Plain CT Scan In Neonatal Convulsion

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Abstract

Backgrounds: Convulsion is the commonest neurologic manifestation in neonatal period. History taking, physical examination and primary paraclinical data leads to the differential diagnosis. Evaluation of brain’s underlying diseases is important in the prognosis, but using anti-convulsive therapy, ultrasonography and Plain CT scan also play significant roles.

Methods: This is descriptive, cross-sectional study performed over 80 neonates with seizures admitted to NICU during one year. The history, physical examination para-clinical and radiological findings were collected in check-list forms and analyzed statistically using SPSS and exact $\chi^2$-test.

Results: Sixty five percent of neonates had abnormal findings in brain CT scan, such as hypoxic ischemic encephalography (27.5%), intracranial hemorrhage (21.2%), brain dysgenesis (10%), metabolic causes (23.7%), and combination of all (22.5%). Most of the neonates with abnormal CT scan had seizure, during 24-72 hours of age.

Conclusion: Most of the neonates with seizures who had abnormal CT scan, had it during first 24-72 hours of age, which statistically was meaningful (P<0.05). As asphyxia and birth trauma were important underlying causes of seizures, improvement of obstetric access and safety of delivery and proper neonatal care should be considered.

Key words: Asphyxia, Neonatal Seizure, Brain CT

Introduction

Seizure is the commonest neurologic manifestation in neonatal period, and usually it shows an underlying problem in the brain. Due to brain damage and developmental defect in CNS, the neonatal convulsion should be studied in all aspects.

A good neonatal history should be taken and proper physical examination should be done, and based on positive findings the primary paraclinical studies such as septic workup including CSF analysis, measuring electrolytes and blood glucose are next step. Then if necessary, ultrasonography and specially brain CT scan would help us in diagnosis of ischemic brain damage which happens with high frequency in neonates with seizures.

The assessment of nervous system based on brain CT scan without contrast was done for three reasons: 1. Prognosis of convulsion depends on birth weight, and underlying brain damages [Hypoxic Ischemic Encephalopathy and (HIE), Intracranial Hemorrhage (ICH)],. 2. Type and duration of anti-convulsive therapy. 3. Availability and reliability of CT scan in diagnosis of ischemic and hemorrhagic causes of brain damage.
Methods
All the neonates who admitted in NICU of Ekhawan hospital with seizure during one year either at the time of admission or during hospitalization were included in this study. The study was descriptive cross-sectional, and all the information was gathered on check-list forms. The including criteria and informations were: 1. Neonatal demography (age, sex, maturity index, referring complaint), 2. Types of seizures (multi-focal, focal and subtle forms), 3. Time of occurring seizures 4. Underlying causes (ICH, HIE, dysgenesis, metabolic, etc.) 5. Positive and important findings in history and physical examination, 6. Brain CT scan reports. All the informations, extracted from check-list forms were analyzed statistically by SPSS and exact χ2-test.

Results
From 80 neonates with seizures, 52(65%) were male, 28(35%) were female, 35% had normal brain CT scan, and 65% had abnormal findings such as: Hypoxic-ischemic encephalopathy (27.5%), intracranial hemorrhage (21.1%), brain dysgenesis (10%), metabolic causes (23.7%) and combination of all (22.5%) table 1.

| Table 1: Types and Causes of Neonatal Seizures |
|-------------------------------|------------------|---------------|------------------|
| Types                        | Generalized Multi-focal | Partial       | Subtle           |
| HIE                           | 10(45.6%)         | 6(27.2%)      | 6(27.2%)         |
| (Hyoxic-Ischemic Encephalopathy) |                  |               |                  |
| ICH                           | 12(63%)           | 6(27.2%)      | 4(21.3%)         |
| (Intracranial Hemorrhage)     |                  |               |                  |
| Brain Dysgenesis              | 5(75%)            | 1(12.5%)      | 1(12.5%)         |
| Metabolic                    | 14(66.5%)         | 2(9.5%)       | 5(24%)           |
| Multi-factorial              | 12(66.5%)         | 5(27.7%)      | 1(5.8%)          |

The most common type of convulsion was generalized or multifocal (60%), subtle form (25%) and partial ones (15%), table 1.

The body weight of 75% of neonates were more than 2500 grams. 42% of neonates had prolonged and difficult labours. 16.5% had positive familial history of convulsion. 42.5% had, seizures during 1 to 4 weeks of age, and 30% at 24-72 hours of age. The leading type of intracranial hemorrhage was Intra Ventricular Hemorrhage (IVH). 76.5% of patients respond to phenobarbital alone, and 22.5% controlled by combination of phenobarbital and phenytoin. The brain dysgenesis found in nine cases, persistent cavum in three, septum-pellucidum in four, large cisterna magna in three, and cavum Vergae and porencephaly in one case for either two (table 2).

| Table 2: Frequency of Dysgenesis |
|-------------------------------|------------------|---------------|
| Patient’s Number              | Types of Brain Dysgenesis |
| 4                             | Persistent cavum-pellucium |
| 3                             | Large cisterna magna |
| 1                             | Cavum Vergae |
| 1                             | Porencephaly |

Discussion
Evaluation of neonates with convulsion at first was done by assessing: pre, peri or post-natal history taking, fever of mother, drugs used by mother, premature rupture of membrane, chorio-amnionitis, birth asphyxia, prolonged and difficult labor, genetic, metabolic, and endocrine backgrounds of the mother. Then by performing proper, and complete physical examination specially neurologic examination such as neonatal reflexes, pupil size, muscle tone, and if needed routine laboratory studies. At the final step for diagnosis of underlying causes of seizure brain CT scan can be helpful.

There is meaningful relation between the age of neonates with seizures and positive findings from birth history (P<0.05). Most of the convulsions, occurring during 72 hours after birth, were associated with history of asphyxia and difficult labours (table 1).

The chance of birth difficulty were more at birth weights of 2500 grams or more, although the relative risk was 1.47 which was not statistically meaningful.

Conclusion
Because of high incidence of abnormal CT scan (65%) in seizures occurring during the first 72 hours
after the birth, which are usually associated with prolonged, and difficult labour and asphyctic child. CT scan of brain is highly recommended, and improvement of obstetrical access and proper set up for safe delivery should be considered in advance.

References