Pediatric Syncope

High-Risk Conditions and Reasonable Approach

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KEYWORDS

• Syncope • Pediatric • Brugada syndrome • Long QT • Short QT
• Arrhythmogenic right ventricular cardiomyopathy • Seizures • Breath holding spells

KEY POINTS

- Syncope is a common presenting complaint and although most cases are of a benign cause careful attention must be made not to miss the dangerous and life-threatening causes.

INTRODUCTION

Syncope, classically defined as a transient, self-limited loss of consciousness and postural tone, is a common presenting complaint in the pediatric emergency department (ED). By definition, the recovery from syncope is spontaneous, rapid, prompt, and complete without any neurologic sequelae.[1] Syncope accounts for approximately 126 in 100,000 children coming to medical attention.[1] The approach to syncope and the etiologies differ from the adult population because most pediatric syncope is from non-life-threatening causes, and a minimal evaluation in the ED is appropriate with parental reassurance. Despite this generally benign prognosis, care must be made to find the more uncommon and potentially fatal causes. The primary purpose of the evaluation of the patient with syncope is to determine whether the patient is at increased risk for death and needs either admission to the hospital or an expedited outpatient evaluation.[2]

HISTORY, EXAMINATION, AND TESTING

History

Syncope is a chief complaint where a detailed history is the most important aspect of a safe and efficient evaluation in the pediatric patient.[3] That history might suggest a benign cause, such as a child with a prodrome of lightheadedness after being outside

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on a hot day, whereas a child with exertional syncope while running is in a higher risk category. Other elements, such as a family history with sudden unexplained death at a young age or congenital deafness, are red flags that may warrant further investigation. Events leading up to the syncopal episode should be carefully noted, and the description of the event itself. The absence of prodromal symptoms, presence of preceding palpitations within seconds of loss of consciousness, lack of a prolonged upright posture, syncope during exercise or in response to auditory or emotional triggers, family history of sudden cardiac death (SCD), abnormal physical examination, and abnormal electrocardiogram (ECG) all should raise concern for a cardiac cause.[4,5] Additionally, standard aspects of the history, such as medication use, can provide clues for QT-prolonging medications, among other potential contributing factors.

The accounts of bystanders are helpful but also potentially misleading. The occurrence of tonic-clonic, seizure-like activity is associated with cardiac and neurologic causes of syncope, and distinguishing between the two etiologies may not be possible. One study found that limb jerking had a sensitivity of 0.686, specificity of 0.877, and a positive likelihood ratio of 5.566 for seizures, making it a moderately helpful but not diagnostic historical feature.[4]

Physical Examination

Certain components of the physical examination are particularly useful in directing the evaluation. Vital signs are a useful clue, although the use of orthostatic vital signs may not be as helpful as often believed. It is estimated that greater than 40% of euvolemic adolescents have positive orthostatic vital signs.[6] In a study of euvolemic adult ED patients it was estimated that 43% met criteria for positive orthostatic vital signs.[7] The presence or absence of positive orthostatic vital signs should not be the sole driver of diagnostic and disposition decisions.

Although challenging in the often noisy and chaotic ED setting, when possible a careful evaluation of the heart for any murmurs, radiation, and change with position of those murmurs should be noted. Specific murmurs are covered in the relevant discussion in this article, but in general any potentially pathologic murmur in the setting of syncope warrants further evaluation by a cardiologist.

A detailed neurologic examination is also paramount to the evaluation of the syncope patient. The presence of focal neurologic symptoms, weakness, ataxia, altered mental status, or slurred speech directs the evaluation toward a more dangerous cause.

Electrocardiogram

Although some studies show only 0.4% of ECGs had a diagnostic yield and there is a high false-positive rate, the low cost and low associated risk makes obtaining an ECG a part of the evaluation of pediatric syncope.[5,8–10] Even the authors of studies critical of the diagnostic yield of ECGs still recommend its use integrated with history and physical examination because of the high sensitivity of all three of these elements combined together.[9] The 2017 American College of Cardiology/American Heart Association guidelines recommended that a detailed medical history, physical examination, family history, and 12-lead ECG should be performed in all pediatric patients presenting with syncope as a Class I recommendation.[5]

SCD is a rare but devastating event. The incidence of SCD during sporting events is infrequent with an incidence of 1 to 2 in 200,000.[11] Despite its rarity, extensive public attention to deaths in otherwise healthy children and the association with exercise has led to a desire to perform some type of risk assessment and screening to decrease the risk of this catastrophic event. In February 2012 the American Medical Society for Sports Medicine held a summit on ECG interpretation in athletes. They developed