АНАТОМИЧЕСКАЯ ИЗМЕНЧИВОСТЬ ИЗВИЛИНЫ МОЗОЛИСТОГО ТЕЛА В ОНТОГЕНЕЗЕ

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ANATOMICAL VARIABILITY OT CEREBRAL GYRUS OF THE CALLOSAL BODY WITH AGE

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Topic: The study of limbic structures is substantial not only for morphologists and physiologists, but for medical practitioners as well, especially for neurosurgery specialists. At the same time neurosurgeons complain of the lack of data on individual anatomic variability of certain cerebral structures, including callosal gyrus.

Purpose of research: using a complex of macro- and microscopic methods, we found some peculiarities of callosal gyrus formation in postnatal period of human development.

We set such tasks:

1. To study typical structure of callosal gyrus at middle sagittal section of human brain and to define its morphometric characteristics.

2. To find a dependence between callosal gyrus shape and surrounding fissures and to compose their classification.

3. To study individual anatomic variability of callosal gyrus shape and planimetric parameters, determining the degree of effect of head shape, sex, age and dissymmetry level upon them.

We composed a classification of sulcus cinguli and sulcus subparientalis shapes, found average values of callosal gyrus length and its width at various levels, as well as stereostatic coordinates at basic levels of cingulotomy. We defined the number of tertiary sulci in each age group on the surface of callosal gyrus and found areas of their preferential localization. We showed the dependence of those parameters on such factors as sex, age and head shape and studied the degree of dissymmetry.

We studied the sections of telencephalon callosal gyrus in postnatal period of human ontogenesis. The length of callosal gyrus was determined by the length of a section marked on abscissa and limited by projections to abscissa of the most protruding points of anterior and posterior elbows of gyrus semi-ring. Stereotactic coordinates of the gyrus were measured at four

levels: frontal fornicommissure, anterior and zero frontal axes and at rostral division. They are points at the center of a section which define gyrus width at respective levels. Gyrus sections are made from brain fixed in formalin with ever-growing concentration. All sections were studied using macromicroscopic methods (some of them in our own modification).

We defined the shape of callosal gyrus as a semi-ring constrained from top downwards. Callosomarginal and subpariental sulci limiting this semi-ring from outside define the shape of gyrus to the largest degree. We singled out such options of sulcus structure: sulcus running almost parallel to callosal sulcus, broken crista galli callosomarginal sulcus, doubled sulcus with rectified external and internal segments, doubled sulcus with broken external segment, callosomarginal sulcus with incomplete doubling, internally doubled, tripled, a sulcus forming an additional callosomarginal sulcus lobulus.

Linear dimensions of callosal gyrus and its stereotactic coordinates showed a substantial variability. The results of multi-factor dispersion analysis prove with confidence that some of studied parameters depend on cranial index, brain hemisphere, sex and age.

Skull shape is the most important factor. Thus, callosal gyrus in dolichocephals is shaped as a more regular semi-ring constrained from top downwards, due to the fact that its limiting callosomarginal sulcus in almost half of cases (43,8%) was straightened, passing almost parallel to callosal sulcus, and only in 12,5% of cases it consisted of two segments and merged with adjacent calci at rostral division. Subpariental sulcus was X-form in a third of cases and T-form in a quarter of cases, disposed closer to horizontal. Besides, callosal gyrus in dolichocephals is relatively longer and includes the least number of tertiary sulci.

Callosal gyrus in brachicephals is characterized in irregular semi-ring with broken external perimeter, sometimes consisting of several separate segments. Thus, callosomarginal sulcus in brachicephals in a third of cases had broken profile or crista galli shape, whereas in another third of cases it consisted of two or more segments and merged with adjacent calci in medium and anterior parts. Subpariental sulcus in brachicephals in most cases was M-form (38,1%) and in a quarter of cases H-form, both disposed vertically. Besides, doubling of both types of sulci in brachicephals takes place more often than in dolicho- and mesocephals, as well as tertiary sulci, whereas their length is smaller.

Thus, obtained results confirm and substantially supplement observation that sulci in brachicephals are disposed closer to vertical, whereas in dolichocephals they are closer to horizontal.

The results of dispersion analysis show that skull shape substantially affects the length of callosal gyrus, its stereotactic coordinates at zero frontal axis level and in adults at the level of cerebral frontal fornicommissure and at rostral division.

Age is a significant factor for callosal gyrus morphometric values. It is demonstrated in the fact that the number of tertiary sulci increases from postnatal period and up to the age of seven, whereas at the age of teens their number is reduced, considerably grows again at the age nearing 70 and decreases close to 90 years. All planimetric parameters are increased with age, reaching their maximum close to 30 years, with the only exception of stereotactic coordinate at zero frontal axis level, which attains its maximum near 20 years. After 30 the average values of all studied dimensions and stereotactic parameters somehow diminish, but their mathematical confidence is demonstrated only in callosal gyrus width coordinate at zero frontal axis level as 5%, in stereotactic coordinate at rostral division as 30% and in callosal gyrus length as 40%.