Original Article

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Role of Neurosonogram in Infant with Seizures: Case Series

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Abstract

Seizures are one of the common symptoms seen in preterm infants. It occurs in 6% to 13% of very low birth weight infants, and in 1to 2 per 1,000 of infants born at term [1, 2, 3]. Sonography of the brain also known as neurosonogram is proved diagnostic modality to evaluate intracranial abnormalities [4 -8]. It is very sensitive in picking intracranial pathologies like haemorrhage (intracranial, intraventricular and subependymal), ischemia, hydrocephalus [9, 10], and congenital abnormalities.

In our hospital all the preterm infants are scanned for abnormality in brain by sonography as they can be missed on clinical evaluation. In our study intraventricular bleed was the most common abnormality detected.

Keywords: Neurosonography; Preterm infant; Seizure.

Introduction

Neonatal sonography of the brain is now an essential part of newborn care, particularly in high risk and unstable premature infants. Current ultrasound technology allows for rapid evaluation of infants in the intensive care unit with virtually no risk.

The advantage of sonography over computed tomography(CT) or magnetic resonance imaging (MRI) include portability, lower cost, speed, no ionizing radiation, and no sedation.

Ultrasound is essential to the neonatal evaluation and follows up of hydrocephalus and periventricular leukomalacia (PVL).

Ultrasound can be useful for the follow up of ventricular shunt therapy or possible complications. Sonography has been described in the evaluation of normal cranial sutures, which may allow diagnosis of craniosynostosis or a lacunar skull in myelo-meningocele patients.

Currently, most brain sonographic examinations are performed through the anterior fontanelle in both the coronal and the sagittal plane. It is increasing however, that the posterior fossa is much better evaluated through posterior and mastoid fontanelle.

Good skin to transducer coupling can be achieved by an acoustic coupling gel.

The anterior fontanelle remains open until approximately two years of age but is suitable for scanning only until about 12-14 months.

Material and Methods

We performed neurosonography on 112 preterm infants with symptom of seizure. First neurosonogram was obtained at 48 hours after the birth. A repeat neurosonogram was performed after 4 weeks of birth. All examinations were performed on portable sonography machine in neonatal department

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Pie Chart Showing Percentage of Causes of Seizures in Preterm in Our Study

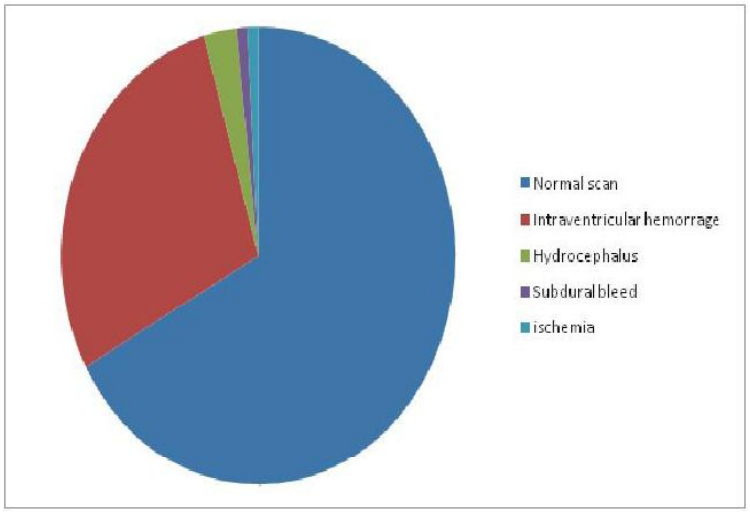
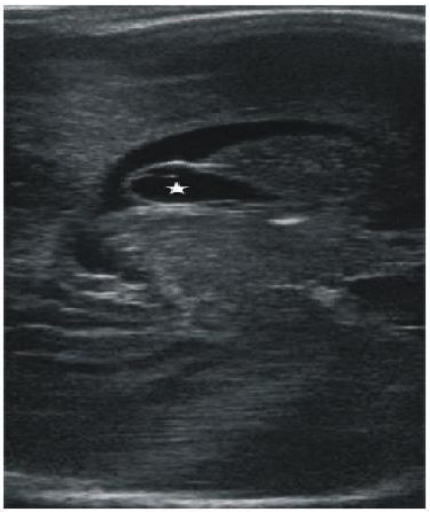


Figure 1: Neurosonogram Coronal Image Shows Dilated Lateral Ventricles (Frontal Horn) with Subependymal Cyst (*) Formation – 4 Week Scan

Figure 2: Neurosonogram Mid-sagittal Image Shows Subependymal Cyst (*) Formation – 4 Week Scan



and on high resolution machine in the Radiology department. All the patients were scanned with 5 MHz transducer. The images were obtained in two planes (coronal and sagittal) through the anterior fontanelle. Three coronal scanning planes were used:

(1) anterior to the third ventricle, through the heads of the caudate nuclei;

(2) at the level of the third ventricle and foramina of Monro; and

(3) at the level of the trigones of the lateral ventricles, through theglomera of the choroid plexus. Three sagittal scanning planes were used: (1) midline and (2) modified parasagittal of each lateral ventricle, to include the anterior, occipital, and temporal horns.

Result

Of the 112 premature infants evaluated, 32 demonstrated intraventricular bleed extending till germinal matrix. Out of these 32,10 showed formation of subependymal cysts during 4 week follow up sonography. 1 patient showed

Figure 3: Neurosonogram Coronal Image Shows Dilated Lateral (*) and Third Ventricle (Arrow} – 48 Hour Scan

Figure 4: Neurosonogram Coronal Image Shows Dilated Intraventricular Bleed

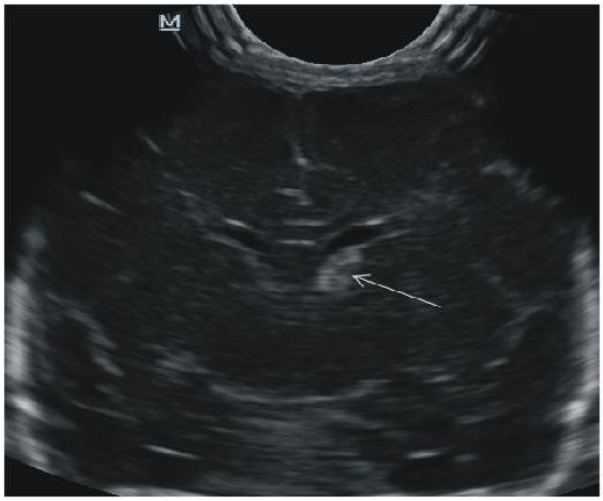
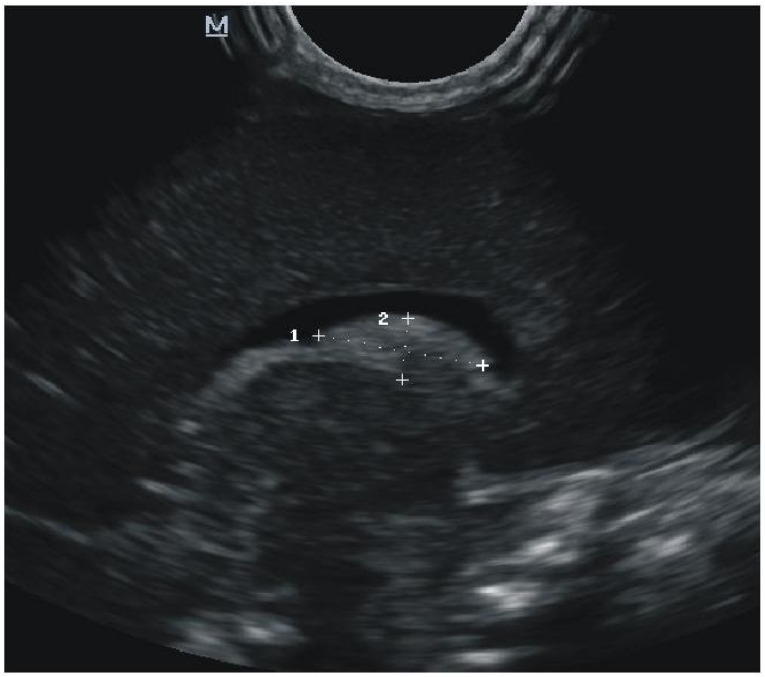


Figure 5: Neurosonogram Sagittal Image Shows Intraventricular Bleed – 48 Hour Scan



subdural bleed on 4 week follow-up scan. It was not picked up on 48 hours sonogram. 1 infant had diffuse ischemia affecting both the cerebral hemispheres. Cerebellum was preserved from ischemia. 3 infants showed hydrocephalus which returned to normal on follow up scan at 4 weeks. 75 infants showed normal findings at 48 hours and 4 weeks neurosonogram scans.

Discussion

Seizure in preterm infant is the most common symptom indicating neurological dysfunction. Thus finding out the cause for neonatal seizures is critical. Etiology determines prognosis and outcome. It also helps the clinician to plan the therapeutic

Figure 6: Neurosonogram Sagittal Image Shows Subdural Collection (Arrow) – 4 Week Scan

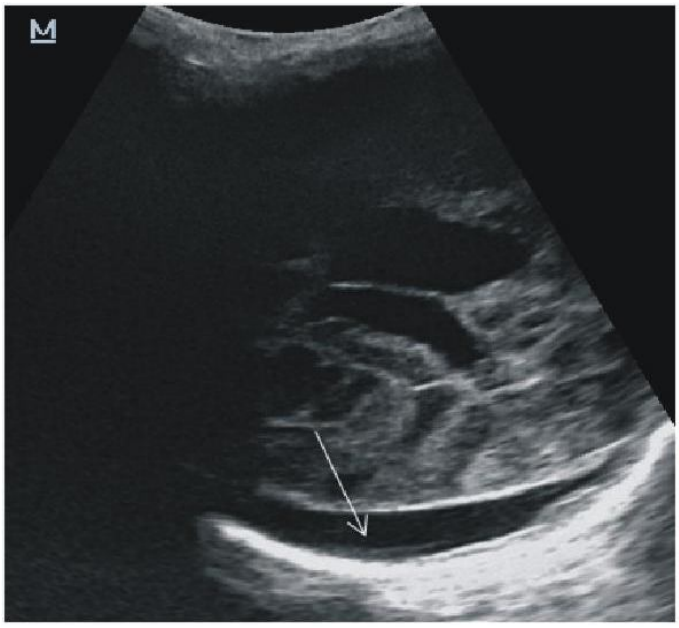


Figure 7: Neurosonogram Coronal Image Shows Changes of Encephalomalacia (Arrow) Secondary to Chronic Ischemia – 4 Week Scan

Figure 8: Neurosonogram Coronal Image Shows Dilated Lateral Ventricles (*) – 48 Hour Scan

strategies. The common causes for seizure in a preterm are :

1. Hypoxic ischemic injury
2. Intracranial haemorrhage
3. Infection
4. Congenital abnormality
5. Metabolic disorder like hypoglycemia or hypocalcemia
6. Familial or idiopathic cause.

Germinal matrix or intraventricularhaemorrhage is the most frequent cause of seizures in preterm infants.One of the study showed 45% of preterm infants with seizures had GMH-IVH [11]. In our study we found it to be 28.5 %. Neurosonogram is easy and bedside imaging

modality which gives immediate diagnosis and rules out concerning causes like ischemia, bleed or congenital abnormality. A follow up scan at 4 weeks helps to diagnose abnormalities like periventricular leucomalacia, subependymal cysts which are not picked up on early scans. This makes follow-up scan crucial. Etiology determines prognosis and outcome and guides therapeutic strategies.

Conclusion

Clinical neonatal seizures occur 6 times more often in preterm infants than in term infants. Hypoxic-ischemic encephalopathy is the major cause of seizure in term infants [12] where as intraventricular bleed is the most common cause in preterm infants. In our series of patients too we found intraventricular bleed as the leading cause. Both bleed and ischemia are easily picked up easily on neurosonogram. Seizure in preterm infants has a poor prognosis with more than 50% mortality and about 22% with major neurological disability.[11, 13,14]. Aggressive treatment is needed to treat neonatal seizures and hence neurosonogram plays an important role in diagnosing the common causes. Neurosonogram being a bedside and easily available imaging modality further makes it more preferred by clinicians as compared to CT scan or MRI.

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