CASE REPORTS

A Rare Cause of Recurrent Syncope in the Pediatric Patient

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Abstract

A previously healthy 4-year-old boy was admitted to hospital for two brief episodes of loss of consciousness. In addition, we note symptoms suggesting a respiratory infection. There was no anemia and no electrolyte imbalance. The child had no neurological symptoms, emergency cerebral CT and EEG were normal. There was however an inappropriate degree of tachycardia, muffled heart sounds and the ECG showed low voltage. Emergency echocardiography showed only mild circumferential pericardial effusion, but also right atrial collapse. NSAID therapy (ibuprofen) was immediately initiated, with no response. It was later replaced with low-dose corticosteroid (prednisone) therapy which resulted in slow, but steady decrease of fluid amount. The patient did not experience recurrent syncope and the pericardial effusion resolved completely during follow-up. Although syncope in children is usually reflex and thus benign, unexplained recurrent syncope should prompt a thorough evaluation including cardiac exam, as most life-threatening causes of syncope (either of temporary or permanent nature) generally have a cardiac etiology.

Keywords: syncope, pericardial effusion, fluid, respiratory infection, NSAID, prednisone

Rezumat

Un băiat în vârstă de 4 ani fără antecedente personale patologice semnificative a fost adus la spital pentru două episoade scurte de pierdere a stării de conştienţă. Se notează în plus simptomatologie sugestivă pentru o infecție respiratorie. Copilul nu prezenta anemie, nici diselectrolitemii. Nu s-au semnalat simptome neurologice, iar CT-ul cerebral efectuat în urgență şi examenul EEG au fost în limite normale. Se constată în schimb zgomote cardiace asurzite, tahicardie şi microvoltaj pe traseul ECG. Ecografia cardiacă efectuată în urgență a pus în evidență o cantitate mică de lichid pericardic dispus circumferențial, dar și colaps parțial al atriului drept. S-a inițiat tratament medicamentos cu antiinflamator nesteroidian (ibuprofen), fără răspuns. Ulterior acesta a fost înlocuit cu corticosteroid (prednison) în doză mică, ceea ce a determinat o scădere lentă, dar constantă a cantității de lichid. Pacientul nu a repetat sincopa și revărsatul pericardic s-a remis în totalitate la evaluările ulterioare. Deşi sincopa la copil este în general reflexă, deci benignă, sincopele neexplicate recurente necesită o evaluare riguroasă, inclusiv un examen cardiologic, deoarece majoritatea afecțiunilor potențial amenințătoare de viață care se manifestă prin sincopă sunt de cauză cardiacă.

Cuvinte cheie: sincopă, revarsat pericardic, lichid, infecție respiratorie, antiinflamator nesteroidian, AINS, prednison

INTRODUCTION

Syncope is type of transient, complete loss of consciousness with an abrupt onset, short duration and complete, spontaneous recovery[1]. It is a frequent symptom in the general population, most patients having a first occurrence between the ages of 10 and 30[2,3]. Strictly considering the pediatric population (under 18 years of age) the reported incidence may be as high as 15%[4].

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While the vast majority of patients experience reflex syncope[5,6], some may indeed present with a serious underlying problem. Sudden cardiac death is nevertheless extremely rare in children (less than 1 per 100 000)[7,8] and in most cases physical exam findings, event description, family history, and ECG findings will allow accurate discrimination between the more common benign etiologies and a severe disorder[4,9].

In the wide spectrum of pathologies that may cause syncope, pericardial effusion in children is not very common, and most cases will present chest pain as cardinal symptom[10]. Nevertheless, signs suggesting pericardial involvement must not be overlooked, as some pericardial syndromes, such as cardiac tamponade, may be life-threatening.

PATIENT, METHODS AND RESULTS

A previously healthy male Caucasian patient aged 4 years 7 month was transferred from a territorial hospital for two brief episodes of loss of consciousness.

The first signs of illness had appeared several days before when the patient had developed a fever, then cough, nasal obstruction and dyspnea, for which ambulatory oral antibiotic therapy was recommended and administered (amoxicillin, then cefaclor). The patient then experienced a first episode of pallor, hypotonia, unresponsiveness and possibly loss of consciousness of short duration (approximately 10-15 seconds), symptoms which lead to hospitalization.

Initial evaluation showed no other signs except those suggesting respiratory infection, according to transfer papers. Antibiotic therapy was switched to intravenous ceftriaxone and gentamicin. Two days later the child experienced a second episode that began with sudden abdominal pain and abundant vomiting followed by a brief episode of loss of consciousness. Perioral cyanosis and profuse sweating were noted. The oxygen saturation dropped to 86% during the episode, but quickly returned to normal (100%) without oxygen supplementation. Under these circumstances the child was transferred for further evaluation.

The patient was initially evaluated from a neurological point of view – he had no signs of meningeal irritation, no signs of cranial nerve dysfunction, reflexes were normal, he had no motor deficit and no ataxia, speech and language were normal for his age. Emergency cerebral computer tomography (CT), both unenhanced and contrast-enhanced, was performed upon arrival and was normal. An electroencephalogram was also performed at a later time and was also normal.

Clinical examination showed mild nasal congestion, hyperemic pharyngeal wall, slightly prolonged expiratory phase and rare sibilant rales, no fever. The patient was hemodynamically stable, blood pressure (BP) of 90/50 mmHg, heart rate (HR) of 115 beats per minute (bpm), no murmurs, heart sounds were however muffled. There were no clinical signs of congestion and no other abnormal findings were noted.

Laboratory tests only showed mild lymphocytosis with neutropenia and slightly elevated inflammatory markers. There was no anemia, no electrolyte imbalance and the urinalysis was normal. A chest radiography was performed and was also normal. The electrocardiogram (ECG) however showed sinus tachycardia with a HR of 114 bpm, low voltage, widespread, mild ST depression (DII, DII, aVF, V5-V6) and generalized T-wave flattening (Figure 1). These findings, together with the clinical signs described above (tachycardia, muffled heart sounds), prompted evaluation through echocardiography.

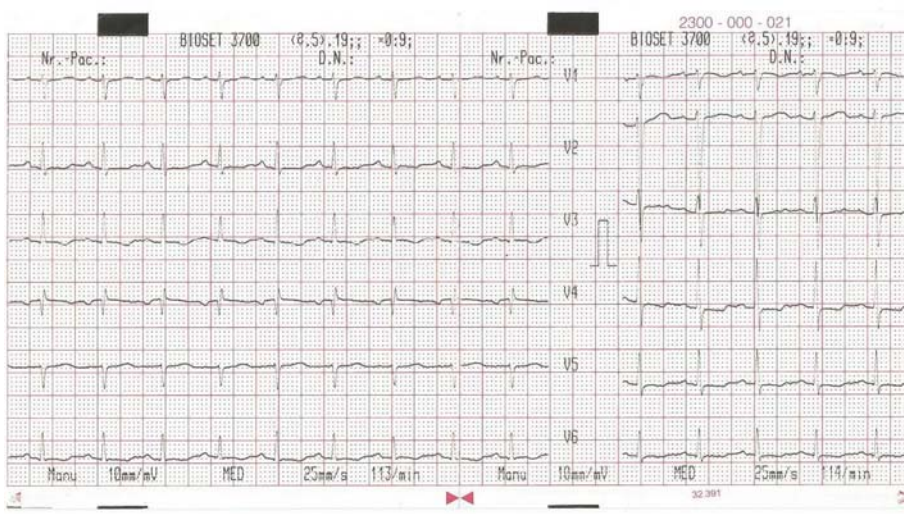

Figure 1. ECG: sinus rhythm, HR=114 bpm, low voltage, widespread, mild ST depression (DII, DII, aVF, V5-V6), generalized T-wave flattening.

Emergency echocardiography revealed mild-to-moderate circumferential pericardial effusion with a maximum of 11mm measured anteriorly of the right ventricle (RV) (Figure 2, Figure 3). We also note slight, brief right atrial collapse, but no other signs of hemodynamic impairment. The cardiac chambers were of normal size, however wall thickness was at the upper range limit (possibly pseudo hypertrophy, Figure 4). An abdominal ultrasound was also performed and recorded a moderate amount of fluid in the pouch of Douglas as well as minimal right pleural effusion.

Oral NSAID therapy was immediately started (ibuprofen 30 mg per day). The antibiotic therapy that had been previously started for respiratory infection was continued. 72 hours later however, while the ECG showed normalization of the ST segment and inverted T-waves (Figure 5), there was no change in the echo estimated amount of fluid. Hence it was decided to re-

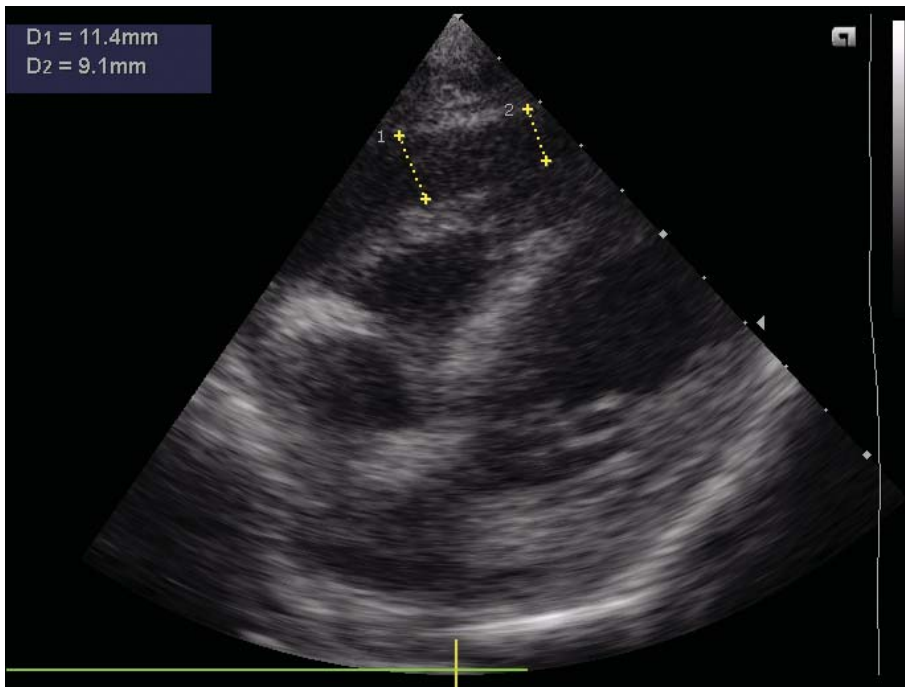

Figure 2. Transthoracic ecocardiography, subcostal view. Pericardial effusion with a maximum of 11.4 mm.

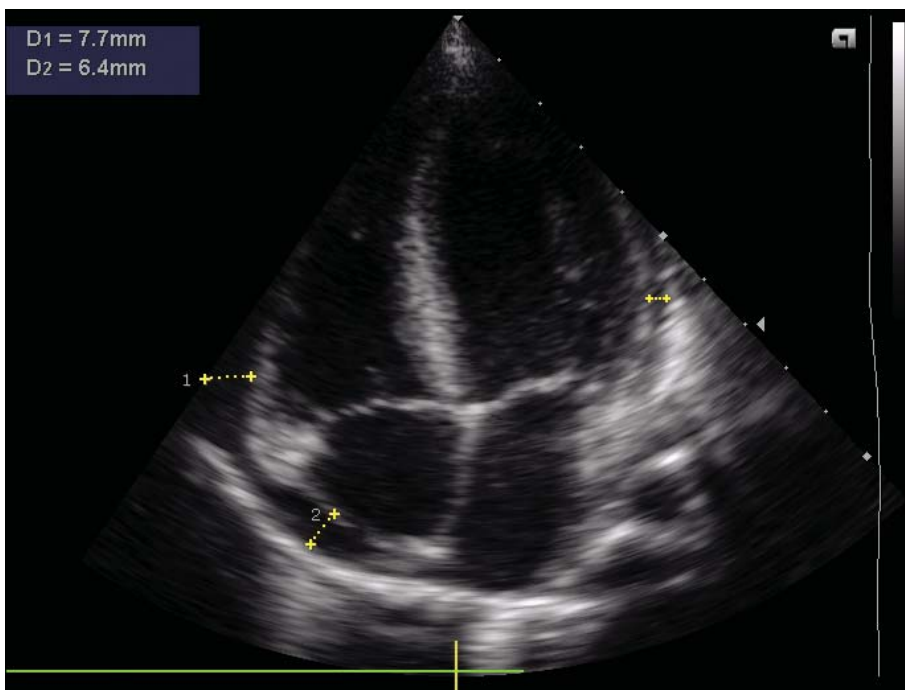

Figure 3. Transthoracic ecocardiography, apical 4 chamber view. Circumferential pericardial effusion.

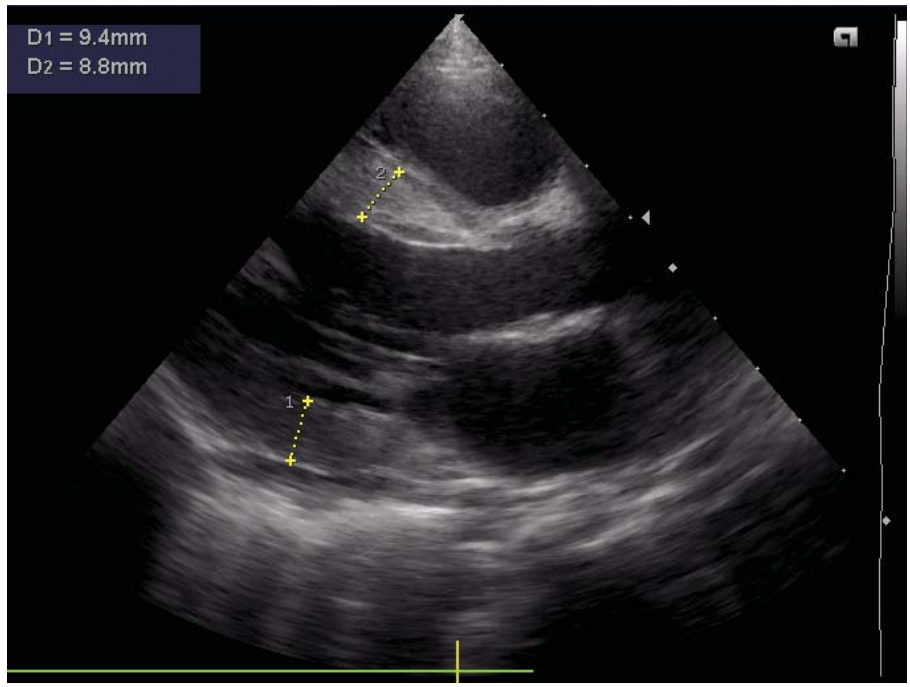

Figure 4. Transthoracic ecocardiography, parasternal long axis view. Pseudohypertrophy of the interventricular septum and left ventricular posterior wall.

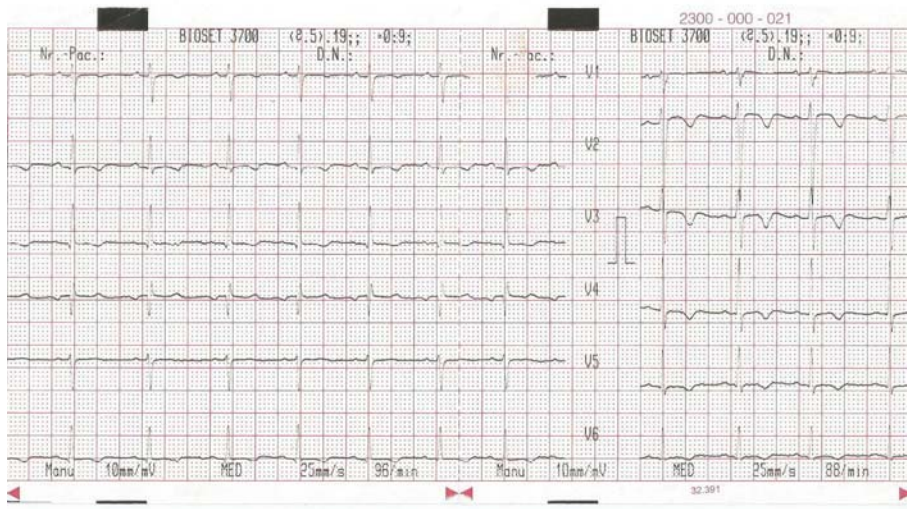

Figure 5. ECG: sinus rhythm, HR=96 bpm, normalization of the ST segment, generalized inverted T-waves.

place ibuprofen with low-dose corticosteroid (prednisone) therapy, at a dose of 15mg per day.

After the switch there was a slow, but steady decrease in the amount of pericardial fluid as estimated through echocardiography. The heart rate and heart sounds returned to normal and the child did not experience recurrent syncope. The respiratory infection symptoms resolved under the specified antibiotic therapy. There was still a small amount of pericardial effusion at discharge with a maximum of 5.1 mm (Figure 6), but it had resolved completely at the medical visit one week later. Prednisone was slowly tapered over a period of 1.5 months. No adverse reactions were noted.

DISCUSSION

This scenario illustrates a case of syncope in the setting of acute pericarditis with mild hemodynamic abnormalities witch did not respond to initial NSAID therapy.

Separating a true syncope from other causes of loss of consciousness in children can be particularly challenging, especially at young ages. Therefore, if in an adult certain pathologies may be excluded first-hand through a thorough anamnesis, in a child one has to consider multiple possible scenarios and employ many different tools for investigation.

In this case the two brief episodes of loss of consciousness were not initially catalogued as syncope, seeing

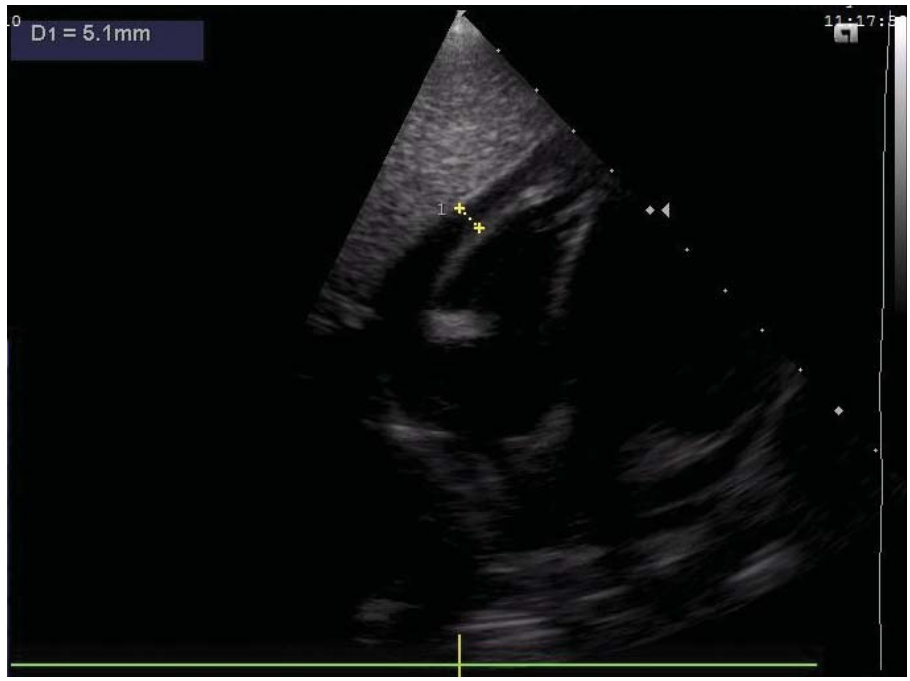

Figure 6. Transthoracic ecocardiography, subcostal view. Pericardial effusion with a maximum of 5.1 mm.

as they manifested under very different circumstances. Rather, they were thought to be signs of either a developing infectious process that did not respond to therapy and lead to neurological involvement or an underlying neurological pathology that first became manifest in the setting of acute respiratory distress. Hence the initial evaluation was a neurological one. To rule out an infectious central nervous system complication a lumbar puncture would have been needed. In this case, however, it was deemed unnecessary, as the neurological examination was completely normal.

The specific clinical findings and ECG exam pointed to cardiac involvement (of note, the child did not experience chest pain). One needs to mention that echocardiography was performed due to the specific findings noted above; as a general rule, echocardiography is not needed for screening, as it has not been demonstrated to provide a significant contribution to the evaluation of the pediatric syncope patient[11].

While the diagnostic was clear (the diagnostic criteria for acute pericarditis are not different in children according to the latest ESC guideline[12]), it is difficult to ascertain that the two episodes of loss of consciousness were indeed caused by the mild pericardial effusion noted on the echocardiography, since the patient was consistently stable and the only sign of hemodynamic impairment was brief right atrial collapse. They could have also been related to fever and severe nasal obstruction (for the first episode) and a vasovagal response to abdominal pain and vomiting (for the second one).

Whether the fluid accumulation had caused syncope or not, treatment was mandatory. Options for acute pericarditis in children cite NSAIDs (ibuprofen, aspirin, indomethacin or naproxen) as the mainstay of therapy, at high dosages[12]. Colchicine may be considered for recurrent pericarditis even in the pediatric setting, but is seldom used[13,14]. There is also emerging evidence for the use of interleukin-1 receptor antagonists such as anakinra in recurrent pericarditis, especially in the setting of corticosteroid-dependence[15-18]. Corticosteroids are generally not recommended for fear of side effects[12]; in this case however, prednisone was successfully employed for an acute pericarditis resistant to initial, adequately dosed, NSAID therapy.

The guideline does not recommend etiology search for most cases, which are deemed non-high risk, and are presumed viral or idiopathic, because of low diagnostic yield and low risk of specific causes and complications[19,20]. In this situation, the fact that the patient did not respond to initial therapy makes him a moderate risk case, according to the risk stratification algorithm proposed by the ESC, and warrants etiological evaluation. In most developed countries the leading etiological agents are viruses[21], however worldwide tuberculosis (TB) remains the leading cause for pericarditis. Specifically for the pediatric population the epidemiology is slightly different, with post cardiotomy syndrome becoming the leading cause of pediatric pericarditis[22,23], which is explicable considering the growing number of children undergoing corrective cardiac surgery at yo-

ung ages. It was not the case in this situation. To note, post-pericardiotomy syndrome is frequent after surgical closure of interatrial secundum defects, and is also a cause for recurrent pericarditis[24,25].

In this case, TB being endemic in Romania, a tuberculin skin test was performed and was negative. There were no other cons to suggest a specific etiology and hence no further testing was performed.

To note, one year after the acute episode there were no recurrences and no other problems have emerged.

CONCLUSION

Syncope in children is usually reflex and thus benign and as such it does not usually warrant specific investigation. Unexplained recurrent syncope however needs to be taken seriously and should prompt a thorough evaluation. Of the multiple tests that may be employed, a cardiac examination is mandatory, as most life-threatening causes of syncope (either of temporary or permanent nature) have a cardiac etiology.

References

1. Shen W-K, Sheldon RS, Benditt DG, et al. 2017 ACC/AHA/HRS Guideline for the Evaluation and Management of Patients with Syncope: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines, and the Heart Rhythm Society. Hear Rhythm. March 2017. doi:10.1016/j.hrthm.2017.03.004.
2. Ganzeboom KS, Colman N, Reitsma JB, Shen WK, Wieling W. Prevalence and triggers of syncope in medical students. Am J Cardiol. 2003;91(8):1006-1008, A8. http://www.ncbi.nlm.nih.gov/pubmed/12686351. Accessed March 26, 2017.
3. Serletis A, Rose S, Sheldon AG, Sheldon RS. Vasovagal syncope in medical students and their first-degree relatives. Eur Heart J. 2006;27(16):1965-1970. doi:10.1093/eurheartj/ehl147.
4. Friedman KG, Alexander ME. Chest Pain and Syncope in Children: A Practical Approach to the Diagnosis of Cardiac Disease. J Pediatr. 2013;163(3):893-896. doi:10.1016/j.jpeds.2013.05.001.
5. Bo I, Carano N, Agnetti A, et al. Syncope in children and adolescents: a two-year experience at the Department of Paediatrics in Parma. Acta Biomed. 2009;80(1):36-41. http://www.ncbi.nlm.nih.gov/pubmed/19705618. Accessed March 26, 2017.
6. Massin MM, Bourguignont A, Coremans C, Comté L, Lepage P, Gérard P. Syncope in pediatric patients presenting to an emergency department. J Pediatr. 2004;145(2):223-228. doi:10.1016/j.jpeds.2004.01.048.
7. Driscoll DJ, Edwards WD. Sudden unexpected death in children and adolescents. J Am Coll Cardiol. 1985;5(6 Suppl):118B-121B. http://www.ncbi.nlm.nih.gov/pubmed/3998328. Accessed March 26, 2017.
8. Wren C. Sudden death in children and adolescents. Heart. 2002;88(4):426-431. http://www.ncbi.nlm.nih.gov/pubmed/12231612. Accessed March 26, 2017.
9. Paris C, Toro Salazar OH, Gauthier NS, et al. Regional Implementation of a Pediatric Cardiology Syncope Algorithm Using Standardized Clinical Assessment and Management Plans (SCAMPS) Methodology. J Am Hear Assoc Cardiovasc Cerebrovasc Dis. 2016;5115(2). doi:10.1161/JAHA.115.002931.
10. Drossner DM, Hirsh DA, Sturm JJ, et al. Cardiac disease in pediatric patients presenting to a pediatric ED with chest pain. Am J Emerg Med. 2011;29(6):632-638. doi:10.1016/j.ajem.2010.01.011.
11. Ritter S, Tani LY, Etheridge SP, Williams R V, Craig JE, Minich LL. What is the yield of screening echocardiography in pediatric syncope? Pediatrics. 2000;105(5):E58. http://www.ncbi.nlm.nih.gov/pubmed/10799622. Accessed March 26, 2017.
12. Adler Y, Charron P, Imazio M, et al. 2015 ESC Guidelines for the diagnosis and management of pericardial diseases. Eur Heart J. 2015;36(42):2921-2964. doi:10.1093/eurheartj/ehv318.
13. Imazio M, Brucato A, Pluymaekers N, et al. Recurrent pericarditis in children and adolescents. J Cardiovasc Med. 2016;17(9):707-712. doi:10.2459/JCM.0000000000000300.
14. Alabed S, Pérez-Gaxiola G, Burls A. Colchicine for children with pericarditis: systematic review of clinical studies. Arch Dis Child. 2016;101(10):953-956. doi:10.1136/archdischild-2015-310287.
15. Picco P, Brisca G, Traverso F, Loy A, Gattorno M, Martini A. Successful treatment of idiopathic recurrent pericarditis in children with interleukin-1β receptor antagonist (anakinra): An unrecognized autoinflammatory disease? Arthritis Rheum. 2009;60(1):264-268. doi:10.1002/art.24174.
16. Finetti M, Insalaco A, Cantarini L, et al. Long-Term Efficacy of Interleukin-1 Receptor Antagonist (Anakinra) in Corticosteroid-Dependent and Colchicine-Resistant Recurrent Pericarditis. J Pediatr. 2014;164(6):1425-1431.e1. doi:10.1016/j.jpeds.2014.01.065.
17. Scardapane A, Brucato A, Chiarelli F, Breda L. Efficacy of an Interleukin-1β Receptor Antagonist (Anakinra) in Idiopathic Recurrent Pericarditis. Pediatr Cardiol. 2013;34(8):1989-1991. doi:10.1007/s00246-012-0532-0.
18. Baskar S, Klein AL, Zeft A. The Use of IL-1 Receptor Antagonist (Anakinra) in Idiopathic Recurrent Pericarditis: A Narrative Review. Cardiol Res Pract. 2016;2016:1-6. doi:10.1155/2016/7840724.
19. Imazio M, Demichelis B, Parrini I, et al. Day-hospital treatment of acute pericarditis. J Am Coll Cardiol. 2004;43(6):1042-1046. doi:10.1016/j.jacc.2003.09.055.
20. Imazio M, Cecchi E, Demichelis B, et al. Indicators of Poor Prognosis of Acute Pericarditis. Circulation. 2007;115(21):2739-2744. doi:10.1161/CIRCULATIONAHA.106.662114.
21. Imazio M, Spodick DH, Brucato A, Trinchero R, Adler Y. Controversial Issues in the Management of Pericardial Diseases. Circulation. 2010;121(7):916-928. doi:10.1161/CIRCULATIONAHA.108.844753.
22. Roodpeyma S, Sadeghian N. Acute Pericarditis in Childhood: A 10-Year Experience. Pediatr Cardiol. 2000;21(4):363-367. doi:10.1007/s002460010081.
23. Shakti D, Hehn R, Gauvreau K, Sundel RP, Newburger JW. Idiopathic Pericarditis and Pericardial Effusion in Children: Contemporary Epidemiology and Management. J Am Heart Assoc. 2014;3(6):e001483-e001483. doi:10.1161/JAHA.114.001483.
24. Heching HJ, Bacha EA, Liberman L. Post-Pericardiotomy Syndrome in Pediatric Patients Following Surgical Closure of Secundum Atrial Septal Defects: Incidence and Risk Factors. Pediatr Cardiol. 2015;36(3):498-502. doi:10.1007/s00246-014-1039-7.
25. Raatikka M, Pelkonen PM, Karjalainen J, Jokinen E V. Recurrent pericarditis in children and adolescents: report of 15 cases. J Am Coll Cardiol. 2003;42(4):759-764. http://www.ncbi.nlm.nih.gov/pubmed/12932616. Accessed March 26, 2017.