

Case Report

Supraventricular Tachycardia in a Child with Williams Syndrome after Nebulized Albuterol

Urgent message: Clinicians must be prepared for the possibility of supraventricular tachycardia after administration of nebulized albuterol in patients of any age, especially in the presence of heart disease.

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Introduction

Asthma is the most common lung disease in children. Five percent of children in the United States have asthma, and status asthmaticus—the leading cause of admission due to asthma exacerbation—accounts for approximately 10% of visits to pediatric emergency departments.¹

Here, we present a case involving a 2-year-old asthmatic boy with Williams syndrome (WS) who developed supraventricular tachycardia (SVT) following standard administration of albuterol.

This case report emphasizes the need for increased awareness among urgent care and emergency physicians, and describes the use of adenosine in the treatment of SVT due to β_2 agonist albuterol.

Case

A 2-year-old boy with WS presented to the emergency department with a three-day history of fever, cough, and wheezing. He received three doses of nebulized albuterol and was diagnosed with reactive airway disease and bilateral otitis media. He was discharged on oral amoxicillin and prednisolone and albuterol MDI.

The patient returned to the emergency department two days later with similar symptoms and vomiting. He had been receiving albuterol MDI every six hours for the previous two days. His parents reported that he vomited shortly after receiving albuterol.

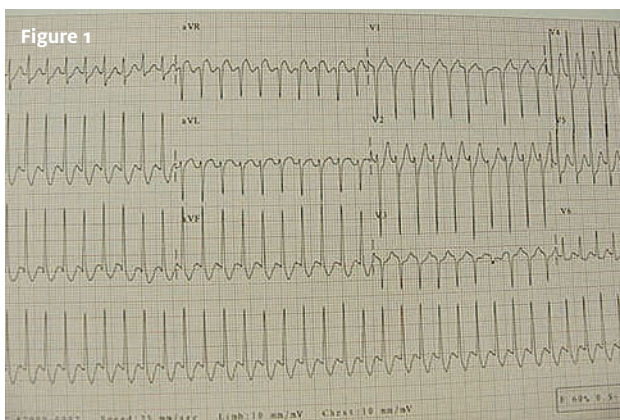
Previously, he had one episode of pneumonia that improved with oral antibiotics.

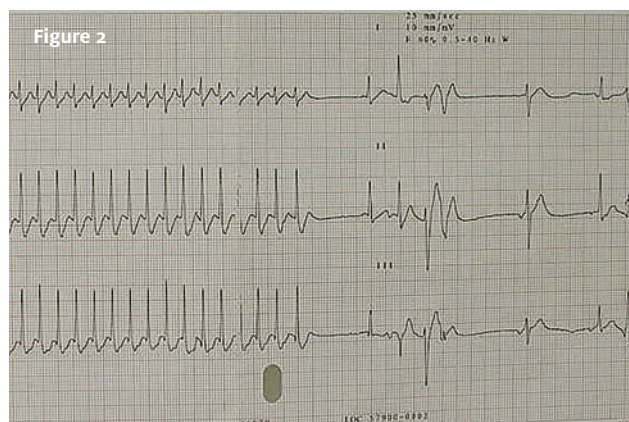
In the emergency department, he was in moderate respiratory distress with a temperature of 102.3°F, respiratory rate of 34 breaths per minute, heart rate of 169 beats per minute, and oxygen saturation of 95%. He had coarse breath sounds with wheezing.

Cardiac examination revealed a regular rate and rhythm and no murmur. The boy was brought to an asthma room because of his respiratory distress and wheezing and started on nebulized albuterol. A chest radiograph revealed right upper lobe pneumonia. The heart size and pulmonary vascularity were normal. The patient was placed on a pulse oximeter.

The following were noted:

- Three episodes of vomiting during second nebulizer treatment
- Heart rate of 242 beats per minute





- A 12-lead electrocardiogram consistent with supraventricular tachycardia was obtained (**Figure 1**).
- The patient was quite anxious during this episode of tachycardia. A bag of ice was applied over his face for 20 seconds, but vagal maneuvers failed to convert his tachycardia to normal sinus rhythm. A rapid intravenous push of adenosine (0.1 mg/kg) converted SVT to normal sinus rhythm (**Figure 2**).

The child was admitted to the pediatric intensive care unit for cardiac monitoring and further treatment. Later in his hospital course, he was treated with an albuterol nebulizer without any additional episodes of supraventricular tachycardia. On follow-up, the patient was doing well on albuterol MDI without any further cardiac complications.

Discussion

Albuterol, a direct-acting β_2 agonist, is used as a mainstay in the treatment of acute asthma and is considered to have minimal cardiovascular effects. However, tachycardia and cardiac arrhythmia have been reported after albuterol and other β_2 agonist administration.²⁻⁵ Mild tachycardia is common when patients are first exposed to β_2 agonists, even the most recent highly selective β_2 adrenergic receptor agents.⁶

Supraventricular tachycardia is the most common symptomatic arrhythmia in children. Fifty percent cases of supraventricular tachycardia are idiopathic.

Predisposing factors for SVT include congenital heart disease, fever, and sympathomimetics. Our patient had all of these factors. He was diagnosed as having WS in early infancy.

Williams syndrome is a recognizable pattern of malformation with mental retardation, mild growth deficiency, characteristic facies and temperament, and cardiovascu-

lar disease. The most prevalent arrhythmias in patients with WS are presumed to be ventricular tachyarrhythmias, but supraventricular tachycardia may occur.⁷

In addition to Williams's syndrome, our patient had a history of fever and use of nebulized albuterol in the emergency department.

The question remains whether his episode of SVT was due solely to the use of albuterol or to a combination of factors including fever and the presence of WS. Sudden death is also a recognized complication of WS.

Acute management of SVT in children involves the use of vagal maneuvers and intravenous adenosine. Intravenous adenosine has been found to be safe and highly effective in the management of SVT in infants and children. Adenosine has no absolute contraindications. The most common side effects are flushing, dyspnea, and chest pain.⁸

Although rapid intravenous adenosine infusion has been uniformly well tolerated, bronchoconstriction in asthmatic patients has also been reported.⁹ Previous studies of the use of adenosine also have excluded patients with asthma for the fear of inducing bronchoconstriction.^{10,11}

Conclusion

Supraventricular tachycardia, although rare, can occur after nebulized albuterol administration—especially in the presence of heart disease. Strict cardiac monitoring is essential in children with underlying cardiac condition in order to make the diagnosis and appropriate treatment. ■

References

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