



INCIDENCE AND SIGNIFICANCE OF CARDIAC MURMURS IN ASYMPTOMATIC FULL TERM NEONATES

KEYWORDS

SHL, CHEST X-RAY, ECG, ECHO.

Dr. Nivedita Patil

Associate Professor, Department of Paediatrics, D.Y.Patil Hospital, Kadamwadi, Kolhapur, Maharashtra, India.

Dr. Rohit Kalani

Junior resident
Department of Paediatrics, D.Y.Patil Medical College

Dr. Shankar Rai

Junior resident
Department of Paediatrics, D.Y.Patil Medical College

ABSTRACT

Aim & Objectives: To determine the incidence of cardiac murmurs in asymptomatic full term neonates, assess the accuracy of Chest X-ray (CXR), Electrocardiography (ECG) and Echocardiography (ECHO) in diagnosing presence of SHL. **Methods:** Each neonate was subjected for CXR, ECG & ECHO. **Result:** Incidence of SHL 22.1 per 1000 live births. Out of 62 neonates who had audible murmur, 44 cases (70.1%) had SHL confirmed on ECHO. CXR and ECG aided diagnosis in 14(31.8%) and 5(11.36%) cases, with sensitivity and specificity of 31.82% and 44.4%, 11.36% and 66.6% respectively. ECHO revealed Ventricular septal defect (VSD) being most common SHL in 19 cases (30.6%), Patent Ductus Arteriosus (PDA) in 9 (14.5%) and Atrial Septal Defect (ASD) in 6 (9.67%). **Conclusion:** The possibility of finding a SHL in asymptomatic term neonates with a murmur is statistically significant; CXR and ECG examinations are of limited value.

INTRODUCTION:

Heart murmurs are the consequence of a turbulent blood flow, however, not all cardiac murmurs indicates structural cardiac problems¹. Congenital heart disease (CHD) in neonates can have varied manifestations like presence of a murmur, cyanosis, weak pulses, and signs of congestive cardiac failure. The other features are obvious and easy to identify whereas a heart murmur needs an experienced ear. Presence of murmur however causes undue anxiety among parents and treating paediatrician leading to many unnecessary investigations. There is a tendency, however, to neglect or omit important aspects of the cardiovascular examination if an orderly routine is not followed. Murmurs can be a single sole sign of presentation of Significant Heart Lesion (SHL). We undertook a study which was aimed to evaluate each murmur thoroughly and systematically to find out their relation with Heart Disease and concurrently assess the reliability of various diagnostic tools (Chest X ray, ECG) which is routine in many setups, and as per many studies adds no extra information.

MATERIALS & METHODS

Study Design: All the term born neonates were examined daily by two observers at different times from day 1 of birth till their hospital stay. Detailed clinical examination with special attention to cardiovascular system examination was done. Auscultation of heart was done with the help of binaural paediatric Littman stethoscope. Asymptomatic term born neonates detected to have cardiac murmur by both observers were included in the study. Written and informed consent from parents was taken before the subject was included in the study. Study was approved by the ethical committee and the university.

Newborns less than 37 weeks (preterm) of gestation and neonates with congenital malformations/ dysmorphic features were excluded from the study. Birth details, including time of detection, and grade of murmur were noted as per proforma. Then each neonate was subjected for Chest X-ray and Electrocardiography (ECG) and were evaluated by Radiologist and Paediatric Cardiologist respectively. Echocardiography and color Doppler was done in all Newborns for confirmation of diagnosis (considered a diagnostic standard).

Period: The Study was carried out in the Department of Paediatrics, D.Y. Patil Hospital, Kadamwadi, and Kolhapur over the period of 24 months (July 2011- Aug 2013)

EQUIPMENTS:

- A binaural paediatric Littman stethoscope.
- 12 lead ECG.
- Digital X- ray (Meditronics)
- M mode Echocardiography (Mindray DC 7 USG Doppler machine Probe 7.5 MHZ).

Type of Study:

Cross Sectional Study

Statistical Analysis: Graph pad Quick cal software is used for analysis of data. Chi- square test (with Yates correction) is used for comparing difference in percentage and also to see the association. Qualitative data is analysed is using chi-square test and probability is calculated at 0.05 level of critical significance.

RESULTS:

Total number of healthy term live births during above mentioned period were 2800, with male: female ratio of 1.04:1, out of these 62 healthy term neonates had audible murmur which were included in the study.

The incidence of cardiac murmurs among healthy term babies was 22.1 Per 1000 live births (i.e. 2.21%).

TABLE 1

Chest X – Ray	Frequency	Underlying SHL	NO SHL
Abnormal	24	14	10
Normal	38	30	8
Total	62	44	18

X²= 2.116p=0.1458 not significant

The above table 1 shows the Chest X-ray findings in suspecting structural heart lesion. All 62 infants had X-rays done and it aided 14 (31.8%) neonates in the diagnosis of structural heart lesion with X-rays.

TABLE 2

ECG	Frequency	Underlying	
		SHL	NO SHL
Abnormal	11	5	6
Normal	51	39	12
Total	62	44	18

$\chi^2=2.853$ $p=0.0912$ not significant

The above table 2 shows the ECG findings in suspecting structural heart lesion. ECG was done in every neonate and was helpful in 5 (11.36%).

The incidence of structural heart lesion in study population is 44 cases (70.9%), proved by Echocardiography

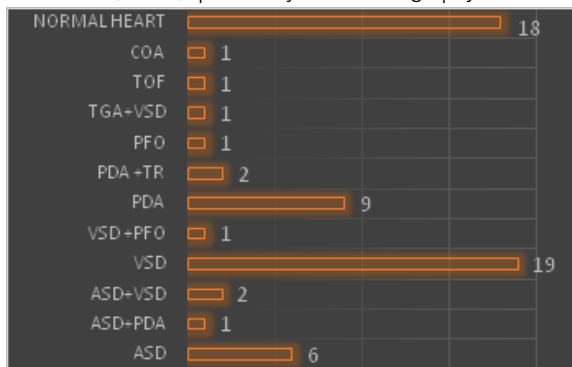


Fig 1: Echocardiographic (ECHO) Findings:

The most frequent Echo diagnosis was VSD in 19(30.6%) cases followed by PDA 9 cases (14.5%); ASD in 6 (9.67%); ASD +VSD, PDA+TR in 2 cases each(3.22%) and ASD+PDA,VSD +PFO, PFO, TGA +VSD, TOF, COA in one case each(1.61%). 18 (29.03%) cases were diagnosed as Normal heart.

DISCUSSION:

The purpose of the study was to address one of the frequently asked questions in neonatology units: what is the clinical significance of a murmur detected in an otherwise asymptomatic neonate, and above all how helpful are chest roentgenogram and Electrocardiography in making the diagnosis.

In the present study incidence of cardiac murmur was 22.1 per 1000 term live births which is comparable with the study done by Bansal et al² and Lardhi AA et al³.

The sensitivity and specificity of Chest radiographs were 31.82% and 44.4% respectively which was comparable to study done by Birkebaek NH et al⁴, they reported sensitivity (43%) and specificity (82%) and showed that ECG and chest X-Ray examination add little to the clinical evaluation of the child with an asymptomatic heart murmur. Our study is also comparable to study done by R.S Oeppen et al⁵ who reported sensitivity (20%) and specificity (83%) respectively. A prospective study done by M Hussain et al⁶ reported higher sensitivity (72.9%) but nearly similar specificity (50%), this difference could be because we included

only asymptomatic cases.

ECG reported sensitivity of (11.36%) and specificity of (66.6%) which was comparable to meta-analysis done by Isabel et al⁷ where eleven studies were retrieved. Six evaluated auscultation: 5 were prospective descriptive studies, one was a case-control study. Five prospective descriptive studies evaluated ECG and CXR. The number of children assessed per study ranged from 100 to 322 with sensitivity and specificity of ECG as 13% and 100% respectively, they also concluded that ECG and CXR caused many false positive results (11%) and did not contribute significantly to the differentiation of heart murmurs. A study done by M Hussain et al⁶ reported higher sensitivity (55.9%) but similar specificity (66.7%), with many false positive(36.61%) results. This variation could be because we included only asymptomatic cases.

Raj Kumar et al⁸ in their study of 128 children referred to paediatric cardiologist with a heart murmur, concluded that the revision of diagnosis with review of ECG and CXR was more often misleading than helpful.

In the present study incidence of SHL was 70.9%, which is comparable to study done by Bansal et al² where they reported underlying SHL (74%). Another study done by Rein AJ et al⁹ reported higher incidence (86%), probably because they included both term and preterm. Though there is a wide variation in cases diagnosed with murmur and underlying structural heart lesion.

In the present study we found 9 PDA (14.5%) and 1 PFO(1.6%), If we presume that these close spontaneously, then the incidence of SHL would be 54.8%. Christie¹⁰ found that the ductus closed in 88% of babies by the 8th week of life and in 99% by the age of 1 year and PFO in 95%.

The most frequent SHL detected in this study was VSD 19 Cases (30.6%), which is comparable to all the studies mentioned above. Bansal et al² found VSD as the most common lesion amounting to 65.63% of the lesions. Sean BA et al¹¹ in their study also found that the most common diagnosis was a ventricular septal defect, which was 37% (54/147), followed by patent ductus arteriosus 23% (34 newborns).

CONCLUSION:

1. The magnitude of cardiac murmur in term born asymptomatic neonates is 22.1/1000 live births 2. Chest X Ray and ECG are of limited values in evaluation 3.The possibility of finding SHL in asymptomatic neonate with murmur is significant 4. Asymptomatic term neonate with a murmur should undergo echocardiography as and when detected.

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REFERENCE

1. Pelech AN. The Cardiac murmur. When to Refer? *PediatrClin North Am* 1998;45:107-122. | 2. Bansal M, Jain H. Cardiac murmur in neonates. *Indian pediatrics*.2005;42:397-398 | 3. Lardhi AA. Prevalence and clinical significance of heart murmurs detected in routine neonatal examination. *J Saudi Heart Assoc*. 2010;22:25-27. | 4. Birkebaek NH et al. Diagnostic value of chest radiography and electrocardiography in the evaluation of asymptomatic children with a cardiac murmur. *ActaPaediatr*. 1995 Dec;84(12):1379-81. | 5. R.S Oeppen, J.J Fairhurst, J.D Argent Diagnostic Value of the Chest Radiograph in Asymptomatic Neonates with a Cardiac Murmur. *Clinical Radiology*. 2002;57:736-740. | 6. Hussain M, Tahura S, Sayeed MA, Al Khan. Accuracy of clinical assessment, CXR and ECG evaluation in the diagnosis of heart disease in children *DS (Child) H J*. 2009;25:1&2. |