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Cranial Ultrasound in High Risk Neonates

Authors
Dr S.K Valinjkar[1], Dr Shruti Dhale[2], Dr Yogesh Mokase[3], Dr Vikas[4], Dr Sukena Susnerwala[5]
[1,2]Associate Professor, [3]Assistant Professor, [4,5]Resident
Dept of Pediatrics, Grant Govt Medical College Mumbai India
Corresponding Author
Dr Sukena Susnerwala
Grant Govt Medical College Mumbai India
Email: *ssusnerwala@gmail.com*, 9920974140

Abstract
Cranial ultrasonography has become an essential diagnostic tool in modern neonatology for depicting normal anatomy and pathological changes in neonatal brain.
In the neonate many sutures and fontanels are open and these can be used as acoustic windows to "look" into the brain .It's a reliable tool for detecting congenital and acquired abnormalities of the perinatal brain and most frequent patterns of brain injury in preterm and full term neonate1. In this observational prospective study total 201 high risk neonates fulfilling inclusion criteria are studied in our NICU, a tertiary care hospital, to find out the role of cranial ultrasound in high risk neonates from October 2014 to September 2016.
Cranial ultrasound was done in these patients and results reviewed.

Introduction

CUS is cheap, easy to perform, non-invasive and easily repeatable. Our study evaluates the importance of CUS as an early investigatory modality in NICU protocols. Cranial Ultrasono-graphy CUS was introduced in neonatology the late 1970s and now is an established diagnostic tool in modern neonatology. Both normal and abnormal USG scans have been very useful in predicting neurodevelopment Outcome1. It is a reliable tool for detecting most of the hemorrhagic, ischemic and cystic brain lesions as well as calcifications, cerebral infections and major structural abnormalities in preterm and full term newborn[1]. Neonates who have greater than average chance of morbidity & mortality due to fetal, placental, maternal anomalies are termed as high risk neonates[2]. Cranial ultrasound can be done at an early stage even immediately after birth and can be done at the bedside in a critically sick neonate causing minimum distress to the baby.

Aims and Objectives

The study was conducted at a tertiary care centre with the objectives
To assess the importance of cranial ultrasound as an early investigatory modality for high risk neonates and

To find out the morphology of various brain lesions and correlate clinically

Materials and Methods

This was a prospective study conducted over a one year period in the tertiary care Hospital in a metropolitan city in INDIA). A total of 201 high risk babies with suspected neurological injuries were included in this study. Patients were divided on the basis of gestational age into post term, term, late preterm, early preterm, very preterm and extreme preterm. Cranial ultrasound of the high risk neonate fulfilling the inclusion criteria between day 4 to day 7 of life by single senior radiologist using SONOSITE USG machine with 5 Mhz probe.

Results and Discussion

In this study among 201 high risk newborns cases there was 1post term newborn (0.5%) , 50cases were term newborns (24.9%) and remaining 150 cases were preterm(74.6%).

_ Among 201 cases in this study group, 114 neonates (56.7%) were AGA, 86 neonates (42.8%) were SGA and 1 case was LGA (0.5%) .

_ Among 201 cases in this study group, 100 neonates (49.8%) were male and 101neonates (50.2%) were female.

_ Amongst the 201 sample size which was studied,41 neonates (20.4%) were multiplets, of which 32 neonates (15.9%) were twins and 9 neonates (4.5%) were triplets, and 160 cases (79.6%) were single

_ There were 2 neonates (1%) with history of significant birth trauma, 26 neonates (12.9%) had birth asphyxia, 19 neonates (9.5%)had neonatal sepsis and 22 neonates (10.9%) had seizures among which 7 were hypoglycemic seizures

1was hypo calcemic seizure, 12 had meningitis and 2 cases, where cause was not found. In this study group, the incidence of abnormal cranial USG was 14% (28/201).

_In this study group, there was no significant difference between male and female for the incidence of abnormal cranial USG.

_ In this study most common abnormality detected in high risk newborn was hydrocephalus followed by intraventricular hemorrhage when USG done between 4-7 day of life.

_ In this study prematurity and SGA graded to be lesser risk factor for abnormal cranial USG on comparison with other risk factors.

Table 1: Showing Abnormal Findings in Cranial USG.

Hydrocephalus & small post. Fossa	8 28.6%
Isolated Hydrocephalus	7 25.0%
Isolated Ventricular Hemorrhage	4 14.2%
Periventricular flair/ leukomalacia	4 14.2%
Other congenital brain anomalies	2 7.1%
Infarct/ Gliosis	1 3.6%
Ventricular Hemorrhage with Hydrocephalus	1 3.6%
Cystic Lesion	1 3.6%
Calcification	Nil Nil
Total	28

Conclusion

This study highlights the convenience and diagnostic efficiency of cranial ultrasound in high risk neonates in NICU.

In this study, Neonatal sepsis, neonatal seizures and birth asphyxia are important risk factors for abnormal cranial USG.

_ In this study, all hypoglycemic seizure newborns has normal cranial USG.

Suggesting poor efficiency of cranial USG to detect hypoglycemic damage/no early visible changes occurs.

_ In this study no association was found between birth trauma and abnormal USG skull, as no abnormalities were detected in both cases. Many birth trauma cases were not included in this study because of hemodynamic instability.

Limitation

Few limitations as observed were only one scan done between day 4-7 of life, good sensitivity (14%) but is lesser on comparison to studies showing sequential scan

_Non availability of bedside USG at the center causing loss of cases with risk factors.

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