

Bee stings of children: when to perform endotracheal intubation?

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Abstract

Hymenoptera stings account for more deaths in United States than any other envenomation. Oropharyngeal stings, although rare, may produce life-threatening airway obstruction by way of localized swelling. We present 4 cases of bee stings in children that necessitated tracheal intubation and mechanical ventilation. Two children had breathing difficulties at admission; the other 2 presented with minimal symptoms but were preventively intubated and mechanically ventilated. Orofacial bee sting victims should be given parenteral treatment with epinephrine, steroids, antihistamines, and inhalational bronchodilators even when they initially present with minimal symptoms, with general anaphylaxis management in large envenomations, as well as immediate endotracheal intubation and mechanical ventilation for at least 24 hours in patients with signs of airway compromise.

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1. Introduction

Insect stings are common and can result in 1 of 4 outcomes: (1) the most usual one is a local reaction with pain and pruritic urticarial lesion less than 5 cm in diameter; (2) a large local reaction more than 5 cm in diameter lasting more than 24 hours; (3) a mild systemic reaction consisting of urticaria, erythema, nausea, or diarrhea; and (4) a severe systemic reaction including laryngeal edema, bronchospasm, and hypotension [1–4]. Life-threatening anaphylaxis to insect stings in childhood is very rare and systemic reactions occur in 0.4% to 0.8% of stung children [1].

Oropharyngeal stings, although rare, have the added potential to cause life-threatening airway obstruction by local swelling [5]. This risk can be minimized if such victim is treated early and aggressively, although the sting may initially present with minimal symptoms. Preventive tracheal intubation is one of such measures and we deem to

report 4 cases of children that were stung on the tongue and treated in the pediatric intensive care of the Western Galilee Hospital (Naharia, Israel).

2. Report of cases

2.1. Case 1

A 7-year-old boy suffered a bee sting on the tongue. Fifteen minutes later, extensive edema of the tongue, face, and eyelids developed. He was treated by subcutaneous epinephrine and intravenous dexamethasone and hydrocortisone. The child developed breathing difficulties and was intubated, subsequently brought to the hospital where he was admitted to the pediatric intensive care unit. This child had a bee sting, but not hospitalized in the past, at the age of 5 years. On the second day of hospitalization a severe bronchospasm developed that mandated deep sedation and muscle relaxation to secure effective mechanical ventilation and oxygenation. Extubation was not possible for 10 days because of bronchospasm, but it was successfully carried out subsequently, without further respiratory problems. The child was discharged and given an injectable epinephrine

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emergency sting kit, and referred to the immunology clinic for immunotherapy with venom.

2.2. Case 2

A 2-year-old girl was stung on her tongue and was administered 0.3 mg of epinephrine and 50 mg of hydrocortisone intravenously by the rural general practitioner, yet despite this treatment she developed edema of the tongue and lips with respiratory distress. She was consequently intubated and rushed to hospital within 2 hours of the sting. The parents revealed that a previous bee sting on her chest had occurred 1 week before the current incident. In the intensive care unit she was treated with steroids and antihistamines, whereupon the edema subsided 2 days later and the child was extubated without any additional respiratory problems.

2.3. Case 3

A 4-year-old boy was admitted to the intensive care unit with mild edema of lips and tongue after a bee sting that occurred an hour earlier. No prior bee stings were evoked during history taking. He was treated by 10 mg of intravenous dexamethasone and subcutaneous epinephrine, and was preventively intubated and mechanically ventilated for 24 hours. The edema subsided and the boy was extubated in a good respiratory state.

2.4. Case 4

A 3-year-old boy was admitted to the pediatric intensive care unit after having been stung by a bee on his lower eyelid. He developed edema of the face, lips, and tongue without respiratory distress. A preventive intubation was decided upon, whereas this patient was also treated with steroids and adrenaline. After mechanical ventilation over 30 hours the edema subsided and the child was extubated and discharged.

3. Discussion

Hymenoptera stings account for more deaths in the United States than any other envenomation [5]. The physiopathologic mechanism is similar to other immunoglobulin (Ig) E-mediated reactions, with laryngospasm and angioedema the prominent symptoms of reaction [1,5]. Stinging insects of the Hymenoptera order are vespids that include the yellowjacket, hornet wasps, and apids that include the honey bee and the bumble bee [6]. Honey bee venom contains phospholipid A, hyaluronidase, and melitin. The allergens in vespid venom are phospholipids, hyaluronidase, and a protein known as antigen 5.

Reactions to envenomation may be directly toxic (either locally or systemically) or allergic in essence (either localized or anaphylactic). The venom of wasps and bees has been reported to be more potent during the autumn months [7,8].

Children with a history of severe reaction may have only a slightly higher risk for anaphylaxis when they reach adulthood compared with the general population, whereas a history of severe reaction as an adult is associated with a rate of 60% [1,4]. Several studies have examined the natural history of untreated patients who are stung again. In a study of 133 adults who had a history of large local reaction, only one experienced a systemic reaction when stung anew [7]. A study of 112 children who had mild or severe systemic reactions found that 40% had any symptoms on reexposure to Hymenoptera stings, and only one child progressed from mild symptoms to a severe reaction [7,8]. Thus, it appears that in stung children the risk of more severe reactions to future stings is low. Oropharyngeal stings are rare but may cause airway obstruction [4]. Shah and Tsang [3] reported a case of dysphagia after drinking a glass of soda that had been unattended for 2 hours and an endoscopic evaluation revealed an erythematous and edematous posterior pharynx with 2 lesions consistent with stings. The threat of airway obstruction is of particular concern in children living in rural areas where emergency medical resources are limited.

We presented 4 cases of children who were stung on the tongue or face. The first 2 developed breathing difficulties and had to be intubated because of threatening signs of airway obstruction. These 2 children had been stung before and it is conceivable that they had more severe symptoms than the other 2 children presented. The 4 children underwent aggressive treatment by epinephrine and steroids. It is agreed that subcutaneous epinephrine and antihistamines should be immediately administered for acute anaphylaxis [3,4]. Steroids are also commonly used for these types of reactions. Steroids are not effective in preventing the relapse of anaphylactic symptoms 6 to 10 hours after the therapy has begun, but may diminish the likelihood of a rebound effect or a biphasic response that may occur in as many as 20% of patients [3].

The 2 children for whom the sting was a first-time event and in whom no respiratory distress occurred (cases 3 and 4) were nevertheless intubated preventively (one of them in the field before being rushed to the hospital) and mechanically ventilated for 24 to 30 hours. The decision of elective intubation in these 2 cases, notwithstanding the risk of intubation and mechanical ventilation with the attendant sedation, was based on the several considerations: (1) the literature lacks substantial data on whether patients without respiratory distress immediately after the sting do or do not proceed to more severe problems subsequently, and the data are even more limited in patients without history of past stings; therefore, an elective wait-and-see strategy was deemed unsafe at the time, especially (2) in light of our very fresh experience with the first two more severe cases; (3) one of these orofacial bee sting events (case 4) occurred in the rural setting, that is, far from appropriate medical facilities that would have permitted supervision and monitoring in the un-intubated state pending possible symptomatic deterioration and emergent intubation (if

needed) during the first few hours after the event. These 2 children were also treated by epinephrine and steroids and had no biphasic reactions.

An argument could be made for the aggressive treatment of children with Hymenoptera stings in the oropharyngeal area because the potential for threatening airway obstruction exists, although the initial presenting symptoms may be minimal. On the other hand, concerns over unnecessary endotracheal intubations in many stung children once such an aggressive treatment protocol is adopted would also be justified. It is our conviction that the treatment of oropharyngeal Hymenoptera stings should focus on aggressive parenteral treatment with epinephrine, steroids, antihistamines, and inhalational bronchodilators, with possible general anaphylaxis management in large envenomations (many stings) that cause shock secondary to myocardial depression and vasodilation (ie, intravenous fluids, volume expanders, oxygen, and aminophylline). Additional specific concerns over local upper airway edema should exist with the intention to perform endotracheal intubation once impending airway compromise occurs, or, should laryngeal edema prove intubation difficult or impossible, cricothyroidotomy and emergent tracheotomy must be performed. Furthermore, we deem that the treatment of minimally symptomatic victims of bee sting in the rural and remote setting should include elective endotracheal intubation while the patient is transported to an intensive care facility. Once the airway is secured, mechanical ventilation is to be instituted for at least 24 hours, as was the case with the children presented in this report.

Venom immunotherapy is highly effective in preventing subsequent reactions in those who have had a severe local

reaction or anaphylaxis, leading to complete protection in more than 98% of patients with wasp venom allergy and in 80% of those with bee venom allergy. Immunotherapy lasts at least 3 to 5 years, and severe adverse reactions to it are rare [9]. It should be considered in the above-mentioned cases because they may be at risk for subsequent severe reactions should future Hymenoptera stings occur, regardless of their age or time since the severe reaction [1,4]. Successful therapy is associated with stimulation of serum venom-specific IgG and decreasing titers of serum venom-specific IgE [4]. Of the 4 victims of bee sting, only the child who developed a severe respiratory disturbance and required prolonged mechanical ventilation was referred for venom immunotherapy after his recovery and discharge.

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