cardiacforum

CONGENITAL HEART DISEASE RECOGNITION & EARLY DIAGNOSIS

DR MAITRI CHAUDHURI
MD (PEDIATRICS)
FELLOW OF NATIONAL BOARD (PEDIATRIC CARDIOLOGY)
CONSULTANT PEDIATRIC CARDIOLOGIST
MANIPAL HOSPITALS, BANGALORE
PHONE: (+91) 9731721968
EMAIL: maitri_cee@yahoo.co.in
dr.maitri@cardiacforum.org

INTRODUCTION

Background:

The incidence of Congenital Heart Disease (CHD) is 4-8/1000 live births while the incidence of critical heart disease in children is 3/1000 live births. If we extrapolate these values to the current Indian annual birth rate, it is immediately obvious that we are staring at the "Tip of an Iceberg". The challenge is to recognize and identify these babies at the earliest.

STEP I : Recognition of Congenital Heart disease:

The manifestations of CHD are subtle and also different among neonates, infants and children.

Also many of these presentations can be picked up by an alert pediatrician and also sometimes these features might overlap with those of noncardiac diseases. I wish to tabulate the "Danger Signs" for quick recognition.

I call it the ASK, LOOK & LISTEN approach.

Remember ALL - Its ALL you need...

ASK

PREGNANCY & DELIVERY

1. Maternal infections(Rubella), Maternal drugs(Lithium, OCP, Anti epileptics etc), Gestational Diabetes, Hypothyroid, SLE
2. Maternal Smoking(including Passive), Alcohol
3. Birth Weight, Prematurity, Birth Aphyxia
4. 'Test Tube' Babies, Repeated Abortions, Child Loss

NEONATAL PERIOD

1. CENTRAL CYANOSIS(Sats<90%), Positive Hyperoxia Test
2. Difficult/ fast Breathing (Respiratory Rate Persistently More than 60/min)
3. Murmur
4. Poor Weight Gain
5. Evidence of Genetic Syndromes(Down's etc)
6. Other Major Malformations like Tracheoesophageal Fistula, Anorectal malformations etc

OLDER CHILDREN

1. Repeated Chest Infections(>2 in six months or >3 in one year)
2. Fast Breathing / Difficult breathing
3. Sweating of Forehead
4. Central Cyanosis , Cyanotic Spell
5. Poor Weight Gain (<5th Percentile For Age)
6. Delayed development(delay in sitting/standing/ walking)
7. Easily gets tired than playmates
8. Detection of Murmur
9. Hypertension
10. Unexplained Chest Pain, Syncope, Palpitations
11. Fever and migratory joint pain, joint swelling esp. beyond 5yrs of age
12. Positive Family History For Heart Disease, Sudden Death in Young

LOOK & LISTEN

LOOK

1. Heart Rate- Inappropriately Low or High
2. Pulses in all four limbs – Absent Femoral Pulses indicates Aortic Arch Anomaly
3. Saturations: Persistent Cyanosis Not responding to Oxygen Means Cyanotic Heart Disease
4. Respiratory Rate and Pattern
5. Mottling of Body and Cold Peripheries
6. Blood Pressure in All Four Limbs
7. Hyperdynamic Precordium, Visible Cardiac Pulsations
8. Soft, Tender Hepatomegaly

LISTEN

1. Abnormal Heart Sounds
   (Focus on S2 – Wide fixed split or Single S2 or very loud P2 suggest Significant Heart Disease)
2. S3 Gallop/ S4/ Pericardial Rub/ Valve Click
3. Murmurs
   -Any Diastolic Murmur
   - Systolic Murmur ≥ Grade III in Intensity
4. Abdominal or Carotid Bruit
5. Chest – crepitations/ decreased air entry

STEP II : FIRST LINE INVESTIGATIONS

1.Electrocardiogram (ECG) : Records the electrical activity in the heart, pacemaker function, arrhythmias, cardiac axis, ischemia - infarction, chamber enlargements. Miscellaneous conditions like dyselectrolytemias, pericardial effusion, hypothyroidism etc can be indirectly assessed.

2.Chest X Ray(CXR): Extremely useful in understanding cardiac enlargement, cardiac contours, pulmonary arterial and pulmonary venous hypertension, aortic arch sidedness, lung parenchyma, pleural effusion, pneumothorax and abdominal situs(relative position of liver and stomach bubble).

3. Echocardiogram: Echo is an ultrasound of heart where two dimensional information is combined with colour flow imaging and Doppler. Recent machines also have three dimensional and Tissue Doppler Imaging.

The basic points to look for in a congenital echo are:

a) Cardiac Situs & Cardiac Axis
b) Arrangement of Right Atrium(RA), Left Atrium(LA), Interatrial Septum(IAS), Systemic and Pulmonary Veins
c) Arrangement of Right Ventricle(RV), Left Ventricle(LV), Interventricular Septum(IVS)
d) Cardiac valves- Mitral, Tricuspid, Aortic and Pulmonary
e) Great Arteries- Aorta , Pulmonary Artery(PA) and PDA
f) Aortic arch- Coarctation, Interruption, Aneurysm etc
g) Pulmonary arterial Pressures
h) Cardiac dimensions and function
i) Pericardial effusion, Vegetations, cardiac clots

Bedside echocardiography has revolutionized pediatric cardiology. A number of therapeutic procedures like balloon atrial septostomy in newborns, pericardial fluid tapping in cardiac tamponade can be done in ICU with the help of an echo machine.

SECOND LINE INVESTIGATIONS

1. **CARDIAC CATHERISATION & ANGIOGRAPHY:** It is an inpatient procedure where under ketamine- midazolam sedation or general anesthesia, direct pressure recording catheters are placed inside the heart chambers and intracardiac pressures, oxygen saturations, cardiac output, valve areas are measured. During angiography, radioactive contrast is injected via cardiac catheters and information about valve stenosis, shunts, regurgitation etc are obtained.

2. **CT Angiogram:** It is an alternative modality where radioactive contrasts are injected via peripheral vein through a 22G IV cannula and focused CT is done of pulmonary artery, aortic arch etc. The disadvantage is this that intracardiac pressures cannot be recorded.

3. **Cardiac MRI :** This is a noninvasive test and also there is no risk of radiation. Both angiographic and hemodynamic information can be obtained. However, pediatric cardiac MRI is not yet available in India.

4. **Holter Monitoring:** It is a 24 hour ambulatory ECG monitoring especially useful in situations of inappropriate bradycardia, tachycardia, arrhythmias etc. Often used in pediatric patients where baseline ECG is abnormal or there is unexplained syncope.

5. **Tread Mill Test (TMT) :** Although very commonly used in adult coronary heart disease, the use of TMT in children is restricted to demonstration of occult arrhythmias or postoperative children to assess the functional capacity. In children, modified Bruce protocol is used and continuous ECG and BP monitoring is done. In many places a lung function test is done before starting TMT.

CONCLUSIONS

Clinical examination including ECG and chest x-ray help answer the important question **"Does the patient have CHD?"**. Once CHD is suspected it is often vital to establish an accurate and complete diagnosis. This is usually achieved through detailed and systematic echocardiography.Other investigative modalities such as cardiac catheterization and cineangiography and rarely, cardiac MRI may be used in specific situations.

Most of the congenital heart diseases are absolutely treatable today. However, we miss many patients because we are not aware. The results for heart surgery in newborns and small children are excellent in the current era. So there is no point in waiting and watching. Pediatricians form the first line of pillar and on minimal doubt, a pediatric cardiologist should be called. Today with availability of portable echo machines, we should be able to reduce the incidence of CHD definitely.

Remember ALL - Its ALL you need...

References

1. Fyler DC. Report on the New England Regional Infant Cardia Program. Pediatrics 65(Suppl)1980, 377.
2. Hoffman JIE, Reflections on the past present and future of pediatric cardiology. Cardiol Young 1994;4-208-223.
3. Fyler DC, Trends in Nadas Pediatric Cardiology, Fyler DC ed, Hanley & Belfuss, 1992, pp 273-280.
4. Ferencz C, Rubin JD, McCarter J, et.al. Congenital heart disease: prevalence at live birth-the Baltimore Washington Infant Study, Am J of Epidemiology 1985:121:31-6.
5. Montana E, Khoury MJ, Cragan JD, Sharma S, Dhar P, Fyfe D. Trends and outcome after prenatal diagnosis of congenital cardiac malformations by fetal echocardiography in a well defined birth population, Atlanta, Georgia, 1990-94. J Am Coll Cardiol 1996;28:1805-9.
6. Bower C, Ramsay JM. Congenital Heart Disease: a 10 year cohort. J Paediatr Child Health 1994;30:414-18.
7. Lees MH, King DH, Heart disease in new-borns, in Moss' Heart Disease in infants children and adolescents. ed Adams FH, Emmannouilides GC, Reimenschneider TA, 4th edition, William and Wilkins, Baltimore, 1989, pages 842-55.
8. Walsh EP, in Nadas Pediatric Cardiology, Fyler DC ed, Hanley & Belfuss, Philadelphia, 1992, pp 117-158.
9. Kumar K, Shrivastava S, The Present state of surgery for transposition of great vessels, Ind J Paeditr, 1991;58:641-653.
10. Nadas AS, Thilenius OG, Lafarge CG, Hanck AJ, Ventricular septal defect with aortic regurgitation: Medical and Pathologic aspects. Circulation 1964;29:864.
11. Huhta JC. Heart Surgery without cardiac catheterization, in Moss' Heart Disease in infants children and adolescents. ed Adams FH, Emmannouilides GC, Reimenschneider TA, 4th edition, William and Wilkins, Baltimore, 1989, 996-1002.
12. Fletcher BD, Jacobstein MD. MRI of congenital abnormalities of the great arteries. AJR 1986; 16:941-48.

cardiacforum

DR MAITRI CHAUDHURI

Cardiac forum: The First Exclusive Cardiology Forum

www.cardiacforum.org

Cardiology Discussions Forum
Free Medical Book Downloads
Free Medical Videos
Free Case Studies
Free Cardiology Powerpoints and more...

Follow us on twitter : www.twitter.com/cardiacforum