

Syncope in Children in Hong Kong

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MOK and SUNG: Syncope in Children in Hong Kong. Objectives: Syncope is a common event in children. The objective of this study was to review the aetiologies and their relative frequencies in the paediatric patients in a general hospital in Hong Kong. **Methods:** This is a retrospective study of paediatric patients admitted to our hospital between 1987 and 1996 with a presenting complaint of syncope. Their hospital notes were retrieved and reviewed. The syncopal event and the circumstances together with the clinical assessment as well as the subsequent investigations were analyzed in order to establish the respective aetiology for syncope. **Results:** Altogether 146 patients were included in the study. The mean age was 10.4 years. Vasovagal syncope accounted for 54.1% of patients presented with syncope. Seizure disorder accounted for 25.3%, while cardiac cause accounted for another 3 patients (2.1%) with 2 patients having paroxysmal supraventricular tachycardia and 1 patient having frequent hypoxic spells due to complex cyanotic heart disease. In 13.7% of patients, the cause of syncope was unknown. One patient belonging to the seizure group died with autopsy finding revealing diffuse glioma at frontal region. **Conclusions:** Syncope is a common presentation in the paediatric population and vasovagal syncope accounts for over half of the cases. Although most cases of syncope are benign, it is important not to miss those cases in whom a life-threatening condition is present. (*J HK Coll Cardiol* 2002;10:7-10)

Aetiology, children, syncope, vasovagal syncope

摘要

目的：暈厥是兒童常見的突發事件。本研究目的是複習暈厥的病因學及其在香港一所綜合醫院兒童患者中有關的發作頻率。方法：這是一個回顧性研究，患者為1987年至1996年間訴暈厥住院的兒童病人。我們檢索、複習了病歷記錄。分析了暈厥事件、環境因素、臨床評價以及隨訪結果以分別確立暈厥的病因學。結果：研究中包括146例患者，平均年齡10.4歲，迷走性暈厥佔54.1%，癲癇疾病佔25.3%，心原性疾病3人(2.1%)，其中2人有陣發性室上性心動過速，以及1人因紫紺型心臟病而有頻繁低氧症狀發作。有13.7%的患者的暈厥原因尚不清楚。1例診斷癲癇的患者死亡，屍檢顯示大腦前葉為彌漫性神經膠質瘤。結論：暈厥在兒童人群中是一常見現象，迷走性暈厥佔一半多的病例。儘管大多數暈厥是屬良性的，但避免遺漏可能威脅生命的一些病例仍是十分重要的。

關鍵詞：病因學 兒童 暈厥 迷走性暈厥

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Introduction

Syncope is a common presentation in the paediatric population. The reported incidence of paediatric syncopal episodes which received medical attention was 71.9-125.8 per 100 000 population.¹ However, the actual incidence of paediatric syncope is not known due to the lack of large-scale population-based study in children. It has been estimated that as many as 15% of children and adolescents experienced at least one episode of syncope prior to the end of adolescence.²

There are many causes of syncope. The most common one is vasovagal or neurally mediated syncope, which accounts for as much as 50% of the cases of syncope in children.³⁻⁶ Neurally mediated syncope is presumably due to relative hypovolaemia leading to vigorous contraction of the heart, thus causing stimulation of C-fibres and sympathetic withdrawal.⁷ Its clinical course is usually benign. However, it is important to exclude the minority of cases which have a more serious and treatable cause of syncope, such as epilepsy or underlying cardiac abnormality.

The objectives of this study were to review the aetiologies and their relative frequencies in the paediatric patients in a general hospital in Hong Kong.

Methods

This retrospective study included paediatric patients admitted between 1987 and 1996 with a presenting complaint of syncope who were identified from our department audit database.⁸ Their hospital notes were retrieved and reviewed. Patients who were already known to have history of seizure attack or history of arrhythmia were not included in the study. Syncope is defined as the sudden, temporary and complete loss of consciousness with loss of postural tone and with spontaneous recovery.

Demographic information including the age at presentation and sex of the patient was noted. Clinical history was thoroughly reviewed with regards to the detailed description of the syncopal event and the circumstances under which syncope occurred. The investigation results were noted, with particular reference to the types of the blood tests performed, electrocardiography, and other more specific

investigations including echocardiography, electroencephalography, Holter monitor as well as brain imaging. The cause of syncope was established based on the review of the clinical presentation as well as the relevant investigation results.

Diagnostic criteria for inclusion of cases in different categories were defined as below. Vasovagal syncope was defined as syncope that was preceded by periods of prolonged upright posture followed by prodromal symptoms of dizziness and diaphoresis prior to the syncopal event. Triggering factors such as emotional and stressful situations may be present. Seizure disorder was diagnosed when the electroencephalogram showed epileptiform discharge or when the patient developed clinical seizure subsequently. Cardiac cause of syncope was diagnosed when there was history of heart disease that was known to predispose to syncope or when there were abnormalities detected on electrocardiogram or echocardiogram that could account for the syncope.

Results

Altogether 146 patients were included in the study over the 10-year period from 1987 to 1996. There were a total of 68 males and 78 females. The age ranged from 3 to 15 years old with a mean (\pm SD) age of 10.4 ± 3.0 years. The results were shown in Table 1.

The majority of patients underwent the basic investigation for the causes of syncope including complete blood count, blood sugar, serum electrolytes level, electrocardiogram and electroencephalogram. Other more specific tests include echocardiogram, Holter monitor, electrophysiological study and computed tomography of the brain and the decision to use these depended on the individual clinical

Table 1. Causes of syncope

| | Number | Male | Female |
|---------------|------------|------------|------------|
| Vasovagal | 79 (54.1%) | 37 (54.4%) | 42 (53.8%) |
| Seizure | 37 (25.3%) | 24 (35.3%) | 13 (16.7%) |
| Cardiac | 3 (2.1%) | 0 | 3 (3.8%) |
| Psychological | 2 (1.4%) | 0 | 2 (2.6%) |
| Others | 5 (3.4%) | 0 | 5 (6.4%) |
| Unknown | 20 (13.7%) | 7 (10.3%) | 13 (16.7%) |
| Total | 146 | 68 | 78 |

presentation and indication. The relative frequencies of the investigations performed were shown in Table 2.

Over half of the study population were classified as having vasovagal syncope (54.1%). Seizure disorder ranked the second important group among the causes of syncope (25.3%). Psychological cause of syncope, such as hysteria, consisted of 1.4%. Cardiovascular cause of syncope accounted for 3 cases (2.1%) of the study population. Among the 3 patients, 1 patient had congenital complex cyanotic heart disease and had repeated hypoxic spells. Two other patients had paroxysmal supraventricular tachycardia. Other miscellaneous causes of syncope accounted for 3.4% of the study group and this included 2 patients with vestibular disorder, 2 patients with upper respiratory tract infection who were prescribed cough mixture and 1 patient with drug overdose. In 13.7% of the study population, no aetiology of the causes of syncope could be identified.

One patient in the study group subsequently died. The patient was a 14-year-old girl who initially presented with syncope. Her electroencephalogram showed abnormal sharp waves and was diagnosed as having epilepsy. This patient did not have a computed tomography of the brain performed before her second admission. She presented as status epilepticus two months afterwards and died within few hours after admission. She was found to have diffuse glioma at the frontal region at autopsy.

Discussion

There were a few published series describing the causes of syncope in childhood. Our study showed that vasovagal syncope accounts for over 50% of syncope in our paediatric population. This figure is consistent with other published data shown in Table 3.

Vasovagal syncope or neurally mediated syncope involving altered systemic vascular tone,⁹ is a diagnosis mainly made based on the clinical history. However, not every patient with vasovagal syncope would present with the typical clinical features, thus occasionally making vasovagal syncope difficult to diagnose. Recently, the upright tilt testing has been increasingly used both as a diagnostic aid as well as a means to evaluate the various therapeutic measures for vasovagal syncope, but different studies have shown variable specificity, sensitivity and reproducibility which may be a result of the absence of a unified study protocol.^{10,11} However, it is still considered to be a useful test in some patients with vasovagal syncope in whom the clinical presentation is less typical and a positive upright tilt test may help to establish the diagnosis. In addition, a positive tilt test in children was also found to be predictive of increased incidence of recurrent rate of syncope compared with those with negative tilt test.¹²

Cardiac cause of syncope accounts for only a small percentage of the study population when compared with Özme et al's report.⁵ This may be due to the fact

Table 2. The relative frequencies of investigations performed on patients presenting as syncope

| Investigation | Number of positive tests/Number of patients tested | % positive |
|------------------------------|--|------------|
| Complete blood count | 0/111 | 0 |
| Serum Electrolytes | 1/108 | 0.9 |
| Serum Glucose | 1/113 | 0.9 |
| Electrocardiography | 3/76 | 3.9 |
| Electroencephalogram | 11/59 | 18.6 |
| Computed Tomography of Brain | 2/5 | 40 |

Table 3. Aetiologies of syncope in other published series

| | McHarg et al (1997) | Özme et al (1993) |
|--------------------|---------------------|-------------------|
| Number of patients | 108 | 80 |
| Vasovagal | 75% | 33% |
| Seizure | 8% | 11% |
| Cardiac | 6% | 27.5% |
| Migraine | 11% | 0 |
| Others | 0 | 1% |
| Unknown | 0 | 27.5% |

that the study patients were from general paediatric wards rather than a cardiac centre. Our results are more comparable to a population-based study published by Driscoll et al,¹ which described that only 6% of the paediatric syncope was attributed to a pre-existing cardiac aetiology. Nonetheless, it is of utmost importance to look for any evidence of cardiac causes of syncope as they are potentially life-threatening. Attention needs to be paid to any possibility of arrhythmia and left ventricular outflow tract obstruction, and necessary investigations including Holter monitoring, stress electrocardiography and echocardiography should be performed if cardiac cause of syncope is suspected.¹³ Electrocardiograms provide many valuable information as arrhythmia may be demonstrated, and the practice of measuring the QT_c interval is important as this may reveal the diagnosis of long QT syndrome as the cause of syncope.

It has always been suggested that the yield of a significant abnormality is relatively low if every child presenting with syncope were to undergo the whole series of comprehensive investigation and it would not be cost-effective as well. This statement is best exemplified in our study which showed that the basic investigations which were frequently included as part of the diagnostic workup for syncope had very low diagnostic yield compared with the more selective investigations such as electroencephalograms and computed tomography of brain. However, there is always the concern of the potential risk of missing the diagnosis of a potential life-threatening cause of syncope. It is thus important in the clinical assessment to identify those individuals in which case the suspicion of a potentially sinister cause of syncope is suspected, such as patients with atypical history, patients with a family history of sudden death, and patients with abnormal clinical examination. These patients would warrant further specific investigations accordingly for the establishment of the respective diagnosis.

The study has its limitation. The true incidence of syncope in children could not be estimated from the study since not all children with syncope would present to the hospital. In one emergency room series, syncope accounts for <1% of all visits.³ In another study which resembled a population-based study as the region was served with a nearly uniform health care provider service, it was found that only about 0.1% paediatric patients came to seek medical attention for syncope.¹

Clearly, it would be interesting to know if there is any difference in the relative frequencies in the various causes of syncope in the general paediatric population compared with those who present themselves to hospitals. Another limitation is related to the retrospective nature of the study, in which the diagnostic criteria used in this study were not prospectively defined. Therefore, there may be potential error in their clinical diagnosis and this may account for a relatively low incidence of cardiac cause of syncope in the study population.

Conclusions

Syncope is a common symptom in the paediatric population and vasovagal syncope accounts for over half of the patients presenting with syncope. Although most cases of syncope are benign, it is essential not to miss those cases in whom a life-threatening cause could be identified, especially those patients with a cardiac cause of syncope or central nervous system pathology.

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