RETINAL VEIN OCCLUSIONS - A CLINICAL STUDY

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ABSTRACT: Retinal vein occlusion is the most common retinal occlusive disorder encountered by opthalmologists and is usually associated with a variable amount of visual loss.The study was conducted over a period of 22 months, we performed a combined analysis of risk factors, clinical presentation, management and complication of these 51 patients.

KEYWORDS: Retinal Vein Occlusions, CRVO, BRVO, Risk Factors, Complications.

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INTRODUCTION: Retinal vein occlusion is the most common retinal occlusive disorder encountered by ophthalmologists and is usually associated with a variable amount of visual loss. The dramatic picture of obstruction of the retinal veins was initially described as retinal apoplexy by Liebreich (1854). Leber (1877) reported the first case of BRVO and called it Haemorrhagic retinitis. It was first established as a clinical entity due to thrombosis by Julius Von Michel (1878). Koyanagi (1928) first reported the association between BRVO and AV crossing.RVO most commonly affects the venous blood supply of the entire retina (CRVO) or a quadrant drained by one of the branches (BRVO). Less commonly the superior or inferior half of the retinal alone is affected (HCRVO).[1]

AIMS AND MATERIALS: The study was conducted over a period of 22 months – from Nov 2009 to Aug 2011.

MATERIALS: We did a random selection of patients suffering from RVO who were attending our Retina Clinic at Government General Hospital, Kakinada. Totally 51 eyes of 51 patients were studied

METHODS: We performed a combined (retrospective and prospective) analysis of risk factors, clinical presentation, management and complications of these 51 patients.[2]

Initially, we prepared a detailed proforma including all the factors we intended to study. A detailed history of present disease as well as risk factors were taken and thorough ocular examination performed. Investigations related to various risk factors were done in accordance with our proforma. The course of the disease was monitored throughout the study period and appropriate intervention in individual cases was done based on its necessity.

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Inclusion Criteria: CRVO: Flame-shaped, dot or punctuate retinal haemorrhages or both in all four quadrants of the retina, dilatation and increased tortuosity of retinal veins and optic disc swelling.
HCRVO: Same as CRVO but involving either superior or inferior half of the retina alone.[3]
BRVO:

- **Initially**: Either flame-shaped, dot or punctuate haemorrhages in the distribution of the occluded branch.
- **Later**: Criteria expanded to include cases in whom retinal haemorrhages had resolved and new vessels or collaterals had developed.

RISK FACTORS: Patients with hypertension were defined as those with systolic BP greater than 160 mm of Hg or diastolic BP greater than 95 mm of Hg or those receiving antihypertensive medications.

Patients with fasting serum cholesterol above 200mg% were considered to have elevated serum cholesterol. IHD was defined as having ECG or echocardiographic abnormalities as confirmed by the physician or cardiologist. Patients with Diabetes were defined as havingfasting blood sugar more than 120mg% or post-prandial blood sugar above 200mg% or those receiving antidiabetic medications.

FUNDUS EVALUATION: Fundus photography with 30° fundus camera was done. FFA was performed as early as possible after haemorrhages cleared. Areas of capillary drop-outs, leaks at macular area or elsewhere, areas of blocked fluorescence, late phase staining of veins and veno-venous channels were noted.

TREATMENT PROTOCOL: Treatment of underlying systemic condition, if found, was routinely done. Physician opinion was sought in the treatment of HTN, DM etc.[4]

Patients below 40 years in whom inflammatory pathology was suspected were treated with systemic steroids. Patients with active periphlebitis and Eales disease

were given retrobulbar injection of dexamethasone on alternate days for 5 doses. Medical management given to all patients consisted of antioxidants and Tab. Vit. C as supportive therapy. Patients with CVS risk factors were treated with Tab. Aspirin 150 mg OD and Tab. Trental (Pentoxyphylline) 400 mg BD for 3 months Specific treatment of all patients was tailored to their requirement depending on clinical and FFA findings but a broad outline of the course of management is as follows:

- ME (in CRVO, HCRVO and BRVO): Grid laser.
- NVD/NVE: In CRVO: PRP, In BRVO: Sectoral PRP.
- ME + NVE (in BRVO): Grid +Sectoral PRP.
- Vitreous Haemorrhage (in CRVO AND BRVO): PPV and EL.
- CNP <5DD (in BRVO): Medical.
- CNP >5DD (in BRVO): Sectoral PRP.

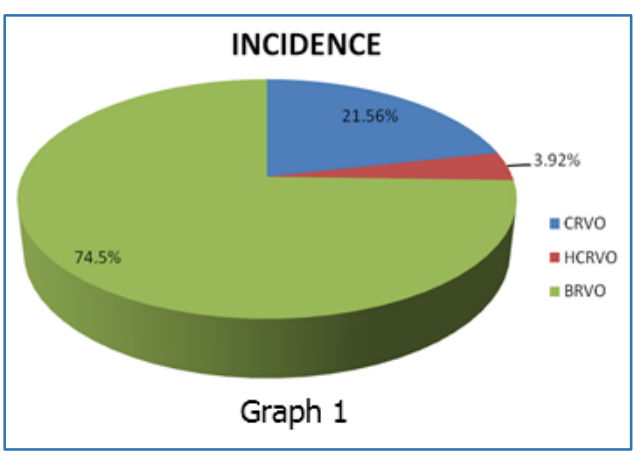
Patients with NVG were treated with Molteno implants while one patient with vitreous haemorrhage and subsequent tractional RD was treated with Pars Plana Vitrectomy release of tractional bands and endolaser.

FOLLOW-UP: Patients were asked to follow-up every month for three months and later at three-monthly intervals.During each visit, patients were reassessed completely.

ANALYSIS OF CASES: We studied retinal vein occlusions in 51 eyes of 51 patients who presented to our hospital. 11 cases of CRVO, 2 of HCRVO and 38 cases of BRVO were included. Our results were compared with a similar study conducted in Australia by Mitchell. P et al.

	Our study(51)	Australian study(59)
CRVO (%)	11(21.56%)	15(25%)
HCRVO (%)	2(3.92%)	3(5.1%)
BRVO (%)	38(74.5%)	41(69.5%)

TABLE 1: (INCIDENCE OF VARIOUS TYPES OF RVO)



Graph 1

AGE GROUP (in years)	CRVO (11)	HCRVO (2)	BRVO (38)
21-30	2	-	2
31-40	1	1	1
41-50	2	-	14
51-60	4	-	14
61-70	1	1	7
>70	1	-	-

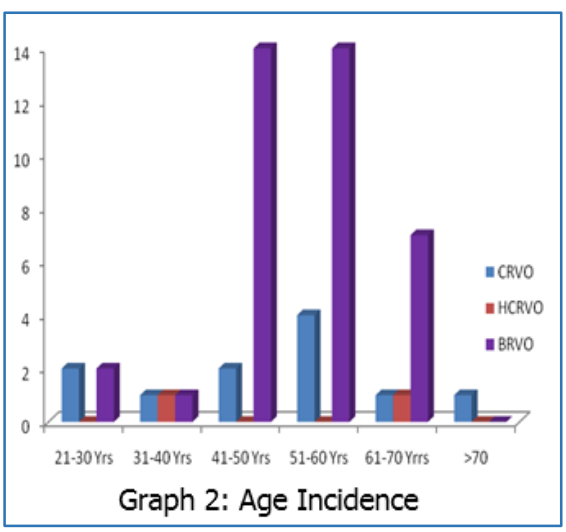
TABLE 2 (AGE INCIDENCE)

Mean age in the CRVO group was 50.2 years, HCRVO group was 53.5 years and in BRVO group was 51.5 years.

According to Stephen Ryan, CRVO is a disease which occurs more commonly over 50 years of age and BRVO occurs in 6th and 7th decades.

This correlated with our study in which BRVO patients under the age of 50 were 16 while 22 patients were in the 6th and 7th decades. Also eight out of 11 patients of CRVO were above 50 years of age.Our study had patients ranging from 27 years to 72 years of age. The youngest patient had CRVO and on further evaluation showed evidence of periphlebitis in the peripheral retina suggestive of Ealesdisease. There was presence of NVD and NVE which was confirmed by FFA. Mantoux was positive.

According to Hayreh S.S., CRVO was not found to be uncommon in young patients, a fact supported by our study too. Rather 45.5% of our CRVO cases were below 50 years of age.



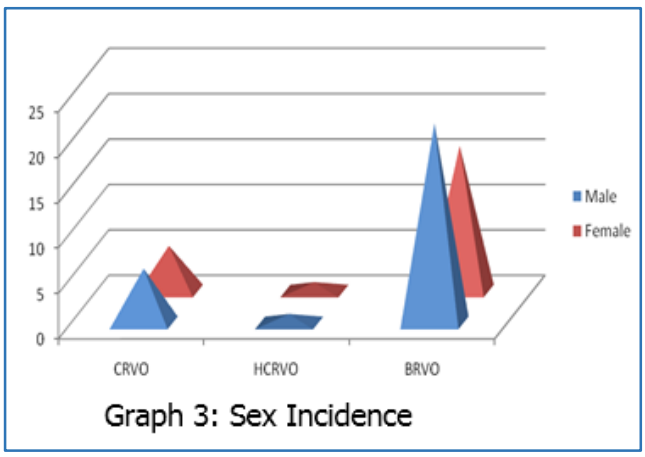
Graph 2: Age Incidence

	Male	Female	Total
CRVO	6 (54.55%)	5 (45.45%)	11
HCRVO	1 (50%)	1 (50%)	2
BRVO	22 (57.89%)	16 (42.11%)	38

TABLE 3: (SEX INCIDENCE)

In our study we found a slight male preponderance for both CRVO and BRVO with approximately 55% and 58% incidence respectively. Higher prevalence of RVO in male sex is documented by Hayreh S.S. of 1229 eyes with RVO in 1108 patients.[5]

In an attempt to explain the increased incidence of RVO in males on hormonal basis, age specific incidence of RVO was calculated in age groups less than 50 years and more than 50 years. Higher haematocrit in males could act as a contributory factor in elevating blood viscosity and producing RVO.

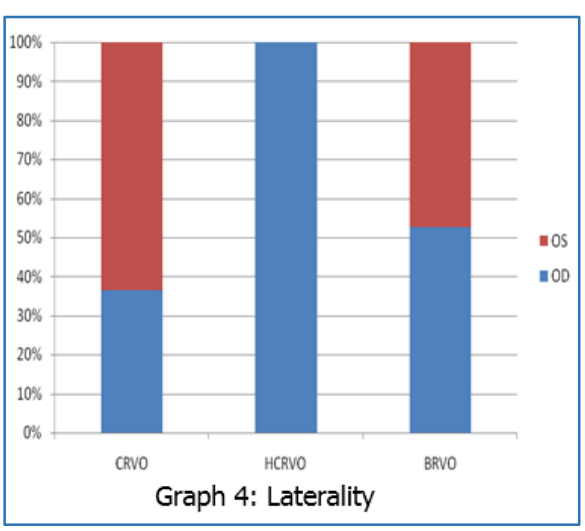


Graph 3: Sex Incidence

	OD	OS	TOTAL
CRVO	4 (36.36%)	7 (63.64%)	11
HCRVO	2 (100%)	0	2
BRVO	20 (52.63%)	18 (47.37%)	38
TABLE 4: (LATERALITY)			

In our study, we considered unilateral cases of RVO alone. Out of the 11 cases of CRVO that we studied, 7(64%) involved the left eye while in cases of BRVO, we had a slight majority of right eyes (20 of 38 cases). But overall we cannot state a significant difference as 26 right eyes and 25 left eyes of 51 patients were studied in toto.

Hayreh S.S. in his study has also derived similar results. His study showed higher incidence of CRVO in the left eye (specifically ischemic CRVO: 57%) and BRVO in the right eye (specifically major BRVO: 57%).



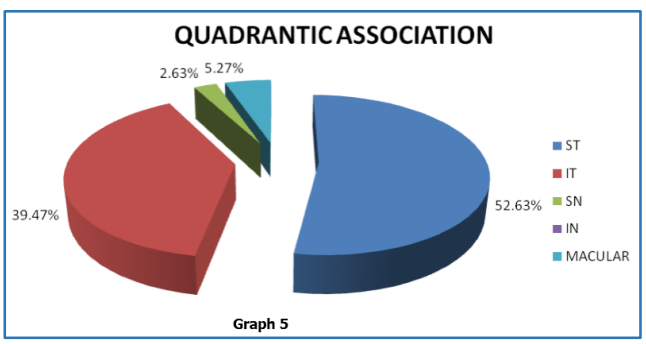
Graph 4: Laterality

	Upper	Lower	Total
HCRVO	2	-	2
TABLE 5: (HCRVO – Branch Involved)			

No significant comment can be made here since the number of HCRVO cases that we studied was very less.

BRVO	Number	Percentage(%)
ST	20	52.63
IT	15	39.47
SN	1	2.63
IN	0	0
Macular	2	5.27
TABLE 6: (BRVO-Branch Involved)		

Superotemporal quadrant is the commonest site of occlusion in BRVO, as is already known and this was corroborated well in our study, ST-BRVO forming about 53% of the total cases followed by IT-BRVO which formed almost 39.5%. There was a single case of SN quadrant being involved, while 2 cases had a macular BRVO.



Graph 5

Risk factors	CRVO (11)	HCRV (2)	BRVO (38)	Total (51)
Male gender	6(54.55%)	1(50%)	21(55.26%)	28
Hypertension	5(45.45%)	2(100%)	26(68.42%)	33
Diabetes	1(9.09%)	0	6(15.78%)	7
CVS disease	2(18.18%)	0	3(7.89%)	5
Periphlebitis / Eales	1(9.09%)	0	3(7.89%)	4
Hyperopia	7(63.64%)	1(50%)	27(71.05%)	35
Cholesterol > 200mg%	5(45.45%)	1(50%)	10(26.32%)	16
Elevated IOP > 20mm Hg	2(18.18%)	0	0	8
No risk factors	2(18.18%)	0	4(10.53%)	6
TABLE 7: (HIGH RISK FACTORS)				

Analyzing the risk factors that we studied in our patients, the most striking feature noted was the association of hypermetropia with both CRVO (64%) and BRVO (71%). In a study conducted by Majji AB, Janarthanan et al., on significance of refractive status in BRVO, hypermetropia was present in 70.7% of patients of

BRVO, as opposed to 44% of controls. This correlated very well with our study. Also the risk of CRVO is high in hypermetropic small eyes with small discs which may make the central retinal vein vulnerable to occlusion at or near the lamina cribrosa due to overcrowding and other anatomical factors.

Male gender was the predominant gender in both CRVO and BRVO series forming about 55% of cases in both categories.

Hypertension formed a higher risk for BRVO (68.5%) in our study than CRVO (45.5%). Also both our patients of HCRVO were hypertensives. Incidence of hypertension was more than DM in both CRVO and BRVO groups while neither of the two patients of HCRVO we studied were diabetics. Only one of the 11 CRVO cases we had was a diabetic, while six of 38 BRVO cases were diabetics (15.8%).

Serum Cholesterol levels were significantly associated with CRVO cases in our series wherein 45.5% of these patients had levels exceeding 200mg%, but when compared to this statistics, the number of patients who actually had systemic manifestation in the form of IHD was only around 18%.

Due to the small number of cases in the HCRVO group, we cannot comment about the association of risk factors though the fact that both our HCRVO cases were hypertensives seems significant. Also serum Cholesterol was above 200mg% in one of the two cases.

	CRVO(11)	**HCRVO(2)**	**BRVO(38)**
<23.50mm	6(54.55%)	1(50%)	25(65.79%)
23.50 – 24.50mm	3(27.27%)	-	5(13.16%)
>24.50mm	2(18.18%)	1(50%)	8(21.06%)

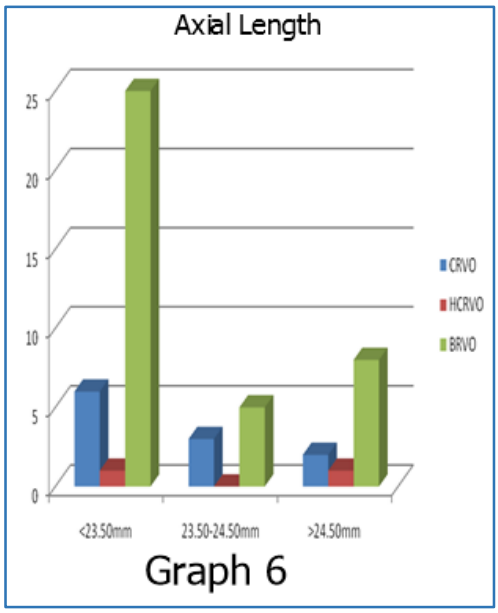
TABLE 8: (AXIAL LENGTH)

	CRVO (11)	HCRVO (2)	BRVO (38)	Total (51)
Myopia	2 (18.18%)	-	8 (21.05%)	10
Hypermetropia	7 (63.64%)	1 (50%)	27 (71.05%)	35
Emmetropia	2 (18.18%)	1 (50%)	3 (7.9%)	6

TABLE 9: (REFRACTVE ERROR)

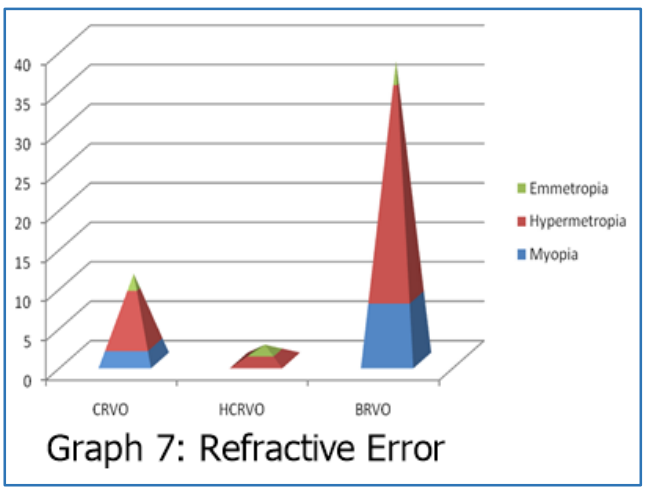
Our study showed a definite risk of CRVO as well as BRVO in eyes with a small axial length. 54.55% of our CRVO and 65.79% of our BRVO cases had axial length less than 23.50mm.

Shorter axial length as a risk factor for BRVO was also reported by Timmerman et al. and by Ariturk et al.



Graph 6

As mentioned under risk factors, hypermetropia had a high incidence amongst our RVO cases.

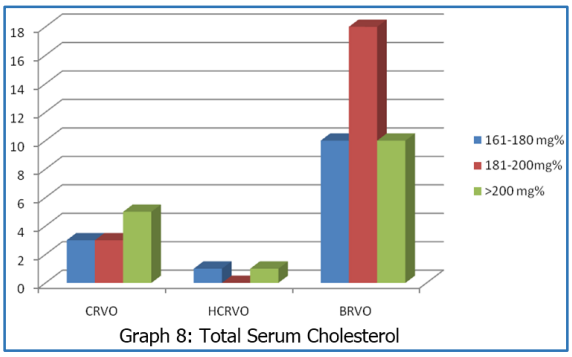


Graph 7: Refractive Error

	CRVO(11)	**HCRVO(2)**	**BRVO(38)**
161 – 180mg%	3(27.27%)	1(50%)	10(26.32%)
181 – 200mg%	3(27.27%)	-	18(47.37%)
>200 mg%	5(45.45%)	1(50%)	10(26.32%)

TABLE 10: (TOTAL SERUM CHOLESTEROL)

Higher prevalence of increased serum cholesterol levels more than 200mg% was found in 45.45% i.e. five of 11 patients of CRVO. In the BRVO category, though levels more than 200mg% was found in around 26% case, levels more than 180mg% was significant comprising of 73.7% of the total(28 of 38 patients).Dodson et al., has reported a prevalence of hyperlipidemia of 54%.

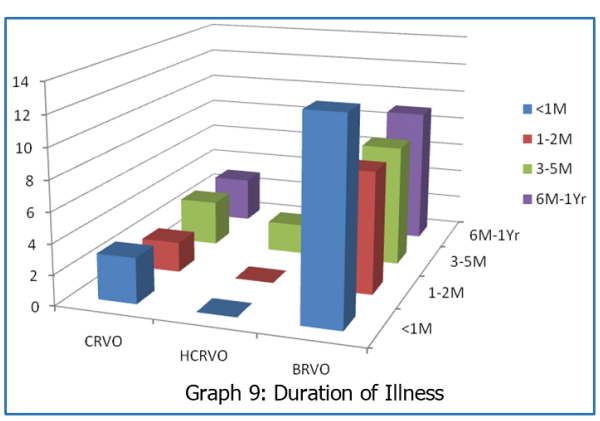


Graph 8: Total Serum Cholesterol

Duration	CRVO(11)	HCRVO(2)	BRVO(38)
<1mo.	3(27.27%)	-	13(34.21%)
1 – 2mo.	2(18.19%)	-	8(21.05%)
3 – 5mo.	3(27.27%)	2(100%)	8(21.05%)
6mo. – 1yr.	3(27.27%)	-	9(23.69%)
TABLE 11: (DURATION OF DEFECTIVE VISION)			

3 of 12 CRVO patients (27%) presented early with sudden painless loss of vision within 1 month while 13 of the 38 BRVO cases (34%) presented within the same period. This disparity, especially the delay of many CRVO patients in presenting to us may be explained by the fact that our institute being a tertiary care ophthalmic centre, referred cases from the periphery came to our hospital a prolonged period after the onset of disease. Two of our CRVO cases who presented to us at 8 months and 6 months after onset had redness and pain of the affected eye of around 4 months duration. IOP in these cases was 56 and 69mm of Hg respectively. Both were diagnosed as cases of NVG with presence of NVI visible on preliminary slit lamp examination. Both cases underwent shunt surgery with Molteno implant to control the refractory glaucoma though there was no improvement in vision. Two other cases of CRVO who presented to us at 3 months after onset had evidence of NVI. One of them with posterior segment evidence of neovascularisation underwent PRP while the other with vitreous haemorrhage was managed conservatively

Both cases of macular BRVO presented to us within 4 days of onset. Of the remaining 11 cases of BRVO that presented to us within a month, 3 cases had macular edema suggesting that in cases of macular involvement, patients tend to seek early medical advice.



Graph 9: Duration of Illness

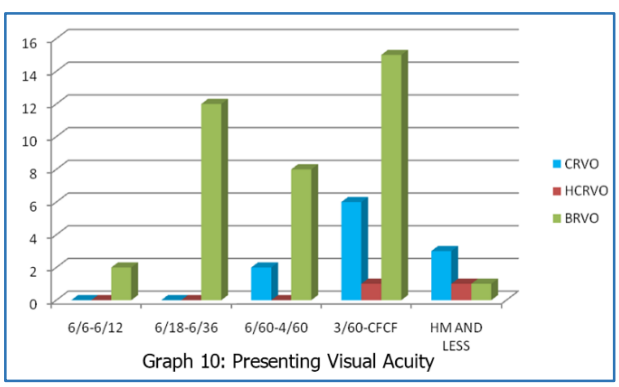
Visual Acuity	CRVO(11)	HCRVO(2)	BRVO(38)
6/6 – 6/12	0	0	2(5.26%)
6/18 – 6/36	0	0	12(31.57%)
6/60 – 4/60	2(18.18%)	0	8(21.06%)
3/60 – CFCF	6(54.54%)	1(50%)	15(39.47%)
HM and less	3(27.28%)	1(50%)	1(2.64%)
TABLE 12: (PRESENTING VISUAL ACUITY)			

Majority of patients with CRVO presented with grossly diminished vision below 3/60. This number amounted to almost 81% of the total CRVO cases. No patient of CRVO had vision over 6/60.

Both patients of HCRVO had macular oedema and hence presenting visual acuity was less than 3/60.

Of the 24 patients in the BRVO category who presented with vision less than 6/60, 9 patients were found to have CNP. Another 7 patients out of the same 24 had vitreous haemorrhage accounting for the gross visual loss. The remaining 8 patients who had similar visual loss were on investigation by FFA found to have either evidence of neovascularisation (6 pts) or CNP more than 5 DD (2pts).

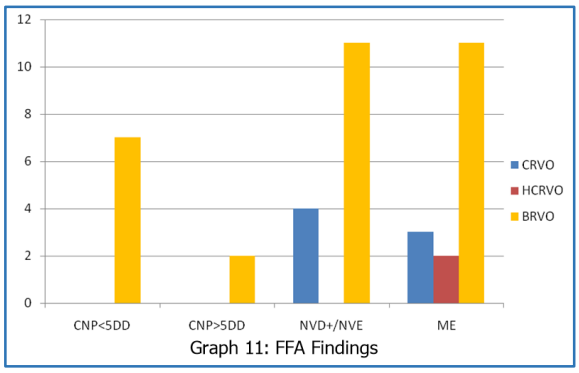
Of the 14 BRVO pts with fairly good vision of 6/36 or better, 50% (7 pts) had areas of CNP less than 5 DD.



Graph 10: Presenting Visual Acuity

	CNP<5DD	CNP>5DD	NVD+/-NVE	ME
CRVO	-	-	4	3
HCRVO	-	-		2
BRVO	7	2	11	11
Table 13: (FFA FINDINGS)				

In our study, of 38 cases of BRVO, 9 cases showed areas of capillary non-perfusion alone without any neovascularisation, two of which had CNP more than 5DD. 11 cases showed evidence of NVD/NVE, while 11 cases had macular oedema shown by late staining of macula. 3 cases showed both neovascularisation and macular oedema. All BRVO cases revealed the site of venous occlusion with dilatation of vein distal to the A-V crossing and late staining of the vessels. FFA was not done in 14 cases because of no view (due to vitreous haemorrhage). These cases subsequently underwent PPV with endolaser.



Graph 11: FFA Findings

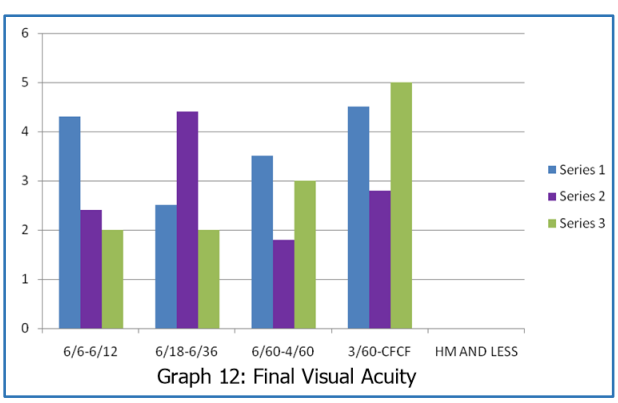
VISUAL ACUITY	CRVO (11)	HCRVO (2)	BRVO (38)
6/6 - 6/12	-	-	6(15.79 %)
6/18 - 6/36	-	-	12(31.58 %)
6/60 - 4/60	3(27.28 %)	2(100%)	7(18.42 %)
3/60 - CFCF	3(27.28 %)	-	11(28.95 %)
HM and less	5(45.45 %)	-	2(5.26%)

TABLE 14: (FINAL VISUAL ACUITY)

Final visual acuity in the CRVO group as expected was significantly less than that of BRVO group. Final visual acuity of all patients in the CRVO category was 6/60 or less while in the BRVO group around 47.5% cases had visual acuity better than 6/60. Only 4 cases of the CRVO group had marginal improvement of vision while the remaining 7 either remained stationary or deteriorated further. An interesting observation was that 3 of these 4 were the only cases in the CRVO group that underwent Grid laser while the remaining one case underwent Panretinal photocoagulation.

In the HCRVO group both cases had grid laser done with subsequential visual improvement while in the BRVO group, 11 cases had grid laser done.

Thus, in our study, among all RVO cases that underwent grid laser, the final visual acuity improved (13 of 16) or atleast remained stationary(3 cases of BRVO having macular oedema) but definitely did not deteriorate.



Graph 12: Final Visual Acuity

ISCHAEMIC CRVO GROUP (8 patients):

IMPROVEMENT OF VISION: Only one patient in this group had visual improvement from 2/60 to 4/60. This patient had NVD and NVE for which we had given him 3 sittings of PRP.

STATIONARY VISION: Five cases had their vision stationary at the end of the study period without improvement or deterioration. Of these, two cases with NVD/NVE underwent PRP alone and an incidental finding was that IOP in these two cases was elevated. One patient, a 27 yr old male having Eales disease was treated with a combination of steroid and PRP.

The remaining two cases that had static vision were the ones who had developed severe vitreous haemorrhage and secondary neovascular glaucoma. We did a PPV with EL for both cases. IOP was 56 and 69 mm of Hg respectively even after vitrectomy. Both patients had NVI and NVG and hence we performed an aqueous shunt procedure using Molteno implant to control the IOP. Inspite of these surgeries, vision remained at PL+ in both cases.

DETERIORATION OF VISION: One case had a vitreous haemorrhage and developed neovascularisation of iris as a complication. This case was managed surgically with PPV and EL, but vision dropped from CFCF to PL+. Finally there was one case of ischaemic CRVO, A 35 year old male without any risk factors who had presented to us with diminished vision in the right eye of 2 months duration. The patient had a vision of CFCF and was found to have a severe vitreous haemorrhage which had organized secondarily caused a tractional retinal detachment. We managed the patient with Pars Plana Vitrectomy, removal of tractional bands and endolaser photocoagulation but the vision dropped to HM.

VENOUS STASIS RETINOPATHY GROUP (3 patients): All these patients had macular oedema and were managed with grid laser. Vision improved by one line in the Snellen's chart in all three patients.

HCRVO GROUP (2 patients): In Both cases, known hypertensives with HCRVO had macular oedema and were managed with grid laser. Vision improved from HM to 4/60 in one patient and 3/60 to 6/60 in another patient.

BRVO GROUP (38 patients): Treatment of all patients was tailored to their requirement depending on clinical and FFA findings but a broad outline of the course of management is as follows:

- ME: Grid laser.
- NVD/NVE: Sectoral PRP.
- ME+NVE: Grid + Sectoral PRP.
- VITHGE: PPV + EL.
- CNP<5DD: Medical management.
- CNP>5DD: Sectoral PRP.

Variable results were found in this category and are described below:

STATIONARY VISION: In 12 of 38 cases (31.58%) vision remained the same. Three of these 12 cases had vitreous haemorrhage one of them being an Eales disease patient who was treated with steroids, PPV and EL. The remaining nine patients were treated with conventional medical management.

DETERIORATION OF VISION: Of the 4 patients in whom vision fell inspite of treatment, three had evidence of neovascularisation while the fourth had significant vitreous haemorrhage which could have been most probably due to underlying NV. This last patient was managed with PPV and EL while the remaining three had undergone sectoral PRP.

IMPROVEMENT OF VISION: The bulk however was formed by patients who had an improvement in their vision post treatment. This was 22 of 38 i.e. 57.9% of cases. This group included patients with multivariate presentation. The only two patients with FFA evidence of CNP>5DD had a good response to sectoral PRP; one patient improved from 4/60 to 6/36 while another from 6/60 to 6/24. Of the 22 patients in this improved vision category, six had undergone PPV and EL for vitreous haemorrhage.

SPECIFIC OBSERVATIONS IN BRVO GROUP: Two patients had Eales disease, one with vitreous haemorrhage which was managed with steroids, PPV and EL and the other with NV which was managed by steroids + sectoral PRP. The first one had vision stationary at HM but the second patient experienced a fall of vision from 3/60 to 2/60.[6]

Another observation that could be substantiated was that among BRVO cases, those presenting with an initial vision of 3/60 or worse (we called these patients poor vision BRVO cases) have a lesser chance of improvement of vision beyond 3/60. 75% of our 16 poor vision BRVOs remained at a final visual acuity of 3/60 or worse. Only 4 of these 16 cases improved beyond 3/60 and even these 25% did not get better than 6/60 irrespective of the type of treatment.[5]

Out of 11 CRVO cases, 2 developed NVG in addition to NVI. Both of them were treated with aqueous shunt procedures.

Another 2 patients had NVI alone in the absence of NV at the angle, though one of them had an IOP of 30 mm of Hg. Regarding NVG, Hayreh SS in his study has found that one third of patients with NVI do not go in for NVG. In our study, one half of patients with NVI did not develop NVG.

One patient had a TRD following massive vitreous haemorrhage and was managed by PPV with endolaser.

In the HCRVO cases both had Macular oedema which resolved following grid.

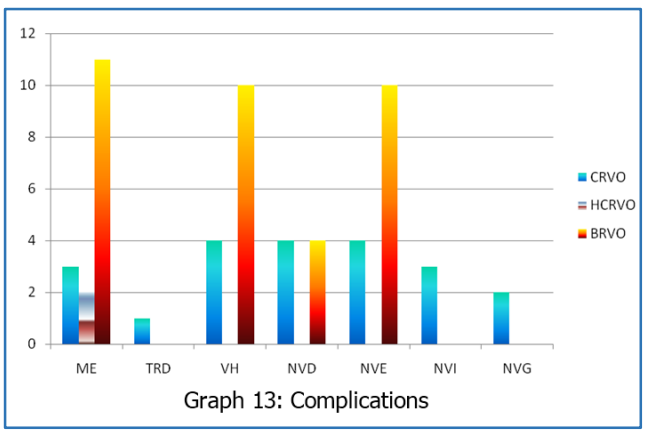
Among BRVO cases, macular oedema, vitreous haemorrhage and NVE was seen with almost equal frequency on an average in about 27% cases. In three cases ME and NVE co-existed while in another three cases NVD and NVE co-existed.NVD alone was seen in a single case only.

DISCUSSION: 51 episodes of unilateral Retinal Vein Occlutions (RVO) in 51 patients were studied in our series giving special consideration to high risk factors, results of vatious modalities of management and eventual complications including management of complications.We considered 11 eyes with CRVO, 2 with HCRVO and 38 cases with BRVO. Thus CRVO consisted of 21.5%, HCRVO 4% and BRVO 74.5% of the total RVO patients we studied. Mean age in the CRVO group was 50.2 years, HCRVO group was 53.2 years and in BRVO group was 51.5 years. Gender wise incidence for both CRVO and BRVO had slight male preponderance with approximately 55% and 58% incidence respectively. This is probably due to the relatively higher haematocrit in males.

Amongst BRVO cases Superotemporal occlusion was commonest (52.63%), 39.47% cases were inferotemporal, 2.63% were superonasal and 5.27% were macular BRVO. Amongst CRVO cases 45.45% were hypertensives, 9% were diabetic, 63.6% were hypermetropic. 45.45% patients had high serum cholesterol, 18% were IHD patients and one patient (9%) with Eales disease.In BRVO group of 38 patients 68.42% were hypertensives and 15.78% were diabetics. 71% were hypermetropes. Serum cholesterol was elevated in 26.32% and 7.89% were having IHD. 7.89% patients had Eales disease, 15.78% had a high IOP.82% cases CRVO and 100% cases of HCRVO presented with a visual acuity of less 3/60, while among BRVO cases this number was 42%.

FFA findings were as follows: 4 patients of CRVO had NVE/NVD while 3 patients had ME. Both HCRVO patients had ME. Among BRVO cases 7 had CNP <5 DD, 2 had CNP >5 DD, 11 had NVD/NVE while 11 had ME.Final visual acuity of all patients in the CRVO category was 6/60 or less, while in the BRVO group we had variable results. Around 47.5% cases had visual acuity better than 6/60. Results varied with PRP, medical management, use of steroids, PPV with EL etc. All patients having macular oedema and whom we treated with grid laser showed no deterioration.4 patients in the CRVO group developed Vitreous Hemmorhage (VH). 4 patients developed NVD, NVE and NVI. 3 patients had macula oedema (ME) while 2 had NVG managed with Molteno implant. One patient who developed Tractional Retinal Detachment (TRD) was treated with PPV and Endolaser. In the BRVO group 11 patients had ME, 10 each had VH and NVE, while 4 had NVD. Both patients of HCRVO had ME but did not have any other complication.For all patients presenting with VH, we went in for a PPV with EL. Results in this group was variable. Of the 4 CRVO patients with VH none responded favourably. 2 had a stationary vision at PL+ since they had associated NVG, while the other 2 experienced a worsening of vision due to complications like TRD and NVI. Among the 10 BRVO cases with VH, vision improved in six (60%),

remained stable in three (30%) and deteriorated only in a single patient.



Graph 13: Complications

CONCLUSIONS: Ischaemic CRVO has a low presenting visual acuity of less than 3/60 and a poor prognosis for vision as well. VSR on the other hand has an overall better presenting visual acuity and the macular oedema when managed with grid laser gives an improvement in visual acuity.

Reduced axial length and hypermetropiawere recognized as definite risk factors for RVO. Smaller eyes with overcrowding of vessels at the disc might make the CRV prone to occlusion.

Hypertension was proven to have a strong association with CRVO, definitely much stronger than diabetes. Also, hypertension formed a higher risk for BRVO (68.5%) in our study than CRVO(45.5%).

Slight male predominance was found in both CRVO and BRVO which could possibly be explained by the raised haematocrit value in males.[7]

Both CRVO and BRVO were commonly found in people above 40 years of age (72.72% and 92.1% respectively). In RVO patients with earlier age of onset, less than 30 years of age, we must look for Eales disease as an associated risk factor as found in 75% of our patients.

Serum cholesterol>200mg% was found to be a significant risk factor for RVO and patients may be benefitted by dietary changes and appropriate drug therapy.

FFA is an important diagnostic modality especially to find out areas of peripheral neovascularisation and ischaemic areas as suggested by capillary drop-outs which may be missed out on ophthalmoscopy and fundus photography. Hence it is a must in all RVO cases.

Among BRVO cases, significant vitreous haemorrhage precluding fundus view as a complication was seen much less in IT-BRVO than in ST-BRVO.

Regarding PPV with EL as a treatment modality for VH patients, it can be said to have a protective effect in BRVO patients at least in preventing further fall of vision (90% of our BRVO with VH). No such conclusion could be drawn in the CRVO group though.

In our study, all VSR type of CRVO and all RVO cases that showed macular oedema as a complication underwent grid laser and the final visual acuity improved (13 of 16) or at least remained stationary (3 cases of BRVO having macular oedema) but definitely did not deteriorate. Hence grid laser can be concluded to be a good modality of treatment with significant benefit to the patients.

However, laser photocoagulation, either panretinal as done in CRVO cases or sectoral as in BRVO cases cannot be said to have a consistently good response in terms of visual acuity.

In patients with good compliance and regular follow-up for one year, laser photocoagulation may be done only if NVE/VD develops.

But if follow-up is not guaranteed, we may go in for prophylactic photocoagulation in patients with significant ischaemia as suggested by widespread areas of capillary drop-outs.

Patients of BRVO with significant ischaemia presenting with initial vision of 3/60 or less (poor vision BRVO cases) are unlikely to improve beyond 3/60 as evidenced in 75% of our poor vision BRVO cases. Additionally they are very highly unlikely to improve beyond 6/60 even with grid laser or laser photocoagulation. None of our 16 poor vision BRVO patients improved to beyond 6/60while four patients (25%) improved to a vision of 4/60 to 6/60.

Due to the small number of HCRVO cases in our study, we could not assess the incidence of ischaemic HCRVO vs VSR-type HCRVO. Both our cases were VSR-type with macular oedema and responded significantly well to grid laser.[8]

Finally we would sum up our study by concluding that beware of three H's in RVO:

- Hypertension.
- Hypermetropia.
- Hypercholesterolemia.

In CRVO, final visual acuity is limited despite currently available treatment options.

The scenario for BRVO is different though, with variable results and a good chance for visual improvement if the patient presents with a moderately good visual acuity (better than 3/60).

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