Original Article

Retinal vein occlusion: Its risk factors and FFA and OCT findings

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Abstract

Aim: To study the risk factors of RVO and to study the role of OCT and FFA in detecting early or late RVO changes, in both ischemic and non- ischemic types. M**aterials and Methods:** A total of 120 patients (60 cases & 60 controls) from outdoor and indoor of Regional Institute of Ophthalmology, Guwahati were taken up for this study during the period from 1st June 2011 – 31st May 2012 presenting with RVO. Patients in the age group between 20 to 60 years were selected. Ocular examinations were done very meticulously in every patient assessing Visual Acuity, Intraocular Pressure, Amsler Grid Chart. Detailed Slit Lamp Examination, Slit Lamp Biomicroscopy With 90 D Lens, and Indirect Ophthalmoscopy for peripheral retina examination were done. FFA and Optical coherence tomography (OCT) imaging were performed. Routine blood investigations were done specially ESR. **Results:** Present study observed that majority of the patients were in the age group >50 years and majority were males. We found out the incidence of RVO and also revealed the association between various risk factors and RVO. Role of FFA and OCT in detecting the various presentations, early and late RVO changes were also studied. The results of our study are comparable to the studies conducted by other investigator all over the world. **Conclusion:** Our study observed the various risk factors for this disease and the role of diagnostic modalities-OCT and FFA in the diagnosis of the various presentations of this disease. OCT may be a good complementary imaging technique to FFA regarding the diagnosis of RVO. Using FFA as the standard reference, OCT has high sensitivity but only moderate specificity in detecting RVO lesions. Adequate control of the risk factors and timely diagnosis can reduce the incidence of RVO.

Keywords: RVO, FFA, OCT, Hypertension, Diabetes.

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Received Date: 18/01/2016 Revised Date: 08/02/2016 Accepted Date: 10/03/2016

Access this article online	
Quick Response Code:	Website: www.medpulse.in
	DOI: 12 March 2016

INTRODUCTION

Retinal vein occlusion (RVO) is the second commonest cause of reduced vision due to retinal vascular disease after diabetic retinopathy.[1] Still it is a highly controversial subject in the ophthalmic world literature. Although multiple factors, both systemic and ocular, are apparently involved in the production of this retinal vascular accident, the exact etiology of the retinal vein occlusion remains unclear. Conditions that may predispose to retinal vein occlusion include diabetes mellitus, hypertension, hyperlipidemia, systemic vascular disease, open angle glaucoma, hyperviscosity, increased erythrocyte sedimentation, certain medications, smoking, drinking etc. Retinal vein occlusion has been classified into 3 varieties: 1) Branch Retinal Vein Occlusion(BRVO), 2) Central Retinal Vein Occlusion (CRVO), and 3) Hemi Retinal Vein Occlusion.[2,3] Profound permanent decreased visual function is a predictable consequence of retinal vein occlusion. The reduced visual acuity in RVO is found to be due to cystoids macular edema, pigment scarring or fibrosis in advanced stage. Vitreous haemorrhage, foveal haemorrhage, arteriolar obstruction, neo-vascular glaucoma may ultimately cause blindness. Preventive measures are needed to reduce the burden of this disease. It is now well accepted that optical coherence tomography (OCT) has an important role to play in the diagnosis and management of retinal diseases. With the

How to site this article: Jyoti Bhuyan, Baby Deka, Arif Sheikh, Anant Singhi. Retinal vein occlusion: Its risk factors and FFA and OCT findings. *MedPulse – International Medical Journal.* March 2016; 3(3): 314-318. http://www.medpulse.in (accessed 16 March 2016).

marked improvements in the quality of tomographic images achieved in the recent years, OCT has become extremely popular both in clinical research and in practice and is used to evaluate the severity of retinal vein occlusion. Profound permanent decreased visual function is a predictable consequence of RVO. Causes of reduced visual acuity include cystoids macular edema, eschemia leading to neo-vascularization, vitreous haemorrhage, neo-vascular glaucoma etc. Fundus Fluorescein angiography (FFA) is of great value in classifying the clinical features of RVO. Interpretation of FFA images of this disease has a major impact on patient care and vision research. In eyes with RVO, FFA is probably most recognized for its ability to demonstrate the presence and extent of capillary perfusion.

MATERIALS AND METHODS

This study was carried out in the Regional Institute Of Ophthalmology, Gauhati Medical College. A total of 120 patients (60 cases & 60 controls) were taken up for this study during the period from 1st June 2011 – 31st May 2012 presenting with RVO. Patients were selected from the outdoor as well as from indoor of RIO, Guwahati. Informed and written consent were obtained from the patients. The study was approved by the Ethics Committee of Gauhati Medical College and Hospital.

Inclusion Criteria: 1) Age-cases of RVO between 20 to 60 years of age

2) sex- both male and female Patients .

Exclusion Criteria: 1) patients with bilateral media opacity,

2) patients with ocular trauma,

3) patients with Central Retinal Artery Occlusion(CRAO),

4) patients with history of cardiac arrest, bronchospasm, convulsions, kidney disease etc as they may lead to fatal adverse reactions during FFA.

Controls: cases not having any ocular problems.

A detailed history including age, sex, complaints, associated other disease, personal history and relevant family history were taken and a thorough systemic examination was done. Ocular examination was done very meticulously in every patient assessing Visual Acuity, Intraocular Pressure, Amsler Grid Chart, Detailed Slit Lamp Examination, Slit Lamp Biomicroscopy With 90 D Lens, and Indirect Ophthalmoscopy for peripheral retina . FFA and FUNDUS PHOTOGRAPHS were taken using Fundus camera. Optical coherence tomography (OCT) imaging was performed using the Stratus OCT machine. The Fast macular thickness protocol was used. Only the high quality, well- centered scans with signal strength more than 6 were saved. Each scan was analysed using the onboard Stratus OCT software (version 4.0) with segmentation of retinal layers and qualitative and quantitative assessment of retinal layers. The blood examination including Hemoglobin, Total leucocyte count, Differential leucocyte count, Erythrocyte sedimentation rate were done.

RESULTS

Table 1: Age distribution

Age distribution(yrs.)	No of BRVO patients	No of CRVO	Ischemic	Non-ischemic
31-40	2(3.33%)	1(1.66%)	0	1(1.66%)
41-50	5(8.33%)	6(10%)	1(1.66%)	5(8.33%)
51-60	18(31.66%)	6(8.33%)	2(3.33%)	3(5.00%)
61-70	8(13.33%)	6(10%)	2(3.33%)	4(6.66%)
71-80	2(3.33%)	5(8.33%)	0	5(8.33%)
81-90	1(1.66%)	-		
Total	36(60%)	24(40%)	5(8.33%)	19(31.66%)

Table 2: Sex distribution

Age Groups	Males	Females
31-40	1(1.66%)	2(3.33%)
41-50	5(8.33%)	6(10%)
51-60	17(28.33%)	7(11.66%)
61-70	9(15%)	5(8.33%)
71-80	4(6.66%)	3(5%)
81-90	1(1.66%)	0
Total	**37(61.66%)**	**23(38.33%)**

Table 3: Fundus findings

Fundus findings	No Of Eyes Total No of eyes=62	Percentages %
Diffuse retinal hemorrhages	24	40%
Localized Hemorrhages	36	60%
Hard exudates	42	70%
Cotton-wool spots	18	30%
Disc Edema	16	26.66%
NVD	5	8.33%
NVE	4	6.66%
Macular Edema	45	75%
Macular Hemorrhages	24	40%
Vitreous Hemorrhages	3	5%

Table 4(a)

Medical hstory	CRVO(%)	BRVO(%)
Diabetes mellitus	9(37.55%)	11(30.55%)
No dibetes mellitus	15(58.33%)	25(69.44%)
Total	**24**	**36**

Table 4(b): Presence of diabetes in cases and control.

Medical history	Controls(%)	Cases(%)	Total(%)
Diabetes mellitus	22(36.66%)	20(33.33%)	42(35%)
No diabetes mellitus	38(63.33%)	40(33.33%)	78(80.8%)
Toal	**60(50%)**	**60(50%)**	**120(100%)**

Table 5(a): Hypertension in RVO patients.

Medical history	CRVO(%)	BRVO(%)
Hypertension	11(45.88%)	20(55.55%)
No hypertension	13(54.16%)	16(44.44%)
Total	**24**	**36**

Table 5(b): Presence of hypertension in cases and controls.

Medical history	Controls(%)	Cases(%)	Total(%)
Hypertension	34(28.33)	31(25.83%)	65(54.16%)
No hypertension	26(21.66%)	29(24.16%)	55(46%)
Total	**60(50%)**	**60(50%)**	**120(100%)**

Table 6: FFA findings

FFA findings	CRVO	BRVO
Capillary dilatation	24(100%)	36(100%)
Delayed venous filling	24(100%)	27(75%)
Leakage of dye	22(91.66%)	2 (5.5%)
NVD	4 (16.66%)	0
NVE	5(20.9%)	0
CME	12(50%)	9(25%)
Areas of capillary drop-out	5(20.9%)	1(2.77%)
Collaterals	5(20.83%)	19(52.77%)

Table 7: OCT findings

OCT findings	CRVO	BRVO
Macular edema	24(91.66%)	14(58.33%)
ERM formation	8(33.33%)	1(2.77%)
SRF accumulation	5(20.83%)	0

DISCUSSION

Incidence of BRVO was found to be 60% and that of CRVO was found to 40% in the present study.Mahoney *et al*[4] found an incidence of 47.6% for CRVO and 52.1% for BRVO. Mitchel *et al* [5] found an incidence of 69.5% in cases of BRVO and 25% in cases of CRVO. Thus the findings in our study correlates with the findings of Mohaney *et al*[4] and Mitchel *et al.*[5] The larger number of the patients 24(40%) in our study were in the age group of 51-60 years (Table 1). Rubinstein and Jones[6] reported the mean age of involvement to be 56 and 63 years for male and female respectively. M.D Tsalomus *et al*[7] found a mean age of 64.6 in CRVO group and on BRVO group it was 63.76. Thus our study was significant with the above studies. From the literature of Rubinstein and Jones[6] it is seen that males suffer almost one decade earlier than females in both central and branch vein occlusions. However, in our study we could not find such difference in mean age of presentation between male and female. Rubinstein and Jones[6] reported male and female ratio 52.5% and 47.5% respectively. Tsaloumas *et al*[7] found 52% affection of males and 48% of female.Ouinlan *et al*[8] found 56% and 44% of males and females respectively. We have encountered similar prevalence of male(61.66%) in our study (Table 2). Thus our study is in accordance with the work of the said authors.

A sudden detorioration of vision was predominant complain of the patients with RVO, which was also observed in various studies. Examination of fundus of 60 patients who had venous occlusion revealed diffuse retinal haemorrhage and dilatation of all the retinal branch veins in 24 eyes(40%), sectoral haemorrhage either flame shaped or dotted was found 36 eyes (60%), hard exudates were found in 42 eyes (70%), cotton wool spots were found in 18 eyes(30%), macular edema in 45 eyes (75%), disc neovascularization in 5 eyes (8.33%) and disc edema in 16(26.66%) eyes (Table 3). Similar findings were reported by Prilucket *et al*[9] In the present study, systemic hypertension was the mosy frequently associated systemic condition to be found as a predisposing factor for developing retinal vein occlusion. We observed 31(51.66%) cases of RVO patients suffering hypertension(Table5). Ouinlan *et al*[8] reported 57% cases of hypertension in their study. Sekimoto*et al*[3] in their study found 65% of the patients with BRVO had systemic hypertension. Mahoney *et al*[4] found 63.6% RVO patients to be hypertensive. Thus our study significantly correlates with above studies. Diabetes mellitus is frequently associated with RVO. Mc Grath *et al*[10] Dodson *et al*[11] and Zegarra *et al*[2] reported 13.34% of cases of diabetes in RVO. In our study, 20(33.33%) patients with RVO were diabetic of which 9 (37.55%) were in CRVO group and 11(30.55%) were in BRVO group (Table 5). Thus our study significantly correlates with the studies of the above said authors. We did not find any significant difference in the prevalence of diabetic between CRVO & BRVO patients, which is also supported by Appiah and Trempe.[12] In our study, we had found 8(13.33%) patients were suffering from CVS disorders. 6(25%) of the total CRVO patients were found to had a CVS disorder and in case of BRVO it was 2(3.33%) Ouinlan *et al*[8] reported 32% of cases of CRVO associated with cardiovascular disease other than hypertension. Rubinstein and Jones found[6] 2.02% cases of CVS disorders in RVO patients. Appiah and Trempe[12] also reported in their study, heart disease contributing to CRVO and BRVO is 22.2% and 23.4% cases respectively. Howeve r our study is in accordance with that of other studies. Elevated ESR reflects changes in shear forces and viscosity of plasma at the level of lamina cribosa , may lead to haemodynamic changes at central retinal vein and results in central retinal venous occlusion . Appiah and Trempe[12] in their study reported an association between raised ESR and RVO. This rise of ESR is more prevalent in CRVO than BRVO. They reported raised ESR in 23.1% of cases with CRVO and 12.2% of cases with BRVO. In our study, we had found elevated ESR in 18(30%) of RVO cases. 9(37.5%) out of total CRVO 24 cases and 9 (25%) of total 36 BRVO patients had raised ESR. High prevalence of elevated ESR in our study may be multifactorial e.g chronic infection like tuberculosis etc, that are very much prevalent in normal Indian population. Cole *et al*[13] reported 16% RVO patients with glaucoma. The present study showed elevated IOP in 11(18.33%) cases. 4(16.66%) out of total 24 CRVO cases and 7(19.44%) of 36 BRVO patients had raised IOP. Our study is also similar with the above study. In our study 11(18.33%) patients with CRVO and BRVO cases were hyperopic. Appiah and Trempe[12] in their studies found that comparing CRVO with BRVO hyperopia was found 38.5% and52.8% respectively. Thus our study is similar with their studies.

Present study observed a prevalence of 41.66% of smoking in CRVO cases while 36.11% among BRVO cases. Wong *et el*[14] had found a prevalence of 57.6% of smoking amongst RVO cases. Tsalomus *et al* [7] found a prevalence of 26.41%of smoking amongst RVO cases. In our study, certain discrepancies were found between the OCT and FFA features in the RVO cases and it was found that the specificity of OCT was less than FFA in detecting RVO lesions (Table 6 & 7). OCT is highly sensitive in detecting any structural change and so subretinal fluid accumulation could not be detected in FFA. Indeed as leakage is very well detected by FFA, so 5 cases which appeared to be subretinal fluid accumulation in OCT came out to be leakage from neovascular vessels in FFA.

Similar results were reported by Antoine Catier *et al*[15] and Zhang *et al*[16]

CONCLUSION

RVO is a multifactorial disease that affects a large segment of the population and research to date has yielded some preventive measures but few effective treatments. Our study aimed at finding the role of risk factors for this disease and to have an idea about the role of diagnostic modalities-OCT and FFA in the diagnosis of the various presentations of this disease. Adequate control of the risk factors and timely diagnosis followed by proper treatment will definitely pave the way for a world with less number of Retinal Vein Occlusion cases.

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Source of Support: None Declared
Conflict of Interest: None Declared