

Importance of Cardiac Murmur in Diagnosing Congenital Heart Disease in Neonatal Period

MD. MAHBUBUL HOQUE¹, JOTSNAARA BEGUM², RAWSHAN JAHAN³, MAK AZAD CHOWDHURY⁴, MANZOOR HUSSAIN⁵

Abstract

Introduction: Congenital heart diseases (CHD) are serious problem of perinatology, occur in 8/1000 live birth. Approximately one third of these neonates require intervention in the first month of life. Clinical features of CHD vary according to type of lesion. Presence or absence of a murmur does not assure either the presence or absence of significant CHD. This study was conducted to determine the clinical and echocardiographic evaluation of neonate with heart murmur and contribution of neonatal examination especially presence or absence of cardiac murmur in the detection of CHD.

Method: The study was carried out in Special Care Baby Unit of Dhaka Shishu Hospital during the period from January 2004 to December 2004. Neonates having heart murmur or when there were some clues to doubt CHD like cyanosis, respiratory distress, heart failure, persistent low partial pressure of oxygen (PaO₂) in arterial blood gas analysis were underwent echocardiography. CHD were classified according to the structural defect with the echocardiographic findings.

Results: Total 812 neonates were admitted during one year period. Heart murmurs were found in 33 cases. Out of 33 cases 15 (45.45%) had CHD confirmed by echocardiography. Another 7 neonates were found to have CHD without murmur after echocardiography. In total 22 (2.7%) neonates had CHD. Pattern of CHD were Ventricular Septal Defect (VSD), Atrial Septal Defect (ASD), Transposition of Great Arteries (TGA), Tetralogy of Fallot (TOF) and Complex cyanotic heart disease.

Conclusion: Infant with CHD may present with or without murmur. Careful clinical examination is mandatory in the initial evaluation of neonates to identify CHD. The infant having suggestive features for CHD with or without murmur should undergone echocardiography, so that appropriate intervention and counseling can be done.

Key words: neonates, murmur, CHD.

Introduction

Congenital heart diseases (CHD) are one of the serious problems of perinatology¹. CHD occurs in 7-8 per 1000 live births, with approximately one third of these neonates requiring intervention in the first month of life^{2,3}. So diagnosis of CHD at the earliest possible time is very important as early referral and appropriate intervention in some of these cases are life saving.

Clinical manifestation of CHD varies according to the type of lesion. Neonates with respiratory distress, cyanosis, feeding difficulties, low cardiac output, dysmorphic syndromes commonly have CHD³. These clinical manifestations of CHD are also the features of other non-cardiac causes in the early neonatal period like perinatal asphyxia, RDS, transient tachypnoea, congenital pneumonia, sepsis, pulmonary hypoplasia, etc. Significant cardiac murmur is one of the differentiating point between them, though the presence or absence of a murmur does not assure either the presence or absence of significant congenital heart disease. Rein et al., from Israel found that 86% of asymptomatic neonates presenting with a murmur in the first days of life have

1. Associate Professor of Neonatology, BICH & Dhaka Shishu Hospital, Dhaka
2. Assistant Professor, BICH & Dhaka Shishu Hospital, Dhaka
3. Medical Officer, Dhaka Shishu Hospital, Dhaka
4. Professor and Head of Neonatology, BICH & Dhaka Shishu Hospital, Dhaka
5. Professor and Head of Paediatric Cardiology, BICH & Dhaka Shishu Hospital, Dhaka

Correspondence: Dr. Md. Mahbubul Hoque

structural heart disease⁴. In another study showed that neonatal examination detects 44% of cardiac malformation which present in infancy, if a murmur is heard there is 54% chance of there being an underlying cardiac malformation⁵.

Clinical evaluation could determine the presence or absence of heart disease in most neonates but echocardiography is necessary to exclude or confirm the clinical finding. This prospective study was conducted to determine the clinical and echocardiographic evaluation of neonate with heart murmur and contribution of neonatal examination especially presence or absence of cardiac murmur in the detection of CHD.

Materials and Methods

This prospective study was conducted in Special Care Baby Unit (SCBU) of Dhaka Shishu Hospital from January, 2004 to December, 2004. Dhaka Shishu Hospital is a 385 bedded paediatric hospital having a SCBU of 24 beds. It does not have maternity unit. All the newborn admitted here were born outside the hospital and transferred to this hospital for different problems.

Routine examination of all admitted newborns (0-28 days) were undertaken initially by resident house officer and then by a senior paediatrician within 24 hours of admission. Neonates having heart murmur or when there were some clues to doubt CHD like cyanosis, respiratory distress, heart failure, persistently low PaO₂ in arterial blood gas (ABG), echocardiography was done to evaluate structural defect of heart. Echocardiographs were performed by a paediatrician working in paediatric cardiology unit and having training in echocardiography, using 2D echocardiograph machine of Siemens-Sonoline Prima, MC 12E6J3-MI, 1999, Japan. All babies were classified according to their cause of referral and physical findings, and subsequently with echocardiography finding, CHD were classified according to their structural defect.

Results

Total 812 neonates were admitted during the study period. Heart murmurs were found in 33 cases. Out of 33 cases 15(45.45%) had CHD confirmed by echocardiography. Another 7 neonates were found to have CHD without murmur after echocardiography. In total 22 (2.7%) neonates had CHD out of total 812

babies (Table-I). Out of 22 cases 15 were term and 7 were preterm babies. Table-II shows various presentations of CHD cases. Eight babies were cyanosed on admission and out of these 8 cases 4 were finally diagnosed as cyanotic heart disease. All the TOF cases were not blue but diagnosis was made after echocardiography. VSD were found in 36.6% of cases followed by ASD (31.8%), TGA and TOF were diagnosed in 13.6% cases each. Table-III shows causes of initial admission of CHD cases and their final diagnosis after echocardiography.

Table-I
Percentage of CHD in relation to murmur

	Murmur No.	CHD No. (%)
Present	33	15 (45.4)
Absent	779	7 (0.9)
Total	812	22 (2.7)

Table-II
Presentation of CHD cases on admission

Presentation	Number
Cyanosis	8
No cyanosis	14
Resp. distress with or without cyanosis	16
Reluctance to feed	12
Heart failure	1

Table-III
Types of structural defects of CHD cases (n=22)

Structural defects	No. (%)
VSD	8 (36.6)
ASD	7 (31.8)
TOF	3 (13.6)
TGA	3 (13.6)
Complex cyanotic heart disease	1 (4.5)

Table-IV
Comparison of initial and final diagnosis of CHD cases (n=22)

Initial diagnosis	Number	Final diagnosis
Perinatal asphyxia	4	Perinatal asphyxia & ASD
Perinatal asphyxia	1	Perinatal asphyxia & TOF
Preterm, LBW, Sepsis	3	Preterm, LBW, Sepsis & VSD
N. Convulsion	2	Hypoglycaemia & ASD
S. Pneumonia	3	S. Pneumonia & VSD
N. Sepsis, Jaundice	1	N. Sepsis, Jaundice & ASD
N. Sepsis, Inguinal hernia	1	N.Sepsis, Inguinal hernia & TOF
CHD (acyanotic)	2+1	VSD & TOF
CHD (cyanotic)	3+1	TGA & Complex heart disease

Discussion

The difficulties in detecting heart disease at neonatal examination are well known. Although congenital heart disease is present at birth, there are often no signs and babies may be asymptomatic. Detection of a murmur on routine examination may be a clue for heart disease and offers the possibilities of early, presymptomatic diagnosis and requires further evaluation.

We have found heart murmur in 33 cases out of 812 neonatal admissions. Forty five percent of the babies with heart murmur were found to have structural cardiovascular malformation after echocardiogram. Detecting heart disease at neonatal examination is very difficult as after birth there are rapid change within the cardiovascular system (CVS) as part of adaptation to extrauterine life, which may produce some murmur that can be mistaken for CHD⁶. Anisworth et al., found heart murmur in 46 (0.6%) neonates out of 7204 during routine neonatal examination of whom 25 (54%) had cardiac malformation⁵. But Kociszewska et al., showed high incidence of murmur during routine neonatal examination. They had found 107 (8.3%) out of 1291 newborn had murmur and 93 (86.9%) of these 107 infants had congenital heart diseases by echocardiography¹. Another study in Israel showed 170 (0.84%) neonates out of 20323 had murmur during examination, of these 147 (86%) were found to have structural heart disease⁴. ZD Du also concluded in his study that 84% of heart murmur in neonates was due to heart disease and 16% were due to innocent murmur⁷.

Detection of a murmur depends on the examiners skill and experiences, the timing and frequency of examination and the condition under which examination takes place. These may be the reasons of variation of reported prevalence of murmur in neonate from low to high as shown by different studies. However all studies including our one supports that all babies with murmur should undergo early paediatric cardiological assessment.

In our study, 7(31.8%) out of 22 CHD cases did not have any murmur. These 7 babies were finally diagnosed to have CHD after echocardiography due to presence of signs and symptoms other than murmur. Anisworth et al., found 48% of CHD in infancy without heart murmur and Shima et al., found 40% CHD without murmur and cyanosis^{5,8}. In our study 8 babies were presented with cyanosis and 15 babies with respiratory distress with or without cyanosis.

VSD was found as most common single lesion (37%) by Rein et al., followed by PDA (23%)⁴. This findings were similar to this study, we have found VSD in 36.6% cases. But we did not find any cases of Patent ductus arteriosus(PDA), probably it could be due to difficulty to identify PDA by 2D echocardiogram machine and at same time majority cases were term baby where chance of PDA is less. One study done in Japan showed that ASD were 9.6% in term neonates presented with heart murmur. But ASD was found in 31.8% cases in this study. Kociszewska et al., concluded in their study that Patent foramen ovale (PFO) was the most frequently observed abnormality in echocardiograph in infant with heart murmur¹. For

differentiation between PFO and ASD follow up echocardiography is needed.

Conclusion

It can be said that prevalence of CHD in newborn is not negligible. Infant with CHD may present with or without murmur. So, the careful clinical examination is mandatory in the initial evaluation of neonates to identify CHD. Infants having features suggestive for CHD with or without murmur should undergo echocardiography, so that appropriate intervention and counseling can be done.

References

1. Kociszewska NB, Zacharska KE, Kulikowska MJ, Marianowski L. Echocardiographic abnormalities in infants with heart murmur. *Ginekol Pol* 2004; 75: 445-50.
2. Wechsler SB, Wernovsky G. Cardiac disorders. In: Cloherty JP and Stark AR, editors. *Manual of Neonatal Care*. 4th ed. Philadelphia: Lippincott-Raven press;1998. P. 393-451.
3. MaConnell ME, Elixon EM. The neonate with suspected congenital heart disease. *Crit Care Nurs Q* 2002; 25: 17-25.
4. Rein AJ, Omokhodion SI, Nir A. Significance of a cardiac murmur as the sole clinical sign in the newborn. *Clin Pediatr (Phila)* 2000; 39: 511-20.
5. Anisworth S, Wyllie JP, Wren C. Prevalence and clinical significance of cardiac murmurs in neonates. *Arch Dis Child Fetal Neonatal Ed* 1999; 80: F43-F45.
6. Archer N. Clinical implication of adaptation to birth. *Cardiovascular diseases*. In: Rennie MAJM, editor. *Robertson's Textbook of Neonatology*. 4th edition. Philadelphia: Churchill Livingstone; 2005. P. 619-58.
7. Du ZD, Roguin N, Barak M. Clinical and Echocardiographic evaluation of neonates with heart murmurs. *Acta Paediatr* 1997; 86: 752-56.
8. Shima Y, Takechi N, Ogawa S. Clinical characteristic of congenital heart disease diagnosed during neonatal period. *J Nippon Med Sch* 2001; 68: 510-15.
9. Takami T, Kawashima H, Kamikawa A, Takei Y, Miyajima T, Hoshika A. Characteristics of 11 neonates with atrial septal defects detected by heart murmurs. *Am J Perinatol* 2003; 20: 195-99.