ORIGINAL RESEARCH PAPER

Cardiology

KEY WORDS: Ventricular premature complex, Atrial premature complex, Complete heart block.

USEFULNESS OF 24 HOURS HOLTER MONITORING IN DIAGNOSING PAEDIATRIC ARRHYTHMIAS

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ABSTRACT

Pediatric arrhythmias vary in presentation from congestive failure in infants to palpitations and syncope in older children. Our study aims to identify the place and role of continuous electrocardiographic 24 hr ECG monitoring in daily clinical practice of pediatric cardiology. **SUBJECTS AND METHODS:** We enrolled 100 pediatric patients (<12 years age) who were referred during the period of November 2018 to May 2019 to our centre. Among 100, 80 children referred for symptoms of arrhythmia and 20 children asymptomatic with ECG changes. All were evaluated initially with 12 lead electrocardiography (ECG) and trans-thoracic echocardiography. 24-hours holter monitoring was done for further evaluation. **RESULTS:** Totally there were 100 patients. Out of 100, 55 were males (55%) and 45 were females (45%). Age group varied from birth 12 years.11% patients belong to < 2 years old, 32% patients were between 2 to 8yrs and remaining 57% patients were between 8 to 12 years of age group. Out of the 100 patients studied 80 patients who were symptomatic, 35 patients (43.75%) had benign arrhythmias, 10(12.5%) patients had frequent VPCs but none developed ventricular tachycardia, 8(10%) patients had frequent APCs, 3 (3.75%) patients had 2nddegree AV block and 2(2.5%) patients had CHB and 2(2.5%) had intermittent preexcitation syndrome. Among 20 asymptomatic children 11 had complete heart block and 9 had WPW syndrome but none developed supraventricular tachycardia. **CONCLUSION:** Arrhythmias in pediatric population have varied presentation and diagnosis of pediatric arrhythmias remains challenging. 24 hours Holter monitoring is an important diagnostic tool in patients with suspected symptoms and it helps in risk stratifying pediatric patients for further management.

1. INTRODUCTION

Evaluation of pediatric arrhythmias starts with careful clinical history and complete physical examination. 24 hours holter monitoring is often an important tool in arriving at a diagnosis in pediatric population. Ventricular tachycardias are less common in children.

10-30% of children with sudden unexplained death have genetic mutations for channelopathies.Sinus node dysfunction and AV block are uncommon in children.Complete heart block is the most common cause of clinically significant bradycardia in children.

Pediatric arrhythmology which studies arrhythmias (dysrhythmias) in children, is still insufficiently explored area of pediatric cardiology. The incidence of significant arrhythmias in children is 2%, and if talked about all insignificant rhythm disorders up to 25%.

The basic mechanism for creation of arrhythmia is caused by instability of the membrane potential of the cells of the heart, which increases automatism and they become ectopic centers that alter the normal order of creation and implementation of stimulus in other parts of the heart. The most common arrhythmiain children's age is sinus tachycardia, and the most importantis paroxysmal supraventricular tachycardia. The main symptoms of dysrhythmias are: sense of general weakness, fatigue, palpitations, hypotension, dizziness, nausea, pallor, cold sweat, redness of the face (flushing), although the most difficult dysrhythmia can remain asymptomatic for years.

Diagnosis is based on a series of diagnostic tests; ECG, twenty-four-hour Holter monitoring, permanent methods of monitoring of the heart rate (transtelephonic ECG and loop recorder); echocardiography,scintigraphy; tilt-table test; ergometry; esophageal electrophysiology; cardiac electrophysiologic studies with programmed electrical stimulation. intracardiac electrophysiology; continuous electrocardiographic twenty-four-hour ECG monitoring is a sovereign diagnostic method (gold standard) of arrhythmias in children.

2. AIM

The aim of this paper was to show the place and role of continuous electrocardiographic twenty-four-hour ECG monitoring in daily clinical practice of pediatric cardiologists.

3. SUBJECTS AND METHODS

3.1 Study population:

The present work reviewed the Holter monitoring of 100 pediatric patients presenting to the department of Cardiology of madras medical college between November 2018 to may 2019. Most patients (80)were referred for the symptoms of palpitations, giddiness, precordial pain or irritability with or without underlying structural heart disease.Asymptomatic patients (20)with intermittent pre-excitation or complete heart block routine on 12 lead ECG were also referred.

All were evaluated initially with 12 lead ECG and then with trans-thoracic echocardiography.
24-hours Holter monitoring was done for further evaluation.

3.2 Methods:

Ambulatory 24 hour Holter recordings was obtained in a standard fashion with 3-channel (V1, V5, aVF) PC card recorders.The following parameters were noted.

Heart rate: Maximum, minimum and mean heart rates were measured and analysed.

Respiratory sinus arrhythmia was identified and if PP intervals were present that exceeded the previous PP interval by more than 10% (and not 2:1 SA block).

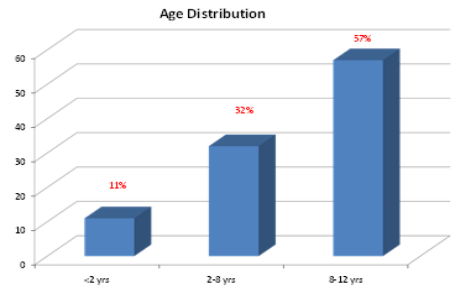
1st degree AV block was defined as PR interval of:- - More than 0.2 sec Supraventricular arrhythmias: number of premature beats in 24 hours was measured by counting them during every hour of recording and computing the total.

SVT ≥ 3 consecutive supraventricular extrasystoles.

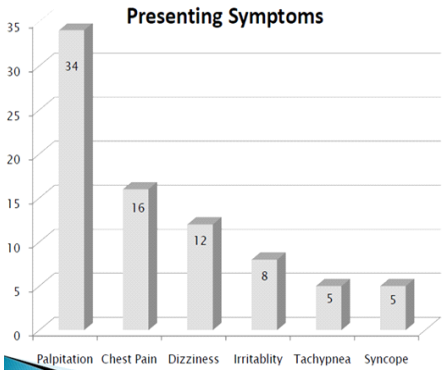
VT ≥ 3 consecutive ventricular extrasystoles.

4. RESULTS:

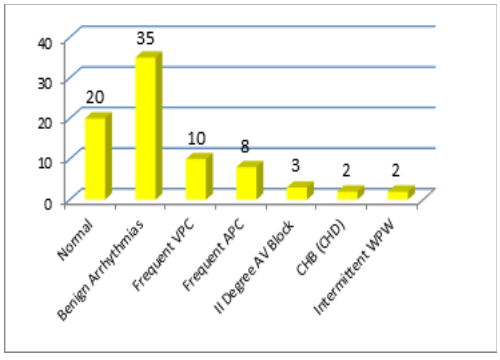
Totally there were 100 patients. Out of 100, 55 were males (55%) and 45 were females (45%). Age group varied from birth to 12 years.11% patients belong to < 2 years old, 32% patients were between 2 to 8yrs and remaining 57% patients were between 8 to 12 years of age group.



Out of 100 children, 20 did not have any symptoms and were referred for changes in 12 lead ECG. 80 patients were referred for symptoms of arryhthmia. The most common indications were palpitations (42.5%), chest pain (20%), dizziness (15%), irritability (10%), tachypnoea(6.2%) and syncope(6.2%).

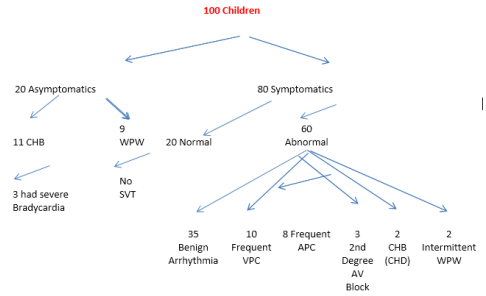


Abnormalities: Result in Symptomatic Children n=80



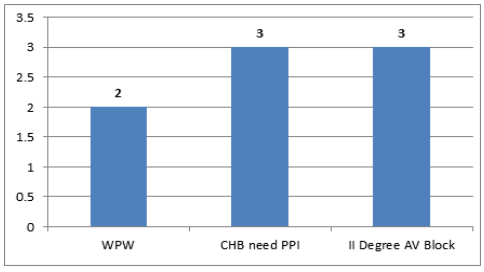
Out of the 100 patients studied 80 patients who were symptomatic, 35 patients (43.75%) had benign arrhythmias (< 5% isolated APCs/day , < 5% isolated VPCs/day), 10(12.5%) patients had frequent VPCs (>15% VPCs/day) but none developed ventricular tachycardia, 8(10%) patients had frequent APCs (> 15% APCs/day), 3 (3.75%) patients had 2nddegree AV block and 2(2.5%) patients had CHB and 2(2.5%) had intermittent preexcitation syndrome. Among 20 asymptomatic children 11 had complete heart block and 9 had WPW syndrome but none developed supraventricular tachycardia.

In total (symptomatic and asymptomatic) 13 (16.3%) had complete heart block, out of which 2 had underlying congenital heart disease. 11(13.8%) children had preexcitation syndrome.



In holter monitoring, 2 new cases of pre-excitation syndrome were newly detected, 3 CHB cases had pause more than 3.5 sec advised PPI and 3 cases of 2nd degree AV block were newly detected.

Newly Detected Cases



DISCUSSION:

Although widely used in arrhythmic disorders of adult patients, studies in the paediatric age group are limited5. Holter technology has endured for more than 40 years and proven to be a valuable adjunctive non-invasive diagnostic technology to record the ambulatory long term ECG1. Children are referred for 24 hour ECG monitoring for many indications6. The present work, which included 100 paediatric patients, showed that the commonest indication, for which children were referred, was for the evaluation of palpitations.Cardiac arrhythmias should be considered among the malignant causes of syncope in children 7,8. Hence syncope is a common cause of referral for Holter.

An earlier study by Drago et al.,11 concluded the diagnostic usefulness of Holter in paediatric fainting reporting a high diagnostic yield compared to resting ECG.In our study only 5 children were referred for syncope. Chest pain is a common cause of anxiety among patients and parents and it is one of the most frequent causes of referral to cardiology outpatient clinics15,16. Despite that, chest pain in children is very rarely caused by a significant cardiac pathology16-18. In our study 16 had precardial pain.

Although diagnostic assessment and treatment have been described in detail in patients with symptomatic WPW the management of asymptomatic subjects remains controversial31. Holter monitoring was deemed unnecessary in evaluation of asymptomatic patients with WPW19. Usually these patients are assumed to have a benign process, however very occasionally they present with VF as the first manifestation of the syndrome31 hence the dilemma of how extensively they should be investigated and managed. Despite the fact that it has been concluded that patients with WPW who develop AF and VF are different from those who don't32; noninvasive methods as HM seem to be relatively incomplete for risk stratification31. In our study 11 patients had WPW of which 2 patients were symptomatic.

CONCLUSION:

Arrhythmias in pediatric population have varied presentation and diagnosis of pediatric arrhythmias remains challenging. 24 hours holter monitoring is an important diagnostic tool in patients with suspected symptoms and it helps in risk stratifying pediatric patients for further management.

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