Original Article

Ischemic Encephalopathy in Neonates

Early Outcome of Hypoxic Ischemic Encephalopathy in Neonates Born at Nazeer Hussain Medical Complex Hyderabad

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ABSTRACT

Objective: To assess the early outcome of Hypoxic Ischemic Encephalopathy in neonates born at Nazeer Hussain Medical Complex Hyderabad

Study Design: Descriptive / cross sectional study

Place and Duration of Study: This study was conducted at the Neonatal Ward of Nazeer Hussain Medical Complex, Hyderabad from January to December 2016.

Materials and Methods: This study was conducted to know the early outcome of birth asphyxia in neonates born at this hospital. Inclusion criteria of our study were all newborn (term, preterm or post-term) with history of perinatal asphyxia or APGAR score at 5 minutes, < 7, or delayed crying after birth or > 10 minutes resuscitation soon after birth. Neonates having lethal anomalies like hydrops fetalis, cyanotic heart defects and congenital malformations were excluded from study. Severity of Asphyxia was assessed by the grading of Hypoxic Ischemic Encephalopathy. APGAR score 5-7 was labeled as mild asphyxia, 3-5 as moderate asphyxia and <3 as severe Asphyxia.

Results. In this study mostly male neonates were there 92.2% (Table 1). Most common of admission was ≤ 2 days 51.2% (Table 1). Most of the neonates were ≥ 37 weeks gestational age 48.8% (Table 1). Grade 1 Hypoxic Ischemic Encephalopathy was most common 41.5% (Table 2). Most of the mothers had age between 25 to 35 years 90.2% (Table 2). Most mothers had the history of multigravida 53.7% (Table 2). Most common fetal presentation was cephalic 80.5% (Table 2). 56.1% neonates born by C-section (Table 2). Only 7.3% mothers had history of prolonged labor (Table 2). 33% neonates died due to Hypoxic Ischemic Encephalopathy (Table 3).

Conclusion: In this study most common type was grade 1 Hypoxic Ischemic Encephalopathy 37.1%. Grade 3 HIE was least common but death rate was more in it 21.9%. Death was least common in grade 1 HIE 4.26%.

Key Words: Birth Asphyxia, Hypoxic Ischemic Encephalopathy, APGAR Score

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INTRODUCTION

Birth asphyxia may cause death or Hypoxic Ischemic Encephalopathy when there is an insult to newborn, during intrauterine life, during birth process or soon after birth. It is due to failure to initiate or inadequate breathing, leading to decreased oxygenation to various organs[1]. Hypoxic Ischemic Encephalopathy occurs when there is hypoxemia (lack of oxygen) and hypercapnia (accumulation of carbon dioxide), combination of this decrease in oxygen supply (hypoxia) and blood supply (ischemia) results in neuronal cell death and brain damage [2].

Birth asphyxia is defined as, Umbilical cord arterial pH<7 or Apgar score of 0 to 3 for longer than 5 minutes after birth or Neurological manifestations like seizures, coma, or hypotonia after birth or Multisystem organ dysfunction like cardiovascular, gastrointestinal, hematological, pulmonary, or renal system after birth (American Academy of Pediatrics) [6].

Of the estimated 130 million infants born each year worldwide[3], 4 million die in the first 28 days of life. Neonatal deaths account for 40% of deaths under the age of 5 years worldwide. Two-thirds of the world's neonatal deaths occur in just 10 countries, mostly in Asia. Pakistan is number three among these countries. With an estimated 298 000 neonatal deaths annually and a reported neonatal mortality rate of 49 per 1000 live births, Pakistan accounts for 7% of global neonatal deaths[4]. Infection (36%), preterm birth (28%) and birth asphyxia (23%) account for 87% of neonatal deaths worldwide[5]. Acute neurologic injury due to birth asphyxia is less common in developed countries (2 to 3 cases per 1000 term live births) while it is higher in developing countries[7].

MATERIALS AND METHODS

A descriptive cross sectional study was conducted from January to December 2016 at the Neonatal Ward of

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Nazeer Hussain Medical Complex to know the early outcome of birth asphyxia in neonates born at this hospital. The Obstetric unit of this hospital receives pregnant women from city and beyond. Neonates are resuscitated by nursing staff, trained in neonatal resuscitation. In case of high risk deliveries, consultant Pediatrics receives and resuscitates the newborn.

Inclusion criteria of our study were all newborn (term, preterm or post-term) with history of perinatal asphyxia or APGAR score at 5 minutes, < 7, or delayed crying after birth or > 10 minutes resuscitation soon after birth. Neonates having lethal anomalies like hydrops fetalis, cyanotic heart defects and congenital malformations were excluded from study. Severity of Asphyxia was assessed by the grading of Hypoxic Ischemic Encephalopathy. APGAR score 5-7 was labeled as mild asphyxia, 3-5 as moderate asphyxia and <3 as severe Asphyxia [10].

For the Nazeer Hussain Medical Complex born babies we have a nursery and Neonatal Intensive Care Unit. All delivered babies were received by senior nursing staff trained in the neonatal resuscitation. Resuscitation was given to neonates who failed to develop spontaneous breathing. Soon after delivery stop watch switched on to note the duration of resuscitation until the infant had good respiratory efforts along with a heart rate >100 beats. If there was no spontaneous breathing 20 minutes after birth then no more efforts taken and resuscitation stopped (American Heart Association).[11]At 5 minutes after birth if babies had APGAR score >7 then they were transferred to postnatal ward for observation for 12 hours and then discharged. Newborns whose Apgar score remained < 7 at 5 minutes after birth were transferred to neonatal ward for further management.

Admitted babies were examined by doctor at 6, 24 and 48 hours of age. Babies' length, weight and FOC were taken and temperature was recorded, while presence of pallor and cyanosis was also noted. Respiratory rate counted in one minutes and examination done for subcostal recessions. Neonates who were irritable hyper alert, mild hypotonic, and sucking poorly were graded as HIE grade 1(mild); neonates who were lethargic, had seizures, marked abnormalities of tone, and had requirement of tube feeding were graded as HIE grade 11 (moderate) and neonates who were in coma, had prolonged seizures, severe hypotonic, failed to maintain spontaneous respiration were classified as HIE grade 111 (severe) (Sarnat 8).[12] At 72 hours of admission early outcome was recorded and was measured as clinical improvement or presence of Hypoxic Ischemic Encephalopathy or death. Data was analyzed by using SPSS version 22. Frequency of birth asphyxia was measured as percentage.

RESULTS

In this study mostly male neonates were there 92.2% (Table 1). Most common of admission was ≤ 2 days 51.2% (Table 1). Most of the neonates were ≥ 37 weeks gestational age 48.8% (Table 1). Grade 1 Hypoxic Ischemic Encephalopathy was most common 41.5% (Table 2). Most of the mothers had age between 25 to 35 years 90.2% (Table 2). Most mothers had the history of multigravida 53.7% (Table 2). Most common fetal presentation was cephalic 80.5% (Table 2). 56.1% neonates born by C-section (Table 2). Only 7.3% mothers had history of prolonged labor (Table 2). 33% neonates died due to Hypoxic Ischemic Encephalopathy (Table 3).

Table No.1: Characteristics of Newborn N=164

Characteristics	No of Patients	%
Gender		
Male	148	90.2%
Female	16	9.8%
Age		
≤ 2 days	84	51.2%
3-5 days	72	43.9%
> 5 days	8	4.9%
Gestational Age		
≥ 37 weeks	80	48.8%
34- 36 weeks	44	26.8%
<34 weeks	40	24.4%

Table No, 2: HIE Staging and Risk factors

	No.of Patients	%
HIE Staging		
Grade I	68	41.5%
Grade II	56	34.1%
Grade III	40	24.4%
Maternal Age		
< 25 years	12	7.3%
25- 35 years	148	90.2%
>35 years	4	2.5%
Anesthesia		
Spinal	64	69.6%
General	28	30.4%
Gravida		
Multi	88	53.7%
Primary	76	46.3%
Fetal Presentation		
Cephalic	132	80.5%
Breach	32	19.5%
Mode of Delivery		
C-Sect	92	56.1%
NVD	72	43.9%
Prolong Labor		
Yes	12	7.3%
No	152	92.7%

Table No, 3: Outcome

	HIE staging		
	I	II	III
Outcome			
Improved	60 (37.1%)	44 (26.8%)	4 (2.43%)
Death	7 (4.26%)	12 (7.31%)	36 (21.9%)
Anesthesia			
General	16(9.7%)	8(4.8%)	4(2.4%)
Spinal	28(17%)	24(14.6%)	12(7.3%)
No	24(14.6%)	24(14.6%)	20(12.1%)
Presentation of fetus			
breech	20(12.1%)	8(4.8%)	4(2.4%)
cephalic	48(29.2%)	48(29.2%)	36(21.9%)
Mode of delivery			
C-Section	48(29.2%)	28(17%)	16(9.7%)
Normal Delivery	20(12.1%)	28(17%)	24(14.6%)
History of prolonged labor			
Yes	8(4.8%)	0	4(2.4%)
No	60(37.1%)	56(31.7%)	36(21.9%)
Prolapsed umbilical cord			
Yes	0	4(2.4%)	0
No	68 41.6	52 31.7	40(24.3%)
Cephalopelvic disproportion			
Yes	0	4 (2.4%)	0
No	68(41.6%)	52(31.7%)	40(24.3%)
Maternal hypotension			
Yes	0	4 (2.4%)	0
No	68(41.6%)	52(31.7%)	40(24.3%)
	HIE staging		
	I	II	III
Premature rupture of membranes (PROM)			
Yes	36 (21.9%)	16 (9.7%)	12 (7.3%)
No	32 (19.5%)	40 (24.3%)	28 (17%)
Maternal Fever			
Yes	8 (4.8%)	12 (7.3%)	20 (12.1%)
No	60 (37.1%)	44 (26.8%)	20 (12.1%)
Multiple births			
Yes	8 (4.8%)	8 (4.8%)	4 (2.4%)
No	60 (37.1%)	48 (29.2%)	36 (21.9%)
Polyhydramnios			
Yes	0	4 (2.4%)	4 (2.4%)
No	68 (41.6%)	52 (31.7%)	36 (21.9%)
Oligohydramnios			
Yes	4 (2.4%)	4 (2.4%)	4 (2.4%)
No	64 (39%)	52 (31.7%)	36 (21.9%)
Meconium-stained amniotic fluid			
Yes			4 (2.4%)
No	68 (41.6%)	56 (31.7%)	36 (21.9%)
Abnormal fetal heart rate or rhythm			
Yes	12 (7.3%)	12 (7.3%)	12 (7.3%)
No	56 (31.7%)	52 (31.7%)	28 (17%)
Premature delivery			
Yes	12 (7.3%)	16 (9.7%)	8 (4.8%)
No	56 (31.7%)	40 (24.3%)	32 (19.5%)

DISCUSSION

Our study showed 21.9% neonates died due to HIE grade 3 and it was present in 24.4% neonates while, only 2.4% expired due to HIE grade 1 and its frequency was 41.5%. Over all death rate was 33%. A different local study from Rawalpindi showed Stage II HIE, was most frequent i.e. 55.6% while stage III cases were 26.1% and stage I was least frequent 18.3%. 40.8% neonates expired [8]. There was no effect of parity on Asphyxia. A death rate was high in this study because in this study neonates were both, hospital and home born, while in our study all neonates were hospital born

Another local study from Lahore showed, Hypoxic ischemic encephalopathy stage I (39.3%), II (40%) and III (11.5%). 78.7% babies were discharged and 21.3% died[9]. The death rate was lower in this study as compare to our study (33%), and this may be due to decreased number of Grade 3 HIE neonates in this study.

Another similar local study from Lahore done over asphyxiated newborns showed Grade 1 HIE in 36.8%, stage 2 in 32.0% and stage 3 in 20.8%. 59.7% of the babies were discharged successfully and 40.3% died. 64.6% weighed >2.5 kg and 35.4% 1.5-2.5 kg [10].

In an different international study done on birth asphyxia neonates showed overall survival rate 86.7%. Mean gestational age was 39 weeks[11]. The good survival rate in this study may be due more mature neonates, while in our 52% neonates were premature.

A study done in India on Birth Asphyxia newborns having 52.6% stage I HIE, 31.5% had stage 2 HIE and 15.7% developed stage III HIE. All HIE stage III babies expired. The mortality was 8%. Of these, 60% were those diagnosed with HIE stage III and the remaining 40% died of MAS with early onset sepsis [12]. Although mortality rate was lower in this study but there was no survival in Grade 3 HIE and this may be due to associated Sepsis and Meconium aspiration. While in our study death was in 24.9% neonates having grade 3 HIE and this difference may be due to no associated sepsis or meconium aspiration in these neonates.

CONCLUSION

In this study most common type was grade 1 Hypoxic Ischemic Encephalopathy 37.1%. Grade 3 HIE was least common but death rate was more in it 21.9%. Death was least common in grade 1 HIE 4.26%.

Author's Contribution:
Concept & Design of Study: Deve Dass
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Conflict of Interest: The study has no conflict of interest to declare by any author.

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