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Retina findings in intracranial aneurysm patients

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颅内动脉瘤患者的视网膜改变

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摘要

目的:评价患有颅内动脉瘤(intracranial aneurysm, ICA)的眼底表现,以明确 ICA 和可辨别的视网膜改变的关系。

方法:共分析了 46 位已经在神经外科诊断颅内动脉瘤患者的病历和眼部检查图像。所有的患者接受了包括荧光血管造影(fluorescein angiography, FAG)在内的眼科检查。此外,玻璃膜疣、黄斑变性、棉绒斑、硬性渗出、视网膜出血、动脉变细、动-静脉交叉征、臂-视网膜循环时间、动-静脉循环时间都进行了分析。ICA 患者(组 1)的检查结果和 22 例特发性视网膜前膜患者未患病眼(组 2)的结果进行了比较。

结果:两组患者的平均年龄分别为 60.02 岁(组 1)和 60.68 岁(组 2)(P=0.70)。高血压的患病率在两组中相似。两组中均未发现患视网膜大动脉瘤的患者。两组之间玻璃膜疣、黄斑变性、棉绒斑、硬性渗出、视网膜出血、动脉变细和动-静脉交叉征的情况无显著差异。平均臂-视网膜循环时间也未发现显著差异。

结论:我们未发现有任何证据证明 ICA 患者 FAG 检查和眼底有特殊改变。

关键词:颅内动脉瘤;荧光血管造影;视网膜大动脉瘤

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Abstract

• AIM: To evaluate fundus findings in patients with intracranial aneurysm (ICA) to determine the relation between ICA and distinguishable retinal features.

• METHODS: We analyzed the medical records and ocular images of 46 patients with previously diagnosed ICA referred from the Neurosurgical Department. All patients underwent ophthalmologic evaluation including fluorescein angiography (FAG). Furthermore, the presence of drusen, macular degeneration, cotton wool spot, hard exudates, retinal hemorrhage, arteriolar attenuation, A-V crossing signs, arm-to-retina time, and A-V transit time were evaluated. The results of ICA patients (Group 1) were compared with those of 22 idiopathic epiretinal membrane patients with unaffected eyes (Group 2).

• RESULTS: Mean ages were 60.02y (Group 1) and 60.68y (Group 2) respectively (P=0.70). The prevalence of hypertension was similar in both groups. No case with retinal macroaneurysm was found in either group. The presence of drusen, macular degeneration, cotton wool spot, hard exudates, retinal hemorrhage, arteriolar attenuation, and A-V crossing sign was not significantly different between the two groups. Mean arm-to-retina time was not significantly different in two groups, either.

• CONCLUSION: We cannot find any evidence that the patients with ICA shows specific changes in the FAG and fundus.

• KEYWORDS: intracranial aneurysm; fluorescein angiography; retinal artery macroaneurysm

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INTRODUCTION

It has been reported that retinal changes are associated with systemic vascular diseases such as hypertension, aortic coarctation, stroke, and heart failure[1-4], presumably due to embryological and histological similarities between the retina and the vascular system[5-6]. Like this same origin of different organism, retinal artery macroaneurysms is known to share common risk factors and pathologic findings with intracranial aneurysms (ICA). Therefore, the authors evaluated fundus findings in patients with ICA to determine the relation between ICA and distinguishable retinal features.

SUBJECTS AND METHODS

The study followed the tenets of the Declaration of Helsinki and was approved by the Institutional Review Board of the Dongsan Medical Center. We retrospectively analyzed the medical records and ocular images of 46 patients who underwent clipping (42 patients) or coiling (4 patients)

Table 1 Baseline characteristics of patients

Parameters	Intracranial aneurysm(n=46)	Control group(n=22)	P
Age (mean±SD, a)	60.02±13.00	60.68±8.80	0.70[a]
M:F (n)	12:34	6:16	0.92[b]
Hypertension (n, %)	20 (43.48)	8(36.36)	0.58[b]

[a]Statistics by Mann-Whitney test; [b]Statistics by χ^2 test.

Table 2 Comparison of fundus findings between both groups

Parameters	Intracranial aneurysm(n=46)	Control group(n=22)	P
Macroaneurysm	0 (0%)	0 (0%)	
Drusen	6 (13.0%)	6 (27.3%)	0.18[b]
Macular degeneration	2 (4.3%)	0 (0.00%)	1.00[b]
CWs or HEs	0 (0.0%)	2 (9.1%)	0.10[b]
Retinal hemorrhage	1 (2.2%)	3 (13.6%)	0.10[b]
Arteriolar attenuation	30 (65.2%)	18 (81.8%)	0.16[a]
A-V crossing signs	8 (17.4%)	3 (13.6%)	1.00[b]
Arm to retina time(s)	18.60±4.15	19.45±5.19	0.93[c]
A-V transit time(s)	10.65±5.58	12.12±6.13	0.27[c]

[a]Statistics by χ^2 test; [b]Statistics by Fisher exact test; [c]Statistics by Mann-Whitney test;CWs: Cotton wool spot; HEs: Hard exudates; A-V: Artery to vein.

surgery for the treatment of intracranial aneurysm. All ICA patients underwent ophthalmologic evaluation including visual acuity (VA), best corrected VA (BCVA), intraocular pressure, fundus photographs and fluorescence angiography (FAG; FF 450 plus IR, Carl Zeiss Meditec, Germany) between January 2011 and December 2012. Patients with diabetes, or intraocular surgery other than cataract removal, were excluded.

The fundus findings which were macular degeneration, cotton wool spots (CWs), hard exudates (HEs), retinal hemorrhage, macular arteriole attenuation, arteriovenous crossing (A-V crossing), arm to retina times, and arteriovenous times were evaluated. Macular degeneration was defined as fluorescein leakage or window defect in FAG. Arterial attenuation was defined as an artery and vein ratio under 1:2.

The control group consisted of the unaffected eyes of which fellow eyes were diagnosed with unilateral idiopathic epiretinal membrane. The results of 46 ICA patients (Group 1) were compared with those of 22 eyes in control group (Group 2). Using the SPSS program (version 18.0; IBM Corporation, Armonk, NY, USA), the Chi-square test, Fisher exact test and Mann-Whitney U test were performed, and a P-value under 0.05 was defined as statistically significant.

RESULTS

In demographic features, the mean ages were 60.02±13.00y (Group 1) and 60.68±8.80y (Group 2). There were no significant differences between both groups in age, sex and prevalence of hypertension (Table 1).

The fundus findings of macular degeneration, CWs, HEs, retinal hemorrhage, retinal arteriolar attenuation, and A-V crossing signs between both groups show no significant differences (Table 2).

In FAG findings, the mean arm to retinal time was 18.60±4.15s (Group 1) and 19.45±5.19s (Group 2). The mean arteriovenous transit time was 10.65±5.58s (Group 1) and 12.12±6.13s (Group 2). There were no significant differences in mean arm to retinal time and arteriovenous transit time between both groups (Table 2). Retinal macroaneurysm was not identified in either group. In Group 1, one patient had optic atrophy due to optic neuritis (OD) and another patient had third cranial nerve palsy (OS).

DISCUSSION

The relevance between ICA with retinal macroaneurysm has been suggested because both have common risk factors including hypertension, old age, female sex, and arteriosclerosis[5-6]. We hypothesized that the patients with ICA could show some degenerative changes in retinal tissues or vessels due to the same embryologic origin and similar pathologic findings between ICA and retinal macroaneurysm. This research evaluated the association between ICA and retinal findings using fundus examination and FAG. However, we could not find any specific retinal findings associated with ICA.

In this study, retinal macroaneurysm was not identified in either group. According to Beijing's research, the prevalence of retinal macroaneurysm is 1:9000 and that of India's research is 3:4543[7-8]. The retinal macroaneurysm prevalence is assumed too low to be detected in small samples of this research.

There was no difference in drusen, macular degeneration, CWs, HEs, arteriolar attenuation, A-V crossing sign, arm to retina time, or arteriovenous transit time between the two groups.

Aoki *et al*[9]'s and Moriwaki *et al*[10]'s research explain that hemodynamic stress brings about remodeling of blood vessels. In elderly patients with hypertension, the retinal artery's muscle layer turns into collagen[11]. This fibrosis can decrease

the blood vessel's flexibility and elasticity, and the blood vessel wall becomes gradually thinner and more vulnerable to inner pressure, leading to aneurysm[12-14]. Even though the mechanism might be similar, ICAs and retinal artery aneurysms have several differences. Unlike the cerebral artery, the retinal artery does not have a layer of elasticity in the intima, and the velocity of the blood flow is different[5, 15]. These differences may not induce the significant association between both groups.

The limitation of this study is that it was retrospective with a limited number of subjects and data.

In conclusion, the patients with intracranial aneurysm did not show any different fundus findings from the age-matched group.

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