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OUTCOMES OF HYPOXIC ISCHAEMIC ENCEPHALOPATHY IN NEWBORNS AT RURAL TERTIARY CARE HOSPITAL OF MAHARASHTRA

Paediatrics

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KEYWORDS

INTRODUCTION

Neonatal encephalopathy is a clinically defined syndrome of impaired neurologic function in the first days of life of the newborn, manifested by difficulty in initiating and maintaining respiration, depression of tone and reflexes, a subnormal state of consciousness, and often seizures. Neonatal encephalopathy (NE) occurs in 1-6/1000 live births and carries a high risk for neurodevelopmental disorders later in life. 12

Worldwide, 3 million newborns die within the first week after birth, with an estimated 4 million neonatal deaths overall. [9] It is estimated that this is the cause of 46% of under-five mortality [10] and is projected to increase to 52% by 2030. [11] More than 99% of neonatal deaths occur in underdeveloped countries. [12] Neonatal asphyxia accounts for 42 million years of life with an adjusted disability. [13]

The American University of Obstetricians and Gynaecologists Working Group on Neonatal Encephalopathy has stated that an acute intrapartum event (usually associated with a sentinel event) can only result in cerebral palsy of the tetraplegic or dyskinetic type and not isolated cognitive deficits.17 A recent review by Gonzalez and Miller18 provided sufficient data to show that survivors of NE after perinatal asphyxia are with at increased risk of cognitive deficits, even in the absence of motor deficits. Outcome studies conducted to date found that school-age cognitive abilities are normal in children with mild NE.13 14 The first study to look at long-term outcomes 5,5, and 8 years after NE was conducted by Robertson et al14 . It found that nondisabled survivors of moderately severe NE were comparable to controls in terms of receptive vocabulary and motor perception skills but had significant delays in reading, spelling, and arithmetic. These children were more likely to be at least one grade level behind the control group or the children with mild NE. A more recent study by Marlow et al16 examined 65 children with NE at age 7. They classified infants as having moderate NE if they had either only seizures or two of the following symptoms in the first week after birth: Impaired consciousness, difficulty maintaining breathing (presumed central origin), difficulty feeding (presumed central origin), abnormal tone, and abnormal reflexes, all of which lasted longer than 24 hours. The children with severe NE had to meet one or more of the following criteria: Ventilation for longer than 24 hours, two or more anticonvulsant treatments required, comatose, or stuporous. 2

A significant proportion of neonatal mortality and morbidity is caused by birth asphyxia. It can lead to death or multiple organ dysfunctions. In addition, those who survive neonatal hypoxia and its main sequelae, hypoxic-ischemic encephalopathy, may have epilepsy, cerebral palsy, mental retardation, blindness, hearing, learning, and behavioural disorders. [14] Newborns in developing countries are at significant risk of suffocation and stillbirth [15] As there are very few studies about outcome of neonatal HIE we aimed to study the outcome of hypoxic ischemic encephalopathy in neonates in a rural tertiary hospital in Maharashtra.

MATERIAL AND METHODS

We studied 100 neonates admitted in neonatal units at Department of Pediatrics, SRTR Government Medical college, Ambajogai and diagnosed with HIE.

Inclusion Criteria For The Study: birth weight over 1800 g and 5-minute Apgar score less than or equal to 6. [15]. HIE was classified according to the classification system of Sarnat and Sarnat. [16] The neonates were classified into stages 1, 2, or 3 based on neurological symptoms, which correspond to mild, moderate, and severe encephalopathy, respectively, according to this classification. [16] Not all infants received the grade HIE. In cases in which the discharge diagnosis had additional signs of possible encephalopathy (such as dysphagia, lethargy, convulsions, decreased tone, or lack of alertness), the recorded discharge diagnosis was reevaluated. Although it was assumed that these infants had HIE, retrospective evaluation was not possible. The study excluded infants with conditions incompatible with life, such as chromosomal abnormalities, obvious congenital central nervous system abnormalities, spinal muscular atrophy, and other plausible causes of low Apgar scores besides prenatal hypoxia. [6] Those who aspirated meconium or were later diagnosed with neonatal sepsis were included. All members of the treatment team were trained in NFP, and infants were ventilated as needed. Infants received all other necessary treatments, including supplemental oxygen, fluids, anticonvulsants, feeding, and antibiotics as needed. Cerebral cooling was not initiated until the end of the study period, which occurred in the intensive care unit.

Demographic data, maternal information, Apgar scores at 1, 5, and 10 minutes, birth weight, gestational age, place of delivery, mode of delivery, need for ventilation after initial resuscitation, presence of seizures, degree of HIE, mortality, length of hospital stay, cerebral cooling, and amplitude electroencephalogram (aEEG) findings were recorded. In addition, meconium aspiration syndrome (MAS), persistent pulmonary hypertension of the newborn (PPHN), and neonatal hypoxia were considered. Only early (72 hours) and late (> 72 hours) cultures considered proven sepsis.

RESULTS

Table 1: Clinical And Demographic Characteristics Of Neonates

Characteristics	
Maternal age	26.7±6.8
Parity	1 (1-9)
Antenatal care	
Yes	70%
No	30%
Mode of delivery	
NVD	
Vaginal breech	
Gestational age	37.1±1.8
Birth weight	3031±483.8
Gender	
Male	56.67%
Female	43.33%

Apgar score	
1 minute	3 (0-5)
5 minutes	4 (1-5)
10 Minutes	6 (1-10)
Bag and mask ventilation	
Yes	73.33%
No	26.67%
Chest compression	
Yes	90.00%
No	10%
Presence of Seizure	
No	80%
Yes	20%
Meconium aspiration syndrome	
Yes	20%
No	80%
PPHN	
Yes	3.33%
No	96.67%
Culture positive	
Yes	3.33%
No	96.67%
HIE	
Yes	70%
No	30%
HIE Grading	
1	16.67%
2	13.33%
3	6.67%
ICU admission	
Yes	86.67%
No	13.33%
Duration of hospital stay (days), median (IQR)	4 (0-76)

Table 2: Problem In Pregnancy And Birth Neonates With Perinatal Asphyxia

Fetal distress	23.33%
Meconium stained liquor	16.67%
Fetal distress + meconium stained liquor	16.67%
Prolonged second stage	6.67%
Malpresentation	3.33%
Cephalopelvic disproportion	3.33%

Table 3: Comparison Between Survivors And Non Survivors

Characteristics	Survivors	Non survivors	X2	P value
Gender				
Male	86.90%	13.10%	0.212	0.9
Female	86.50%	13.50%		
Antenatal care				
Yes	86.60%	13.40%	2.731	0.26
No	82.20%	17.80%		
Bag mask ventilation				
Yes	84.70%	15.50%	4.203	0.04*
No	92.20%	7.80%		
Chest compression				
Yes	77.30%	22.70%	3.724	0.54
No	87.70%	12.30%		
MAS				
Yes	82.80%	17.20%	0.45	0.5
No	88%	12%		
PPHN				
Yes	100%	0%	0.35	0.557
No	86.80%	13.20%		
Culture positive				
Yes	92.30%	7.70%	15	-
No	86.70%	13.30%		
HIE				
Yes	83.30%	16.70%	61.38	-
No	98.10%	1.90%		
ICU admission				
Yes	88.10%	11.90%	0.82	0.78
No	86.50%	13.50%		

Table 4: Analysis Of Continuous Parameters Between Survivors And Non Survivors

Characteristics	Survivors (Mean±S.D)	Non survivors (Mean±S.D)	P Value
Maternal age	25.6±6.1	26.2±6.8	0.58
Birth weight	2895.7±589.1	2962±514.7	0.41
Gestational age	38.1±2.9	38±6.23	0.18
Duration of hospital stay	6.5±6.6	2.8±0.8	0.001**

DISCUSSION

Among all study cases 13.3% of deaths occur while hospitalised, with the burden expected to fall on the surviving who are immobilized. Our rates of HIE and perinatal hypoxia were comparable to those discovered by Horn et al. [21] The 5-minute Apgar score does not accurately predict cerebral damage. In this study, while there was no evidence of HIE in 8 infants (26.7%), there were indicators of neurological deterioration in 23 babies (76.7%). Attending staff does not consistently assign an HIE grade. Due to the difficulty of making a decision after the fact, this is a crucial omission. Possible explanations for the lack of proper grading or a thorough neurological examination include difficulties in a busy setting with limited resources, a lack of continuity of care (as different healthcare professionals review patients every day), or a lack of training for healthcare professionals on the criteria to look for and the grading to assign. The challenges of coming to agreement on HIE definitions and criteria are discussed by Horn et al. [21]. Depending on the criteria utilized, the statistics demonstrate that there is a significant variance in the incidence and severity of HIE. It is necessary to use a more precise classification system for prenatal asphyxia than the 5-minute Apgar score; this could be the TOBY[22] or CoolCap[23] classifications, although these call for additional research. It is necessary to motivate workers to appropriately issue an HIE grade. In resource-limited settings without access to arterial blood gas measurement or an aEEG, the necessity for resuscitation at birth could be included in the definition of perinatal asphyxia. There are significant hurdles in our busy, resource-constrained setting where only 74.2% of children delivered with a 5-minute Apgar score 6 receive bag-mask resuscitation. Prior to the implementation of a cooling programme, all asphyxiated infants must get sufficient neonatal resuscitation and strict HIE grading.

At only 30.0% (9/30), our follow-up rate is intolerably poor. Socioeconomic factors and the poor level of education of our patients' parents and guardians may play a role in their failure to show up for follow-up appointments. It's possible that a few asphyxiated infants passed away after being released from the hospital, or that disabled kids are kept at home without access to medical care. As a result, it is impossible to appropriately report post-discharge disability or fatality rates. Seven (23.33%) of the 30 patients with follow-up information had disabilities. The findings of the study indicate that the style of delivery, the place of birth, and resuscitation at birth were predictors of survival. Elective caesarean sections were associated with improved results. All breech infants delivered vaginally survived. According to a study, scheduled caesarean sections resulted in better newborn outcomes for breech presentations than vaginal births. [24] In contrast, a study from Europe found that the newborn outcome following an elective caesarean section and a planned vaginal delivery did not differ from one another. [25]. Newborns that died spent less time in the hospital than babies who lived, showing that their disease was severe and caused an early death.

CONCLUSION

The high rates of overall survival and survival following ICU admission serve as a standard for further care. Since using the available resources would not have allowed for long-term follow-up, enough data must be collected. For accurate population studies and HIE benchmarking, agreed definitions must be established through additional study. The high frequency of HIE shows that a therapeutic hypothermia programme with a long-term follow-up component would be advantageous, and more resources are required to assure proper follow-up.

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