

Association of primary glaucomas with retinal vein occlusion

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Abstract

Aims and Objectives: To determine the association of Primary glaucoma with retinal vein occlusion.

Methodology: A prospective cross-sectional study was carried out in B.P. Koirala Lions Centre for Ophthalmic Studies from April 2002-July 2003. All diagnosed cases of retinal vein occlusion were evaluated in detail for the presence of primary glaucoma. Detailed history was taken. Best corrected visual acuity was recorded, slit-lamp evaluation of anterior segment was performed, intraocular pressure was assessed with the help of applanation tonometer, gonioscopy was done and fundus evaluation was done under full mydriasis.

Results: Out of 50 patients, 19 (38%) were central retinal vein occlusion and 31(62%) were branch retinal vein occlusion. Majority of the retinal vein occlusion patients were in the age group of (61-70years) 12 out of 50 patients (24%). There were 12 patients of primary glaucoma in 50 patients of retinal vein occlusion. Out of which 11 patients had primary open angle glaucoma and 1 patient had primary angle closure glaucoma.

Conclusion: This study shows association of primary glaucoma as a risk factor of retinal vein occlusion. Evaluation of retinal vein occlusion patients for primary glaucoma would be worthwhile for early detection and prevention of blindness.

Keywords: Primary open angle glaucoma (POAG), Primary angle closure glaucoma (PACG), Central retinal vein occlusion (CRVO), Branch retinal vein occlusion (BRVO).

The word glaucoma derives from the Greek word *glaukos* which means watery or diluted blue. Hippocrates mentioned the condition of the *glaukosis* among the infirmities that old men suffer¹. The term glaucoma refers to a group of diseases that have in common a characteristic optic neuropathy with associated visual field loss for which elevated intraocular pressure is one of the primary risk factors².

Studies have shown that glaucoma is the second leading cause of blindness in the United States³ as well as the second leading cause of bilateral blindness in the world⁴. It was estimated that in 2000, United States residents would make 8.8 million office visits for glaucoma. In 2000, the number of people in the United States with primary open angle glaucoma (POAG) was estimated to be 2.47 million, i.e. 1.84 million white and 619,000 African Americans⁴.

Glaucoma is a leading cause of irreversible blindness in both developing and developed countries. It is a major eye problem leading to blindness in Nepal. According to National Blindness Survey (NBS) 1981,

it is the fourth major cause of bilateral blindness; the first three being Cataract, Iatrogenic sequelae of cataract and retinal disease⁵. Retinal vascular occlusion refers to vein or arterial occlusion. It may be central or branch vein occlusion. Retinal vein occlusion may not be expression of a single disease but a clinical phenomenon common to several diseases like Diabetes Mellitus, Systemic arterial hypertension and atherosclerotic cardiovascular disease, hyperlipidemia and many others⁶. Open angle glaucoma is a relatively common finding in patients who have retinal vein occlusion. Patient who have history of glaucoma are about five times more likely to have retinal vein occlusion than those who do not, presumably because of structural alterations of the lamina cribosa induced by elevated IOP⁷.

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This study has been undertaken to determine the association of primary glaucoma with retinal vein occlusion with following specific objectives:

- To find out the pattern of retinal vein occlusion.
- To find out age and sex distribution of retinal vein occlusion patients.
- To find out the association of glaucoma with retinal vein occlusion.
- To find out the pattern of glaucoma in retinal vein occlusion.

Materials and methods

Prospective study was carried out to see association of primary glaucoma in retinal vein occlusion in B. P. Koirala Lions Centre for Ophthalmic Studies from April 2002 to July 2003. Informed consent was taken of each case before including in the study.

Inclusion criteria: All diagnosed cases of retinal vein occlusion.

Exclusion criteria: Patients with media opacity whose fundus evaluation is not possible, patients with secondary glaucoma, patients with non-glaucomatous optic atrophy were excluded.

All patients diagnosed as a case of retinal vein occlusion were considered for glaucoma evaluation.

Detailed history were taken and recorded in proforma. Visual acuity was recorded with self-illuminating standard Snellen chart or E chart for illiterate and children. Visual acuity with best corrected refraction was recorded.

Detail slit-lamp examination was done under Haag Streit 900 slit lamp biomicroscope and findings (normal and abnormal) were recorded in proforma.

The depth of anterior chamber was assessed by Van Herick method. Recording of intraocular pressure was done with applanation tonometer. Indirect gonioscopic examination with Goldmann one mirror gonio lens was done in all patients. Grading of the irido-corneal angle was done according to the modified Shaffer Spaeth system, where angle is graded on scale of 0,I,II,III,IV⁸.

Detailed fundus evaluation was done.

- a. Direct ophthalmoscopy with Neitz hand held model ophthalmoscope with white light and with red free light.
- b. Indirect ophthalmoscopy
- c. Binocular evaluation in slit-lamp with Volk 90D lens

Mydriatic (Tropicamide 1%) drops were used to dilate the pupil for detail view of fundus. While doing funduscopy the sizes, shapes of the optic discs were evaluated. Similarly the status of neuroretinal rim was assessed.

The depth of the cup, other vascular signs such as splinter haemorrhages, bayoneting signs, barring of the circumferential vessels and nasal shifting of the retinal vessels if present were noted and recorded.

Visual field analysis was done with Goldmann perimeter. Fundus photography was done of all the retinal vein occlusion patients with primary glaucoma by Canon CF 604 fundus camera.

Diurnal variation of intraocular pressure was recorded in all cases where intraocular pressure was found to be within normal limit. It was recorded at the interval of three hours. In these cases where the results were equivocal water drinking stress test (WDST) were carried out. WDST was done by giving a litre of water to drink in an empty stomach and intraocular pressure was recorded at an interval of every 15 minutes till the IOP is dropped to baseline level and remained unchanged in two consecutive readings. Intraocular pressure more than 22mmHg and diurnal variation curve of more than 8mmHg were considered significant. Diagnosis of glaucoma was confirmed by presence of any two of the following parameters:

1. Glaucomatous optic atrophy
2. Visual field changes
3. High Intraocular pressure (> 22mm Hg)

Statistical Analysis:

Data analysis was done by Microsoft excel and Epi-info programme.

Results

Total fifty patients of retinal vein occlusion were included in this study. Out of total fifty patients, 19 (38%) were central retinal vein occlusion and 31(62%) were branch retinal vein occlusion (Table 1). Ratio of branch retinal vein occlusion with central retinal vein occlusion was 1.63. So branch retinal vein occlusion was 1.63 times more than central retinal vein occlusion. Out of 31 patients, 23 patients (74%) had superior temporal branch vein occlusion, 5 patients (16.13%) had inferior temporal branch retinal vein occlusion and 3 patients (9.68%) had macular branch retinal vein occlusion.

Minimum age group was in the range of 11-20 years and maximum age group was in the range of 81-90 years. 12 patients (24%) out of 50 retinal vein occlusion were in the age group of 61-70 years and 12 patients (24%) were in the age group of 71-80 years.

Out of 25 male patients of retinal vein occlusion 8 patients (32%) were in the age group of 71-80 years, 1 patient (4%) was in the age group of 11-20 years; 25 female patients of retinal vein occlusion 7 patients (28%) were in the age group of 61-71 years and 1 patient (4%) was in the age group of 81-90 years (Table 2).

Out of total 50 patients of retinal vein occlusion in 12 patients (24%) patients had glaucoma and in 38 patients (76%) glaucoma was absent. Out of 31 patients of branch vein occlusion 7 patients (22.58%) had glaucoma and 24 patients (77.41%) did not have glaucoma (Table 3).

Out of 19 patients of central retinal vein occlusion, 5 patients (26.31%) had primary open angle glaucoma. Out of 31 patients of branch retinal vein occlusion 6 patients (19.35%) had primary open angle glaucoma and 1 patient (3.22%) had chronic primary angle closure glaucoma (Table 4).

Table 1: Pattern of retinal vein occlusion

RVO	Total	Percentage
CRVO	19	38
BRVO	31	62

Table 2: Age and sex distribution of retinal vein occlusion

Age(in years)	Male	Female	Total	Percentage (%)
11-20	1	-	1	2
21-30	-	2	2	4
31-40	3	2	5	10
41-50	4	5	9	18
51-60	4	4	8	16
61-70	5	7	12	24
71-80	8	4	12	24
81-90	-	1	1	2
Total	25	25	50	100

Table 3: Association of Primary glaucoma with retinal vein occlusion

Glaucoma	CRVO	BRVO	Total	Percentage (%)
Present	5	7	12	24
Absent	14	24	38	76
Total	19	31	50	100

Table 4: Pattern of primary glaucoma in retinal vein occlusion

Type of glaucoma	CRVO	%	BRVO	%
POAG	5	26.31	6	19.35
PACG	0	0	1	3.22

Discussion

Fifty patients were included in this study to determine the association of primary glaucoma with retinal vein occlusion.

Glaucoma is second leading cause of blindness second only to cataract. Retinal vascular obstructive disease is one of the commonest vascular diseases of eyes; second only to diabetic retinopathy⁹. Glaucoma and retinal vein occlusion are both potentially blinding eye diseases occurring worldwide. Early detection and timely intervention remains the key to prevent visual deterioration from these two entities.

Fifty patients were enrolled in this hospital based prospective study. The study showed that out of fifty patients included 19 patients (38%) were central retinal vein occlusion and 31 patients (62%) were branch retinal vein occlusion. Ratio of branch retinal vein occlusion to central retinal vein occlusion is 1.62:1. This showed that branch retinal vein occlusion was more common than central retinal vein occlusion.

This is comparable with the study done by Mitchell P, Smith W, Chang A¹⁰. In this study out of 59 patients 41 (69.5%) patients were of branch retinal vein occlusion and central retinal vein occlusion were 18 (25%). Central retinal vein occlusion accounted for 34% (n=34) and branch retinal vein occlusion accounted for 66% (n=66) in a hospital based

prospective study conducted in BPKLCOS, Tribhuvan University Teaching Hospital¹¹.

The vessels most usually affected are the superior temporal vein because of its greater frequency of arteio-venous crossings in its course. According to Koyanagi's series of 27 cases, 21 patients (77.77%) involved the superior temporal vein, 5 patients (18.51%) the inferior temporal and 1 patient (3.70%) both the superior and inferior¹². In our study out of 31 patients of branch retinal vein occlusion patients, 23 patients (74%) had superior temporal branch retinal vein occlusion, 5 patients (16.13%) had inferior temporal branch retinal vein occlusion and 3 patients (9.68%) had macular branch retinal vein occlusion. This is comparable to the study conducted in BPKLCOS, TUTH where out of 66 patients of branch retinal vein occlusion there were 44 patients (67%) of superior temporal branch retinal vein occlusion, 20 patients (30%) of inferior temporal branch retinal vein occlusion and 2 patients (3%) of infero-nasal branch retinal vein occlusion¹¹.

This study showed the age of presentation of the patient of retinal vein occlusion ranged from 17 years to 85 years. Majority of the patients (48%) were in the age group (61-80 years) 48%. Mean age of these patients were 59.42 years. This gives the impression that middle and elderly age groups are frequently affected by the retinal vein occlusion. Coat (1913) found the average age group to be 60 years with

extremes of 35 years and 80 years, Foster Moore (1924) found average age of 60 years. Six cases only out of 59 being younger than 50 years¹³. In Ocular Vascular Unit at University of Iowa the age range of patients were between 14 years and 92 years in a series of 1108 patients (1129 eyes) with various types of retinal vein occlusion seen over 17 years¹⁴.

Out of 50 patients of retinal vein occlusion 25 patients (50%) were females and 25 patients (50%) were males. This is similar with the study done by Mitchell P, Smith W, Chang A. Both males and females were of equal number¹⁰.

Out of total 19 patients of central retinal vein occlusion 8 were males and 11 were females, which shows female predominance. Minimum age group was in the range of 11-20 years and maximum age group in the range of 71-80 years. 5 patients (23.8%) were in the age group of 61-70 years.

This is comparable with other studies. The mean age of patients with central retinal vein occlusion was 53.63 years and standard deviation was 16.75.

Out of 31 patients with branch retinal vein occlusion 17 were male and 14 were female with male predominance. Minimum age group was in the range of 21-30 years and maximum age group in the range of 81-90 years. Majority of the patients were in the age group of 61-80 years (51.6%). The mean age of the patients with branch retinal vein occlusion were 58.48 years with a standard deviation of 15.12.

Among primary glaucoma, primary open angle glaucoma in particular seems to have a close association with retinal vein occlusion. Out of 19 central retinal vein occlusion patients 5 patients had glaucoma and all these 5 patients had primary open angle glaucoma (26.31%). Out of 31 patients of branch retinal vein occlusion, 7 patients had glaucoma of which 6 patients (19.35%) were primary open angle glaucoma and 1 patient (3.22%) had primary angle closure glaucoma(chronic). So out of 50 patients of retinal vein occlusion 12 patients (24%) had primary glaucoma and in 38 patients (76%) glaucoma was absent.

This study showed that central retinal vein occlusion is associated with primary open angle glaucoma more than branch vein occlusion. This study is comparable to the study done in Turkey, 2 out of 73 eyes (2.7%) with branch retinal vein occlusion and 10 out of 53 eyes with CRVO (18.9%) had glaucoma¹⁵. The study done by Appieh AP, Geenidge KC showed that

19.1% had open angle glaucoma in retinal vein occlusion patients¹⁶.

In a study "Retinal vein occlusion in Armenia" found glaucoma was an associated condition (12.6%)¹⁷. Overall result showed that out of fifty cases, 12 cases were found to be associated with primary glaucoma. Of these one case had chronic angle closure glaucoma and rest 11 cases had primary open angle glaucoma. This study showed that there is association of primary glaucoma with retinal vein occlusion. It would be worthwhile to carefully evaluate all retinal vein occlusion cases for primary glaucoma.

Conclusion

Primary glaucoma and retinal vein occlusion are important causes of blindness. Its early detection and timely intervention remains the key to prevent visual deterioration from these two diseases. Fifty retinal vein occlusion cases were evaluated for its association with primary glaucomas. Out of 12 primary glaucoma patients only 1 patient had primary angle closure glaucoma, so this showed that there is not much association of primary angle closure glaucoma with retinal vein occlusion.

It would be worthwhile to carefully evaluate all the patients of retinal vein occlusion for primary glaucoma especially primary open angle glaucoma. Good control of intraocular pressure in a patient known to have glaucoma may prevent occurrence of retinal vein occlusion.

This study thus emphasizes frequent and careful evaluation of retinal vein occlusion cases primary open angle glaucoma.

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