

Review Article

When to suspect heart diseases in Children?**Dr. P. John Solomon¹, Dr. A. Priya Margaret², Dr. S. Alph Shirley³**¹Professor & Director of Pediatrics²Assistant Professor of Pediatrics³Postgraduate trainee

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Abstract: General Practitioners and young doctors are often faced with a dilemma of making a definite diagnosis of cardiac disease. Even when it is a definite case of heart disease, it is difficult to differentiate a congenital heart disease from acquired heart disease. Pulmonary parenchymal diseases may be mistaken for acquired heart diseases. Methemoglobinemia may also be mistaken for heart disease. At birth and during the early years in the childhood period, children have cardiac murmurs and most often they are innocent. In the olden days when investigating facilities were not good, we would have missed some cardiac disorders or we would have even over diagnosed heart diseases. In the present day world of Scientific advances using advanced ECHO and other investigation facilities we are able to detect cardiac lesions early in life and confirm them accurately. This will help the patient and the doctor for early diagnosis and appropriate treatment before complications develop. But unfortunately these facilities and expertise are not available to all the patients and doctors particularly to those who are in remote areas. Here we plan to discuss a few guidelines which would help young doctors to suspect heart diseases in children and refer them early for expert management.

Keywords: Heart disease, clinical diagnosis.

Introduction

Diagnosis of cardiac disease is a tough task for General Practitioners and young doctors [1]. Even when it is a definite case of heart disease, it is difficult to differentiate a congenital heart disease from acquired heart disease. Pulmonary parenchymal diseases may be mistaken for acquired heart diseases. Methemoglobinemia may also be mistaken for heart disease. At birth and during the early years in the childhood period, children have cardiac murmurs and most often they are innocent. In the olden days when investigating facilities were not good, we would have missed some cardiac disorders or we would have even over diagnosed heart diseases. In the present day world of Scientific advances using advanced ECHO[2] and other investigation facilities we are able to detect cardiac lesions early in life and confirm them accurately.

Does the patient have a heart disease?

Alexander Nadas has given some guidelines which can help us to arrive at reasonable conclusion to say whether there is heart disease or not

Nadas Criteria

There are major and minor criterias. Presence of one major criteria or two minor criterias suggest the presence of heart disease in the child.

Major Criteria

Systolic murmur of Grade III or more in intensity
Congestive Heart Failure
Diastolic Murmur
Cyanosis

Minor Criteria

Systolic murmur of less than Grade III of intensity
Abnormal Second heart sound
Abnormal Blood Pressure
Abnormal ECG
Abnormal Chest X-ray Findings

Major Criteria

Pan systolic murmur of Grade III or more in intensity indicates the presence of VSD or Mitral Regurgitation or Tricuspid Regurgitation. If this murmur is associated with a thrill, it is almost certain of presence of heart disease.

An ejection systolic murmur of Grade III may be due to organic heart disease or anemia or hyperkinetic circulatory states. About 50 % of children below the age of five years have innocent soft ejection systolic murmur. If the ejection systolic murmur is associated with an ejection click or a thrill it is suggestive of organic heart disease. If there is no cardiomegaly, the second heart sound is normal and the ECG and Chest X-ray are normal, it is likely to be an innocent murmur.

Even when the heart is normal, severe anemia, systemic hypertension and hyperkinetic circulatory states can produce a diastolic murmur which will disappear when the cause is treated successfully. When these causes are ruled out the presence of diastolic murmur is significant.

Severe anemia, hypoxia, hypoglycemia and hypocalcemia can produce congestive cardiac failure. In the absence of these, congestive cardiac failure suggests the presence of a structural heart disease.

Cyanosis may be central or peripheral. Central cyanosis can be easily seen in the oral mucous membranes and the tongue. Peripheral cyanosis is seen in the exposed part of the body. In peripheral cyanosis, the arterial oxygen saturation is normal. Peripheral cyanosis is caused by low cardiac output and it is associated with cold extremities. Cyanosis is not clinically evident when Hemoglobin is less than 5 gm% and systemic saturation is above 85% and hence in severe anemia cyanosis may not be evident clinically.

Lung diseases, or cardiac diseases with right to left shunt can cause central cyanosis and it is characterised by arterial oxygen desaturation. Pulmonary venous desaturation may be due to the presence of blood flow in the areas of the lungs which are not ventilated and hence unoxygenated blood reaches the systemic circulation. Eg) Pulmonary atelectasis.

Bluish discolouration can be caused by methemoglobinemia also. But in this condition there is no clubbing and the clinical examination of the heart, X-ray chest and ECG are normal.

Minor Criteria

Sometimes even in severe heart disease the systolic murmur may be less than Grade III in intensity. It is possible to have a pan systolic murmur of less than Grade III intensity in mitral regurgitation or in tricuspid regurgitation if the right ventricles are dilated due to myocardial disease.

When we auscultate the heart sounds, each person may differ in the accuracy of the findings which is subjective in nature and hence the abnormality of the second heart sound is usually taken as minor criteria.

An abnormal ECG alone does not always mean heart disease. ECG helps us to determine the electrical axis and chamber hypertrophy. Diagnosing chamber hypertrophy based on voltages of QRS complex is also not specific for heart disease because it may be affected by blood viscosity, electrolyte imbalance, position of the electrode on the chest wall and the thickness of the chest wall. Hence if the clinical findings are normal and the X-ray chest is also normal and if the ECG alone is abnormal the child needs proper re-evaluation before labelling it as heart disease.

X-ray chest taken in expiration will show cardiomegaly. If the X-ray is taken in inspiration and if the diaphragm is below the tenth rib, presence of cardiomegaly is significant.

It is very difficult to record the correct blood pressure in infants and small children because of anxiety and non cooperation, and also due to the difficulty in getting appropriate sized BP cuff to cover two third of the circumference and length of the arm to connect to the mercury manometer. Large sized cuff will show low BP recording and small sized cuff will show high BP recording. The electronic and Doppler BP recording systems are not accurate.

The above mentioned are only guidelines and not confirmatory for the diagnosis of heart disease. Hence if the child is clinically normal and ECG and X-ray chest are abnormal, it is necessary to re-evaluate the child after a few weeks or months before labelling it as heart disease.

The above mentioned criteria have to be correlated with the clinical condition of the patient for clinical diagnosis of heart diseases. Whenever there is doubt, it is better to confirm the diagnosis by doing echocardiogram by a person who is well trained in Pediatric and neonatal echocardiogram.

Is the heart disease congenital or acquired?

Once the presence of heart disease is confirmed, it is important to determine if it is congenital or acquired. Some acquired heart diseases can present early in life. At the same time, some congenital heart diseases can be asymptomatic and present very late in life.

If the structural defect of the heart is present since birth it is congenital heart disease. Sometimes antenatal scan can detect heart disease in the fetus. Sometimes immediately after birth heart diseases can be detected. Obstructive and regurgitant lesions are easily detected at birth. Septal defects with shift to the left will be clear after some time. At birth the pressures and resistances in the pulmonary and systemic circuits are close to each

other and the left to right shunt will be clinically silent. After few days when the pulmonary vascular resistance decreases, left to right shunt will be clinically detectable. Accordingly VSD and PDA murmurs will be usually heard by the third, fourth or fifth day after birth. Thus if a heart disease is diagnosed very early in life as early as three years or below, it is very likely to be a congenital heart disease. If the murmur is present at birth, it is likely to be a left to right shunt.

The murmurs of congenital cardiac defects are usually heard well in the parasternal region but

sometimes in the secundum type of ASD the murmur may be heard in the apex. Thus if the murmur is parasternal, it is most likely to be congenital cardiac lesion. At the same time, it is not always possible to exclude congenital cardiac disease if the murmur is apical. If the suspected heart disease is associated with cyanosis, it is congenital. If the heart disease in a small child is associated with extra cardiac congenital anomalies like syndactily, polydactily, arachnodactily, hypertelorism etc, it is possibly a congenital heart disease. Some specific congenital anomalies and their associated cardiac lesions are given below [3].

Extra cardiac Anomaly	Congenital Heart Disease
Downs Syndrome(Trisomy 21)	Coarctation of Aorta, Aortic Stenosis, pulmonary stenosis
Turners syndrome	PDA, Peripheral pulmonary stenosis
Rubella Sydrome	ASD
Ellis-van- creveld syndrome	ASD
Holt-oram Syndrome	Aortic Regurgitation
Marfans syndrome	Aortic Regurgitation
Hurlers syndrome	VSD
Syndactily, Polydactily	ASD
Arachnodactily	ASD

CONCLUSION:

General practitioners and young doctors are often faced with the dilemma in spelling out confidently whether a child has heart disease or not and if so whether it is congenital or acquired. The above guidelines will help them particularly those in remote areas who do not have easy access to advanced imaging modalities to arrive at a definite diagnosis of heart disease, and facilitate further referral and management.

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