

COMPLEX INVESTIGATIONS OF ISCHEMIC CEREBRAL LESIONS

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Cerebral vascular diseases are the most frequent reason for brain insult as an expression of brutal disturbance of cerebral circulation accompanied by severe insufficiency of the brain functions of general and local character. Cerebral infarctions account for 55—70 per cent of cerebral insults according to different reports (5). During the last two decades their relative share sharply increases as compared with cerebral hemorrhages (3, 4, 6, 10).

The introduction of a series of non-invasive modern methods such as electroencephalography (EEG), rheoencephalography (REG), computer tomography (CT) etc. contributes to specifying of the early diagnosis, treatment and prophylaxis of the hemodynamic cerebral abnormalities (1, 2, 7—9).

The purpose of the present study is the analysis of the data from the complex clinical, electrophysiological and CT investigation of patients with ischemic brain lesion.

Material and methods

We investigated a total of 961 patients with an ischemic cerebral insult hospitalized in the Neurological Clinic of the Higher Institute of Medicine in Varna during the period from 1981 till 1985. We analysed the data from CT, EEG and REG studies. CT investigation was performed by using of the apparatus «Siretom-1» — Siemens with 10 mm thick sections. EEG examination was carried out by means of 8-channel electroencephalograph «RFT» and electrodes were assembled after the schedule 10/20. An approved visual EEG analysis was used. REG was performed by using a REG appliance switched to the electroencephalograph. Both fronto-mastoidal and occipito-mastoidal leads were used.

Results and discussion

During this period there were a total of 1386 cases with cerebro-vascular disease, of which 961 ones were clinical observations of an ischemic cerebro-vascular lesion.

The structure of cerebral infarction according to years on the background of total morbidity of the cerebro-vascular disease as well as cerebral ischemia — cerebral hemorrhage ratio was demonstrated on table 1.

The historical survey of various statistical reports during the recent two decades showed certain difference concerning both absolute rates and percentage ratios. According to our investigation, the relative share of cerebral infarction was between 61 and 76 per cent when cerebro-vascular disease was concerned, and, in contrast to cerebral hemorrhages, the infarctions rose in number.

Age range of patients was between 18 and 84 years. When we analysed the incidence of the cerebral infarction in single age groups we noted that there was a priority of the 5th and 6th decades. However, during the last two years the relative part of the young age group increased.

Table 1

Structure of stroke according to years

Years	Cerebro-vascular disease							
	ischemia		hemorrhage		transitory disorders of cerebral circulation		total	
	n	%	n	%	n	%	n	%
1981	169	60.79	52	18.70	57	20.51	278	100.00
1982	181	66.05	69	25.18	24	8.77	274	100.00
1983	228	73.54	37	11.93	45	14.53	310	100.00
1984	198	76.70	41	15.89	19	7.41	258	100.00
1985	185	69.54	54	20.30	27	10.16	266	100.00
Total	961	69,33	253	18,25	172	12,42	1386	100,00

The percentage ratio of the etiological factors for the ischemic cerebral insult according to our material was presented on table 2.

Table 2

Etiological factors for cerebral infarction

Etiological factors	%
Atherosclerosis	54
Hypertension	21
Rheumatism	6
Arteriitis	3
Congenital or acquired cerebrovascular anomalies	2
Arterial hypotensions	3
Diabetes mellitus	1
Alcohol abuse	4
Unspecified etiology	6

CT outlined the acute ischemic lesion in the following localizations: 1. in the region of the medial cerebral artery — total, deep and superficial infarctions; 2. in the area of the anterior cerebral artery — total and posterior cortical ones; 3. in the field of the posterior cerebral artery — total, profound and superficial ones; 4. in the area of the basilar artery, and 5. in the region of the vertebral arteries.

Clinical manifestations varied depending on localization, size of infarction and state of collateral circulation. The probability-statistical analysis of 185 patients allowed us to reveal the diagnostical value of the single symptoms participating in the process of prognosticating the outcome of the ischemic cerebral insult. These single symptoms classified after a five-degree scale in dependence of the extent of characteristics (5) down to indifference (0) were listed on table 3. We used tabular calculation systems compiled on the basis of the publications of N. S. Misyuk et al. (4) to elaborate this table. The results obtained could be used for optimal decision making when an urgent medical care was required.

The analysis of the EEG studies permitted us to divide them into 4 groups in relation of BEA changes detected:

1st group — slightly abnormal EEG with diffuse changes of teta and peak waves without any hemispheric asymmetry and an outlined pathological focus.

Table 3

Symptoms in cerebral infarction and their expressiveness

Nr.	Symptoms	Evaluation		Nr.	Symptoms	Evaluation	
		survival	lethal outcome			survival	lethal outcome
1.	Clear consciousness	2	0	22.	Repeated stroke	0	2
2.	Quantitative changes of consciousness with gradual course	0	5	23.	Brain-stem stroke	0	5
3.	Quantitative disorders of consciousness up to 3 hours	5	0	24.	Cortical insult	5	0
4.	" " more than 5 hours	0	5	25.	Accompanying myocardial infarct	0	5
5.	Cerebral coma	0	5	26.	No lung complications	2	0
6.	Subfebrile temperature	2	0	27.	Lung complications	0	5
7.	Higher temperature over 38°C	0	5	28.	Cardiovascular insufficiency	0	2
8.	Acute respiratory failure	0	5	29.	Renal disorders	0	2
9.	Tachycardia without arrhythmia	5	0	30.	Marked atherosclerosis or III degree hypertension	0	5
10.	Tachycardia with arrhythmia	0	2	31.	Severe diabetes mellitus	0	5
11.	Absolute arrhythmia	0	2	32.	Lung emphysema	0	2
12.	Muscular atony with areflexy	0	2	33.	Active rheumatism	2	0
13.	No pupilar disorders	2	0	34.	Leukocytosis over $10,0 \times 10^9/l$	0	5
14.	Present pupilar disorders	0	5	35.	Blood sugar over 11.0 mmol/l	0	2
15.	Swimming bulbi oculi	0	5	36.	Blood pressure over 220/120 or below 80/40 mm Hg	0	2
16.	Present corneal and conjunctival reflexes	2	0	37.	Age below 60 years	2	0
17.	Loss of corneal reflexes	0	5	38.	Age over 60 years	0	2
18.	Bulbar disorders	0	5	39.	General brain manifestations increase in the first 24 hours	0	5
19.	Repeated vomiting	0	2	40.	Focal symptoms increase in the first 24 hours	0	2
20.	Slight focal symptoms without dynamics for 24 h	5	0	41.	Babinski's reflex bilateral positive	0	5
21.	Pelvic reservoirs not controlled	0	2	42.	Decrease of general-brain and focal manifestations in the first 24 hours	5	0

We established changes of this type in 76 of the patients. The comparison between CT, clinical picture and EEG feature demonstrated that cases with small ischemic foci (up to 2 cm) predominated. Clinically, these patients achieved almost complete restitution of their state.

IInd group — bilateral changes of slow waves and manifested interhemispheric asymmetry without any well-marked pathological focus. This group consisted of 115 patients. On CT cases with focal size over 2 cm prevailed. There was also dislocation of the ventricular system. There were often two or even more foci in the single hemisphere. Clinically, there were data about cerebral oedema and general-brain phenomena.

The third group — with diffuse changes and well-outlined slow-wave focus — consisted of 680 cases, i. e. it was the greatest one. The scanning could not detect any ischemic lesion in 21 cases while EEG investigation ascertained a marked pathological focus in the temporal region corresponding to the clinical diagnosis and the neurological syndrome. 132 patients from this group showed also EEG data about bilateral synchronization of the pathological graphic elements. On CT there was dislocation of the ventricular system, a great number of ischemic

foci or simultaneous damage of brainstem-medial structures, too. These CT phenomena were mutually related that essentially perplexed the evaluation of the influence of each of them on EEG picture.

IVth group — EEG data about brainstem dysfunction without any outlined pathological focus. There were a total of 90 patients. Clinically, an ischemia in the vertebrobasilar system was specified. CT image was normal in 11 cases.

REG studies demonstrated REG asymmetry in almost all the patients tested in the global as well as in the regional leads. The index of pulse blood supply was reduced to a different extent homolaterally to the ischemic focus. In cases with ischaemiae in the area of the superficial branches of the medial cerebral artery the asymmetry was more markedly expressed but the vascular tone was increased mainly on the side of the vascular lesion. A total reduction of the rate of pulse blood supply was found out in ischaemiae in the profound structures. On this background a moderately manifested pulse deficit could be revealed on the side of the lesion.

On the basis of the comparative analysis of the results concerning the information value of EEG and CT we can conclude that there are correlations concerning localization and severity of the damage of the brain. Simultaneously, in certain cases there is discrepancy of the data related mainly to brainstem and cortical localizations of the ischemic lesions where EEG possesses a greater information value. On the other hand, CT as a structural-morphological method, provides information chiefly about the topics and differential diagnostics, namely for precise determination of the localization, size and characteristics of the focus, for the accompanying brain oedema, the state of the ventricular system and the dislocation of medial formations.

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КОМПЛЕКСНЫЕ ИССЛЕДОВАНИЯ ИШЕМИЧЕСКИХ ПОРАЖЕНИЙ ГОЛОВНОГО МОЗГА

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РЕЗЮМЕ

Исследовано 961 больной с ишемическим мозговым инсультом, лечившихся в клинике неврологии при ВМИ — Варна с 1981 по 1985 г. Была прослежена структура мозгового инсульта в течение каждого года. Установлено нарастание удельного веса ишемических инсультов среди сосудистых заболеваний мозга. При помощи вероятностно-статистического анализа установлена диагностическая ценность отдельных симптомов, которые учитываются при прогнозировании исхода ишемического мозгового инсульта.

Авторы сравнивают информативность КТ, ЭЭГ и РЭГ, что дает им возможность отметить корреляции, связанные с локализацией и тяжестью поражения головного мозга.