

POPULATION AND MORPHOMETRIC FEATURES OF ANNIVERSIS OF INTERNAL SLEEP ARTERY WITH BREAK AND WITHOUT BREAK

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✓ *Resume,*

Aneurysms of the internal carotid artery, according to the literature, have a low risk of rupture and are often characterized by transient ischemic attacks, cerebral or focal neurologic symptoms, symptoms of compression of the nerve trunks nearest to the aneurysm and sympathetic plexuses

Keywords: aneurysm, nerve trunk, carotid artery, morphometric feature of carotid artery.

ИЧКИ УЙҚУ АРТЕРИЯСИНИ ШИКАСТЛАНГАН ВА ШИКАСТЛАНМАГАН ҲОЛДАГИ АНЕВРИЗМАЛАРИНИ ПОПУЛЯЦИОН ВА МОРФОМЕТРИК ХУСУСИЯТЛАРИ

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Ички уйқу артерияси аневризмаси маълумотларга кўра, қон - томир ёрилишининг паст хавфи ва транзитор ишемик атака билан характерланиб, бош мия умумий ёки ўчоқли неврологик симптоматика, симпатик битишма ва нерв ўзаги аневризмаларига олиб келиши билан тавсифланади.

Калит сўзлар: аневризма, нерв тўқимаси, уйқу артерияси, уйқу артериясининг морфометрик хусусиятлари.

ПОПУЛЯЦИОННЫЕ И МОРФОМЕТРИЧЕСКИЕ ОСОБЕННОСТИ АНЕВРИЗМ ВНУТРЕННЕЙ СОННОЙ АРТЕРИИ С РАЗРЫВОМ И БЕЗ РАЗРЫВА

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Аневризмы внутренней сонной артерии по данным литературы имеют низкий риск разрыва и часто характеризуются транзиторными ишемическими атаками, общемозговой или очаговой неврологической симптоматикой, симптомами компрессии близлежащих к аневризме нервных стволов и симпатических сплетений

Ключевые слова: аневризма, нервная ствол, сонная артерия, морфометрическая особенность сонная артерия.

Introduction

Materials and methods

Predicting the risk of adverse cerebral aneurysms is an important task in preventing subarachnoid hemorrhage, as a result of which 32% to 40% of patients die already in the first case of acute cerebral circulation disorder, 10-20% of survivors develop a pronounced neurologic deficit and only 40% of patients are restored after a stroke [3,4]. Along with the population risk factors for intracranial aneurysm rupture, the literature presents data on the importance of hemodynamic features of blood flow in the aneurysmal sac: shear stress in aneurysms with high and low blood flow velocity [7], instability of blood flow patterns in aneurysms with high risk of rupture [4]. Also in the literature are data on the relationship between the geometric parameters of aneurysms and the features of the blood flow in the aneurysmal sac [8].

Purpose of the study. In this study, the analysis of population and morphometric characteristics of an aneurysm of the internal carotid artery with a rupture and without rupture was carried out.

The study included 43 people who during the period from 2009 to 2013 performed digital subtraction angiography. Angiography was performed on angiographs INNOVA 3100 and INNOVA 4100. All measurements of morphological parameters were performed after 3D reconstruction of the image of the resulting angiographic study in a rotational mode with a frame rate of 30 per second at a rotation speed of 40° per second. 43 saccular aneurysms of the intracranial section of the internal carotid arteries (ICA) were diagnosed. The study was performed using a non-ionic Xenitix-300 contrast agent with bolus injection of 21 ml. contrast medium at a rate of 4 ml / sec. with a delay from the moment of introduction of contrast medium 2 seconds. All patients on the basis of clinical picture and computed tomography were stratified into two groups: group 1 - aneurysms with rupture and group 2 - aneurysms without rupture. The following parameters were taken into account in the study: sex, age of patients, localization of pathological formation, maximal diameter of aneurysm dome, maximal diameter of aneurysm neck, ratio of aneurysm dome diameter to cervical diameter, aneurysm volume. The localization of

aneurysms was classified as follows: - aneurysms in the mouth of the anterior choroid artery (AchoA), 2- posterior connective artery (PcomA), 3- superior pituitary artery (SHA), 4- eye artery (OphA), 5- aneurysm, localized medial and below the eye artery and above the border of the cavernous segment of the internal carotid artery (SC), 6 - aneurysm of the cavernous part of the internal carotid artery (C).

To assess the homogeneity of the two samples, Fisher's criterion (Φ) was applied to the analyzed feature. In order to reveal the difference in the severity of the test feature, the Student's t-test (t) was applied provided that the distribution in the samples is normal, and the Mann-Whitney criterion (U) is absent in the given conditions. The results were considered reliable with error probability $p \leq 0.05$. Statistical calculations were carried out using the SPSS 15.0 program.

Results and discussion

The study included 38 people who were diagnosed with 43 aneurysms of the intracranial part of the internal carotid artery, aneurysm rupture was detected in 23

patients (25 aneurysms), and 15 patients (18 aneurysms) had no signs of rupture. Of 38 men, 11 men (13 aneurysms), women 27 (30 aneurysms). The average age of the patients was 50.9 ± 11.6 years.

In the group of patients with rupture of brain aneurysms, men accounted for 30.4% ($n = 7$), women 69.6% ($n = 16$), men without a break were 26.7% ($n = 4$), women 73.3% ($n = 11$). In assessing the reliability of the difference in sex groups, no statistically significant difference was found ($\Phi = 0.25$, $p \geq 0.05$).

The mean age of patients in group 1 was 50.3 ± 12.8 years, in the group of patients No.2 52.6 ± 11 years, the difference was statistically not significant ($t = 0.58$, $p \geq 0.05$).

Aneurysms of the supraclinoid section of the ICA in group 1 were 100% ($n = 25$), in the group No. 2 88.9% ($n = 16$), infraclinoid section 0% and 11.1% ($n = 2$), respectively, the difference was statistically significant $t = 2.2$, $p \leq 0.05$).

Features of localization of aneurysms of ICA in groups are presented in Table. 1. There was no statistically significant difference in the localization of an aneurysm of the internal carotid artery with a rupture and without a rupture.

Table 1.

Localization of aneurysms of the internal carotid artery

Localization	Group 1	Group 2	F (p)
1 (AchoA)	4 (16%)	3 (16,7%)	0,06 ($p \geq 0,05$)
2 (PcomA)	7 (28%)	4 (22,2 %)	0,44 ($p \geq 0,05$)
3 (SHA)	6 (24%)	3 (16,7 %)	0,58 ($p \geq 0,05$)
4 (OphA)	8 (32 %)	6(33,2%)	0,08 ($p \geq 0,05$)
5 (SC)	0	1 (5,6%)	1,5 ($p \geq 0,05$)
6 (C)	0	1(5,6%)	1,5 ($p \geq 0,05$)
Total aneurysm	25	18	The result 43

When analyzing the difference in the diameter of the aneurysm dome in group 1, the median is 7 mm, 25% - 5.5 mm, 75% - 10.7 mm, the spread is from 3.6 to 18.2 mm, in group 2 - the median is 5 mm, 25% to 3.4 mm, 75% to 8.8 mm, a spread of 1.7 mm to 18.2 mm, differences between groups based on the diameter of the dome of the aneurysm were statistically significant: the Mann-Whitney criterion $U(25; 18) = 135.5$, $p = 0.028$.

When analyzing the difference in the diameter of the cervical aneurysm in group 1, the median is 3.7 mm, 25% is 2.4 mm, 75% is 5.5 mm, the spread is 1.8 to 9.6 mm, in group 2 - the median 3.4 mm, 25% - 2.9 mm, 75% - 4.8 mm, a spread of 1.7 mm to 7.8 mm, differences between groups based on the diameter of the aneurysm neck were statistically insignificant: the Mann-Whitney $U(25; 18) = 224.5$, $p = 0.99$.

When analyzing the difference in the ratio of the diameter of the dome to the diameter of the neck of the aneurysm in group 1 - the median 2, 25% - 1.7, 75% - 2.4, the spread from 0.9 to 6.1 mm, in group 2 - the median 1, 3, 25% 1.1 mm, 75% 2.1 mm, a spread of 0.6 to 3.5, the difference between the groups for this characteristic was statistically significant: the Mann-Whitney test $U(25; 18) = 106.0$, $p = 0.003$.

As a result of analysis of the volume of aneurysms in the group with rupture and without discontinuity, the

following data were obtained: group 1 - median 8.3 cm³, 25% - 3.6 cm³, 75% - 17.1 cm³, range from 2.9 to 28.2 cm³. in the group 2 - median 2.7 cm³, 25% - 1.4 cm³, 75% - 8 cm³, range from 0.3 to 36.9 cm³, the differences between the groups for this characteristic were statistically significant: the Mann criterion - Whitney $U(25; 18) = 106.5$, $p = 0.004$.

According to the literature, an aneurysm of the internal carotid artery is characterized by a low risk of rupture. According to Weir et al. (2002), no aneurysm of the cavernous part of the internal carotid with a rupture was observed among 945 patients, 65% of the aneurysms in the ocular artery were also not complicated by the rupture [12]. Wiebers et al (2003) cites the results of an international study of unexploded cerebral aneurysms, involving 4060 patients, where a 5-year risk of rupture of an aneurysm of the internal carotid artery was 0% [14]. In a previously published article, we also noted the prevalence of pathological formations of the internal carotid artery among unexplained aneurysms [1,2]. When studying an aneurysm of the internal carotid artery, gender differences in groups with a rupture and without a rupture were not revealed, which distinguishes this aneurysm localization from previously obtained results for a common set of pathological formations [1].

This fact can be explained by the predominance among female patients of an aneurysm with localization in the internal carotid artery, which is reflected in the current literature [6]. Wermer et al. (2007) summarized the results of 19 studies of unexploded aneurysms, including observations of 4705 patients with 6556 aneurysms, according to the authors, patients older than 60 years are most at risk of rupturing brain aneurysms [13]. In our study, the average age of patients in group 1 with a rupture of brain aneurysm and group 2 without aneurysm rupture did not differ significantly.

Szmuda et al. (2011) report that 85.71% of giant aneurysms were located on the intracavernous portion of the ICA, a rupture was observed in only one case, all aneurysms of this smaller localization showed no signs of rupture [11]. We also concluded that there is less frequency of localization of ruptured aneurysms of subclinoid localization. As a result of an international study of unexploded aneurysms, it was concluded that most ruptured aneurysms belonged to the group of "large" (10–25 mm) [14]. Parlea et al. (1999) found no statistically significant differences in the diameter of the aneurysm dome and the diameter of the cervix, the ratio of the diameter of the dome to the diameter of the cervix in groups of aneurysms with and without rupture [9]. In our study, in assessing the mean diameter of the dome, the ratio of the diameter of the dome to the diameter of the aneurysm neck, and the volume of the aneurysmal sac, a statistically significant difference was found with large median values in the group of ruptured aneurysms. Particular attention should be paid to the fact that it was the ratio of the diameter of the dome to the diameter of the aneurysm neck that was statistically significantly different in the groups, for the diameter of the aneurysm neck there was no evidence of this pattern.

This fact probably reflects the pathogenesis of the rupture of the aneurysmal sac, namely, decompensation of adaptive possibilities, consisting in decreasing the adverse effect of hemodynamic loads on the wall of pathological formation due to an increase in the size of the aneurysm neck with an increase in the diameter of the aneurysm dome [10].

Conclusion

In groups of patients with rupture and without rupture of an aneurysm of the internal carotid artery by sex and age, no differences were found. In the group of patients with rupture of aneurysms, the pathological formations of the supraclinoid section of the ICA predominated. A statistically significant difference in the diameter of the aneurysm dome in the study groups was found, with a large value in the group of ruptured aneurysms, similar results were obtained for the ratio of the diameter of the dome to the diameter of the neck, the volume of the aneurysmal sac. The difference in the diameter of the neck between the groups is not statistically significant.

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