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X-RAY-ANATOMICAL FEATURES OF MORPHOMETRIC INDICATORS OF CREREBRAL VENTRICLES IN CONCUSSIONS AND INJURIES AT DIFFERENT LEVELS

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Introduction: Recent publications, Scientific Conferences and other sources of information were used to collect reliable information about the lateral ventricle, the largest of all ventricles of the brain. It can be divided into frontal branch, body, dorsal branch and lower branch. Different methodologies can produce different results when measuring lateral ventricular length.
Keywords: Traumatic brain injury, brain concussions, lateral ventricle, MRI scans.

Aim: Study of the age and gender-specific X-ray anatomical features of the cranial ventricles. And determination of morphometric specificity of cranial ventricular dimensions in different periods of concussions and mild levels of cranial injury.

Relevance. Today, in applied medicine, complications caused by traumatic brain injury (TBI) and concussions are from diseases that cause the death and disability of the population and are a medico-social problem in a number of countries around the world. According to experts from the World Health Organization (who), cranial injury accounts for 30-35% of all injuries, and the record of deaths is 55-60%. This, in turn, does not remain without an impact on the medical and social status of society[1,2].

One of the extremely conserved features of the vertebrate brain is the ventricular system, which is a network of linked chambers filled with cerebrospinal fluid [3]. The cerebral ventricles have been known since the time of Aristotle [4]. Approximately 2% of the brain's total volume consists of ventricles [5]. Clinicians, Neurosurgeons, and Radiologists can benefit from understanding the normal and abnormal structure of the brain's ventricular system in their day-today scientific work [6]. A crucial examination for hydrocephalus in children involves visualising the cerebral ventricles. The diagnosis and classification of hydrocephalus have always relied on morphometric measurements of the ventricular system, as well as the assessment and monitoring of ventricular system expansion during interventions such as ventricular shunts [7,8]. There is a reduction in brain tissue associated with ventricular enlargement and other physical and histological changes in the brain as a result of aging and various dementias [9]. Another explanation for the atrophy of cerebral white matter resulting in ventriculomegaly is diffuse axonal damage. Consequently, abnormal ventricular enlargement has been considered a sign of impending cerebral degeneration. This could be due to the adaptive potential of the ventricular system or a reduction in neuron size [10]. Research on postmortem cases as well as imaging studies have demonstrated the association between increased cerebrospinal fluid areas and decreased cerebral volume during normal aging in humans [11]. Therefore, a comprehensive understanding of agerelated physiological changes in the brain is recommended before evaluating abnormal findings [12]. Many authors suggest that there are gender variations in the brain's aging process, with the changes in females being relatively mild compared to males Typically, the left lateral ventricle is larger than the right lateral ventricle [13]. There is ongoing debate about the most effective method for measuring the various parts of the cerebral ventricular system in the fields of neuroanatomy, psychiatry, neuroradiology, and neurology [14]. Despite an extensive literature search, there is a lack of studies comparing the measurements of lateral ventricle parameters in MRI scans and cadaveric brain specimens. So, the

present study was conducted with the aim to measure the length of lateral ventricle using formalin-fixed brain specimens and Magnetic Resonance Imaging (MRI) scans[15,16].

Symptoms observed in cranial injuries and concussions include anxiety-depressive syndrome, sleep disorders, emotional lability, impaired pain response, attention and memory loss, among others, being studied to be associated with morphological changes in the lateral ventricles of the cranium [17]. Comatose conditions such as es-hush loss, amnesia in moderate to severe cases are widely used in neurosurgery to be assessed on the Glasgow scale in the 3-15 point range.[18] Considering that the lateral ventricles of the brain interact with corpus collosum in the orbitofrontal area, with white matter in the occipital area, nospecific symptoms - such as nausea, vomiting, skin discoloration, cardiac dysfunction-also go back to structural changes in the ventricles [19].

In research by scientists, X-ray-anatomical features that represent changes in the size of the brain ventricles in traumatic brain injuries and concussions reflected the relationship between several clinical signs that occurred in patients and the results of the study.[20] In the final CT scan of each patient, ventriculomegaly was found in 39.3% of patients with severe head injuries and 27.3% of those with moderate head injuries. An increase in ventricular volume was observed in 57.6% cases 4 weeks after injury and 69.7% cases 2 months after injury [21].

Post-traumatic ventriculomegaly is one of the most pressing medical problems that occurs frequently and is detected late in patients with moderate to severe traumatic brain injury.[22] The lives of patients struggling with this pathology are often at risk, the process of social adaptation is derailed. Such patients leave not only themselves, but also their loved ones surrounded by difficulties and unhealthy life [23].

In today's modern medicine, complications after mild to moderate cranial injury often bother patients. These conditions lead to the social desadaptation process of humans and a decrease in the quality of life[24]. The result of scientific research is noted that the advertising of the cerebral ventricles in relation to injury and the structural changes that occur in them are also important. These indicators determine the intensity of post-traumatic symptoms and complications observed in the patient [25].

Mild traumatic brain injury (YBMJ) includes concussions that involve a temporary change, and most of them are accompanied by a normative recovery of brain activity. In 15% of cases, symptoms after contusion are observed [26]. These include anxiety-depressive syndrome, sleep disorders, emotional lability, pain response disorders, attention and memory impairment, among others, being studied to be associated with morphological changes in the cranial lateral ventricles [27].

According to the results of a study after moderate to severe brain lesions (O'OBMJ), changes in the size of the cranial ventricles are of particular importance in the occurrence of disorders of consciousness, loss of consciousness, dysfunctions in the sensory and movement zones. The results of scanning and neuropsychological testing are consistent with morphometric and histological changes in the lateral ventricles [28,29].

Mild traumatic brain injury (mTBI) is a significant health burden among military service members. Although mTBI was once considered relatively benign compared to more severe TBIs, a growing body of evidence has demonstrated the devastating neurological consequences of mTBI, including chronic post-concussion symptoms and deficits in cognition, memory, sleep, vision, and hearing [30]. The discovery of reliable biomarkers for mTBI has been challenging due to under-reporting

and heterogeneity of military-related mTBI, unpredictability of pathological changes, and delay of post-injury clinical evaluations. Moreover, compared to more severe TBI, mTBI is especially difficult to diagnose due to the lack of overt clinical neuroimaging findings [31]. Yet, advanced neuroimaging techniques using magnetic resonance imaging (MRI) hold promise in detecting microstructural aberrations following mTBI. Using different pulse sequences, MRI enables the evaluation of different tissue characteristics without risks associated with ionizing radiation inherent to other imaging modalities, such as X-ray-based studies or computerized tomography (CT) [32]. Accordingly, considering the high morbidity of mTBI in military populations, debilitating post-injury symptoms, and lack of robust neuroimaging biomarkers, this review summarizes the nature and mechanisms of mTBI in military settings, describes clinical characteristics of military-related mTBI and associated comorbidities, such as post-traumatic stress disorder (PTSD), highlights advanced neuroimaging techniques used to study mTBI and the molecular mechanisms that can be inferred, and discusses emerging frontiers in advanced neuroimaging for mTBI [33]. We encourage multi-modal approaches combining neuropsychiatric, blood-based, and genetic data as well as the discovery and employment of new imaging techniques with big data analytics that enable accurate detection of post-injury pathologic aberrations related to tissue microstructure, glymphatic function, and neurodegeneration [34]. Ultimately, this review provides a foundational overview of military-related mTBI and advanced neuroimaging techniques that merit further study for mTBI diagnosis, prognosis, and treatment monitoring [35].

Conclusion. Post-traumatic ventriculomegaly is one of the most pressing medical problems that occurs frequently and is detected late in patients with moderate to severe traumatic brain injury. The lives of patients struggling with this pathology are often at risk, the process of social adaptation is derailed. Such patients leave not only themselves, but also their loved ones surrounded by difficulties and unhealthy life.

Based on the above information, it is worth noting that the topic of the research work covers the most pressing medical and social problem of the present day. Particular attention was paid to the fact that the goals and objectives of the study expected to be carried out were clearly determined, the methods of verification were correctly selected, the results of scientific work played an important role in medical practice.

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