Original article

Clinico-epidemiological characteristics of central retinal vein occlusion in a tertiary level eye care center of Nepal

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Abstract

Background: Central retinal vein occlusion (CRVO) is one of the common retinal disorders causing severe visual impairment. **Objective**: To study the clinical profile, risk factors and visual outcome in central retinal vein occlusion. **Materials and methods**: Seventy-four eyes of 74 patients with central retinal vein occlusion were retrospectively enrolled during the period of one year. All the patients in the study were classified with regard to their ischemic status into two groups, ischemic CRVO and non-ischemic CRVO. The demographic pattern of the patients was recorded. The other parameters studied were visual acuity, history of glaucoma, hypertension, diabetes mellitus and hyperlipidemia. The patients were followed up at 1 month, 3 months and 6 months after treatment.**Results**: The majority of the patients (n = 49, 66.2 %) had the ischemic type of CRVO, whereas, 25 (33.8 %) of them had the non-ischemic type. The CRVO was more commonly observed in males in both the groups. Hypertension was the most common risk factor associated with CRVO. The visual improvement was significantly better in non-ischemic CRVO (RR = 0.04, 95% CI = 0.01 – 0.31, p = 0.000). **Conclusion**: The CRVO was more common in males than in females. It was associated with systemic hypertension. The ischemic type of the CRVO was more prevalent than the non-ischemic one in this study. Visual outcome was better in the non-ischemic CRVO.

Keywords: central retinal vein occlusion, visual acuity

Introduction

Central retinal vein occlusion (CRVO) is the most devastating ocular condition after diabetic retinopathy (Shahid et al., 2006). It typically affects older individuals. Unilateral presentation is common although the risk of bilateral involvement is approximately 1% per year (Group, 1997). CRVO is clinically classiûed into two types, the more common non-ischemic CRVO and the less common ischemic CRVO (Arend et al, 1996). Non-ischemic CRVO accounts for 75 % of all cases and is typically associated with better visual acuity, less severe retinal ûndings, lack of an afferent pupillary defect and lack of cotton wool spots (Group, 1995, 1993). The exact pathogenesis of the thrombotic occlusion of the central retinal vein is unknown. However, various local and systemic factors play an important role (Hayreh, 1994, Ota et al, 2008).

Received on: 17.09.2013 Accepted on: 12.12.2013
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An increased risk of CRVO is found with increasing age, systemic hypertension, diabetes mellitus, cardiovascular disease, lower albumin-globulin ratio, hyperlipidemia, higher erythrocyte sedimentation rates in women and open-angle glaucoma (Turello et al., 2010, 1996). The risk of CRVO is reduced with increasing levels of physical activity and in women with use of postmenopausal estrogens (1996). Various modalities of interventions such as systemic anticoagulation, panretinal photocoagulation (PRP), macular grid photocoagulation, hemodilution, dexamethasone sustained-release implant, intravitreal anti-VEGF agents and triamcinolone acetonide are used for the treatment of CRVO (Shah and Shah, 2011).

The purpose of this study was to study the clinical profile, various risk factors and visual outcome of central retinal venous occlusion.

Materials and methods

This was a retrospective study conducted among patients who presented at the retina clinic at the Lumbini Eye Institute, Bhairahawa, Nepal during a period of one year (February 2011 to January 2012). It included 74 patients (74 eyes) with CRVO. Patients with prior episodes of central retinal venous occlusion were also included. All patients included in the study were classified with regard to their ischemic status into two groups, ischemic CRVO (Figure 1) and non-ischemic CRVO (Figure 2). To differentiate ischemic and non-ischemic CRVO functional tests (visual acuity, relative afferent pupillary defect) and morphological tests (ophthalmoscopy, fundus fluorescein angiography) were used (Hayreh et al, 1990). A detailed history was recorded which included visual loss and past history with relevance to systemic diseases like diabetes, hypertension and hyperlipidemia. Ocular risk factors like primary open angle glaucoma were also noted. Whenever required, fundus photographs and fluorescein angiography were taken. Laboratory examinations including blood sugar and serum lipid profile were done as basic investigations. Blood pressure was recorded on every individual. Whenever indicated, special tests like X-ray chest, ECG and echocardiography were done. Systemic risk factors were treated in the concerned specialties.

The treatment offered included pan-retinal photocoagulation, intra-vitreal injection of avastin, combined treatment with avastin and pan-retinal photocoagulation, and vitrectomy for non-clearing vitreous hemorrhage.

Patients were followed up at 1 month, 3 months and at 6 months after treatment. At each visit patients were evaluated for Snellen's best corrected visual acuity (BCVA), intraocular pressure measurement by applanation tonometry, slit-lamp bio-microscopy and indirect ophthalmoscopy.

Statistical analysis

Statistical analysis was performed using a commercially available statistical software package (SPSS for Windows, version 16.0; SPSS, Chicago, IL, USA). The proportions of patients according to age group, sex, type of CRVO, treatment of modalities, risk factors and visual acuity were calculated.

Results

Out of 74 eyes of 74 patients, the majority (n = 49, 66.2 %) were of the ischemic variety and 25 (33.8%) were of the non-ischemic type. Patients presenting with CRVO ranged from 35 to 80 years. The majority of the cases of CRVO were in the 40 to 60 years age group (Table 1). Both ischemic and non-ischemic types of the CRVO were more common in males, 15 (60%) and 35 (71.4%) patients respectively. The CRVO was more frequent in the right eye 40 (54.1 %) than in the left eye 32 (43.2 %).

Among the patients with ischemic CRVO, 30 (61.2 %) had presented with relative afferent pupillary defect while none in non-ischemic CRVO had this defect. In our study, the majority

of the patients (37.8 %) had hypertension (Table 2). The association of risk factors like hypertension, diabetes and hyperlipidemia with ischemic and non-ischemic types was not statistically significant (Table 2, 3, 4). Twenty-two (44.9 %) patients in the ischemic CRVO group had a raised intraocular pressure, of which 7 (14.3 %) had primary open angle glaucoma. In the non-ischemic CRVO group, 3 patients (12 %) had a raised intraocular pressure and all had primary open angle glaucoma (Table 5). Presenting best corrected visual acuity was as shown in Table 6.

Among those enrollees diagnosed with CRVO, 20 patients (27 %) with ocular neo-vascularization were treated with panretinal photocoagulation, 31 patients (41.9 %) with macular edema were treated with avastin, 22 patients (29.7 %) with macular edema and ocular neo-vascularization received a combined treatment with avastin and panretinal photocoagulation, and one patient (1.4 %) with non-clearing vitreous hemorrhage was managed with vitrectomy. All patients were followed up on first post-intervention day, at two weeks and at three months. None of the patients developed any post-intervention local or systemic side effects. Sub-conjunctival hemorrhage was observed in four patients and was procedure-related which resolved after a few days. Visual outcome after 3 months of treatment was as shown in Table 7. Comparison of visual outcome after the treatment in the ischemic and non-ischemic types was not statistically significant (Table 8).

Table 1: Age distribution of CRVO

Age group (years)	No of patients (%) (N = 74)
< 40	9 (12.2 %)
40 to 60	36 (48.6 %)
> 60	29 (39.2 %)

Table 2: Association of hypertension with ischemic and non-ischemic CRVO

Hypertension	Ischemic	Non-ischemic	Chi-square	OR	95 % CI (p value)
Present	20	8	0.316		
				1.47	0.48 - 4.58
Absent	29	17			(0.40)

Table 3: Association of diabetes with ischemic and non-ischemic CRVO

Diabetes	Ischemic	Non-ischemic	Chi-square	OR	95 % CI (p value)
Present	7	5	0.375	0.67	0.16 - 2.81
Absent	42	20			(0.52)

Table 4: Association of hypelipidemia with ischemic and non-ischemic CRVO

Hyperlipidemia	Ischemic	Non-ischemic	Chi-square	Fisher exact test
Present	1	3	0.109	
Absent	48	22		P = 0.108

Table 5. Intraocular pressure in CRVO patients

Intraocular Pressure	Ischemic CRVO	Non-ischemic CRVO
Raised intraocular pressure	22 (44.9 %)	3 (12 %)
Normal intraocular pressure	27 (55.1 %)	22 (88 %)

Table 6: Visual acuity at presentation

VA	Ischemic	Non-ischemic
< 6/24	2 (4.1 %)	2(8 %)
6/24 - 6/60	12 (24.5 %)	6 (24 %)
6/60 - 3/60	19 (38.8 %)	9 (36 %)
3/60 – PL	10 (20.4 %)	8 (24 %)
NPL	6 (12.2 %)	0
*Better than 6/60	14	8
*Worse than 6/60	35	17

*RR = 0.86, 95 % CI = 0.57 – 1.29, p = 0.45

Table7: Visual acuity after 3 months of intervention treatment

VA	Ischemic	Non-ischemic
< 6/24	2 (4.1 %)	4 (16 %)
6/24 - 6/60	13 (26.5 %)	8 (32 %)
6/60 - 3/60	12 (24.5 %)	5 (20 %)
3/60 – PL	14(28.6 %)	7 (28 %)
NPL	8 (16.3 %)	1 (4 %)
*Better than 6/60	15	12
*Worse than 6/60	24	13

RR = 0.86, 95 % CI = 0.57 – 1.29, p = 0.45

Table 8: Comparison of visual outcome after the treatment in ischemic and non-ischemic

Type of CRVO	VA improved	VA did not change	VA deteriorated
Ischemic	1 (2 %)	39 (79.6 %)	9 (18.4 %)
Non-ischemic	12 (48 %)	5 (20 %)	8 (32 %)

For improvement in visual acuity in non-ischemic CRVO : RR = 0.04, 95 % CI = 0.01 – 0.31, p = 0.000 (Fisher exact test)

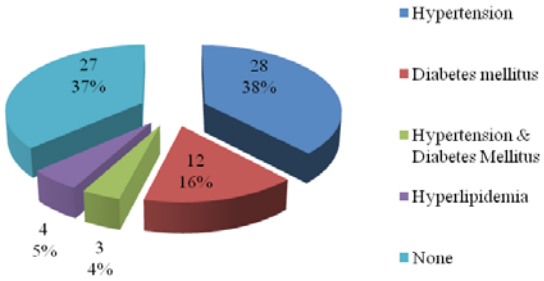

Figure 1: Associated systemic risk factors

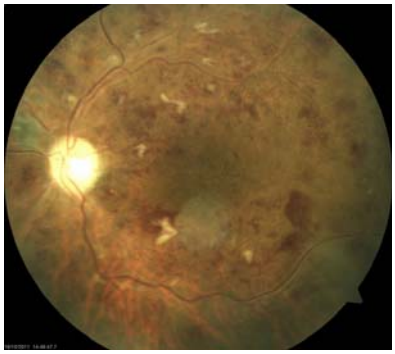

Figure 2: Picture of ischemic CRVO showing secondary optic atrophy and nerve fiber layer infarctions

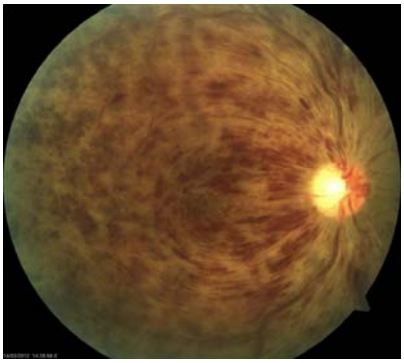

Figure 3: Picture of non-ischemic CRVO showing splinter hemorrhage in all the four quadrants and optociliary shunt at the nasal side of the optic disc.

Neo-vascular glaucoma (NVG) was observed in 15 patients (20.27 %) with the ischemic type of CRVO. One patient developed vitreous hemorrhage. None of the patients with non-ischemic CRVO developed neo-vascularization of the anterior or posterior segment.

Discussion

CRVO is reportedly prevalent in the older age group. The mean age of presentation of non-ischemic CRVO was 51.7 years and that of ischemic CRVO was 61.5 years (Raju and Abdulkhader, 2009). In our study, most of the patients (48.6 %) were in the age group of 40 - 60 years and 29 patients (39.1 %) were of more than 60 years. However, CRVO in young subjects is not rare (Hayreh, 1994). Likewise, in our study, about 12.2 % of the cases were observed in patients of less than 40 years.

CRVO was more frequently observed in males (67.6 %) than in females (32.4 %) in the present study, which has also been described in other studies (Koizumi et al., 2007, 1996). The left eye is more commonly involved, especially in the ischemic type of CRVO (Hayreh, 1994, Raju and Abdulkhader, 2009). On the contrary, CRVO was observed more in the right eye (54.1%) than in the left eye (43.2 %) in this study and the right eye involvement was more frequent in both ischemic and non-ischemic CRVO.

The non-ischemic type of CRVO is more common than the ischemic type as described in previous studies. Non-ischemic CRVO constituted 81 % of 620 CRVO patients (Hayreh, 1994). In another study, 66 % of CRVO were of the non-ischemic type (Hikichi et al., 1995). However, the majority of the cases with CRVO were of the ischemic type (66.2 %) in our study. Similarly, a study done by Zhang et al showed ischemic CRVO in 633 eyes (67.1 %) and non-ischemic CRVO in 311 eyes (32.9 %) (Zhang and Xia, 2002). In a prospective study of nine eyes of nine patients with CRVO, 5 of the 9 eyes (55.5 %) had ischemic CRVO and 4 of the 9 (44.4 %) eyes had non-ischemic CRVO (Shah and Shah, 2011). The present study was a hospital-based study and the selection bias could not be eliminated completely. As many patients with non-ischemic CRVO may remain asymptomatic and the CRVO resolve spontaneously without medical intervention, a significant number of non-ischemic CRVO might have been missed. Another reason for the high percentage of the ischemic type in our study may be due to the delay in seeking medical treatment, as most of the patients attending our hospital were from low socioeconomic background, and these patients had a less health-seeking behavior, and also prompt referral to higher centers was not possible due to various reasons. Conversion of non-ischemic CRVO to ischemic type may occur within two days to two years (Chen et al., 1995). Hence, in our patients, because of delay in presentation, many patients might have had non-ischemic CRVO which had converted to the ischemic type resulting in a higher proportion of the ischemic type of CRVO.

In our study, the major risk factor identified was hypertension (37.8 %) (Table 2). Similarly, other studies have shown that persons with a history of systemic hypertension have more than a two-fold increased risk of CRVO (Zegarra et al., 1979, 1996). Primary open-angle glaucoma as a local risk factor was found in 12 % of the non-ischemic CRVO and in 14.3 % of the ischemic CRVO in our study. The prevalence of primary open-angle glaucoma in association with CRVO widely varies as reported in various studies (Dryden, 1965, Vannas and Tarkkanen, 1960). In a study, 48 % of CRVO patients had a lower intraocular pressure in the affected eye than in the fellow eye at the initial evaluation and the intraocular pressure equalized with time (Hayreh, 2004). Low intraocular pressure was not observed in the patients in this study. Most of the patients in this study attended the hospital late for their initial evaluation and this could be the reason that low intraocular pessure was not detected. Comparing the best corrected visual acuity of the two groups at presentation and post treatment, non-ischemic CRVO showed a better visual outcome. Similarly, another study has shown that the ischemic CRVO is associated

with a low mean visual acuity both at the time of the diagnosis and during the follow-up periods (McIntosh et al., 2010).

Patients presenting with a best-corrected visual acuity (BCVA) of < 6/24 to 6/60 improved upon their visual acuity or maintained it at the initial level in both the groups. Likewise, other studies showed that the eyes with an initial visual acuity of at least 6/12 were more likely to retain good vision (Kiire and Chong, 2012). Neo-vascular glaucoma (NVG) was diagnosed in 15 (20.27 %) patients and all of them had the ischemic type of CRVO. None of the non-ischemic CRVO patients developed NVG. Neo-vascular glaucoma was seen in 67 to 82 % of the ischemic CRVOs and in 1 % of the non-ischemic CRVO in other studies (Zegarra et al, 1979; Sinclair and Gragoudas, 1979). One patient developed vitreous hemorrhage. A study of 10 eyes with CRVO reported a meaningful estimate of the incidence of vitreous hemorrhage, which was 10 % by 9 months after the onset of CRVO (Tewari et al, 1995).

Our study had the limitations that any retrospective study does. The number of patients with CRVO, although relatively large, compared with other series was still low.

Conclusion

CRVO is a visually-disabling disease which is common among the elderly population. Hypertension was the most common risk factor associated with CRVO. Non-ischemic CRVO accounted for better visual acuity compared with ischemic CRVO. Unlike previous studies, the ischemic type of CRVO was more frequent in this study. A larger, prospective study may be required for confirmation of these findings.

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Source of support: nil. Conflict of interest: none