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Section: Medicine

DISSYMMETRY OF THE DIPLOIC CANALS OF THE HUMAN SKULL VAULT

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Relevance: Modern science acknowledges both the universality of the principle of symmetry and the interconnection between symmetry and dissymmetry. In the structure of biological objects, including the human body and its parts, various deviations from bilateral symmetry are observed, which collectively characterize the dissymmetry of these objects. This statement fully applies to the skull. The significance of dissymmetry as a structural pattern of the skull can be considered from several perspectives. Deviations from symmetry in the human skull rarely exceed the limits of normal biological variability, but in some cases, they are caused by intracranial pathological processes and hold direct clinical relevance.

The Aim of the Study: To examine and analyze individual morphological variants of dissymmetry in the diploic canals of the cranial vault in elderly humans.

Materials and Methods: *Theoretical methods:* Review and analysis of scientific and methodological literature. *Practical methods:* Original research involving the study of dissymmetry in diploic canals using total bone sections from 100 cranial vaults of individuals of different ages from the collection of the Department of Human Anatomy, Clinical Anatomy, and Operative Surgery.

Results and Conclusions: The main diploic canals of the cranial vault can be classified as bilateral (symmetric and dissymmetric) and unilateral (asymmetric). Predominantly bilateral formation of diploic canals is observed only during the first three years of life. Subsequently, the ratio between bilateral and unilateral canal forms gradually shifts in favor of the latter. In elderly and senile individuals, bilateral forms remain predominant only in the frontal canals.

Dissymmetry of the intraosseous venous bed appears as early as 20–24 weeks of intrauterine development and presents in various forms. The plexiform venous structures of the right and left cranial vault bones in fetuses usually differ in surface area, complexity of the venous plexus, and the degree of canal development.

In the postnatal period, the frequency of dysmorphic forms in the diploic venous system gradually increases, reaching 90% in elderly and senile individuals, with an overall occurrence of 73% (considering four characteristics: shape, direction, number of roots, and the nature of diploic anastomoses). A significant group of dysmorphic forms (19%) consists of canals that on one side of the cranial vault merge into an arch-like structure, while on the opposite side they run separately, converging toward the sphenoidal angle of the parietal bone (*Fig. 1*). Dissymmetries of this type occur with equal probability in both children and adults, while other types of diploic canal dissymmetries are more prevalent in adults.

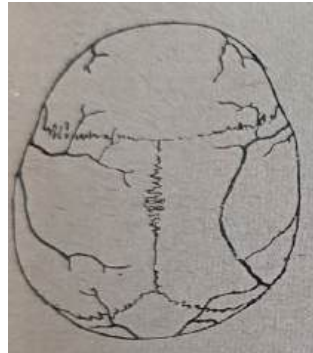


Fig. 1

A fairly common (16%) variant of dissymmetrization of the diploic canal system is characterized by the presence of an arched canal on one side of the cranial vault, which curves around the parietal eminence and receives several tributaries, while on the opposite side, a longitudinal canal runs across the entire cranial vault (*Fig. 2*).

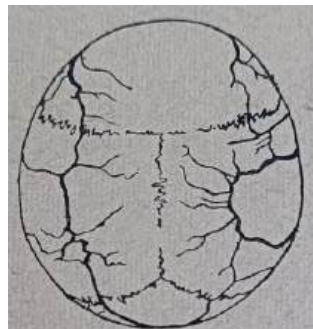


Fig. 2

The third form of dissymmetrization of the diploic venous system (10%) involves a predominantly longitudinal orientation of the diploic canals on one side of the cranial vault and a transverse orientation on the other. Such asymmetrical canal patterns are generally regional in nature (*Fig. 3*).



Fig. 3

The fourth form of dissymmetry of the bilaterally positioned diploic canals (9%) is characterized by the presence of a venous “ring” or “star” on one side of the cranial vault, usually in the parietal region, while on the opposite side, in a corresponding area, there are tree-like branching canals resembling roots in shape (*Fig. 4*).



Fig. 4

The fifth dysmorphic form of the bilateral diploic canals is observed in 5% of cases and is characterized by a similar arrangement of the canals, which extend in a fronto-parieto-occipital direction. On one side of the cranial vault, the canals diverge away from the midline, while on the opposite side, they converge toward it (*Fig. 5*).

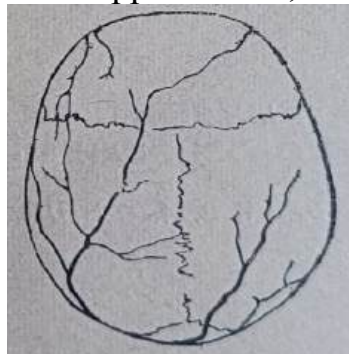


Fig. 5

Other deviations from the symmetry of the diploic canals, located in corresponding regions of the right and left halves of the cranial vault, are observed sporadically and collectively account for 14% of cases. The roots of the diploic canals are positioned less symmetrically compared to the main trunks.

The presented data expand the understanding of the patterns governing cranial dissymmetrization. However, they do not support the widely accepted view in the literature that dissymmetry of the diploic canals serves as a diagnostic indicator for intracranial tumors.