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PREVENTIVE STRATEGIES FOR ISCHEMIC STROKE IN STENOTIC LESIONS OF CEREBRAL ARTERIES

Abstract. This prospective study was carried out over a 12-month period and involved 80 individuals diagnosed with dyscirculatory encephalopathy accompanied by stenotic changes in the carotid arteries of varying etiology. The participants were categorized into two cohorts: Group I (n = 50): patients who experienced transient ischemic attacks (TIA) associated with atherosclerotic narrowing of the carotid arteries; Group II (n = 30): patients diagnosed with pathological deformities of the carotid arteries, such as kinking and coiling. The research highlights predictive markers for the onset of ischemic stroke over the observation period, utilizing the ABCD3 risk assessment tool and duplex ultrasonographic imaging to monitor hemodynamic changes and structural abnormalities in the cervical arterial system.

Keywords: duplex ultrasound, arterial coiling, kinking, ABCD3 scoring system, ischemic stroke, cerebrovascular disorders.

Бош мия магистрал артерияларининг стенозловчи шикастланишларида ишемик инсультни прогнозлаш

Аннотация. Ушбу илмий тадқиқотда уйқу артерияларида юзага келган турли хил келиб чиқишли (генезли) стенозловчи (торайтирувчи) шикастланишлар мавжуд бўлган ва дисциркулятор энцефалопатия ташхиси қўйилган 80 нафар бемор 12 ой давомида кузатилди. Иштирокчилар икки гуруҳга ажратилди: I гуруҳ: уйқу артерияларида атеросклероз фонида ривожланган дисциркулятор энцефалопатия ва транзитор ишемик ҳужум (TIA) бўлган 50 нафар беморлар. II гуруҳ: уйқу артерияларида патологик деформациялар (кинкинг ва койлинг) мавжуд бўлган 30 нафар беморлар. Мақолада 1 йиллик кузатув натижалари асосида магистрал артериялардаги атеросклеротик торайишлар ва патологик ўзгаришлар фонда ишемик инсульт ривожланиш эҳтимолини ABCD3 баҳолаш шкаласи ва дуплекс сканерлаш диагностика усули ёрдамида баҳолаш натижалари келтирилган.

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Калит сўзлар: дуплекс УЗИ, койлинг, кинкинг, ABCD3 шкаласи, ишемик инсульт, уйқу артерияси, прогнозлаш.

ПРОФИЛАКТИКА ИШЕМИЧЕСКОГО ИНСУЛЬТА ПРИ СТЕНОЗИРУЮЩИХ ИЗМЕНЕНИЯХ ЦЕРЕБРАЛЬНЫХ АРТЕРИЙ

Аннотация. В рамках настоящего наблюдательного исследования, продолжавшегося на протяжении одного года, были обследованы 80 пациентов с диагнозом дисциркуляторной энцефалопатии, у которых выявлены стенозирующие изменения сонных артерий различной природы. Участники были распределены на две подгруппы: Первая группа (n=50) включала пациентов с транзиторными ишемическими атаками (ТИА), развившимися на фоне атеросклеротического сужения сонных артерий. Вторая группа (n=30) состояла из больных с ТИА на фоне анатомических деформаций сонных артерий, таких как кингкинг и койлинг. Статья представляет собой анализ динамики и прогностических критериев вероятности развития ишемического инсульта у данной категории больных в течение 12 месяцев. Для оценки рисков использовались шкала ABCD3 и результаты дуплексного ультразвукового исследования экстракраниальных отделов артерий.

Ключевые слова: ультразвуковое дуплексное сканирование, койлинг, кингкинг, шкала ABCD3, ишемический инсульт, цереброваскулярные патологии.

Relevance of the Study. One of the major contributing factors to ischemic stroke is atherosclerotic stenosis of the carotid arteries and pathological deformities such as kinking and coiling of these vessels. These conditions remain among the most pressing issues in modern neurology [1,2]. Ischemic strokes primarily result from transient ischemic conditions occurring in the carotid and vertebrobasilar arteries due to pathological changes such as stenosis, occlusion, vascular anomalies, or vasospasm [3,4]. The accumulation of lipids within the arterial walls, along with fibrous tissue proliferation and plaque formation, are pathological processes that contribute to the narrowing and deformation of arteries [5,6]. Structural abnormalities in the brachiocephalic arteries disrupt normal blood flow and are often classified based on their morphology, such as coiling (loop formation) and kinking (sharp bends) [7]. The assessment of patients with such anomalies helps identify distinct clinical presentations associated with various vascular deformities. At present, duplex ultrasound scanning plays a critical role in the early prediction and prevention of ischemic stroke, especially at the primary care level.

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Objective of the Study. To predict the development of ischemic stroke in patients with carotid artery stenosis of various etiologies

Materials and Methods of the Study. A total of 80 patients diagnosed with dyscirculatory encephalopathy and stenosing lesions of the carotid arteries of varying etiology were selected as study participants. All patients were observed over a period of 12 months. Based on the nature of their vascular pathology, the participants were divided into two groups: Group I consisted of 50 patients who had transient ischemic attacks (TIA) and dyscirculatory encephalopathy associated with atherosclerotic stenosis of the carotid arteries. Group II included 30 patients with structural deformities of the carotid arteries, specifically kinking and coiling. All patients underwent comprehensive neurological and clinical evaluation at both 6 and 12 months. To assess the risk of ischemic stroke, the ABCD3 scoring system was applied, along with duplex ultrasonography of the brachiocephalic arteries.

Results of the Study. The mean age in Group I was 53.5 ± 1.4 years, with 63.5% male (n = 32) and 36.5% female (n = 19). In Group II, the average age was 51.4 ± 1.5 years, with 66.7% male (n = 20) and 33.3% female (n = 10). (Refer to Table 1 for full demographic data.)

Table 1.

Number of Patients and Mean Age by Groups

Gender	Total (n=80)	Group I (n=50)	Group II (n=30)
Male	32(63,5%)	30 (62,5%)	19 (67,8%)
Female	27 (35,5%)	18 (37,5%)	9 (32,2%)
Mean age	51,5±1,4	52,5±2,15	50,5±1,8

In the comparative analysis between the groups, primary attention was given to assessing the patients' general clinical and neurological status. Particular focus was placed on identifying the presence and severity of developed neurological symptoms. The findings are summarized in Table 2.

Table 2.

Analysis of Subjective Clinical and Neurological Symptoms

Symptoms	Group I (n=50)	Group II (n=30)

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	abs	**%**	**abs**	**%**
Headache	**44**	**(91.7±2,15)**	**27**	**(96,4±1,15)**
Noise in the head and ears	**33**	**(64.5±3,25)**	**25**	**(89,3±4,25)**
Dizziness	**37**	**(77±1,15)**	**24**	**(85,7±3,15)**
Memory impairment	**23**	**(47.9±1,25)**	**19**	**(67,8±2,55)**

As seen in the table, among the subjective complaints, the most frequently reported symptoms included headache, tinnitus, and memory decline. In the assessment of neurological status, special attention was paid to identifying cranial nerve dysfunction, increased tendon reflexes, disturbances in motor and sensory functions, presence of pathological reflexes, and varying degrees of impairment in higher nervous system functions. These findings are detailed in Table 3.

Table 3.

Analysis of Objective Clinical and Neurological Symptoms

Symptoms	Group I (n=50)		Group II (n=30)	
	abs	**%**	**abs**	**%**
Central facial paralysis (VII cranial nerve)	**45**	**(92.8±3,25)**	**26**	**(92,8±2,25)**
Central hypoglossal nerve palsy (XII nerve)	**43**	**(89.7±4,15)**	**25**	**(89.3±3,35)**
Increased tendon reflexes	**40**	**(83.4±2,25)**	**21**	**(75±3,25)**
Nystagmus	**11**	**(22.8±1,75)**	**8**	**(28,6±3,65)**
Marinescu–Radovici sign	**15**	**(31.2±1,25)**	**11**	**(39,3±3,35)**

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Presence of pathological reflexes	**17**	**(35.5±3,45)**	**10**	**(35.7±1,45)**
Vestibuloataxic syndrome	**31**	**(64.6±3,25)**	**22**	**(78,6±2,05)**
Cognitive impairment	**17**	**(35.3±2,75)**	**14**	**(50±4,25)**

ABCD3 Risk Score Analysis — Group I: At baseline, 26% of patients had a score of 6, indicating high stroke risk; 35.3% scored 5 (moderate risk), and 38.6% were classified as low risk. After 6 months, the proportion of high-risk cases (score 6) increased to 33.3%, moderate risk remained at 36.9%, and low risk declined to 28.9%. At the 12-month follow-up, 48.1% of patients were in the high-risk category, 35.5 % in the moderate-risk, and only 16.6% remained at low risk.

Table 4.

Dynamics of Stroke Risk Distribution Across Groups Over Time

Group Category	Before the Study			After 6 Months			After 12 Months		
	Low Risk	Moderate Risk	High Risk	Low Risk	Moderate Risk	High Risk	Low Risk	Moderate Risk	High Risk
Group I (n=50)	19	17	12	14	18	16	8	17	23
Group II (n=30)	12	9	7	9	10	9	7	10	11

ABCD3 Risk Score Analysis — Group II: Initially, 24.4% of patients were at high risk, 33.1% at moderate risk, and 43.1% at low risk. At 6 months, 31.9% had progressed to high risk, 36.0% were moderate, and 31.9% remained low risk. By 12 months, the high-risk group increased to 39.3%, moderate remained at 36.1%, and low-risk patients decreased to 25.1%.

Duplex Ultrasound Findings: In both groups, duplex scanning (DS) revealed varying degrees and patterns of carotid artery involvement, including hemodynamic changes and structural characteristics. (Refer to Figure 1 for visual representation.)

Conclusion

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1. One of the primary contributors to the development of ischemic stroke is atherosclerotic narrowing and structural deformities (such as kinking and coiling) of the carotid arteries. As time progresses, the absence of timely reconstructive interventions on the carotid vessels may lead to increased stenosis of the cervical major arteries, significantly elevating the risk of ischemic events.
2. Among patients in Group I, the average ABCD3 score was 5.1 ± 0.11, with 48.1% of cases falling into the high-risk category. The incidence of ischemic stroke in this group, based on the ABCD3 scale, was 17.4%. In Group II, the average score was 4.2 ± 0.25, with 39.4% of patients classified as high risk, and the actual incidence of stroke was recorded at 9.2% according to the ABCD3 risk assessment.
3. In conclusion, to ensure early detection and effective prevention of ischemic stroke, it is recommended that individuals over the age of 50 undergo duplex ultrasonographic screening of the brachiocephalic arteries at least twice a year.

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