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SECTION: MEDICINE

DRAINAGE SYSTEM OF THE FRONTAL FONTANELLE

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"Experience is not what happens to you;
it's what you do with what happens to you."

Isaac Newton

Introduction. Thanks to significant advancements in morphology and related disciplines, recent years have seen an expanded understanding of the structural composition of cranial fontanelles in children. Before the introduction of computed tomography (CT) and magnetic resonance imaging (MRI) into practice, diagnosing the nature of pathological processes and damage to fontanelles based solely on clinical manifestations was extremely challenging. In particular, an accurate diagnosis of certain conditions could only be made post-mortem or intraoperatively. However, the improvement of radiological diagnostic methods and the widespread adoption of modern research techniques have led to a dramatic improvement in this situation. The prevention, early diagnosis, and timely treatment of angioneurosurgical diseases in children are among the most pressing issues in medical science. Despite more than 100 years of history in neurosurgical treatment, the number of patients with cerebrospinal fluid circulation pathology is increasing in nearly all countries.

The aim of the study is to determine the nature and role of the drainage system of the frontal fontanelle.

Materials and Methods. Theoretical: review and analysis of scientific literature; Practical: personal research to identify variations in the drainage network of the frontal fontanelle.

Results and Conclusions. One of the distinctive features of a child's skull is the presence of fontanelles. The significant role of the frontal fontanelle in regulating cerebrospinal fluid pressure in children has been known since the 19th century. It was believed that the frontal fontanelle acts as a safety valve, rising and lowering in response to changes in intracranial pressure. Currently, despite some discrepancies

regarding the circulation of cerebrospinal fluid, the meninges are unanimously recognized as one of the primary regulators of cerebrospinal fluid pressure in both adults and children. However, the regulation of cerebrospinal fluid pressure in children has certain characteristics compared to adults, which are related to the structural features of their skull and meninges. The presence of fontanelles in a child undoubtedly creates different conditions for regulating intracranial pressure compared to adults. As evidence of the uniqueness of intracranial pressure regulation in children, there is a correlation between the closure of fontanelles and the vigorous formation of Pacchionian granulations. However, even in this case, the frontal fontanelle acts only as a natural elastic valve that locally regulates cerebrospinal fluid pressure. Based on literature data, it can be concluded that the frontal fontanelle indeed plays a significant role in the regulation of intracranial pressure, particularly during the first months of a child's life. However, its role is not limited to that of a mechanical valve that passively bulges or recedes depending on changes in intracranial pressure. In the frontal fontanelle of children, as well as in newborns and fetuses during the last two months of development, a well-developed system of lateral clefts is found, passing between collagen bundles and extensively interconnected. These clefts are especially developed in the inner layer of the frontal fontanelle, where they form an entire system that opens into the subdural space through small pores. The walls of these lacunae are composed of collagen fibers, lined on the inside by a single layer of flat epithelium, which lies on a basement membrane and often loses its continuity. When reconstructing the frontal fontanelle using serial planar sections, it is evident that these lacunae are not only distributed within the inner layer but often represent a complex system of interconnected clefts that traverse the fontanelle in all directions, following the main structure of its tissue. Through pores that open on the inner surface of the fontanelle, they are connected with the subdural cavity. On the other hand, these lacunae are closely associated with the venous vessels of the fontanelle, which encircle them with a dense network and often originate from them. This system is analogous to the foveolae granulares or "juice" cleft system described by several authors in the dura mater of adults. There is no consensus on the nature and purpose of this system in the dura mater. Some authors consider these clefts to be lymphatic vessels, while others classify them as part of the blood vascular system, viewing them as ordinary capillaries and veins with specific structural features characteristic of the dura mater. Experimental studies have shown that the injected vessels in the dura mater are not at all similar to typical lymphatic vessels, but rather resemble lymphatic lacunae, whose connection with lymph nodes has not been established, while a connection with venous sinuses has been confirmed.

This system of relatively small clefts in the tissue of the frontal fontanelle directly continues into larger oval-shaped cavities located along the sagittal sinus. Upon detailed examination, it becomes evident that the walls of these lacunae have the same structure as those in the entire system of clefts. In the larger lacunae, beneath the basement membrane, there are thin elastic fibers that extend into the elastic network of the surrounding tissue. These cavities are typically filled with clear serous fluid containing a few blood cells.

These lacunae are described in the literature under the name lacunae laterales seu venosae Trollardi. Most authors consider these formations as auxiliary venous systems that are either constantly filled with blood or periodically fill in cases of obstructed blood outflow through the sinuses. The assertion of their auxiliary role in venous circulation can be questioned based on the fact that, in our studies, we never observed blood in the lacunae. Even in cases where the death of a newborn resulted from hemorrhage into the brain and meninges, and the entire fontanelle tissue was saturated with blood, the lacunae remained free of blood. In our opinion, the shared structure and close connection of these lacunae, on the one hand, with the system of "juice" clefts and, on the other hand, with the venous sinuses of the dura mater, suggest that these formations are part of the general drainage system of the fontanelle.

Evidence that the frontal fontanelle performs a drainage function is the fact that, in cases of chronic hydrocephalus in children, the system of "juice" clefts in the fontanelle is particularly well-developed. The lacunae significantly enlarge and are so close to each other that the tissue of the fontanelle and adjacent areas of the dura mater take on a sieve-like appearance. In these cases, it is often possible to observe ruptures of individual lacunae, likely due to a sharp increase in intracranial pressure.

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ВИПАДКИ ДИСФОНІЇ ЦЕНТРАЛЬНОГО ГЕНЕЗУ. ВЛАСНІ СПОСТЕРЕЖЕННЯ.

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Голос є дуже важливим компонентом життя. При афонії - повній втраті голосу, або при різних формах дисфонії, що проявляються захриплістю, підвищеною стомлюваністю, слабкістю голосу, появою тембральних та інтонаційних порушень, ускладнюється здатність до спілкування, страждає трудова діяльність осіб голосомовних професій, до яких належать артисти, співаки, викладачі, лектори, військовослужбовці, священнослужителі. Крім того,