



# Intradural Hemorrhage in the Tentorium Cerebelli as a Sign of Pathological Configuration and Compression Hypoxia of the Brain

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## Abstract

It was revealed that Hemorrhages in the Tentorium Cerebelli (HTC) are found in 11.9% of intrapartum dead fetuses and newborns, the causes of death of which were mainly congenital aspiration pneumonia, aspiration syndrome, RDS-syndrome and intranatal hypoxia. The presence of these hemorrhages indicates that the children had excessive configuration (molding) with brain compression and compression hypoxia during labor. HTC is an important criterion for the diagnosis of excessive configuration of the head and compression hypoxia transferred during labor. Detection of HTC is important for the diagnosis of compression hypoxia and birth trauma.

**Keywords:** Tentorium cerebelli; Intradural hemorrhage; Head compression; Head configuration (molding); Compression hypoxia; Birth trauma

## Introduction

In the process of spontaneous labor, the configuration of the head naturally occurs due to its compression in the mother's birth canal, which is accompanied by displacement of the bones of the skullcap, impaired venous outflow of blood from the skull and brain, compression of the sinuses, increased intracranial pressure, hypoxia of the brain tissue, etc. [1-3]. The configuration can be physiological and pathological, and the pathological is divided into excessive, rapid and asymmetric [1]. The configuration can become abnormal when using obstetric forceps and a vacuum extractor. Pathological configuration leads to Birth Trauma (BT) and Compression Hypoxia (CH) of the brain, which is not well studied in the literature [4]. The significance of fetal compression and its head in the occurrence of intrapartum hypoxia written and write many, highlighting such concepts as "hypoxic compression encephalopathy", "circulatory hypoxia" and "traumatic hypoxia" [5-8]. CH is usually included in the concept of hypoxia. CH is difficult to distinguish from BT and from intranatal hypoxia of a different genesis. An important criterion of differences is intradural Hemorrhage in the Tentorium Cerebelli (HTC), which is not given sufficient attention by both clinicians and pathologists. Studies have shown that excessive compression of the head of the fetus during childbirth in the first place leads to overstretching of the Tentorium Cerebelli (TC), which is first accompanied by the appearance of hemorrhages in it, and then ruptures [1]. The compression of the head of the fetus in any plane is accompanied by the tension of the falx and TC. Due to the fact that the falx is almost 2 times stronger than the TC, the latter is damaged in the first place and most often. TC is the area of "Locus minoris resistentiae" (place of least resistance) when compressing the skull. HTC is not yet BT does not lead to the tanatogenetically important subdural hemorrhage, its presence indicates the presence of excessive compression of the skull, in which CH occurs. Therefore, the detection of HTC can help clinicians in the diagnosis and justification of the CH.

## Material and Methods

The study was conducted on the material of 295 intrapartum dead fetuses and newborns. Children with a birth trauma of the skull, congenital malformations of the skull, spine, brain, with various deformities and perforations of the skull were removed from the study group. A pathologic-anatomical study with a detailed study of the tentorium cerebelli, brain and spinal cord was performed. The study was conducted in accordance with its own method of opening the skull and extracting the brain [1].

## Results and Discussion

Our material revealed 35 cases (11.9%) with HTC (Figure 1 and 2), and did not take into account

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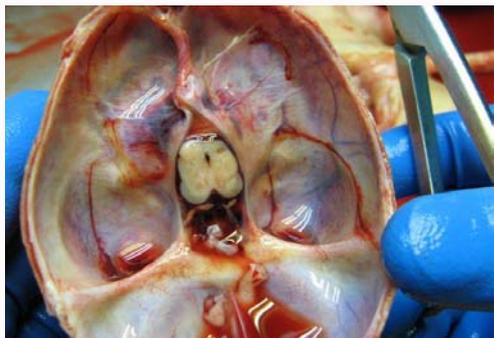
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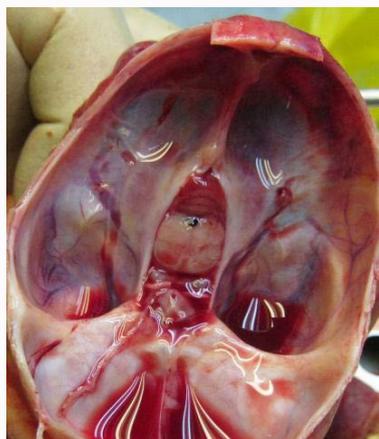
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**Figure 1:** Bilateral intradural hemorrhage into the cerebellar tentorium in a neonate.

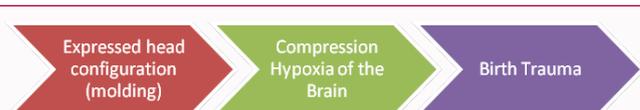


**Figure 2:** Cerebellar tentorium without hemorrhages and tears (for comparison).

cases of birth trauma with ruptures of the TC and other structures. HTC were of different shapes, sizes, localization, one-sided and two-sided. These hemorrhages were usually combined with signs of bone displacement in relation to each other and with various brain lesions (subarachnoid and subpial hemorrhages of the brain hemispheres (18.4%), as well as cerebellum (6.1%), subependymal, intraventricular and intracerebral hemorrhages (11.4%), periventricular leucomalacia (8.6%), ischemic lesions of neurons of various brain regions, etc). In addition to hemorrhages in the cerebellum, four children (11.4%) showed small tears of the upper leaf of TC, which did not accompany subdural hemorrhage. In a group of 49 children who died from intrapartum hypoxia, HTC was detected in 14.3% of children.

Figure 1: bilateral intradural hemorrhage into the cerebellar tentorium in a neonate; the larger hemorrhage is in the right half (arrow) of the cerebellar tentorium. The skull cap and cerebral hemispheres are removed. The intersected brain stem is in the center. Figure 2: cerebellar tentorium without hemorrhages and tears (for comparison).

The causes of death of the studied group of children with HTC were: respiratory distress syndrome (31.4%), congenital aspiration pneumonia (17.1%), aspiration syndrome (8.6%), intrapartum hypoxia (1.4%), various intracranial hemorrhages (8.6%), and hemorrhage in the adrenal glands (5.7%), hemolytic disease (5.7%), pneumonia (5.7%), intrauterine infection (2.8%), and acute respiratory viral infection (2.8%). Thus, children had a high frequency of aspiration of amniotic fluid (25.7%), indicating transferred intrauterine hypoxia,



**Figure 3:** The relationship of hypoxia with birth trauma (scheme).

and RDS-syndrome (31.4%). In some cases, newborns develop severe hemorrhages intracerebral and intraventricular (8.6%), leading to death. Studies show that dead children in childbirth suffered CH, which was accompanied by various birth injuries and aspiration of the amniotic fluid. Developing after birth diseases are often a complication of the CH.

In the process of childbirth, the configuration of the head occurs, which can be divided into three degrees (of the form light, moderate, and expressed) [1]: 1) overlapping of bones along one of the sutures, 2) overlapping of bones within 2-3 sutures, 3) overlapping of bones 4-5 sutures. Clinical studies have shown that with the second and third degrees of the configuration of the head, early deceleration is observed: with the 2<sup>nd</sup> degree the appearance of early decelerations, with the 3<sup>rd</sup> degree the appearance of early and sporadic decelerations [9]. Light and moderate degrees do not lead to pathological changes, but the expressed (pathological) degree leads to compression hypoxia of the fetal brain and birth trauma. What are the differences between Compression Hypoxia (CH) and birth trauma? Both conditions are due to mechanical forces acting on the skull. However, unlike CH in BT, various tissue breaks occur, accompanied by hemorrhages. This usually occurs when the compression force exceeds that which occurs during the CH.

Compression of the skull during childbirth is accompanied by the expressed (excessive) configuration of the head, which leads to the CH of the brain, and then to the birth trauma of the skull (Figure 3). First of all, with the expressed configuration of the head, the tentorium cerebelli is damaged in the form of the occurrence of intradural hemorrhages and ruptures. CH is not yet BT, but it includes birth traumatic injuries. The selection of CH is important in order not to engage in overdiagnosis of BT. It is important to understand that intrapartum hypoxia occurs not only in violation of the uteroplacental circulation, pathology of the umbilical cord, diseases of the mother and fetus, but also in excessive compression of the head of the fetus during childbirth.

BT must be distinguished from CH and generic traumatic injuries. BT and CH are diseases, nosological forms, and birth injuries are local pathological processes, associated conditions. HTC is one of the types of generic traumatic injuries that can be present in both BT and CH.

The results of the study show that children with HTC often die not in childbirth, but after birth from respiratory failure caused by aspiration of the amniotic fluid by the RDS-syndrome (57.1%). This suggests that compression hypoxia during childbirth is not only accompanied by direct brain damage, but also by its complications-aspiration syndrome, congenital aspiration pneumonia, etc.

## Conclusion

The results of the study showed that HTC (11.9%) are found with a high frequency in deceased fetuses and newborns, which indicates the expressed configuration and compression of the skull during childbirth. HTC is an important criterion for the diagnosis of pronounced configuration of the head and transferred intrapartum

hypoxia, which is unfavorable for the development and course of diseases of the respiratory system and brain after birth. Detection of HTC in newborns helps to diagnose CH and differentiate birth trauma from CH.

## References

1. Vlasyuk VV. Birth Trauma and Perinatal Brain Damage. Cham: Springer; 2019.
2. Lindgren L. The influence of pressure upon the fetal head during labour. *Acta Obstet Gynecol Scand.* 1977;56(4):303-9.
3. Zirakadze AN, Kintraya PY. Experimental analysis of the value of methods for monitoring the functional state of the fetus during labor. On Sat scientific Proceedings of the Research Institute of Perinatal Medicine, Obstetrics and Gynecology of the Ministry of Health of the Georgian SSR. Tbilisi; 1983:3-9.
4. Vlasyuk VV. Compression Circulatory Hypoxia of the Brain as a Type of Intrapartum Hypoxia. *J Gynecol* 2019;4(1):173.
5. Heyborne KD. A Systematic Review of Intrapartum Fetal Head Compression: What Is the Impact on the Fetal Brain? *AJP Rep.* 2017;7(2):e79-85.
6. Schifrin BS, Deymier PA, Cohen WR. Cranial compression ischemic encephalopathy: fetal neurological injury related to the mechanical forces of labor and delivery. In: Zhang L, Longo LD, editors. *Stress and Developmental Programming of Health and Disease: Beyond Phenomenology.* Network: Nova Scientific Publishers; 2014. p. 651-88.
7. Gutner MD. Intranatal asphyxia. Krasnoyarsk: Krasnoyarsk Medical Institute. 1958.
8. Dergachev IS. Pathological anatomy and pathogenesis of diseases of newborns, infants and young children. M: Medicine. 1964.
9. Mochalova MN, Ponomareva YuN, Mudrov VA. Features of the configuration of the head at birth large fruit. *Modern problems of science and education.* 2015;3.