



# Pathology/Biology Section - 2015

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## H15 Sudden Childhood Death Due to Acute Bronchospasm

Sarah A. Higdon, MD\*, University of Kentucky, 800 Rose Street, Lexington, KY 40511; Beth E. Frost, DO, 126 Wabash Drive, Lexington, KY 40503; Kristine D. Song, BA, University of Kentucky, Dept of Pathology, 315 Broadleaf Lane, Lexington, KY 40503; Meredith H. Frame, MD, Office of the Associate Chief Medical Examiner, 100 Sower Boulevard, Ste 202, Frankfort, KY 40601; William O'Connor, MD, University of Kentucky Medical Center, Dept of Pathology & Laboratory Medicine, Lexington, KY 40536; and Gregory J. Davis, MD, UK Medical Center, MS 117, 800 Rose Street, Lexington, KY 40536-0298

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The goal of this presentation is to present a case which serves as a rebuttal to the general misconception that bronchial asthma is seldom, if ever, a fatal disease.

This presentation will impact the forensic science community in terms of competence (ability) to include acute bronchial spasm secondary to asthma in the differential diagnosis for sudden natural death in a child who does not have a documented history of this disease. This case is an unusual presentation (sudden unexpected death) of asthma in a child with previously mild respiratory symptoms.

A 7-year-old African American female was sitting on the steps of the shallow end at a community pool when she was witnessed to clutch her chest and fall forward into the water. A lifeguard reportedly pulled her from the water after less than 30 seconds, at which time she was noted to have a pulse and was gasping for air. Cardiopulmonary Resuscitation (CPR) was initiated and the child was observed to vomit a small volume of water following the initial rescue breath. At this point, her pulse had noticeably weakened. Witnesses then described "seizure like" activity for 15-20 seconds after which she became pulseless and cyanotic. CPR was continued by emergency medical services upon arrival. The child was pronounced dead upon arrival at the local hospital. The coroner was contacted and the body was sent to the medical examiner's office for autopsy.

Review of medical records revealed a medical history negative for obstructive airway disease and positive for seasonal allergies only. Gross examination of the body revealed moderately congested lung parenchyma with no other pathologic abnormalities in any other organ system, including the heart. Microscopic findings of the lung showed an exuberant peribronchial/bronchiolar inflammatory infiltrate with a predominance of eosinophils, basement membrane thickening, mucous gland hyperplasia, and smooth muscle hypertrophy. Sections of lung also showed mucous plugging with abundant eosinophils. Given the intensity of bronchial/bronchiolar constrictive findings and eosinophilic infiltrate, the findings and cause of death are consistent with acute bronchospasm due to undiagnosed asthma. Multiple sections of myocardium, including the cardiac conduction system, were also examined and found to be unremarkable.

This death was unexpected due to the relatively mild or asymptomatic nature of her prior clinical picture. Prior to death, the subject did not carry the diagnosis of asthma and it is likely that her asthma was mistaken for seasonal allergy symptoms. This case represents an unusual presentation of asthma and its disease course. Within minutes of being presumably free of symptoms, the subject experienced cardiopulmonary arrest.

Asthma-related deaths usually result from a combination of physiological abnormalities involving respiratory failure with hypoxia, hypercapnia, and acidosis, right ventricular failure secondary to pulmonary hypertension, and/or pulmonary infection.<sup>1</sup> The mechanism for a hyperacute attack includes both bronchospasm and inflammation.<sup>2</sup> Histopathological findings in fatal asthma have been shown to range from global mucus filling of all airways to moderate involvement to virtually empty airways.<sup>1</sup> Postmortem examinations have revealed mucous plugging in up to 74% of cases.<sup>2</sup> Asthma mortality rates are particularly high among women, African Americans, and children aged 5-14 years.<sup>2</sup> This case serves as a rebuttal of the general misconception that bronchial asthma is seldom, if ever, a fatal disease.<sup>1</sup> Individuals suffering from a fulminant form of bronchial asthma are at potential risk for rapid progression from a relatively controlled state to death within minutes.<sup>1</sup> Even patients who are asymptomatic on a daily bases can have a fatal attack.<sup>2</sup> The possibility of idiosyncratic anaphylactic reaction cannot be ruled out, as patients with bronchial asthma may be more susceptible to anaphylaxis than the general population.<sup>1</sup>

### References:

1. Robin ED, Lewiston N. Unexpected, unexplained sudden death in young asthmatic subjects. *Chest* 1989;96:790-793.
2. Wobig EK, Rosen P. Death from asthma: rare but real. *Journal of Emergency Medicine* 1996;14(2):233-240.

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### Bronchospasm, Sudden Death, Child