytosis.

In conclusion, although children with more extensive skin involvement by mastocytosis have a higher risk for anaphylaxis, it is important to be aware that anaphylaxis can occur with a solitary mastocytoma and to plan adequate, careful, and individualized management of potential elicitors of mast cell mediator release.

CONFLICTS OF INTEREST

The authors have no conflicts of interest to declare Statement on prior presentation.

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