
Cardiac Arrhythmias in Libyan-Children: Hospital Based Study

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Abstract:

Background: Regular sinus heart rate is very important for the heart to pump blood efficiently. In infant, children and young adults, Cardiac tachyarrhythmia occurs, and leads to different presentations.

Method: Medical records of 17251 patients were examined in Tripoli Children Hospital- Cardiology Outpatient Clinic- during Jan. 2004 to Dec 2008. Their clinical file records were reviewed retrospectively. Out of those records, 79 patients were found to have cardiac arrhythmias. All patients had ECG, ECHO and some had holter. Frequency, type of arrhythmia, age and presentation were assessed with excel and SPSS program.

Results: The patients mean age was 6.9 years, ranges between intrauterine-life to 15 years. There were 40 Females (51.1%) and 38 (48.9%) males. According to the age of presentation, they were divided into three-age groups. Patients of a less than one year old were 19 (3wks-8 months). There were 11 females (57.9%) and 8 males (42.1%). Sinus tachycardia was the most common presentation (52.6%) followed by heart failure (36.8%). Cough with breathless was reported only in (10%). The mean heart rate was 205 beats/min. SVT was confirmed by ECG in 17 patients (89.4%) and WPW syndrome ECG findings were reported in two patients. Normal heart by ECHO was reported in 15 patients (78.9%). ASD, VSD, MR and low ejection fraction were reported in 4 different patients. Patients aged more than one year but less than 10 years old were 27 patients (34.2%). There were 12 females (44.4%), 15 males (65.5%). The mean heart rate in this group was 138 beats/min. Chest pain and palpitation, heart failure, palpitation only, palpitation and pallor 48.2%, 3.7%, 25.9%, 11.1% were presenting symptoms respectively. Two patients only had WPW ECG evidence, and the rest had SVT-ECG changes. Heart ECHO was normal in all patient of this age group. The third group age include children aged more than 10 years old (11-15 years). There were 32 patients, 18 female (56.3%), 14 male (43.7%). Their mean heart rate was 126 beats/min. Chest pain with palpitation was the commonest complaint (69%), followed by palpitation in 5 patients (19%), while palpitation plus pallor, and tachycardia only was in 2 patients each (6.3%). SVT was diagnosed by ECG in 30 patients (94%) and only one patient (6%) and other one (3%) had WPW-ECG changes presented with palpitation. By ECHO, one patient (3%) had mitral prolapsed, and other one had MR, while the rest had normal heart ECHO finding.

Conclusion: SVT is the commonest arrhythmia in childhood period, although other dysrhythmias occur. Parents' education to symptoms and signs of SVT as well as certain techniques to terminate SVT at home are needed. Further, studies and education methods must be initiated to explore the importance of the problem.

Key word. *WPW, SVT, tachyarrhythmia, ECHO.*

Introduction:

In a newborn baby, the normal heart is approximately 140 beats/ minute, and the normal heart beats 70 beats/min in childhood and teenager age group. Arrhythmia occurs if the heart's electrical conduction system compromised, causing either fast heart rate (tachycardia) or slow heart rate (bradycardia) or ectopic (abnormal beat.)

Supraventricular tachycardia (SVT) is defined as an abnormally rapid heart rhythm originating at both atria, excluding atrial flutter and fibrillation. SVT is often, although it is - not always- associates with a narrow QRS complex¹. In childhood, cardiac arrhythmia is

less common in comparison to adults. Most arrhythmias in children and in adulthood are temporary and usually asymptomatic, and are not life threatening. Symptomatic arrhythmia is reported only in 5% of the emergency admissions in the pediatric hospitals.²

The commonest arrhythmia at childhood and early adulthood period is SVT. SVT is mostly mediated by accessory pathway, and non-accessory pathway induced SVT follows mostly corrective cardiac defect surgery³. The prevalence of SVT is not accurately documented, but it is estimated between one in 250 to one in 25,000 normal children.^{1,4} The

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prevalence is much higher in critically ill children with congenital or acquired heart disease treated in pediatric cardiac intensive care units.^{5,6}

SVT that occurs in earlier life is commonly due to accessory pathway as atrioventricular reciprocating tachycardia represents 85% of the arrhythmias in fetal life, and 82% of the arrhythmias during infancy. In most situations, fetal and infancy occurring SVT improved spontaneously by childhood period, although it may be recur latter.⁷

The two most common forms of SVT in children are atrioventricular reentrant tachycardia, including WPW syndrome, and atrioventricular nodal reentrant tachycardia⁸. Majority of patients with SVT have structurally normal hearts, although SVT may be associated with congenital heart disease (CHD) or following surgical repair of CHD.^{7,9,10}

In infancy and childhood age-group, ventricular tachycardia (VT) is uncommon, it occurs in association with hypertrophic cardiomyopathy, long QT syndrome and Brugada syndrome. Ventricular arrhythmia is usually asymptomatic, but occasionally, it might be symptomatic as in incessant idiopathic infant ventricular tachycardia, right ventricular outflow tract tachycardia, benign VT, idiopathic left ventricular tachycardia and in post-cardiac surgical patients.¹¹

Atrioventricular reentry is the most common mechanism for fetal tachyarrhythmias. Sustained tachycardia during fetal life increases the risk of congestive heart failure by 50%, and also sudden death risk in untreated-hydrops child by 50%.¹²

Atrioventricular nodal reentrant tachycardia is uncommon during infancy. It accounts for 4% of the infancy and childhood arrhythmias. The incidence of this arrhythmia type is about 23% in the 1-5 age group, 34% in the 6-10 age group and 20% in those over 10 years of age. Most of these do not resolve spontaneously and will require radio frequency ablation.¹³

Atrial flutter, chaotic atrial tachycardia and atrial ectopic tachycardia are less common. The incidence of atrial tachycardia is around 10-15% during childhood. These arrhythmias are commonly reverting to normal sinus rate spontaneously.¹³

Object of the study:

The goal of this work is to study the frequency of cardiac arrhythmias and their presentation

into Libyan children and ultimately the reasonable ideas to reduce disability and death from heart arrhythmia.

Method and statistical analysis

Between January 2004 to December 2008, 17251 patients were followed in Tripoli Pediatric Hospital-Cardiology Clinical. Out of those patients' medical records, 78 patients' had attacks of heart arrhythmia. Records of those patients were reviewed retrospectively. All patients underwent cardiac examination; ECG, echocardiography and some had Holter study. The relevant data was arranged in Microsoft Excel program, and descriptive statistical analysis was carried out by SPSS version 17 program.

Results:

A total of 78 patients were documented to have disturbed cardiac rhythm, their mean age was 6.9 years (range intrauterine life to 15 years. They were 40 Females (51.1%) and 38 (48.9%) males.

Nineteen patients, 11 females (57.9%) and 8 males (42.1%) aged less than a year (3.2 ± 0.54 months) (mean $\pm$ sem). The age range of this group was between 21 days and 8 months. Tachycardia was the presenting feature in 10 patients (52.6%). Heart failure reported in 7 patients (36.8%). Cough with breathless was reported only in two patients (10%). The mean heart rate in this group was 205 beats/min. SVT was confirmed by ECG in 17 patients (89.4%), and WPW syndrome was diagnosed only in two patients. Normal heart was reported in 15 patients (78.9%), ASD, VSD, MR and low ejection fraction were reported once in 4 different patients by echocardiography.

Table 1: Presenting symptoms in patient age-group between 21 days and 8 months.

Presenting symptom	Number of patients	%
Heart failure	7	36.8%
tachycardia	10	52.6%
Total	19	100%

The second age included, patients aged one year to 10 years with a mean age of 6.5years. This age group included 27 patients (34.6%) There were 12 (44.4%) female and 15 (55.6%) male. Chest pain and palpitation were the main presenting symptoms in 13 patients (48.2%), one patient had heart failure (3.7%) Palpitation

only was a presenting symptom in 7 patients (25.9%), palpitation and pallor reported in 3 patients (11.1%). Tachycardia reported in 3 patients (11.1%). The mean heart rate was 138 beats/min. two patients had WPW ECG evidences and the rest had SVT ECG changes in this group. Heart ECHO in this group was normal.

Table 2: Presenting symptoms in patient age-group between Patients aged at one year to 10 years.

Presenting symptom	Number of patients	%
Palpitation+chest pain	13	48.2%
Heart failure	1	3.7%
palpitation	7	25.9%
Palpitation + pallor	3	11.1%
tachycardia	3	11.1%
Total	27	100%

A third group was a group of patients who aged more than 10 years. There were 32 patients, 18 female (56.3%) and 14 male (43.7%). The mean age of this group was 11.8 years. The commonest presenting complains were palpitation and chest pain 22 patients (69%), followed by palpitation in 5 patients (19%). Palpitation with pallor was reported in 2 patients, and sinus tachycardia was reported in 2 patients each (6.3%). The mean heart rate in this group was (126 beats /min.). SVT was diagnosed by ECG in 30 patients (94%), and only one patient and other one (3%) had WPW ECG changes presented with palpitation. Echocardiographically, one patient (3%) had mitral prolapse, and another one had mitral regurgitation, and the rest had normal heart.

Table 3: Presenting symptoms in patient age-group more than 10 years old

Presenting symptom	Number of patient	%
Palpitation+chest pain	22	68.8%
palpitation	6	18.8%
Palpitation + pallor	2	6.3%
Tachycardia	2	6.3%
Total	32	100%

Discussion:

Dysrhythmia is an irregularity in heart rhythms that may lead to ineffective pumping of blood by blood. Most arrhythmias in infant, children and young adult are temporary and are not life threatening. About 5% of children presented to emergency by symptoms as abnormal heart beat, fatigue, dizziness and palpitation. Sudden death, heart failure and thromboembolic complications may be presenting symptoms². Cardiac arrhythmia in children can be participated by stress, exercise, serum electrolyte imbalance as sodium or potassium, magnesium, calcium, cardiomyopathy, injury from heart attack and heart muscle trauma.

Normally, the heart rate is higher during the first year of life in comparison to the subsequent age group before adult stage. In the current study, the heart rate was $(205.9 \pm 11, 138 \pm 12, 126 \pm 13)$ ((mean $\pm$ sem) at the three age group respectively. This was also reported earlier by Sacchetti et al¹⁴ 1999, but other reported lower heart rate record than the current study. The increased heart rate in the youngest age group in this study might be due to higher incidence of heart failure reported in this group, or might be due to the presence of non-diagnosed CHD that might precipitate the organic lesion or chamber abnormality that did not detected by echocardiography. Furthermore, most arrhythmias reported in this group were not fatal.

In this study, ECG proven SVT was the commonest arrhythmia in the three- age groups (>95%), especially in infancy and childhood age groups. This was not different significantly from the previous reports.^{4,15} The study showed that SVT documented in nearly all patients older than 10 years old, though, the patients were not significantly clinically ill, they were presented with palpitation, chest pain, and two patients had either mitral valve regurgitation or mitral prolapse. This was not completely agreed with others, Lee et al⁵ (2001) reported that the prevalence of SVT is much higher in critically ill children and young adults with congenital or acquired heart disease treated in pediatric cardiac intensive care unit. The commonest arrhythmia at childhood and early adulthood period is SVT that mostly mediated by accessory pathway as in WPW syndrome. A significant proportion of patients did not reveal pre-excitation ECG changes at the time of presentation and most of them were asymptomatic.¹⁶ Overall risk of sudden cardiac

death in WPW syndrome is estimated at 2 per 1000 patient years¹⁷. In this study, tachycardia was the commonest at presentation (53%), followed by heart failure evidences (36.6%) during infancy. SVT confirmed by ECG in 89% in less than one year old patients. About 80% of this age group had no cardiac ECHO findings, but only three patients had CHD and one child had poor myocardium function. WPW syndrome was reported in two patients. In the contrary, in the other two age groups, no ECG evidences of WPW syndrome had been documented.

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Conclusion:

Cardiac arrhythmias occur in children and young adults. SVT is the commonest arrhythmia during childhood age group, others cardiac arrhythmias occur. Parents' and school teachers' education to symptoms and signs of SVT, and clinical techniques to terminate SVT at home are needed. Further, studies and education methods must be investigated to explore the importance of the problem.