RHEOENCEPHALOGRAPHIC CHANGES IN PATIENTS WITH BRAIN TUMOURS OF THE MACROGLIA GRADE

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Rheoencephalography (REG), apart from establishing the topical diagl nosis, is also applied, although partially, in the species diagnosis of cerebra neoplasms (3, 4, 5).

In the work submitted, we set out to use the method in the differentiation of macroglia tumours. For the purpose a series of forty patients, 20 with astrocytomas and 20 with multiform glioblastomas, were studied. The results obtained show that the rheoencephalographic picture, besides on topography, depends also on the character of the pathological process.

In all instances of brain astrocytoma, a marked regional REG asymmetry is established, and in 19 of them the amplitude of the pulse curve on the side of the tumour is lower, while in one patient with clinical evidence of brain dislocation it is higher. In eight cases, homolaterally to the focus, the peak of the REG curve is slightly rounded, while the polydicrotic waves are flattened out. In the remainder, no worthwhile changes in the pulse tracing architectonics are recorded.

For better illustration of the above findings a case report is presented: 1. G. N. I., aged 28 years, with astrocytoma in the left temporal lobe — case record No 22362/30. 10. 1968. No hemispheric asymmetry is discovered in the global fronto-mastoid lead. The architectonics of the pulse tracing is completely intact. In the regional temporo-temporal lead, a roughly manifested REG asymmetry is noted, with the pulse curve amplitude on the left side amounting to 0.08, and on the right side — 0.11 ohms. The asymmetry coefficient reflects the blood cerebral deficit, and is equal to 37.5 per cent. The time of the ascending part of the REG curve to that of a complete pulse wave ratio is within normal limits — 11.7 per cent. The configuration of the pulse tracing is well preserved (Fig. 1).

The rheoencephalographic finding in the case reported on points to a cerebral hemodynamics disorder in the territory of the left middle cerebral artery. The unilateral lowering of the REG amplitude, the lack of evidence of vascular tone increase, and the preservation of the pulse tracing architectonics warrant the assumption that regional brain circulation derangements are produced by a benign neoplastic process.

The rheoencephalographic picture in multiform glioblastomas differs essentially from that in astrocytomas. In 17 of the patients, both in the global and in the regional leads, a bilateral decrease in the inclination angle of the ascending part of the REG curve is established. The peaks of the pulse tracing are rounded or arched, while the polydicrotic waves are flattened out. In the other three cases, a steep increase of the ascending part of the rheoencephalogram is established bilaterally. The polydicrotic waves display a proximal

positioning, with the dicrotic notch exceeding the height of the systolic peak in the pulse curve. Against the background of the changes outlined, a moderately pronounced REG asymmetry is established in all instances, with the REG

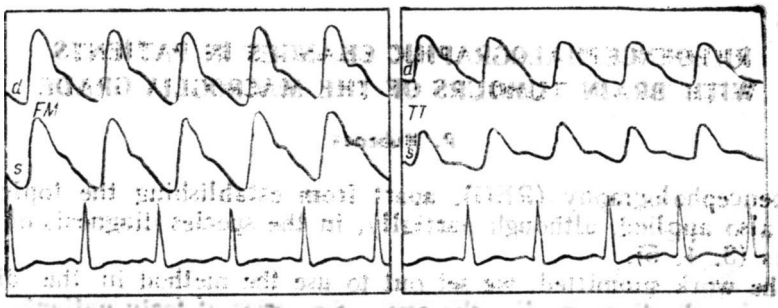

Fig. 1. REG of G. N. I., 28 years old, with astrocytoma in the left temporal lobe.

curve amplitude on the side of the expansive process being lower. It is equal to 0.07±0.008, and on the contralateral side — 0.1±0.009, in the average. The asymmetry coefficient, reflecting the blood cerebral deficit, is average 42.8 per cent. The ratio between the time of the ascending part of the REG and the time of a complete heart cycle, characterizing the changes in tone and elasticity of cerebral vessels on the homolateral side of the tumour, is equal to 21.7±2.91, and on the contralateral side — 17.1±2.25.

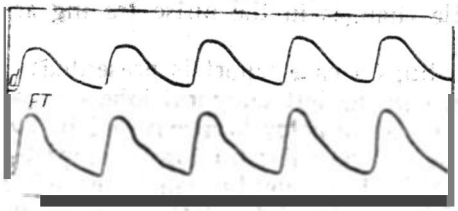

Fig. 2. REG of D. A I., 10 years old, with multiform glioblastoma in the right temporo-parieto-occipital region.

It is evident from the above data that multiform glioblastomas are accompanied by bilateral hemodynamic changes, with blood cerebral deficit, homolaterally to the focus, being more strongly manifested, and the vascular tone — considerably increased.

The REG of two additional cases are presented for illustration:

2. D. A. I., 10 years old, with multiform glioblastoma in the right temporo-parieto-occipital region — case record No 2684/13. 2. 1969. A gross asymmetry of the REG is discovered in the fronto-posterior temporal lead, with amplitude on the right side being 0.11, and on the left — 0.16 ohms. Asymmetry coefficient — 42.4 per cent. The ratio between time of the ascending part of REG and time of the total pulse wave on the right is 36.3 per cent, and on the left — 27.2 per cent. The pulse tracing peaks are rounded bilaterally, while the polydicrotic waves — smoothened. The inclination of the ascending part of the REG curve on the right side is slightly reduced (Fig. 2).

The bilateral changes in the pulse tracing architectonics, the total increase of the vascular tone with obvious prevalence on the side of the tumour, as well as the decreased amplitude on the right side warrant the assumption that an infiltrative tumour is present in the right postero-temporal region.

3. A. L. B., aged 74, with multiform glioblastoma in the right frontal area, infiltrating corpus callosum, and edema of the brain — case record No 2910/ /14. 5. 1969. The global fronto-mastoid lead (FM) failed to detect hemispheric asymmetry. The pulse tracing configuration displays bilateral disturbance.

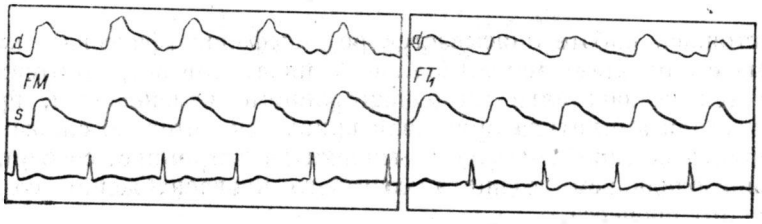

Fig. 3. REG of A. L. B., aged 47, with multiform glioblastoma in the right frontal area.

The dicrotic notch is higher than the systolic peak. The polydicrotic waves are smoothened, and in various points well formed venous waves are detectable. Upon regional FT lead, a marked REG asymmetry is noted. The pulse curve amplitude on the right side is 0.05, and on the left — 0.08 ohms. Asymmetry coefficient — 60 per cent. The ratio between time of ascending limb of the REG and time of a complete heart cycle on the right is 16.6, and on the left — 12.5 per cent. The inclination of the descending limb of the REG is substantially decreased (Fig. 3).

The total disturbance of cerebral hemodynamics with gross prevalence in the territory of the right anterior cerebral artery points to the presence of an infiltrating process in the right frontal region.

Bilateral changes in the architectonics of the pulse tracing, as well as the overall reduction of the blood cerebral index among patients with multiform glioblastoma should be correlated not merely with the nature of the expansive process, but, to some extent, also with the presence of intracranial hypertension and cerebral edema. Similar inferences were reached by Gund (6), Zozulya (1), Lerman (2) etc.

The analysis of the findings shows that astrocytomas of the brain cause unilateral changes in the rheoencephalogram, with the pulse curve amplitude on the homolateral side of the focus being lower, and the polydicrotic waves— moderately smoothened or preserved. Multiform glioblastomas are characterized by bilateral changes in the REG tracing configuration, and by a more clearcut reduction of the blood cerebral index on the side of the tumour.

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РЕОЭНЦЕФАЛОГРАФИЧЕСКИЕ ИЗМЕНЕНИЯ У БОЛЬНЫХ С ОПУХОЛЯМИ МОЗГА МАКРОГЛИАЛЬНОГО РЯДА

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РЕЗЮМЕ

В настоящей работе описывается реоэнцефалографическая картина у 40 больных с опухолями макроглиального ряда. При астроцитомах она характеризуется незначительными односторонними изменениями, причем со стороны опухоли амплитуда пульсовой кривой сначительно снижена, а при мультиформенных глиобластомах изменения двухстронние, со слегка выраженным преобладанием дефицита мозгового кровоснабжения со стороны экспансивного процесса.