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Original research article

A study on critical congenital heart defects in asymptomatic newborn babies

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Abstract

About 1 in every 4 babies born with a heart defect has a critical congenital heart defect (critical CHD, also known as critical congenital heart disease). Critical congenital heart diseases consist of a subgroup of congenital heart diseases which needs surgery or catheter intervention in the neonatal period. In Asymptomatic new borns measurement of saturations using pulse oximeter on the Right hand and foot was carried out after 24hrs of birth. Saturations above 95% was regarded as having negative screen. Those with saturation below 90%were subjected to Echocardiography. Patients with saturations between 90 and 95 % were subjected to a second pulse oximetry screen 6-12 hrs later. Screening was done after 24 hrs of birth. 25% of neonates suffering from CCHD were males and 75% of neonates suffering from CCHD were females. All 4 (100%) of neonates suffering from CCHD were Low birth weight babies. None of the babies who were born with birth weight of >2500gms were found to be suffering from CCHD. This association was statistically significant.

Keywords: Congenital heart defects, asymptomatic, newborn babies

Introduction

Congenital heart disease (CHD) is a leading cause of infant mortality, accounting for more deaths than any other type of malformation [1]. Congenital Heart Disease (CHD) is defined as a gross structural abnormality of the heart or intrathoracic great vessels that is actually or potentially is of functional significance. This definition excludes functionless vascular anomalies like-persistent left superior vena cava, cardiomyopathies due to genetic defects, electrophysiological disturbances like long QT syndrome, WPW syndrome. The incidence of CHD varies between 4-10/1000 live births in India [2].

About 1 in every 4 babies born with a heart defect has a critical congenital heart defect (critical CHD, also known as critical congenital heart disease). Critical congenital heart diseases consist of a subgroup of congenital heart diseases which needs surgery or catheter intervention in the neonatal period [3].

Surgery greatly improves survival, particularly for infants with potentially life-threatening critical disorders.2If defects are not detected early, there is a risk of circulatory collapse, which can result in shock and acidosis with a substantial adverse effect on prognosis [4].

Methodology

Study setting

The study was conducted in the post natal ward in the tertiary care hospital, S. Nijalingappa Medical College, Bagalkot .

Study design

This was a hospital based prospective observational study. All neonates fulfilling selection criteria, born and admitted in postnatal ward during study period were included in the study.

Study method

In Asymptomatic new born measurement of saturations using pulse oximeter on the Right hand and foot was carried out after 24hrs of birth. Saturations above 95% was regarded as having negative screen. Those with saturation below 90%were subjected to Echocardiography. Patients with saturations between 90 and 95% were subjected to a second pulse oximetry screen 6-12 hrs later. Screening was done after 24 hrs of birth.

Detailed clinical examination was done in all newborns after pulse oximetry.

Any positive findings in CVS was noted.

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Inclusion criteria

- All the asymptomatic newborn neonates (term and late preterm) delivered in the tertiary care hospital.
- Parents who gave informed consent.

Exclusion criteria

Newborn with respiratory symptoms and signs. Newborn with symptomatic cardiac diseases.
All neonates with prenatal sonographic diagnosis of duct dependent circulation.

Results

Table 1: CCHD incidence among the study population (N=400)

CCHD	Frequency	Percent
Positive	4	1%
Negative	96	99%
Total	7	100%

The incidence of CCHD in the present study was found to be 1%

Table 2: Distribution of CCHD according to sex of neonates

Sex of Neonates	CCHD Positive (N=4)	CCHD Negative (N=3)	Chi square p value
Male	1 (25%)	2 (66.7%)	0.271
Female	3 (75%)	1 (33.3%)	
Total	4 (100%)	3 (100%)	
Male: Female	1:3		

Note *significant at 5% level of significance

25% of neonates suffering from CCHD were males and 75% of neonates suffering from CCHD were females.

Table 3: Distribution of CCHD according to birth weight of neonates

Birth weight	CCHD Positive (N=4)	CCHD Negative (N=3)	Chi square p value
LBW	4 (100%)	0 (0)	<0.001*
>2500 gm	0 (0 %)	3 (100%)	<0.001*
Total	4 (100%)	3 (100%)	

Note *significant at 5% level of significance

All 4 (100%) of neonates suffering from CCHD were Low birth weight babies. None of the babies who were born with birth weight of >2500gms were found to be suffering from CCHD. This association was statistically significant.

Discussion

Antenatal screening for birth defects, has now become routine in many parts of the world with history taking, blood tests, antenatal ultrasound. Even advanced methods such as amniocentesis and chromosomal analysis has become part of the prenatal assessment [5].
However, screening fetal echocardiography is not a universal test and in fact, is limited to the developed countries and tertiary centres in low and middle income countries.
Clinical examination of neonates in the postnatal ward has been the routine practice of ruling out possibility of a heart defect. However, a complete evaluation encompasses careful inspection, palpation including peripheral pulses and auscultation [6].
However, according to Reide *et al* such neonates who receive treatment for an antenatally detected duct dependent lesion from birth cannot be withheld.
Hence, pulse oximetry in these newborns reflects the underlying haemodynamic status rather than acting as a screening tool.
Another study, by Cuneo *et al* showed that the accuracy of antenatal diagnosis improved with the integration of a pediatric cardiologist into the perinatal team [7].
In a developing country like India, where infant mortality rate is high, the dream of achieving millennium development goal is far from real. If focus on emerging causes of morbidity and mortality are not addressed at the appropriate time, this cannot be solved [8].
The number of diagnosed cases of congenital heart diseases has been increasing over time due to the use of echocardiogram, not only after birth but antenatally also.
However, the number of missed cases of CCHD or the impact of a delayed diagnosis of a CCHD is not

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known worldwide.

The limited availability of echocardiogram machines and cost of echocardiography are major confounding factors in considering its use for purpose of screening.

In a study by Matthew *et al*, those neonates who had more severe disease are more likely to be diagnosed earlier and with associated poorer survival.

This observation re-emphasizes the magnitude of threat posed by a silent, birth defect in a neonate who may be sent home only to be received back in the emergency room with cardiovascular collapse.

Pulse oximetry screening for detection of hypoxemia in neonates with critical congenital heart disease is being discussed globally.

Conclusion

Congenital heart diseases are a major cause of morbidity and mortality in children. Out of these, a subpopulation of critical congenital heart diseases requires early diagnosis. They may need medical and surgical management in the neonatal period itself.

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