

FREQUENCY OF INTRAVENTRICULAR HEMORRHAGE IN PREMATURE INFANTS

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ABSTRACT

Objective: To determine frequency of IVH in premature infants delivered at Military Hospital Rawalpindi.

Study design: Descriptive study.

Place and Duration of study: The study was conducted in the Neonatal Intensive Care Unit at Military Hospital Rawalpindi. from September 2006 to February 2007.

Materials and Methods: In this study 100 premature babies were included. High frequency ultrasound was used for evaluating IVH because of its non-invasive nature, easy availability and conveniences.

Results: A total of 100 babies were included in the study. Sixty-one babies were delivered by spontaneous vaginal delivery (SVD) while 39 babies by lower segment cesarean section (LSCS). Mean gestational age was 32.3 ± 2.12 weeks. Mean birth weight of the babies was 1637.7 ± 349.25 grams. Total 11 cases of IVH were detected in study.

Conclusion: Frequency of IVH was 11% in premature infants. We suggest that any premature infant born before 32 weeks gestation or weighing $<1500\text{g}$ should be evaluated for IVH by cranial ultrasound.

Keywords: Cranial Ultrasound, Intraventricular haemorrhage, Premature infant

INTRODUCTION

Intraventricular hemorrhage (IVH) and germinal matrix hemorrhage (GMH) are the most common and most important neurologic injuries in preterm neonates. Although the incidence has declined since the 1980s, IVH remains a significant cause of both morbidity and mortality in infants who are born prematurely¹. Ruckenstein and Zollner were the first to point out that GMH-IVH developed following hemorrhage in the subependymal germinal matrix, a structure that is most prominent between 24 and 34 weeks of gestation and regresses almost completely by term².

The first studies, using CT scan and ultrasound, were performed between 1978 and 1983 and showed the incidence of intracranial hemorrhages to be 40-50% in the infants with a birth weight of less than 1500 g. In the 1990s many groups observed a decline in the incidence of GMH-IVH to about 20-30% in very low birth weight infants^{3,4}. In addition to prematurity, other risk factors for early IVH

include vaginal delivery and the presence of intrapartum asphyxia; the contribution of labor is uncertain⁵⁻⁷.

Coronal and parasagittal views are obtained routinely to identify blood in the germinal matrix, ventricles, or cerebral parenchyma. Grading of severity is assigned based upon the location and extent of the IVH⁹. IVH is graded according to Papile classification as grade I germinal matrix hemorrhage only, grade II intraventricular bleeding without ventricular enlargement, grade III intraventricular bleeding with ventricular enlargement and grade IV any infant with intraparenchymal bleeding¹⁰.

As IVH can occur without clinical signs, serial examination and monitoring is necessary for the diagnosis. Sequential ultrasound studies enable accurate timing of the onset after birth. These studies showed that majority of IVH occurred within 72 hours, with more than half occurring during the first 24 hours^{11,12}.

Sensitivity and specificity of cranial ultrasound is nearly 100% and 91%, respectively for detection of IVH in premature infants. USG can depict GMH as small as

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5mm¹³. USG has negative predictive value (NPV) similar to those of CT scanning and MRI.

The purpose of the study was to find out the frequency of intraventricular hemorrhage in premature infants delivered at Military Hospital Rawalpindi. Although CT and MRI scans have higher sensitivity, cranial ultrasound imaging is the gold standard for diagnosing IVH. The advantages of USG are its high resolution, portability, cost effectiveness, availability in the periphery and lack of ionizing radiation.

PATIENTS AND METHOD

This descriptive study was conducted in Neonatal Intensive Care Unit at Military Hospital Rawalpindi in collaboration with Radiology Department of the same hospital. Duration of study was six months starting from September 2006. Total 100 premature infants delivered at Military Hospital Rawalpindi with gestational age less than 37 weeks weighing less than 2.5 Kg were included and selected by convenient non probability sampling. Gestational age was determined from antenatal record of mother. Weight was measured by digital weighing scale. Transcranial ultrasonography was performed on 3rd and 7th day of life by the pediatrician with the help of resident radiologist and when necessary by consultant radiologist. Ventricles of brain were examined through anterior fontanelle for any discrepancy in size, shape and anatomical variation. Special attention was given to identify any intraventricular echogenic mass (haemorrhage). Intraventricular hemorrhage was detected as echogenic mass with or without ventricular dilatation. Cerebrospinal fluid (CSF) blood levels were observed. Once haemorrhage was seen, search was made to see its extent, ventricular dilatation and any intraparenchymal bleeding. Informed consent was obtained from the parents for USG brain of babies. Cranial ultrasound was performed with a high frequency 5 MHz convex probe.

The data was analyzed by the SPSS version 11. Frequencies were calculated for IVH, gender and mode of delivery. Means and standard deviation (SD) were calculated for gestational age and birth weight.

RESULTS

During the study period a total 100 preterm babies were included. Mean gestational age was 32.3 weeks (SD=2.12). Maximum number of the patients (70%) was in the age group of 30 weeks of gestation. Mean birth weight of the babies was 1637.7gm (SD=349.25) and male to female ratio was 1:1. Sixty-one (61%) of babies were delivered by SVD, while 39 (39%) babies were born by LSCS.

Cranial Ultrasound was able to diagnose 11(11%) cases of IVH in 100 preterm babies. IVH was detected in 7 babies on third day of life, while in rest of 4 babies on day 7 (Table). Among these 11 cases 4 cases of grade I, 4 cases of grade II, 2 cases of grade III, and 1 case of grade IV hemorrhage were detected. Out of these 11 cases of IVH 7 were females. Eight babies were delivered by SVD while three babies by LSCS. Distribution of patient according to the gestational age is given in figure.

DISCUSSION

Intraventricular hemorrhage remains a significant problem in preterm and low birth weight babies, particularly when it is associated

Table: Frequency of the patient developing IVH (n=100)

	Frequency	Percentage
No IVH	93	93%
IVH on 3 rd day	07	07%
IVH on 7 th day	04	04%

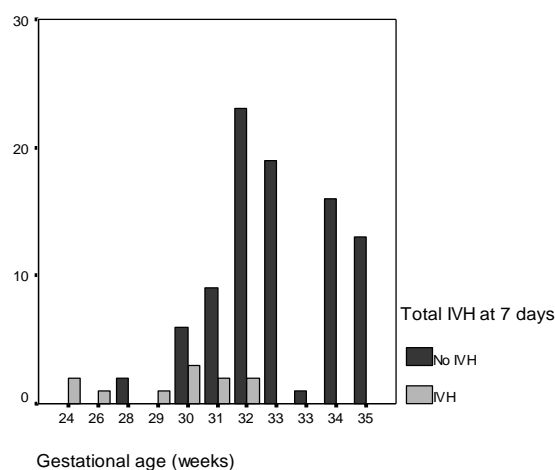


Figure: Number of cases of IVH as a function of gestational age.

with perinatal hypoxia leading to long-term neurological impairment and decreased survival rate.¹⁴ The major risk factors for GMH/IVH include a young gestational age, low birth weight, early sepsis, hypoxia, excessive handling, and exposure to antenatal steroids for less than 48 hours. The risk of IVH is inversely related to gestational age and birth weight^{11,13}.

In the present study, IVH was diagnosed in 11 preterm low birth weight infants out of 100 infants included. This is comparable to the studies done by different research groups from different regions in the world. Vural et al, from Turkey has reported 13% IVH frequency in preterm babies¹⁵. In another study by Köksal, the incidence of IVH was 15%¹⁶. Both these studies show a direct correlation with the results of our study.

On the contrary, high frequency of IVH is reported by Rasul et al from Lahore, who found IVH in 75 % of premature infants¹⁷. This discrepancy may be due to a concentration of more critical cases at their center or may represent a bias in patient selection.

We diagnosed 7 babies developing IVH within 72 hr of their life while in rest of 3 babies IVH was detected on cranial USG done on 7th day of life. However, Volpe found it more frequent on day 3 of the life¹⁸. Other researchers from different regions in the world has also reported high occurrence of IVH in the first week of life. Köksal et al has reported IVH occurrence in 78% of babies within first week while Antoniuk et al found it to be 65%^{16,19}. Linder et al., detected 86% of cases with hemorrhage occurring during the first week of life, with 70% of cases diagnosed before or on the third day¹¹. All these studies are in accordance with our results and suggest that occurrence of IVH is very high ($\geq 65\%$) in preterm babies within their first week of life and there is a need to screen all preterm babies for IVH during first week after birth.

Our results suggest that the development of IVH is more frequent in low birth weight and preterm babies. This fact was also supported by a recent study done by Kadri et al²⁰. Present

study included equal number of male and female babies and IVH is found slightly more in female. This fact is supported by other studies in the world¹³.

Mode of delivery affects frequency of IVH and we found IVH more common (13%) in babies delivered by SVD as compared to (7.6%) babies delivered by LSCS. Heuchan et al. found IVH more common (19%) in SVDs as compared to LSCS which was found to be 11%.²¹

High frequency cranial USG should be done as the primary modality of IVH screening in all preterm babies with gestational age <32 weeks. There are very few studies from developing countries. Data on IVH in preterm neonates needs to be collected on country basis and used subsequently as baseline while evaluating improvement in neonatal care.

CONCLUSION

Frequency of IVH was 11% in preterm and low birth weight babies. Improvements in obstetric and perinatal care have markedly decreased the incidence and severity of GMH/IVH. Efforts should be made to decrease the frequency of premature births to avoid this complication. Cranial ultrasonography is modality of choice in evaluating intraventricular hemorrhage because of its high sensitivity, acceptable specificity, and is convenient and non invasive. All premature infants with gestational age <32 weeks or <1500 g birth weight should be initially screened with ultrasound at 3 to 7 days. There is need to do further studies on the subject within the country.

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