Perinatal Arterial Ischaemic Stroke In Neonate

Anila Haroon, Shakeel Ahmed, Syed Rehan Ali

ABSTRACT

Arterial ischemic stroke (AIS) is not uncommon in neonates, but in large part of developing world it has been missed and remains undiagnosed because of lack of resources and insufficient engagement by health care providers. The incidence of ischemic perinatal stroke ranges between 1 in 200 No, to 1 in 5000 births and is reported to be responsible for 30% to 50% of congenital hemiplegic cerebral palsy (CP) who were born at term or late preterm gestations. The true incidence of AIS from the developing world is not known as neuroimaging facilities are available in few centers; most of these cases remain undiagnosed.

Over the past decades, ischemic perinatal stroke has emerged as an important cause of brain injury in the perinatal period and remains a leading cause of cerebral palsy. We are reporting a 3 days old male baby who presented with refractory seizures, subsequently diagnosed as arterial ischemic stroke.

Key words: neonate, arterial ischemic stroke, neuroimaging

Introduction

Ischemic perinatal arterial stroke (IPS) is defined as a group of heterogeneous conditions in which there is focal disruption of cerebral blood flow secondary to arterial or cerebral venous thrombosis or embolization, happens between 20 weeks of fetal life through the 28th postnatal day and is confirmed by neuroimaging or neuro-pathologic studies[1,2]. AIS are estimated to affect 1 in 4000 neonates, 17 times more common in the perinatal age group as compared to rest of pediatric population[3]. The type of stroke and etiology depend on the age of the fetus and the infant. The left middle cerebral artery (MCA) is the most common vessel involved, with the left cerebral hemisphere the most common region area involved[4]. Infants often presents with focal or generalized seizures and sometimes with apnea, hypotonia, or episodes of duskiness, irritability, and poor feeding. Long term risks from IPS include seizure disorders and delayed or impaired language development. Neuroimaging studies remain the most important tools for the confirmatory diagnosis of IPS.

Case History

A 3 day old baby boy was born to a young primigravida at 31 weeks of gestation with emergency LSCS due to premature rupture of membranes. Pregnancy was uneventful with no known comorbids except vitamin D Deficiency. Birth weight was 2300 grams with Apgar 7 in 1 min and 9 in 5 min. On 3rd day of life, baby developed seizures and difficulty in breathing. Vitals: HR 160/min, RR 56/min, BP 60/40 mm Hg, O2 saturation 99%, Temp 36ºC, OFC 29 cm. Baby was loaded with phenobarbitone but seizures continued so loaded with another dose of phenobarbitone followed by phenytoin. Seizure was continued after every 10 to 15 minutes clinically as well as on EEG for which midazolam infusion was started. Baby responded well with cessation of seizure activity evidenced on EEG. Initial investigations revealed WBC $19.4x10^9$/L, platelets $201x10^9$/L, normal coagulation screen, CRP <0.3mg/dl (n=0-1.0), Calcium 8.0mg/dl (8.4-10.2), Lumber puncture revealed white cell count of 29 /cu mm (0-6), glucose 54mg/dl (45-80) with blood glucose of 74mg/dl (80-110) and protein count 1 gram/dl (15-40mg/dl). Baby was started on cefotaxime and amikacin in meningitic doses. Initial ultrasound head revealed grade 1 IVH on left side. Baby remained seizure free over the next 2 days but found to be hypotonic. Phenobarbitone levels were normal. Further investigation revealed Ammonia level: 166 µmol/l (18-60), Homocysteine: 13.73 µmol/l (4.72-14.05), Lactic acid: 2.0 mmol/L (2.5-5.0), Protein C: 31 (72-106%), Protein S: 34 (60-110%), Anti-thrombin III: 69 (80-120%) Factor V Leiden: 1.01 (0.9-2.9%). MRI Brain showed multiple small areas of diffusion restriction in the left thalamus and bilateral periventricular regions most likely representing areas of acute infarction (Figure 1, 2). Midazolam infusion was stopped on day 2 and baby was continued on oral phenobarbitone. Baby subsequently improved with good neurological examination and developed breast feeding. He was discharged in a stable condition, maintenance dose of phenobarbitone and orogastric feed.

Discussion

In developing countries due to limited resources and lack of expertise, AIS are not reported or missed frequently, although one way or the other doctors come across a lot of cases of cerebral palsy. Knowledge of the preexisting perinatal

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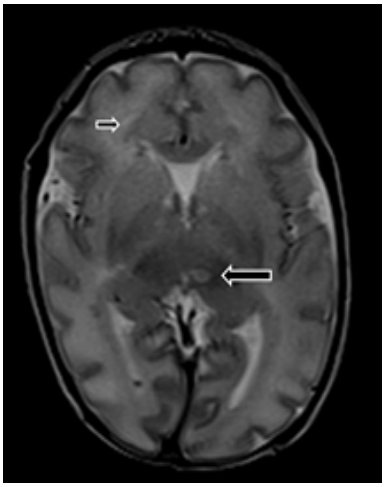

Figure 1

MRI axial image T2 weighted image. Small areas of high signal in the left thalamus (long arrow) and along the frontal horn of right lateral ventricle (short arrow) most likely representing areas of acute infarction.

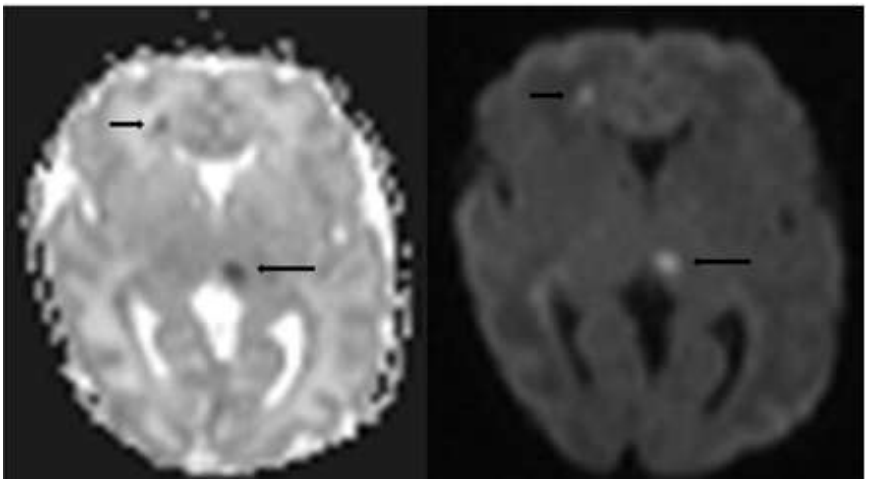

Figure 2

Diffusion weighted images. Small areas of diffusion restriction seen in the left thalamus (long arrow) and along the frontal horn of right lateral ventricle (short arrow) most likely representing areas of acute infarction.

arterial stroke (PAS) and the availability and accessibility of diagnostic modality make it possible to diagnose and manage this important condition promptly.

The Canadian stroke registry, one of the largest studies on perinatal arterial stroke, reported complicated birth asphyxia to be present in about 18% of patients[5]. Other studies have also found emergency caesarean section, vacuum extraction, prolong rupture of membranes, prolong stage II of labor and cord abnormalities to be potential risk factors for PAS[3,6].

Contrary to these findings, the national hospital discharge survey (NHDS 1980-1998) recorded perinatal asphyxia in < 5% of neonatal stroke[7]. This factor has been questioned in recent studies and while there is good evidence of an association of asphyxia with border zone cerebral ischemia, evidence to support a strong association with focal infarction is lacking. There have been reports of non-hemorrhagic arterial stroke with hereditary protein C deficiency, but larger studies have not convincingly demonstrated that protein C deficiency is a risk factor for the development of arterial thrombosis[7].

Neonates with underlying cerebral ischemia, rarely present with focal signs but may present with seizures, apneic spells, lethargy, poor feeding, birth asphyxia or hypotonia during the first 24-72 hours of life[8]. Seizures have been reported as the most common presentation of neonatal stroke. The Canadian stroke registry, has also reported similar findings; seizures in 85% of cases and hemiparesis in only 7% cases[5]. Generalized hypotonia and lethargy has been found to be the most frequent findings on neurologic examination[9].

In literature infections, dehydration and infection during the perinatal period are also a risk factor for stroke in neonate. Neonatal pulmonary hypertension and extracorporeal membrane oxygenation (ECMO) have also been stated as a risk factor in some cases[9]. The international pediatric stroke study involved 30 centers in 10 countries. They enrolled 248 neonates on the basis of symptoms and neuroimaging. They found 10% babies were premature. Seizures were commonest presentation present in 72% and non-focal neurologic signs in 63%[4].

The primary objective in the treatment of neonatal ischemic stroke is reestablishing the obstructed blood flow and thus, reduced oxygen supply. The management of neonatal stroke includes supportive care to provide adequate ventilation, meticulous fluid management, avoidance of hypotension and hypoglycemia, and treatment of seizures[10].

In developing country like us where there is limited facilities and resources for neuroimaging and other investigations, these cases are often not diagnosed and increased the morbidity in the form of cerebral palsy. Health care provide should have knowledge of this important entity and if there is high suspicion, neuroimaging should be done. A prospective study should be carried out in babies who have suspected IPS to know the real burden of this important condition in our country.

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