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## Research Article

# RISK FACTORS AND TREATMENT OF INTRACRANIAL HEMORRHAGE IN NEWBORNS

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### ABSTRACT

**Introduction:** Intracranial hemorrhage (HIC) is the common name for intraventricular and intraparenchymal hemorrhage in newborn brain. It can result in neurodevelopment impairment as the neonatal period is critical for brain development.

**Aim:** To analyze the risk factors and treatment of newborns with HIC.

**Material and methods:** We reviewed the medical records of 43 newborns with intracranial hemorrhage treated in the period from September 2021 to September 2023 at the Pediatric Clinic University Medical Center Sarajevo.

**Results:** The birth weight under 1,000 g had 15/43 (34.9%), 1,000-1,499 g 13/43 (30.2%), 1,500-2,499 g 9/43 (20.9%) and over 2,500 g 6/43 (13.9%) newborns. In 30/43 (69.8 %) newborns 5-minute Apgar score was < 7, of which 6/30 (20%) were with severe perinatal asphyxia (5-minute Apgar score < 3). The first grade of HIC had 18/43 (41.9%) newborns, the second 12/43 (27.9 %), the third 10/43 (23.3%) and fourth 3/43 (6.9%) newborns. In 4/43 (9.3%) newborns a posthemorrhagic hydrocephalus developed.

**Conclusion:** A key risk factor for the development of HIC were low birth weight and perinatal asphyxia. Since there is no specific treatment for HIC, the supportive care and treatment of symptoms were applied. In case of posthemorrhagic hydrocephalus the surgery was needed.

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### INTRODUCTION

Intracranial hemorrhage (HIC) is the common denominator for brain Intraventricular and intraparenchymal hemorrhage in neonatal period (I). It primarily occurs in preterm but also in term and post term newborns as a result of immaturity of blood vessels and hemodynamic instability, asphyxia, congenital vascular anomalies, blood coagulation disorders and traumatic delivery (2,3).

The incidence of HIC in the neonatal age varies according to the data of various authors. The incidence HIC in newborns weighing under 1,000 g is 50-60%, and in newborns weighing 1,000 - 1,500 g is 10-20% (4,5).

The aim of our study was to analyze risk factors and treatment of newborns with HIC in the neonatal intensive care unit of the tertiary level.

### MATERIAL AND METHODS

This was a retrospective study in a two-year period (September 2021 - September 2023) at the Department of Neonatology and Intensive Care at the Pediatric Clinic in Sarajevo. We evaluated medical records of 43 newborns with HIC. Intracranial hemorrhage was diagnosed on the basis of clinical picture, laboratory findings and brain ultrasonography Data were analyzed by PASW Statistics18.

### RESULTS

The study included 43 newborns with HIC, out of which 22/43 (51.2%) were male and 21/43 (48.8%) were female./29 (55.1%) Newborns with birth weight below 1,500 g were represented by 53.5% (Table 1.).

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**Table 1** Distribution of newborns with HIC according to birth weight

Birth weight (g)	n	%
<1,000	15/43	34.9
1,000-1,499	13/43	30.2
1,500-2,499	9/43	20.9
>2,500	6/43	13.9

The large number of newborns with HIC had perinatal asphyxia with 5-minute Apgar score < 7 (Table2.)

**Table 2** Distribution of newborns with HIC according to 5-minute Apgar score

5-minute Apgar score	n	%
8-10	13/43	30.2
5-7	16/43	37.2
3-4	8/43	18.6
<3	6/43	13.9

The distribution of severity of HIC (according to Papile) is shown in Table 3.

**Table 3** Distribution of severity of HIC according to Papile classification

Grade	n	%
I	18/43	41.9
II	12/43	27.9
III	10/43	23.3
IV	3/43	6.9

In four patients posthemorrhagic hydrocephalus developed which required neurosurgery.

## DISCUSSION

Predisposing factors for the occurrence of HIC (IVH/PVH) are: prematurity, RDS, hypoxic-ischemic damage, hypotension and hypertension, hypervolemia, increased and decreased cerebral blood flow, decreased vascular integrity in the central nervous system, coagulation blood disorder, increased venous pressure and pneumothorax. All of these factors, rarely alone, but mostly combined lead to intracranial hemorrhage.

Our results show that the occurrence of intracranial hemorrhages is directly related to prematurity (< 1,500 g, 41.9% of newborns), perinatal asphyxia and hypoxic ischemic encephalopathy (69.8% of newborns with HIC had 5-minute Apgar score <8).

Therefore, many authors emphasize the prevention of prematurity and perinatal asphyxia, prevents HIC (6).

Postnatal care would include properly and timely neonatal resuscitation, correction and prevention of major hemodynamic disorders, correction of abnormalities in blood coagulation, administration of Phenobarbital, Vitamin E and Indomethacin (7,8).

The treatment of HIC involves a series of medical procedures to stabilize the vital parameters - if convulsions occur, the administration of anticonvulsant drugs (Phenobarbitone, Phenytoin, Diazepam),

the urgent correction of anemia and repeated transfusions of blood and blood derivatives (fresh frozen plasma and platelets), the correction of metabolic acidosis by giving saline solution and 1-2 mEq/kg of bicarbonate (9,10).

Repeated lumbar punctures, external drainage Becker and implantation of ventriculoperitoneal shunt reduce the symptoms of posthemorrhagic hydrocephalus (10).

## CONCLUSION

The main risk factors for HIC in newborns are low gestational age and perinatal asphyxia. Brain ultrasonography as a non-invasive diagnostic method is indisputable in detection of HIC, and should be used as a screening test, especially in neonates of low gestational age and low birth weight. The best prevention of HIC is prevention of prematurity and perinatal asphyxia.

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