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Axial Length in Retinal Vein Occlusion

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ABSTRACT

Introduction: Retinal vein occlusion is one of the most common forms of vascular disease in retina, and leads to visual loss in patients. Various treatment options were proposed for this disorder. The aim of this study was to compare axial length in eye with retinal vein occlusion in comparison with intact eye.

Materials and Methods: After ethical approval, this case-control study was designed in Mashhad University of medical sciences. We selected 63 patients with retinal vein occlusion and 23 control group. Axial length was measured by a mode scan (NIDEK-US 4000, Japan), macular thickness (macular edema) was evaluated by Optical Coherence Tomography (ZEISS, Germany). Data were analyzed with SPSS Version 16. P<0.05 was considered as significant level.

Results: Axial Length (AL) in eye with central retinal vein occlusion was significantly shorter in comparison with control group (P=0/003). AL was not differed significantly in affected eye in patients with Central Retinal Vein Occlusion (CRVO) and Branch Retinal Vein Occlusion (BRVO) (P=0.8). There was not a significant difference between AL in intact eye of patients with CRVO (P=092) and BRVO (P=0.54) in comparison with control group.

Conclusion: Axial length in patients with central retinal vein occlusion was shorter than AL in BRVO and control group.

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Introduction

Retinal vein occlusion is one of the most common vascular diseases in retina and leads to visual morbidity in many cases (1). This occlusion happens due to thrombosis formation or as segmental intra-retinal hemorrhage. Retinal vein occlusion is associated with heart disease, diabetes mellitus and glaucoma (2).

Various treatment options were proposed for this disease, such as anti coagulant therapy, local antifibrinolytic agents, radial optic neurotomy, anti Vascular Endothelial Growth Factor (VEGF), but none of them has been successful enough to be considered as the standard treatment (3). The fundamental problem in retinal vein occlusion is awareness about disease pathogens (4). One of the theories discussed about retinal vein occlusion pathogens is vein compression due to atherosclerosis in adjacent artery which might cause endothelial damage and intravenous thrombosis.

One of the other proposed views in this area is compartment syndrome development in scleral canal that leads to vicious cycle in which raising edema resulting in more compression on vein and reduces blood flow in it and increase edema.

Branch Retinal Vein Occlusion (BRVO) is a common cause of vascular diseases in retina. Disease does not have a sexual preference and affects both sexes equally (5, 6). BRVO is more common in six and seven decades of life and occurs in one of the branches of the main retinal vein in arteriovenous crossing site.

Bilateral BRVO found in (9%) of cases. Hypertension and atherosclerosis are the main underlying causes of BRVO (7).

Central Retinal Vein Occlusion (CRVO) is another common type of retinal vein occlusion; variable visual loss is the main manifestation of CRVO. Its male/ female ratio is one (8). CRVO is more common over 65 years. Younger patients usually might have an underlying inflammatory disease. Axial length of orbit has a great impact on scleral canal and can affect the mentioned vicious cycle (9). This length defines as distance between the anterior and posterior poles of the eye. Some studies revealed a close relation between shorter axial length and CRVO and BRVO and resulted in axial length of orbit is a local risk factor in the pathogenesis of retinal vein occlusion

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(10). Confirming this theory might be e revolution in retinal vein occlusion prevention and treatment options.

The aim of this study was to evaluate the relation between axial length of orbit and BRVO and CRVO occurrence.

Materials and Methods

This case control study was designed and approved in Mashhad University of medical sciences, and was performed in Khatam- al- Anbiya Hospital. 40 cases of CRVO, 23 cases of BRVO were compared with 23 cases in control group. Patients study sample size was estimated 19 patients in each group with the power of (90%) with regard to Mahdizade study (10). Patients suffered from CRVO or BRVO for utmost six months.

Their disease was confirmed by ophthalmic examinations and/or fluorescein angiography.

Exclusion criteria included Retinal Detachment (RD), history of ophthalmic trauma or surgery, corneal leukoma syndrome, intra ocular inflammation and tumor. Control group was patients who referred to ophthalmic clinic due to none vascular diseases. These patients were matched with case group with regard to their age and sex. Ophthalmologic examination Axial Length (AL) of orbit was measured by A-mode scan (NIDEK-US 4000, Japan) and macula thickness was assessed by Optical Coherence Tomography (ZEISS, Germany). All examinations were performed by a single ophthalmologist. Statistical analysis Data was analyzed by SPSS Version 16. Axial Length (AL) of orbit was compared with paired T-test in both eyes of patients. Student T-test was performed to compare AL between two groups of patients. P-value less than (0.05) was considered significant.

Results

25 patients in CRVO, 14 in BRVO and 17 in control group were male. There was not a significant difference between three groups regard to gender (P=0.6).

Mean age of CRVO and BRVO patients was (57.5±13.4) and (52.9±9.3) years, respectively (P=0.37).mean age of patient in control group was 59 ±16 years and did not differ significantly with other groups (P>0.05). In table-1 mean intraocular pressure, refraction and visual acuity, macular thickness and axial length was compared between groups.

Table1: Ophthalmologic examination result

		Intact eye	Involved eye	P value
	Visual acuity	0.61±0.33	0.16±0.27	0.001
CRVO	Refraction	-1.4±1.8	0.34±1.34	0.001
	IOP	3.06±14.26	3.4±15.14	0.17
	Axial length	1.6±22.9	0.64±22.2	0.001
	Macular thickness	194±305	214±491	0.001
	Visual acuity	0.22±0.8	0.23±0.36	0.12
BRVO	Refraction	-0.15±0.79	0.62±0.7	0.001
	IOP	2.6±13	2.1±14.4	0.1
	Axial length	0.42±23.07	0.42±23.2	0.989
	Macular thickness	168±177	144±354	0.016

Mean macular thickness was not significantly differ in involved eye compared to intact eye in BRVO patients (P=0.989). Macular thickness was decreased in involved eye in BRVO PATIENTS (p=0.016). Mean visual acuity and axial length was lower in involved eye in CRVO patients (p=0.001, p=0.001). Mean macular thickness was significantly higher in involved eye in CRVO patients (P=0.001).

Average axial length in affected eye in CRVO was significantly lower than control group (P=0.003). Mean AL did not differ in fellow eye in CRVO and control group (P=0.92) and BRVO (p=0.54)(figure-1).

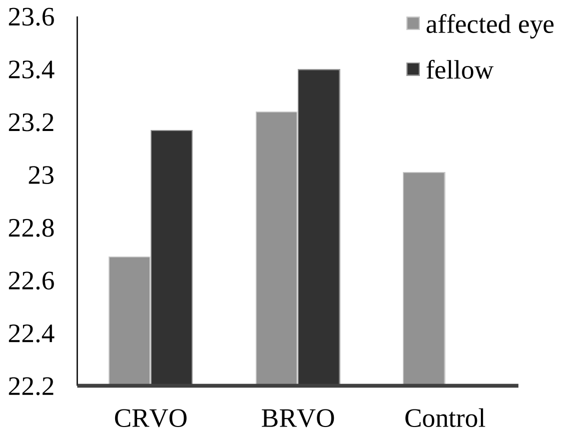

Figure 1: Average axial length measured by A-mode scan (after elimination of the macula edema impact) was shown.

Discussion

Nowadays vascular diseases of retina became more common and various projects were performed to identify the predisposing factors of CRVO and BRVO (11). The effect of aging and hypercoagulopathy state on retinal vascular disease was confirmed in previous studies. Ophthalmic factors associated with CRVO and BRVO was proposed recently. Ophthalmic predisposing factors proposed for retinal vascular disease include posterior segment, axial length, refraction, hyperopia and myopia (12). There is not an agreement about axial length impact on retinal vascular disease. In some studies it was revealed that severe myopia is associated with vascular damage particularly in diabetic patients, because it can reduce blood flow of retina (13).

The site of pathology in CRVO is Lamina Cribrosa and eyes with shorter axial length are at risk of CRVO because ophthalmic component are more compact in these eyes (14). The pathology of BRVO refers to local compression or occlusion in branch vein and does not correlate with axial length of orbit (15). Occlusion in retinal vein leads to macular edema and has a confounding effect on AL (16). This factor was controlled in our study, so we reported the true AL. In many studies macular edema was not considered as a confounding factor in determining AL like Aritürk

(16), so AL was reported lower in BRVO patients.

Aging is one of the important causes of retinal vascular disease and this relation was confirmed in Bandello paper (17). We controlled the effect of age by matching groups. Bandello did not find correlation between AL and retinal vein occlusion. This result was in contrast with our findings and might occur due to high incidence of refractory error in his patients. Brown showed that AL in CRVO patients was about (0.67) millimeters (two Dioptre) lesser than control group (18). This measurement in our study was (0.32) mm for CRVO and (-0.23) mm for BRVO patients and confirmed the effect of axial length in retinal vein occlusion. On the other hand some studies revealed the main gonioscopy finding in CRVO patients is small globe size (shorter AL) (19-21).

Conclusion

Axial length of orbit is associated with vascular disorders of eye, particularly with central retinal vein occlusion. This finding could be useful to identify and prevent the vascular events of patients at risk of developing vein occlusion.

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