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CLINICAL PROFILE AND SHORT TERM OUTCOME OF INTRA VENTRICULAR HEMORRHAGE IN NEONATES BORN BEFORE 34 WEEKS OF GESTATION ADMITTED TO NEONATAL INTENSIVE CARE UNIT

Neonatology

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ABSTRACT

INTRODUCTION: Intraventricular hemorrhage (IVH) affects 15–20 % of babies born before 32 weeks of pregnancy. A lot of risk factors of developing IVH are known. The making appropriate recommendations for dealing with infant born less than 32weeks of gestation aimed at reducing the incidence of IVH is still needed. The study aim was to determine the incidence and analyze risk factors of IVH stage 3 and 4 in infants born before 34+0 weeks of pregnancy.

METHODS: The retrospective analysis of 297 preterm babies (24 to 34 weeks of gestation) hospitalized in June 2016 to June 2017 at Department of Neonatology,institute of obstetrics and gynecology was performed. The diagnosis of IVH was confirmed by ultrasound scans according to Papille criteria. Stage 3 and 4 of IVH was confirmed in 38 (68 %) newborns from less than 28 weeks of gestation; 18(32%) from 28 to 32 weeks of gestation; and no babies above 32 weeks of gestation.

RESULT: The incidence of IVH stage 3 and 4 was higher in children with incomplete 53(95%) use of AST ($p<0.01$), born with asphyxia 42(74%) ($p<0.01$), with shock treated with NS bolus 54(96%) ($p<0.01$) andinotropes54 (96%) ($p<0.01$) and those neonates treated for hypotension 54(96%) ($p<0.01$).N the logistic regression analysis considering the entire group, we found that gestational age ($\beta = -0.414$; $p = 0.000$),birthweight ($\beta = 0.991$; $p = 0.000$) and 5min Apgar score ($\beta = 0.322$; $p = 0.004$) after adjusting for birth weight were associated with both grades of IVH ($R 2 = -0.9709$; $p < 0.0001$ for the model). fifty six out of fifty six(100%) of patient died with IVH grade 3 and 4 when compared to grade 1 and 2 only three died (8%)all other babies in that group were discharged 34(92%).

CONCLUSION: Intraventricular Hemorrhage constitutes an important cause of morbidity and mortality in neonate.Preterm and VLBW infants have higher incidence of IVH. Antenatal risk factors and maternal antenatal steroid intake also influence the incidence of IVH in newborns.Need for assisted ventilation irrespective of the co morbidities, presence of shock, have been associated with increased incidence of IVH.Deranged coagulation profile have been associated with increased risk for the incidence of IVH in newborns.

KEYWORDS

Intraventricular hemorrhage .Preterm newborns. Risk factors.

INTRODUCTION:

Intraventricular hemorrhage characterized as bleeding due to rupture of blood vessels within the germinal matrix tissue of the developing brain into the ventricular system and the incidence for IVH gradesI–IV,is around 27% in neonates weighing less than 1500 g[1] . IVH ranges in severity from grade I to the most severe grade IV. About 90 % cases of intraventricular hemorrhage occur within the first 3 days of the newborn's life and in 20–40% of IVH cases become more extended, during first week of life. In the majority of cases involving mild bleeding (classified as grade1andgrade2), no clinical effects are observed, usually resolve themselves and cause no long-term problems. Approximately in 60 % of premature infants with grade III and IV of IVH incur cognitive disabilities such as Cerebral palsy and mental retardation [2].

AIM AND OBJECTIVE:

To evaluate the clinical presentation, etiological risk factors of IVH by history, physical examination and available relevant lab investigations, to correlate the birth weight, gestational age, sex, mode of delivery, perinatal factors with the incidence of IVH and to study the immediate outcome.

MATERIALS AND METHODS:

This is a retrospective study which included neonates with IVH admitted in the Neonatal intensive care unit of Department of Pediatrics,institute of obstetrics and gynecology during the period of July 2016 and July 2017.

STUDY POPULATION:

Out of Two hundred ninety seven premature infants (delivery before 34+0 weeks of gestation) admitted to the Neonatal Intensive Care Unit at the Department of Neonatology, institute of obstetrics and gynecology between July 2016 and July 2017 ninety three were recruited into study.

All new-born were screened using relevant history, available laboratory methods and Cranial Ultrasound Examination for the evidence of IVH. Incidence, Risk factors and Immediate outcome i.e., survival or death among the neonates with Intraventricular hemorrhage were analyzed.

INCLUSION CRITERIA:

All the Neonates with IVH admitted in the Neonatal Intensive Care Unit at Department of Pediatrics, institute of obstetrics and gynecology between June 2016 and June2017 were recruited into study.

EXCLUSION CRITERIA:

- Neonates who died within the first 48 hours of life
- Those with lack of Cranial Ultrasound examination within the first 10 days of life
- Not include neonates born after34+0weeks of pregnancy
- Not includes chromosomal abnormalities or TORCH (toxoplasmosis, other, rubella, cytomegalovirus, and herpes).

DATA COLLECTION:

The list of neonates were taken from record book and the case sheets were reviewed from MRD and details were taken and entered in excel sheets. This was divided into mild (grade 1 and 2) and severe (3and 4) group. Data on clinical outcome, including mother' s age, pregnancy complications, such as prolonged rupture of membranes, chorioamnionitis, as well as the use of antenatal steroids, saline bolus,inotropes, type of delivery, Apgar scores need for ventilator, ventilator were obtained by chart review. We also analyzed complications during the clinical course such as necrotizing enterocolitis, sepsis, and PDA.

DIAGNOSIS OF INTRAVENTRICULAR BLEEDING:

Intraventricular hemorrhage was diagnosed with the use of a cranial ultrasonography scan. According to the guidelines of the American Academy of Neurology (AAN), a routine cranial ultrasonography scans were performed on 3rd, 7thday of life, and once more just before discharging from hospital. The classification of intraventricular bleeding was based on the papile IVH[3]

IMMEDIATE OUTCOME:

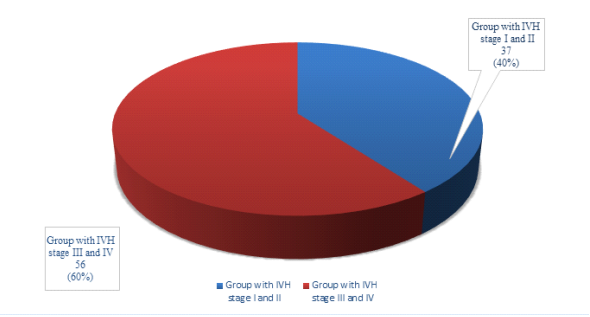
It was noted whether the child survived or expired.

STATISTICALANALYSIS:

Descriptive and inferential statistical analysis has been carried out in the present study. Results on continuous measurements are presented on Mean ± SD (Min-Max) and results on categorical measurements are

presented in Number (%). Significance is assessed at 5% level of significance. The following assumptions on data is made, Assumptions: 1.Dependentvariables should be normally distributed, 2.Samples drawn from the population should be random, Cases of the samples should be independent Chi-square/ Fisher Exact test has been used to find the significance of study parameters on categorical scale between two or more groups, Non-parametric setting for Qualitative data analysis. Fisher exact test used when cell samples are very small.

FIGURE1
RESULTS



The incidence of mild (grade 1and 2) severe (grade 3 and 4) IVH in gender is of no significance (p-0.630). The risk of IVH stage 3 and 4 was the greater in lower the gestational age. Stage 3 and 4 of IVH was confirmed in 38 (68 %) newborns from less than 28 weeks of gestation;18(32%) from 28 to 32 weeks of gestation; and no babies above 32 weeks of gestation with significant difference(P-0.000).The risk of IVH stage 3 and 4 is greater in elbw and vlbw Grade 3 and 4 is more in birth weight less than 750 grams 17(30%) and in 750g-1000g 29(52%). 62% of the new-born with severe IVH had prolonged prothrombin time (p<0.01).The incidence of IVH stage 3 and 4 was higher in children with incomplete 53(95%) use of AST (p<0.01), born with asphyxia 42(74%)(p<0.01), with shock treated with NS bolus 54(96%)(p<0.01)and inotropes54(96%) (p<0.01) and those neonates treated for hypotension 54(96%) (p<0.01)

There was no significance increase incidence of IVH stage 3 and 4 in neonates if the baby had risk factors like PPROM, NNEC,pneumonia and thrombocytopenia after birth. In the logistic regression analysis considering the entire group, we found that gestational age ($\beta = -0.414$; $p = 0.000$), birthweight ($\beta = 0.991$; $p = 0.000$) and 5min Apgar score ($\beta = 0.322$; $p = 0.004$) after adjusting for birth weight were associated with both grades of IVH ($R^2 = -0.9709$; $p < 0.0001$ for the model).Fifty six out of fifty six(100%) of patient died with IVH grade 3 and 4 when compared to grade 1 and 2 only three died (8%)all other babies in that group were discharged 34(92%).

TABLE 1 CHARACTERISTIC OF STUDY POPULATION

	Group with IVH stage I and II stage (N=37; 40 %)	Group with IVH stage III and IV (N= 56; 60 %)	P – value
Gender			
Male	23 (62%)	32 (57%)	0.630
Female	14 (38%)	24 (43%)	
Gestational Age			
< 28	5 (14%)	38 (68%)	0.000
28 – 32	22 (59%)	18 (32%)	
> 32	10 (27%)		
Birth Weight (gm.)			
< 750		17 (30%)	0.000
750 – 1000	8 (22%)	29 (52%)	
1000 – 1500	25 (68%)	10 (18%)	
> 1500	4 (11%)		
PPROM	22 (59%)	32 (57%)	0.825
STEROID			
Complete	22 (59%)	3 (5%)	0.000
Incomplete	15 (41%)	53 (95%)	
MOD			
LN	24 (65%)	47 (84%)	0.034
LSCS	13 (35%)	9 (16%)	
5 Min Apgar			
< 5	4 (11%)	42 (74%)	0.000
> 5	33 (89%)	14 (25%)	
RDS-cpap	15 (40%)	4 (7%)	0.000
RDS-PS	22 (59%)	52 (93%)	0.000
PNEUMONIA	4 (11%)	6 (11%)	0.988
PDA	13 (35%)	35 (63%)	0.010
SEPSIS	25 (68%)	52 (93%)	0.002
NNEC	3 (8%)	9 (16%)	0.262
THROMBOCYTOPENIA	18 (49%)	31 (55%)	0.526
PT/APTT/INR			
normal	29 (78%)	21 (38%)	0.000
prolonged	8 (22%)	35 (62%)	
TRANSFUSION	8 (22%)	42 (75%)	0.000
HYPOTENSION	12 (32%)	54 (96%)	0.000
NS BOLUS	21 (57%)	54 (96%)	0.000
INOTROPS	12 (32%)	54 (96%)	0.000
VENT	24 (65%)	56 (100%)	0.000
OUTCOME			
death	3 (8%)	56 (100%)	0.000
discharged	34 (92%)		

DISCUSSION:

Although major improvements in survival rates in extremely low birth weight infants have been observed in many countries worldwide, extensive intraventricular hemorrhage remains an important risk factor for bad neurological outcomes. Low gestational age, RDS, and low birth weight are recognized as risk factors for this complication, and in our study, the proportions of these conditions were higher in the severe IVH. In the present study out of the 297 neonates admitted in NICU in 1 years, 93 neonates with IVH were included in the study in regards to the inclusion criterion. The overall incidence of IVH in the present study is 31.3%.

Out of 93 new-born with IVH, 57% were males and 43% were females with severe IVH. In the present study, out of 297 babies screened for IVH, 37 babies had mild IVH and 56 babies had severe IVH. Incidence of severe IVH was more in preterm born less than 28 weeks (68%) and less than 32 weeks (32%) compared to those born >32 weeks gestational age in which no babies had severe IVH.

There was however a striking decrease in the incidence of hemorrhage after the 30th postmenstrual week, and this is perhaps of importance in consideration of the timing of delivery in a compromised fetus. The reason for the fall in prevalence of IVH at this time is probably related to maturation of the vascular anatomy [4] or to the physiology of cerebral auto regulation affecting the germinal matrix capillaries.

In the present study, out of 93 babies with IVH, incidence of severe IVH in infants with birth weight <750 grams was 30%, birth weight between 750 grams-1 kg was 52% and birth weight between 1kg-1.5kg was 18% and no babies with birth weight >1.5 kg . The association was statistically significant ($p < 0.001$).

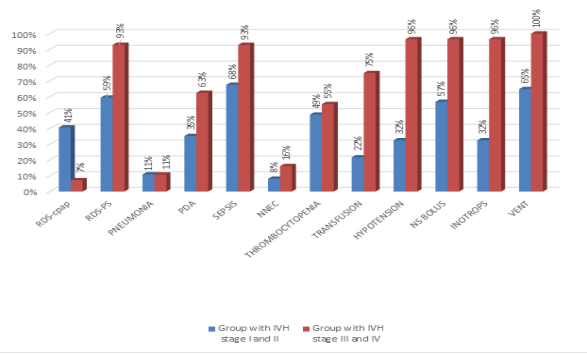
Among 56 babies with severe IVH, 3 babies (5%) developed IVH born to mother with complete steroid cover and 48 babies(86%) and 5 babies (9%) born to mothers with incomplete and no steroid cover respectively. The association was statistically significant (p<0.001).A Cochrane review showed that antenatal steroid reduced the risk of neonatal death by 31 %, RDS by 44 %, and IVH by 46 % [5].

Among 56 babies with severe IVH in the study period, incidence of IVH in new-born born out of normal vaginal delivery was 84% and incidence of IVH in those born out of emergency LSCS was 16%. Although often contradictory, these results suggest the possibility that active labor and vaginal delivery may be a risk factor for developing early onset IVH.

Among these 93 babies, (74%) with history of birth asphyxia

developed severe IVH and 11% with history of birth asphyxia developed mild IVH 16 babies. The association was statistically significant(p<0.001)in a study by Liu et al [6] on 1122 infants born before week37ofgestational age, asphyxia is mentioned as one of major risk factors for IVH.

FIGURE 2 RISK FACTORS OF IVH



Among 56 babies with severe IVH all were ventilated during NICU stay (100%).In mild IVH babies only 65 % are ventilated. The association was statistically significant($p < 0.001$).In a study conducted by Ally H, Hammed TA, Essers J, Wung JT[7] at an American hospital, data was collected on delivery room intubation and mechanical ventilation during the first 3 days of life in very low birth weight infants.

Among 93 babies with IVH 54 babies (96%) were treated with normal saline bolus and inotrops developed severe IVH and also in mild IVH group required bolus and inotrops 57% and 32% respectively.The association was statistically significant ($p < 0.001$).Rong et al. [8] found catecholamine therapy to be a risk factor for IVH.

Cardiorespiratory complications of neonatal care have long been considered to be the most important predisposing risk factors in the development of IVH. RDS as and its treatment by CPAP [9] is such factors. In this study RDS treated with surfactant is more prone for severe IVH (93%) than CPAP, all correlated very strongly with the development of IVH (p-0000).

Among 93 babies, 55% with severe IVH developed thrombocytopenia and 49% with mild IVH developed thrombocytopenia and this was however statistically not significant with p value 0.526.

Among 93 babies, 21 babies (38%) out of 56 babies with normal prothrombin time developed severe IVH, 35 babies (62%) out of 56 babies with prolonged prothrombin time developed severe IVH during the course of Illness in the period of NICU stay. The association was statistically significant ($p < 0.001$)

CONCLUSION:

- From current study, we concluded that:
- Intraventricular Hemorrhage constitutes an important cause of morbidity and mortality in neonate.
- Preterm and VLBW infants have higher incidence of IVH
- Antenatal risk factors and maternal antenatal steroid intake also influence the incidence of IVH in newborns.
- Need for assisted ventilation irrespective of the co morbidities, presence of shock, have been associated with increased incidence of IVH.
- Deranged coagulation profile have been associated with increased risk for the incidence of IVH in newborns.

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