Are we missing anaphylaxis in children presenting with acute severe wheeze?

Jeanette Tan¹ N Sargent² M D Lyttle³ C V E Powell¹ ⁴

1 School of Medicine, Cardiff University, Cardiff, UK
2 Paediatric Emergency Department, Bristol Royal Hospital for Children, Bristol, UK
3 3 Academic Department of Emergency Care, University of West England, Bristol, UK
4 Department of General Paediatrics, Children’s Hospital for Wales, Cardiff, UK

Objectives

- Appraise evidence in prior literature on the similarities in the presenting features of anaphylaxis and acute severe asthma.
- Retrospectively analyse large national clinical data of 110 children who presented to emergency departments within the Paediatric Emergency Research in the United Kingdom and Ireland (PERUKI) network with acute severe wheeze.
- Identify the prevalence of anaphylaxis in a multi-centre study of children with acute severe wheeze, based on diagnostic guidelines in the Brighton Collaboration Case Definition (BCCD) of anaphylaxis.
- Obtain results from this study to increase understanding on the need to consider anaphylaxis in children presenting with acute severe wheeze.

Introduction

Anaphylaxis is rare but occurs as a severe manifestation of hypersensitivity reaction involving multiple organ systems. Although anaphylaxis has a low lifetime prevalence of 0.3% in the general population, it can be life-threatening. Anaphylaxis presents with variable signs and symptoms, with a predominance of dermatological and respiratory features in children. ² Acute respiratory features such as dyspnoea, wheeze, stridor, hoarse voice, cyanosis, increased use of accessory respiratory muscles and subcostal recession are known to be present in both acute severe asthma and anaphylaxis, causing diagnostic confusion.³ ⁴ Prior studies have identified asthma as a significant comorbidity in majority of patients diagnosed with anaphylaxis, with some cases involving fatal anaphylactic reactions to food.⁵ This causation is clinically relevant and must be thoroughly investigated, as allergic reactions to food could trigger and exacerbate an acute asthma attack, making it difficult to reverse bronchospasm during treatment.⁶ Prior case studies,⁷ including a recent single-centre study by Sargent et al., have identified clear evidence of anaphylaxis masquerading as acute severe asthma in children and warranted multi-centre studies to enhance understanding on the prevalence of anaphylaxis in this targeted paediatric population.

Methods

3238 children aged 1-16 years, were recorded to have presented with acute wheeze to emergency departments of 24 PERUKI network centres across the UK and Ireland.⁵

110 children (3.3%) were identified to have received IV bronchodilators treatment for acute severe wheeze.

110 detailed clinical case report forms were handed out to be completed by clinicians at time of hospital admission for FESTIVA (Feasibility for Intraavenous Treatment in Asthma) service evaluation study.

Figure 1: Diagram illustrating the methodology of the CASMA national service evaluation study.

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Results

1/109 case (0.9%; 95% CI 0.02%-5%) fulfilled three minor diagnostic criteria (Table 1), classified under Level 3 of diagnostic certainty in the BCCD of anaphylaxis guidelines.⁸ Although the guidelines state that the combination of major dermatological and cardio-respiratory signs is most specific in diagnosing anaphylaxis (Level 1 of diagnostic certainty), it is known that the clinical presentation of acute and rapidly deteriorating anaphylaxis often varies.⁹ Hence, to increase the sensitivity of the BCCD of anaphylaxis diagnostic tool, Levels 2 and 3, with the latter being least specific, have been designed to capture cases involving of two or more organ systems listed in Table 1, with cardiovascular and/or respiratory symptoms as mandatory criteria for diagnosis of anaphylaxis.¹⁰ In our study, 8/109 cases fulfilled two minor diagnostic criteria involving the cardiovascular and/or respiratory system, and one other system. However, this clinical information is deemed insufficient to meet any level of diagnostic certainty in the BCCD of anaphylaxis, but could be challenged by a more detailed clinical review on these individual cases.

<table>
<thead>
<tr>
<th>Dermallogical</th>
<th>Cardiovascular</th>
<th>Respiratory</th>
<th>Gastrointestinal</th>
<th>BCCD Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red itchy eyes</td>
<td>None recorded</td>
<td>Wheeze</td>
<td>Vomiting</td>
<td>Level 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sneezing or</td>
<td></td>
<td></td>
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<tr>
<td></td>
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<td>minor rhino</td>
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</table>

Table 1: Clinical features of the case meeting the BCCD classification for anaphylaxis

Conclusion

The outcomes of this multi-centre study may not be applicable to a wider population of patients with allergy, however our study is concordant with prior literature that, although rare, childhood anaphylaxis may be overlooked in certain cases of acute severe wheeze. This gap in clinical practice may be attributed to various factors, such as the very rare clinical incidence of anaphylaxis in our general population. This renders clinicians with less experience in encountering and managing children with acute respiratory features from this end of the broad diagnostic spectrum. Hence, it is crucial that a more robust, clinical prospective multi-centre study should be carried out, using the BCCD of anaphylaxis diagnostic tool, to accurately assess the impact of potential misdiagnosis on the management of acute severe wheeze in children.

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References: