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Commentary

Comments on 2018 CPCS guideline for diagnosis and treatment of syncope in children and adolescents

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Syncope is one kind of transient loss of consciousness, due to transient global cerebral hypoperfusion [1]. It is sometimes misunderstood with other causes of transient loss of consciousness, like epilepsy, metabolic disorders, head trauma, psychological factors, and so on. Syncope in children and adolescents is common and seriously impacts the quality of their lives [2]. However, its pathogenesis, etiologies, diagnosis and management are complex.The studies on syncope attract great interest of pediatricians and great progress has been made in this interesting field. Based on the improvement achieved so far, Chinese Pediatric Cardiology Society (CPCS) successfully developed a guideline for the diagnosis and treatment of syncope in children and adolescents, which would greatly improve the level of clinical management of syncope [3].

For the diagnosis of pediatric syncope, a structured diagnostic flowchart is necessary. In this guideline, a clear and standard diagnostic flowchart is included, which makes the diagnosis efficient and economical, and the efficacy of diagnosis would be improved profoundly [4,5]. In the guideline, the flowchart is divided into 2 steps [3]. The first step includes history-taking, physical examination and supine and upright heart rate, blood pressure as well as electrocardiography. History-taking and physical examination are the primary and necessary procedures, because they can provide suggestive information for physicians. Supine and upright heart rate, blood pressure as well as electrocardiography are regarded as important as the above two elements. After the first step, one can successfully divide syncopal patients into three groups, namely definite diagnosis group, suggestive diagnosis group and unexplained syncope group. Some situational syncope, postural tachycardia syndrome (POTS), orthostatic hypotension, orthostatic hypertension and drug-induced syncope cases can get the diagnosis. While, those with suggestive diagnosis would receive further examinations for a final diagnosis. In the next step, echocardiography, Holter electrocardiography, blood biochemical analysis, genetic studies, cardiac catheterization, computed tomography or magnetic resonance imaging and electrophysiology tests are selected according to the individual situations. In this step, diseases, such as cardiomyopathy, pulmonary hypertension, cyanotic congenital heart disease and some arrhythmias can be diagnosed based on the clinical pictures and laboratory findings. Great attention should be paid once cardiac syncope is suspected for its possibility of sudden death [6]. For those still with unexplained syncope, head-up tilt test plays an important role. However, head-up tilt test has some risks in certain situations especially in which cardiac factors are considered. Hence, exclusion of cardiac syncope before conducting the test is essential. Meanwhile, the preparation of equipment, circumstance and qualified medical staffs in advance is required. Unfortunately, though the above stepwise flowchart is carried out, approximately 20% of underlying causes of syncope are remaining obscure and require reevaluation and reassessment by neurologists, endocrinologists and even psychiatrists as necessary [5].

In China, the studies on the underlying disease spectrum of syncope in children and adolescents have been undertaken for over 20 years. In 1997, Du's team firstly applied head-up tilt test in pediatric syncopal patients, and as a result, pediatric vasovagal syncope in China was firstly reported [7], which was proved to account for about 45% of syncopal causes [8]. In 2005, this team firstly reported POTS as a cause of pediatric syncope in China with a proportion of about 30% of syncopal cases [8]. And especially, in 2012, orthostatic hypertension was firstly found in children as a cause of pediatric syncope [9], which accounted for about 3% of syncopal cases [5]. Because of the landmark findings, the unexplained syncope cases are greatly decreased from about 90% to 20%.

Consequently, with the continuous optimization of diagnostic process and the understanding of syncopal disease spectrum, the costs of diagnosis have decreased gradually in the past 10 years [10], which greatly benefits the patients and so has marvelous social values.

Health education is always the first-line therapy for syncopal patients, which is emphasized in the guideline [3]. Recognizing the common triggers and avoiding them, identifying presyncopal symptoms and performing self-saving maneuvers like changing positions or counter-pressure maneuver, ensuring appropriate physical exercise, as well as maintaining psychological health are the primary strategies to cope with syncope [11]. Autonomic nervous function exercise could modify the function of autonomic nervous system, so that it has been advised by some physicians. Though its efficacy is controversy, it is still worthy of advising for its potential benefits [12,13]. Notably, guardians should be atten-

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dant for its possibility of inducing syncope or presyncope. In the guideline, another nonpharmacological method is recommended to increase the intake of water and salt based on the mechanism of hypovolemia [3]. Increasing studies have testified its efficacy, but patients with hypertension, kidney disease or heart failure are not within the scope [14]. Based on multiple mechanisms participating in the pathogenesis of syncope, a few kinds of pharmacological therapies have been suggested when patients have poor response to non-drug therapy, presyncope with risk of injury or recurrent syncope [1]. Nonetheless, this guideline recommends the utility of midodrine hydrochloride and metoprolol individually [3]. In 2006, a relatively small-scale study conducted by Du's team firstly showed that midodrine hydrochloride was effective for pediatric vasovagal syncope [15], which supplied pediatricians a new choice of treatment and this study received positive evaluation from Stewart [16].

To increase the efficacy of various therapies, the concept of individualized treatment has been popularized deeply in this field. And fortunately, compelling progress has been obtained recent years. In 2012, Zhang et al. utilized pro-adrenomedullin to predict the efficacy of midodrine hydrochloride in pediatric POTS [17], which enhanced the efficacy greatly and attracted much interest from other researchers. Henceforth, studies of searching effective, easy-to-perform and inexpensive methods have been a trend. Ultrasound-derived flow-mediated dilation or changes of blood pressure during standing test have been investigated distinctly to have the great value of predicting the efficacy of midodrine hydrochloride. Meanwhile, POTS patients should be treated by autonomic nervous function training once their corrected QT interval dispersion > 43 ms, or by oral rehydration salts when their body mass index < 18 kg/m^2 or 24-h urinary sodium < 124 mmol/L [18].

Regular follow-up for syncopal patients is essential after the initial diagnosis and treatment. Frequency and degree of symptoms, treatment compliance and drug tolerance should be monitored closely.

In conclusion, the guideline is useful to standardize the clinical management of pediatric syncope. Meanwhile, more studies on syncopal pathogenesis, disease spectrum and management are expected to optimize the guideline in the future [19].

Conflict of interest

The authors declare that they have no conflict of interest.

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