



Study of Neurosonography Findings in Very Low Birth Weight Neonates Requiring Respiratory Support in Level 3 NICU

KEYWORDS

VLBW neonates, Cranial Ultrasound

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ABSTRACT

Objective: Study of neurosonography findings in very low birth weight neonates requiring respiratory support in level 3 NICU

Methodology: All VLBW neonates (<1500gm) who required respiratory support, admitted in Noble Hospital , Pune, NICU were studied during 1 year study period. Sequential Cranial Ultrasound were done in all patients.

Result: First cranial USG was done within 72 hrs of life. No abnormality was detected in 58 (72.5%) babies. IVH was found in 13 (16.3%) which was predominant abnormal cranial USG findings. Cerebral edema was found in 6.3%, ventricular lesions in 7.5% and choroid plexus cyst in 3.8% patients.

Conclusion: Out of 80 studied patients, 22 (27.5%) had abnormal cranial USG . IVH was the predominant finding. The risk of getting an abnormal cranial USG is more in babies who have low birth weight , low GA, abnormal RI and who required respiratory support for prolonged duration.

Introduction : Pediatric Neuroradiology is a fast developing speciality and facilities for cranial ultrasound (USG) Computerised Axial Tomography (CAT), Positive Emission Tomography and Magnetic Resonance Imaging are currently being used at advanced centres. Of these various modalities, CT scan and USG are available at the referral neonatal units in the country. CT scan has many advantages but it is an expensive investigation, rather cumbersome to be done in a sick newborn. USG on the other hand is a rapid and accurate method of diagnosing many intracranial lesions. Repeated scans can be done to follow the evolution of the lesion , without any risk of ionic radiation to the patient. Cranial Ultrasound has become an essential diagnostic tool in modern neonatology for depicting normal anatomy and pathological changes in neonatal brain. It is 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 neonate.

MATERIALS AND METHODS

Study design: Prospective Observational study.

Study area: This study was conducted in the Department of PEDIATRICS, NOBLE Hospital, PUNE , which is a Tertiary care hospital.

Study duration: 1 year (May 2012 to April 2013)

Study Population: In the present study, study of neurosonography findings in 80 very low birth weight neonates who required respiratory support were studied.

Data Collection Techniques and Tools: Present study included 80 patients. These patients were assessed according to gestational age, birth weight, respiratory distress, respiratory support, various neurosonography findings, outcome.

INCLUSION CRITERIA:

Very low birth weight neonates requiring respiratory support with any of the following:

1. Neonatal convulsions
2. Birth asphyxia & HIE
3. Respiratory distress
4. Neonatal sepsis
5. Preterm neonates
6. Congenital malformation of CNS

EXCLUSION CRITERIA:

1. Babies with only hyperbilirubine
2. Babies admitted for poor feeding
3. Babies admitted for hypoglycemia

SAMPLE : 80 patients were enrolled in this Observational study after fulfilling the inclusion criteria.

A detailed neurological examination was carried out. Following this, first Cranial USG was done within 72hrs of life. 2nd Cranial USG was performed at the end of 1st week, (while wherever required it was repeated and findings at the end of 1st week were recorded). 3rd Serial Cranial USG was done from 2nd to 4th week of life

Data Analysis: At the end of the study, data analysis was done by using SPSS (Statistical package for social science) version 17.0. We have used two independent sample 't' test, Chi-square test Fisher's exact test to find the association between various parameters. P value <0.05 was considered significant.

DISCUSSION

Out of 80 babies included 54 (67.5%) were male and 26 (32.5%) were female sex ratio being (male : female) approximately 2:1.

Amongst the 80 cases 45 babies (56%) were born to primigravida mother whereas 35 babies (44%) were born to non – primigravida mothers.

Maternal risk factors like PIH, PROM, Oligohydramnios, cord prolapse etc. were present in 67 babies (83.8%) while 13 babies (16.2%) lacked such maternal risk factors.

29 (36.2%) babies of study group were delivered vaginally whereas rest 51 (63.8%) babies delivered through LSCS.

In present study, foetal distress in utero was present in 49 (61.3%) cases, while 31 (38.7%) had no foetal distress.

Out of 80 cases, 34 (42.5%) required resuscitation at birth in form of Bag & mask and/ or Intubation while rest 46 (57.5%) didn't require any resuscitation.

Amongst 80 VLBW babies, 76 (95%) babies had respiratory distress while 4 (5%) did not have respiratory distress.

The incidence of neurological symptoms in the VLBW babies was around 47.5%. Out of which, 2 had apnea (2.5%), 2 had convulsion (2.5%) while majority i.e. 33 cases (41.3%) were having abnormal neurobehavior – weak cry and tone abnormalities. Rest 52.5 % patients had relatively normal CNS findings.

Amongst 80 cases, 59 (73.8%) required CPAP, 5 (6.2%) required Ventilator and 16 (20%) required both.

Table no. 1 Distribution of patients with respect to 1st USG (done within 72 hrs of life) findings :

USG findings	No. of patients	%
Normal	58	72.5
Hemorrhagic lesion	13	16.3
Parenchymal	5	6.3
Ventricular lesions	6	7.5
Others	3	3.8

In present study, we conducted neurosonography for 80 VLBW babies requiring respiratory support within 72hrs of life. No abnormality was detected in 58 (72.5%) babies. Hemorrhagic lesion (IVH) was found in 13 (16.3%) babies, parenchymal abnormality in form of cerebral edema, was found in 5 babies i.e. 6.3 % patients. USG showed ventricular lesion i.e. abnormality in ventricular size, symmetry or ventriculitis in 6 babies(7.5%). 3 (3.8%) babies showed other abnormalities like choroid plexus cyst.

As 4 babies could not survive, 2nd USG was done in 76 babies at the end of first week of life. (Out of the expired babies, three babies had grade III IVH while 1 had low apgar score at birth, required resuscitation, and Cranial USG was s/o cerebral edema with slit like (chinked) ventricles). 54 (71.1%)patients showed normal USG. 16 (21.1%) babies were found to have grade I IVH. 1 had dilated ventricle. 1 baby was found to have asymmetry of ventricles. 2 (2.6%) had chinked ventricles whereas 2 babies were found to have choroid plexus cyst. 1 baby had both asymmetric ventricles and choroid plexus cyst. Out of 16 patients detected to have Grade I IVH, 6 were newly detected in this study which were found to be normal in 1st USG scan. 10 patients continued to have grade 1 IVH as detected in 1st USG scan. 3 babies having IVH in 1st scan expired, all were having grade III IVH.

3rd USG was done in 75 patients between 2nd to 4th week of life (5 expired before doing this scan). 45 (60%) babies showed normal scan. 14(18.7%) babies shown resolving grade I IVH, whereas 1(1.3%) baby showed resolved grade I IVH. 4 (5.3%) babies were found to have PVL. 5 (6.7%) showed grade I IVH. 2 (2.7%) babies had dilated ventricles.

1 baby was found to have asymmetry of ventricles whereas 2 babies were found to have choroid plexus cyst. 1 baby had both asymmetric ventricles and choroid plexus cyst. 3 babies were detected to have grade I IVH in this scan which were not present in previous scans.

Out of 80 babies, 5 expired. 3 babies had grade 3 IVH, died within 72 hrs of life. All 3 of them were <1000 g. Other 2 had low apgar score at birth requiring resuscitation and had cerebral edema.

In our study, mean GA of study population was 31.35 weeks (SD 1.58). GA of the babies showed inverse relationship with the abnormal cranial USG findings i.e. less the GA more the chances of getting abnormal USG. This correlation was statistically significant (p value 0.003).

Also, GA showed strong and inverse relationship with IVH on cranial USG (p value <0.001).

Mean birth weight in study population was 1340 gms (SD 0.17). Further, we found that there was significant inverse association between birth weight and cranial USG i.e. less the birth weight more the chances of getting abnormal USG findings.

In our study, we also found that there was association between weak cry, tone activity with the cranial USG (p value <0.05).

In present work, all babies having abnormal RI showed abnormal USG findings confirming statistically significant association between USG finding and abnormal RI (p value 0.004).

Also, we found direct correlation between surfactant treatment and cranial USG findings. This association was statistically significant (p value 0.004).

Table no. 2 Distribution of patients with respect to overall USG findings and days of support

Overall USG outcome	No. of patients	Days of support		P value
		Mean	SD	
Normal	45	2.84	2.12	0.011
Abnormal	35	5.57	5.78	

In this study, we also observed that there was significant association between mean days of respiratory support required with respect to USG outcome i.e. those VLBW babies who required prolonged duration of respiratory support had abnormal cranial USG outcome. . This association was statistically significant. (p value 0.011).

SUMMARY AND CONCLUSIONS

Thus, the risk of getting an abnormal cranial USG is more in babies who have-

- Low birth weight (mainly < 1500g)
- Low GA (usually < 32 weeks)
- Abnormal Resistivity Index (>0.9 or <0.55)
- Required respiratory support for long duration

Hence, cranial USG should be performed as early as possible preferably within 72 hours of life. Also, cranial USG should be repeated frequently in presence of above risk factors to find out improvement, deterioration or evolution in cranial USG finding. It is also useful for assessment of long term outcome.

Such patients i.e. those who have above mentioned risk factors and abnormal cranial USG findings should be monitored in terms of following parameters during follow up in future.

- Head circumference
- Neurological examination
- Visual Assessment
- Cranial USG

By doing this, we can definitely decrease the morbidity and can help our nation for development.

RECOMMENDATIONS

1. Routine screening cranial US should be performed on all infants with birth weight < 1500 g or GA < 32 weeks irrespective of symptoms and signs.
2. First Cranial USG should be performed in all preterms within 72hrs of life.
3. Cranial USG should be repeated frequently in presence of risk factors like low GA, low birth weight and requirement of prolong duration of respiratory support.
4. Resistivity index <0.55 or >0.90 in the cerebral blood vessels is associated with immediate and long term poor outcome, hence it should be monitored.

CUS can be used to predict long-term neurodevelopmental outcome

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