Neonatal Seizures: Etiology and Hospital Outcome

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Neonatal seizures are a manifestation of neurological dysfunction. It constitutes a medical emergency requiring urgent etiology specific therapy to prevent further brain injury. The aim of this study was to observe clinical presentation, etiology and hospital outcome of neonatal seizures. This was an observational study done in the Department of Pediatrics, Dinajpur Medical College Hospital from January, 2012 to December, 2012. A total of 130 cases of Neonatal seizures were included in the study. Out of 1280 total admitted newborns One hundred thirty (10.1%) cases developed convulsions. Term (61.5%) normal birth weight babies (63% were the main victims .Most seizures occurred within 1st day of life(44.6%). Hypoxic – Ischaemic Encephalopathy (HIE) was the main cause (60%), followed by hypocalcaemia (23.8%) and infection (20%). Most seizures (79%) were controlled by monotherapy (intravenous phenobarbitone).HIE was the (60%) leading cause of death .Overall mortality was 15.3%. HIE, hypocalcaemia and infection were the main causes of neonatal seizures. Most seizures responded to phenobarbitone .Majority of hypocalcaemic babies required more than 2 days intravenous calcium gluconate.

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Key words: Neonatal seizure, etiology

Introduction:

Neonatal seizures are a manifestation of neurological dysfunction. Frequent or prolonged seizures may contribute to brain injury.[1-6] Neonatal seizures are paroxysmal electroencephalograph (EEG) activity often with motor manifestations and sometimes with autonomic or behavioral clinical manifestations including effect on respiration ,heart rate and blood pressure.[3]

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Seizures may be only electrographic with no clinical signs[1] or electro-clinical with both clinical signs and an EEG seizure. Neonatal seizures can present differently and different types may be seen in the same baby over several hours.[2] Accurate seizure diagnosis remains a clinical challenge .Any unusual or stereotype movement may represent a seizure.[1,2] However seizures must be distinguished from irritability, jitteriness, some normal behaviour like stretching, nonspecific random movement and benign neonatal myoclonus which require no treatment at all.[5]

Seizures occur more frequently during first 28 days of life than any other period.[2,4,7,8,11] Incidence in the newborn baby is 1.5-3.5/1000 live term birth.[1,2,3,10] HIE secondary to Perinatal Asphyxia (PNA) is the commonest cause in term babies. [9,17]and responsible for very poor outcome.[2,5,6,7]

Though there are many causes, only a few causes are responsible for majority of neonatal seizures. CNS infections, intracranial hemorrhage, metabolic abnormalities like hypoglycemia and hypocalcaemia are other predominant causes.[1,7-10] Identification and immediate etiology specific treatment is crucial to control seizure effectively and to prevent worsening of brain injury. So far known, only a few such type of study has been done in our setting which induces us to design this study.

Methods

This study was done in Pediatric department, Dinajpur Medical College Hospital during January, 2012 to December, 2012.130 admitted newborn (developed overt convulsion prior or after admission) among 1280 0f total admission were enrolled in the study. A structured form containing gestational age, birth weight, time of onset of seizures, drug response and clinical presentation was made and data were filled from hospital records. EEG facility was not available. Only overt frank convulsions were taken into count. Intravenous phenobarbitone 10-20 mg/kg (loading dose) were given to all cases of PNA, other babies with no h/o PNA, IV glucose and IV calcium gluconate were given as a first line drug after taking blood sample. IV phenobarbitone was given at a dose of 2.5 mg /kg/dose for uncontrolled seizure after glucose and calcium. Only a few cases required IV midazolam and per rectal diazepum .All data sheets, medical records and investigation records were examined and statistical analysis was done.

Results

Out of 1280 of total admitted newborn,130 (10.1%) newborns developed seizure either prior or after hospital admission. Seizures occurred predominantly during first 24 hrs of life (44.6%). Term babies (61.5%) having normal birth weight (63%) was the main victim. The main cause was HIE (60%).Hypocalcaemia and infection were the other major causes. Subtle seizures were noted among major patients (64.6%). Seizures due to HIE were mostly controlled by monotherapy (IV phenobarbitone). Hypocalcemic seizures were controlled by IV calcium gluconate 2ml/kg/dose but maintenance doses were required for 2-3 days particularly in patients having h/o PNA. Recurrent seizures were seen in 48% cases of total seizures and were due to hypocalcaemia or HIE or both. Eighty

five percent cases of this series was improved and discharged. Mortality rate was 15%. HIE (60%) was the main cause of death.

Table I: Distribution of gestational age and birth weight in neonatal seizures (n=130)

Gestation (weeks)	Seizures No. (%)	Birth weight (gm)	Seizures No. (%)
> 37	80(61.5)	≥2500	82(63)
34-37	26(20)	1500-2500	30(23)
<34	24(18.5)	≤1500	18(14)

Table II: Time of onset of seizures (n=130)

Time	No. (%)
< 24 hrs	58 (44.6)
24-72 hrs	45(34.6)
72 hrs - 1 wk	19 (14.5)
> 1 wks	8 (6)

Table III: Clinical manifestations (n=130)

Clinical Features	No.(%)
Fever /hypothermia	39 (30)
Irritability /excessive cry	12 (9)
Jaundice	45 (34.6)
Pallor	6 (4.6)
Abdominal distension	13 (10)
Umbilical discharge	8 (6)
Skin pustules	5 (4)
Lethargy/reduced spontaneous movements	92 (71)
Granting	4 (3.8)
Chest indrawing	5 (4)

Table IV: Etiology of neonatal seizures (n=130)

Etiologies	No.(%)
HIE	78(60)
Metabolic abnormalities (hypocalcaemia ,hypoglycemia,)	54(41.5)
Infection (meningitis, septicemia)	26 (20)
Intracranial hemorrhage	8 (6)
Kernicterus	4 (3)
CNS malformation	2 (1.5)
Others	3 (2.3)

Table IV: Metabolic abnormalities in neonatal seizures (n=54)

Metabolic abnormalities	No. (%)
Hypoglycemia	31(57)
Hypocalcaemia	17(32)
Hyponatremia	2(3.6)
Hypernatremia	4(7.4)

Table V**:** Anticonvulsants used in the treatment of neonatal seizures (n=130)

Drugs	No (%)
Phenobarbitone only	103 (79)
Phenobarbitone + Diazepum	19 (14.6)
Midazolam	8 (6.15)

Table VI: Types of seizure (n=130)

Types of seizure	No. (%)
Subtle	84(64.6)
Tonic	6 (4.6)
Clonic	32 (24.6)
Myoclonic	8 (6.2)

Table VII: Metabolic abnormalities in neonatal seizures (n = 54)

Metabolic abnormalities	No. (%)
Hypocalcemia	31 (57)
Hypoglycemia	17 (32)
Hyponatremia	2 (3.6)
Hypernatremia	4 (7.4)

Table VIII: Causes of death (n=20)

Time	No. (%)
HIE	12(60)
IVH	3 (15)
Meningitis	3 (15)
Kernicterus	2 (10)

Discussion

Incidence rate of neonatal seizure is 10.1% in this study. This percentage is likely to be higher with the feasibility of EEG which would disclose more cases, whereas in USA this frequency is 80-120 cases per 1,00,000 neonate per year[2,3] in India,1-5%.[1,2] A study in BSMMU showed 9% incidence.[11] This higher incidence rate in the northern zone of our country might reflect poor obstetric care. Incidence varies with gestational age and birth weight.. In this study seizures occur predominantly in term babies (61.5%) having normal birth weight (63%) not contrasting well with the study in developed countries, where intraventricular hemorrhage due to prematurity is the leading cause of neonatal seizure leaving HIE far behind as a cause. HIE was the main cause of neonatal seizure in this series contrasting well with other developing countries like India [5,6,8] reflecting relatively poor health care facilities with illiteracy and poverty at the grass root level. Infection (20%) was the other common causes of neonatal convulsion in this observational study. Septicemia and CNS infection are important causes of neonatal convulsion in developing countries as shown in different studies in Bangladesh and India[4,9] also reflect unsafe delivery practices in these zone. Subtle seizures were the main seizure type during neonatal period which is consistent with other studies.[5,7,8]

In 44.6% cases seizures developed within 24 hrs of life contrasting well with other studies.[5,10] Intravenous phenobarbitone (loading dose 10-20 mg/kg, maintenance dose 5 mg/kg/day in 2 divided doses) was successful (79%) to control seizure particularly HIE cases. Only a few resistant cases required IV midazolam or per rectal diazepum for effective control of seizure activity. Richard and Young [11] also observed phenobarbitone as a suitable monotherapy.

Outcome of neonatal seizure is etiology dependent .Death was observed in 15% cases and HIE (60%) following PNA was the leading cause of death which supports well with other studies.[12,13]

Conclusion

This observational study disclosed HIE following PNA, hypocalcaemia andinfection were the main causes of neonatal seizure. HIE was the leading cause of death adding much to infant mortality. Improved obstetric care along with mass people awareness might reduce the incidence which would help to achieve MDG-4.

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