

**Original article:**

## **Study of detection of incidence of cranial USG abnormalities in neonates with asphyxia**

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### **Abstract:**

**Introduction:** World Health Organization (WHO) states that about 9 million neonates develop birth asphyxia every year. Of them 1.2 million die and same number develop severe consequences such as cerebral palsy, epilepsy and developmental delay.

**Methodology:** This was a Descriptive Longitudinal Prospective study conducted in Neonatal Intensive Care Unit at Paediatric Department of Pravara Rural Hospital, Loni, which is a tertiary care hospital for surrounding districts, during the period of two years. In our period 162 neonates having perinatal asphyxia was studied to evaluate the usefulness of Cranial Ultrasonogram in diagnosis of various lesions in symptomatic neonates with history of birth asphyxia.

**Results :** In our study 72 (44.4%) neonates had abnormal CUS findings of total of 162 neonates. In our study abnormal CUS among preterm neonates was maximum in neonates with weight in 1-1.5kg (87.5%) range which is consistent with Dubowitz et al although we had higher percentage (87.5%) in that range as compared to Dubowitz et al (41%). In our study abnormal CUS among term neonates was maximum in neonates with weight in 2-3kg (71.4%) range [ 2-2.5kg (25%) and 2.5-3kg (46.4%) range] this is also consistent with Dobowitz et al<sup>1</sup> which had 51% preterm with abnormal CUS in this range.

**Conclusion:** Cranial ultrasonogram is a sensitive, non-invasive, cost-effective, initial investigation of choice for detection of abnormal changes in brain among neonates. High efficacy of CUS in detecting presence of brain damage and its evolution on regular follow up guides clinical decisions and prognosis.

### **Introduction:**

World Health Organization (WHO) states that about 9 million neonates develop birth asphyxia every year. Of them 1.2 million die and same number develop severe consequences such as cerebral palsy, epilepsy and developmental delay. Cranial ultrasound is the most available and easily repeatable imaging technique for the neonatal brain showing brain development and the most frequently occurring forms of cerebral injury in the preterm and terms.<sup>1</sup>

Ultra sonogram through the fontanelle forms the best acoustic window and is as use full as CT with added advantages as it is simple, cost effective, can be repeatable at bedside, free of radiation, minimum discomfort to the baby. And thereby enables visualization of ongoing brain maturation and the evolution of brain lesions. In addition, it can be used to assess the timing of brain damage.

Hence this study is undertaken to evaluate the usefulness of Cranial Ultra sonogram in diagnosis of various lesions in symptomatic neonates with history of birth asphyxia.<sup>2</sup>

**Methodology:**

This was a Descriptive Longitudinal Prospective study conducted in Neonatal Intensive Care Unit at Paediatric Department of Pravara Rural Hospital, Loni, which is a tertiary care hospital for surrounding districts, during the period of two years. In our period 162 neonates having perinatal asphyxia was studied to evaluate the usefulness of Cranial Ultrasonogram in diagnosis of various lesions in symptomatic neonates with history of birth asphyxia.

Inborn Term and Preterm neonates with perinatal asphyxia admitted to Neonatal Intensive Care Unit during the study period at Pravara Rural Hospital, Loni.

All cases of Birth asphyxia fulfilling inclusion criteria were included in the study.

**INCLUSION CRITERIA**

**A.** All Inborn term and preterm neonates with features suggestive of perinatal asphyxia.

**B.** Criteria for asphyxia includes

1. Apgar score of  $\leq 3$  at 1min.

2. Positive pressure ventilation for more than 1 min at resuscitation.

3. Fetal heart rate abnormalities (Fetal bradycardia  $<100$ beats/minute or fetal tachycardia  $>160$ beats/minute) and/or presence of meconium stained amniotic fluid.

4. Abnormal neurological findings including altered muscle tone, altered sensorium and seizures.

5. Need for chest compression during resuscitation.

**EXCLUSION CRITERIA:**

Outborn neonates.

Neonates with major congenital malformations e.g.- anencephaly, open neural tube defects, diaphragmatic hernia etc.

Neonates who are extremely low birth weight (  $<1000$ gms )

Neonates of extreme prematurity (less than 28 weeks of gestation)

Neonates which failed resuscitation.

Informed consent was obtained from the parents/guardian regarding inclusion of the neonate in the study.

All babies received standard care during and after resuscitation.

The relevant maternal and neonatal data was recorded in the proforma.

Gestational age in completed weeks was assessed on basis of mother's last menstrual period and confirmed where necessary by routine early antenatal USG examination. In some cases where LMP was not available and antenatal USG was not done, then gestational age was assessed by New Ballard's score.

fontanelle. Image quality was maximized by fine adjusting the preset already available for transcranial scans.

**Results**

**Table 1: Distribution of various clinical findings V/s Neurosonography**

Presentation		Pupil reflex (n=162)			Ant. Fontanelle(n=162)			Transillumination (n=162)	
N	Mi	My	Ab	Bulged	Depressed	Normal	Positive	Negative	
<b>TOTAL (n=162)</b>	84	34	16	28	32	16	114	12	150
<b>CUS Normal (n=90)</b>	78	10	2	0	0	14	88	0	90
<b>Abnormal (n=72)</b>	6	24	14	28	32	2	26	12	60

**Table 2: Relation of central cyanosis and Neurosonography findings.**

CUS	CENTRAL CYANOSIS	
Present	Absent	
<b>Total</b>	<b>20</b>	<b>142</b>
<b>Normal (n=90)</b>	<b>0</b>	<b>90</b>
<b>Abnormal (n=72)</b>	<b>20</b>	<b>52</b>

**Table 3: Distribution of birth asphyxia neonates based timing of cranial ultrasound**

Time	CUS		Total
Normal	Abnormal		
< 24 hours	106	56	162 (100%)
4-72 hours	96	66	162 (100%)
>72 hours	90	72	162 (100%)

### Discussion:

In our study 72 (44.4%) neonates had abnormal CUS findings of total of 162 neonates. In our study abnormal CUS among preterm neonates was maximum in neonates with weight in 1-1.5kg (87.5%) range which is consistent with Dubowitz et al although we had higher percentage (87.5%) in that range as compared to Dubowitz et al (41%). In our study abnormal CUS among term neonates was maximum in neonates with weight in 2-3kg (71.4%) range [ 2-2.5kg (25%) and 2.5-3kg (46.4%) range] this is also consistent with Dobowitz et al which had 51% preterm with abnormal CUS in this range.<sup>4,5,6</sup>

Jeffrey M. Perlman, Nancy Rollins et al in their study found out that up to 50%

Of neonates weighing less than 1500 g exhibited some abnormality on the initial CUS.<sup>7</sup>

In our study we have found that out of 162 neonates, 86 had meconium of which 40 (46.5%) had abnormal scan. 76 mothers had anemia of all these deliveries 36 (47.3%) had abnormal CUS.

PROM as risk factor was present in 36 pt. of these deliveries 22 (61.1%) had abnormal CUS.

Out of 30 deliveries with PIH as risk factor, 10 (33.3%) neonates had abnormal scan.

In only 6 deliveries cord around neck was present, 4 (66.6%) of these neonates had abnormal scan.

Prolonged 2nd stage of labour was present in 26 deliveries, 18 (69.2%) of these asphyxiated neonates had abnormal neurosonography.<sup>8</sup>

By applying chi-square test it was observed only **prolonged 2nd stage** of labour has statistically significant association with abnormal CUS. p value=0.0326

Badrawy N et al reported that PROM and preeclampsia influenced the presence of CUS abnormalities and risk of developing periventricular intraventricular hemorrhage PIVH.<sup>9</sup>

### Conclusion:

Cranial ultrasonogram is a sensitive, non-invasive, cost-effective, initial investigation of choice for detection of abnormal changes in brain among neonates. High efficacy of CUS in detecting presence of brain damage and its evolution on regular follow up guides clinical decisions and prognosis.

### References:

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