

Original Contributions



SYNCOPE IN THE PEDIATRIC EMERGENCY DEPARTMENT – CAN WE PREDICT CARDIAC DISEASE BASED ON HISTORY ALONE?

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Abstract—Background: The American Heart Association recommends a “meticulous history” when evaluating patients with an initial episode of syncope. However, little is known about which historical features are most helpful in identifying children with undiagnosed cardiac syncope. **Objectives:** Our objectives were 1) to describe the cardiac disease burden in Emergency Department (ED) syncope presentations, and 2) to identify which historical features are associated with a cardiac diagnosis. **Methods:** Using syncope presentations in our ED between May 1, 2009 and February 28, 2013, we 1) performed a cross-sectional study describing the burden of cardiac syncope, and 2) determined the sensitivity and specificity of four historical features identifying cardiac syncope. **Results:** Of 3445 patients, 44.5% were male presenting at 11.5 ± 4.5 years of age. Of patients with a cardiac diagnosis (68, ~2%), only 3 (0.09%) were noted to have a previously undiagnosed cardiac cause of syncope: 2 with supraventricular tachycardia and 1 with myocarditis. Among the three cases and 100 randomly selected controls, the respective sensitivity and specificity of the historical features were 67% and 100% for syncope with exercise, 100% and 98% for syncope preceded by palpitations, and 67% and 70% for syncope without prodrome. **The presence of at least two features yielded a sensitivity of**

100% and specificity of 100%. Conclusions: Our study, which represents the largest published series of pediatric syncope presenting to the ED, confirms that newly diagnosed cardiac causes of syncope are rare. Using a few specific historical features on initial interview can help guide further work-up more precisely. © 2015 Elsevier Inc.

Keywords—cardiac syncope; electrocardiogram; pediatric emergency department; screening; supraventricular tachycardia; long QT syndrome

INTRODUCTION

Syncope is a common complaint prompting evaluation in pediatric emergency departments (EDs). The authors of a recent review describing over 70 million pediatric ED encounters reported that syncope is the chief complaint of just less than one of every 100 patients presenting to the ED (1). In this group of patients, cardiac causes, both previously recognized and newly diagnosed, have been estimated to provide the etiology for syncope in 1–5% of patients (2–4). Although cardiac causes of syncope are rare, they have a high recurrence rate and may be associated with significant morbidity.

The extent of the diagnostic evaluation needed for children with syncope in the ED has been a focus of discussion and research in the past, with the preponderance

The data collection on human patients under the auspices of Children’s Healthcare of Atlanta has been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments.

of the literature asserting that the history and physical examination are of greatest value when attempting to discern between cardiac and noncardiac causes of syncope. The American Heart Association published a statement on the evaluation of syncope in 2006, which stated that a “meticulous history” is of paramount importance when evaluating patients with an initial syncopal episode (5). However, no studies to date have clarified the precise historical features that have been associated with cardiovascular causes in pediatric patients presenting to the ED with syncope. The electrocardiogram (ECG) has been an important adjunct test in studies of syncopal children; its utility has been described previously in various cohorts, although not specifically in new ED cardiac diagnoses (1,3,5–7). Further, evaluations beyond a detailed history, physical examination, and ECG have been shown to be high cost and low yield in the evaluation of pediatric syncope. Echocardiography, as well as Holter and event monitoring, have low utility in the syncope population, with only 0.6% of echocardiograms demonstrating a potentially causative abnormality, and no abnormal monitors yielding a cardiac diagnosis in this population (8,9). Given that there is no standard work-up for the evaluation of syncope in the ED, our goals included providing data to inform such a standardized evaluation and clarifying more precisely which historical features are associated with cardiovascular causes to predict appropriate testing.

Our objectives were 1) to describe in a pediatric ED the burden of syncope due to a new cardiac diagnosis, and 2) to identify the historical features that are associated with an underlying cardiac diagnosis. We hypothesized that patients with cardiac syncope would present with at least two of the following four historical features: syncope with exercise, syncope preceded by palpitations, syncope without prodrome, or syncope with exercise preceded by chest pain.

MATERIALS AND METHODS

Data Source

With approval of the Institutional Review Board of Children’s Healthcare of Atlanta (GA), we reviewed the electronic medical record of the two primary EDs (Children’s Healthcare of Atlanta at Egleston and Scottish Rite) of our large pediatric tertiary care health care system from May 1, 2009 through February 28, 2013. Inclusion criteria were age eighteen years or younger with a chief complaint of syncope or near syncope (ICD-9 codes 780.2 and 780.4).

Data were collected on each patient by an experienced and trained abstractor (D.A.H.) using a standard software application, including demographics, the date of service, length of time spent in the ED, the time until the next ED

visit, the chief complaint, a history of present illness, the ED diagnosis(es), the disposition from the ED, and the final hospital diagnosis(es) if admitted. ED diagnoses included ECG interpretations by the attending emergency physicians with review by a pediatric cardiologist within 24 hours. Final diagnoses were extracted from the attending of record documentation and listed in accordance with International Classification of Diseases, Ninth edition, by medical coders. Patients with a known history of structural, acquired, or electrical heart disease were not considered to represent new cases of cardiac syncope.

For those with a potentially new case of cardiac syncope, outpatient charts were also reviewed where follow-up was performed. Finally, the ED and inpatient (where applicable) records of 100 controls from those diagnosed with noncardiac syncope were reviewed to evaluate the sensitivity and specificity of the historical features. The initial chart review was performed by one reviewer (D.H.), with an additional reviewer involved in the categorization of each patient with a cardiac diagnosis with no discrepancies.

Outcomes and Variables of Interest

Our primary outcome of interest was an ED presentation of syncope in the patient with a new cardiac diagnosis. Our primary exposure variables were the historical features of presentation including exercise-related syncope with or without chest pain, absence of a prodrome, and palpitations associated with syncope. Because the utility of ECGs in the evaluation of syncope has been reported in the past, we sought to describe previously unreported historical features that might help predict a cardiac cause of syncope in ED presentations (3,6,7).

Statistical Analysis

Data were summarized using mean (SD) and median (range) for continuous variables, and n (%) for categorical variables. After the descriptive analysis was completed, sensitivity and specificity, as well as positive and negative predictive values for historical features of syncope, were calculated using ED cases of syncope with a newly diagnosed cardiac etiology and 100 randomly selected patients from the same ED population with no cardiac etiology of their syncope. For all variables, we have reported 95% confidence intervals. We performed data analysis using Statistical Analysis Software (version 9.3; SAS Institute Inc., Cary, NC).

RESULTS

During this defined study period, 3445 patients who met inclusion criteria presented identifying a chief complaint

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