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ASSESSMENT OF HAEMORRHAGE PATTERN WITH MACULAR PERFUSION STATUS IN RETINAL VEIN OCCLUSION: A CROSS SECTIONAL STUDY

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ABSTRACT **PURPOSE -** To study the association of haemorrhage pattern at posterior pole with macular perfusion status in reinal vein occlusion (RVO) patients.

METHOD - This observational cross-sectional study was carried out on 31 eyes of 30 patients diagnosed with retinal vein occlusion involving posterior pole. Fundus was examined and the presence of flame shaped/non flame shaped hemorrhage at posterior pole was noted. The eyes were categorized into two groups on the basis of macular perfusion status as: non perfused macula (group A) and perfused macula (group B) with fundus fluorescein angiography. Statistical analysis done by fisher's exact test.

RESULT - Out of all 31 eyes evaluated in the study, 17 eyes (54.84%) had macular ischemia whereas 14 (45.16%) eyes had no macular ischemia. In the group with eyes having macular ischemia, nonflame shaped hemorrhage was observed more commonly as compared to flame shaped hemorrhage at the posterior pole. This difference between both the groups was statistically significant (p=0.0113).

CONCLUSION – Non flame (dot & blot) shaped haemorrhage at posterior pole may be the one of the predictors of macular ischemia on fundus examination with some extent.

KEYWORDS : retinal vein occlusion, macular ischemia, flame shaped/non flame shaped hemorrhage

INTRODUCTION

There has been a substantial hike in improvement of visual prognosis of retinal vein occlusion (RVO) after the introduction of anti-vascular endothelial growth factor (VEGF) agents [1–4]. However, cases with inadequate recovery of visual functions where retinal ischemia occasionally involves the macular area are still encountered despite the use of aggressive anti-VEGF treatments.

The global impact of RVOs is significant with an estimated 16.4 million adults affected worldwide [5]. There are three types of RVO, which differ in location of occluded vessels that are: central retinal vein occlusion (CRVO); branch retinal vein occlusion (BRVO); and hemiretinal vein occlusion (hemi-RVO) which is an anatomical variant of CRVO.

Large population based studies have shown that the incidence of RVO over a 10 – 15 year period is 1.6 -2.3%,[6,7] a 15 year cumulative incidence of BRVO is 1.8% and CRVO is 0.5%.[6] The estimated prevalence of BRVO and CRVO is 4.42 and 0.8 per 1000 persons respectively.[5]

RVOs predominantly occurs in persons over the age of 65 years and affects both sexes equally, [8-10] and among older population there may be associated systemic vascular diseases, like hypertension and diabetes.

Macular ischemia is one of the common causes of visual loss in retinal vein occlusion. In spite of the fact that fluorescein angiography (FA) is an invasive investigation and requires intravenous injections of dye, it is still an essential tool for detection of morphologic and functional alterations of the retinal vasculature. [11-15]

Some studies have reported association between macular ischemia and nonflame shaped hemorrhage (dot or blot) in the macular area. [16]

In this study we wish to evaluate association between haemorrhage pattern and macular perfusion status which would be beneficial for hospital centre where fundus fluorescein angiography and optical coherence tomography are not available.

AIMS AND OBJECTIVE

To evaluate association of haemorrhage pattern at posterior pole with macular perfusion status in reinal vein occlusion patients.

METHOD

This observational cross-sectional study was carried out on 31 eyes of 30 patients diagnosed with retinal vein occlusion involving posterior pole in the Department of Ophthalmology, S.S. Medical College and associated Gandhi Memorial Hospital, Rewa (M.P.) during the period January 2019 to September, 2020.

Eyes with poor fluorescein angiography images (where fovea could not be visualized due to hazy media) and patients with macular edema caused by other etiologies were excluded from this study.

After taking written consent, a detailed clinical history was taken including the chief visual complaint, history of present illness, past medical and surgical history. Thorough ophthalmic examination including BCVA (best corrected visual acuity), IOP (intra ocular pressure), anterior segment examination, fundus examination and fundus fluorescein angiography were performed in each eye which were enrolled in the study. Fundus was examined with slit lamp bio-microscopy with +90 D lens and indirect ophthalmoscope and the presence of flame shaped/non flame shaped hemorrhage at posterior pole was noted.

The eyes were categorized into two groups on the basis of macular perfusion status as: non perfused macula (group A) and perfused macula (group B). Macular ischemia was considered to be present when- Foveal avascular zones (FAZs) ≥1000 µm, or broken perifoveal capillary rings at the borders of the FAZ or distinct areas of capillary nonperfusion within one disc diameter of the foveal center.[17]

Statistical Analysis Plan

The categorical data haemorrhage pattern which had been compared between 2 groups was analysed using fisher's exact test. P value less than 0.05 was considered statistically significant.

OBSERVATION AND RESULT-

A total of 30 patients were enrolled in the study which comprised 18 males and 12 females. The mean age of study subjects was 59.56 ± 8.16 years. Most of the patients (19) had BCVA ranging 6/60 to 6/18. In this study the eyes were divided into two groups, group A and group B. Group A included eyes which had macular ischemia and those with no macular ischemia were included in group B. Out of all 31 eyes evaluated in the study, 17 eyes (54.84%) had macular ischemia (figure 1) which were included in group A whereas 14 (45.16%) eyes had no macular ischemia (figure 2) and hence included in group B as depicted in table number one.

In the group with eyes having macular ischemia, nonflame shaped hemorrhage was observed more commonly as compared to flame shaped hemorrhage at the posterior pole. In contrast to this group, the group with eyes having no macular ischemia was associated with more

flame shaped hemorrhage as compared to nonflame shaped hemorrhage. This difference between both the groups was statistically significant (p=0.0113). (table no. 2)

Table- 1 Distribution Of Eyes According Macular Perfusion Status

GROUPS	NO. OF EYES (n=31)
GROUP A- Non perfused macula (MACULAR ISCHEMIA PRESENT)	**17(54.84%)**
GROUP B – Perfused macula (MACULAR ISCHEMIA ABSENT)	**14(45.16%)**
TOTAL	**31**

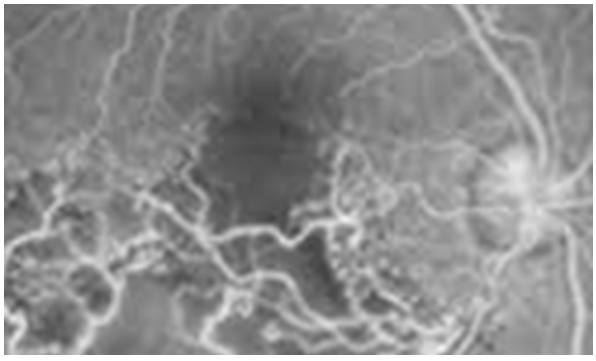

Figure 1 non perfused macula

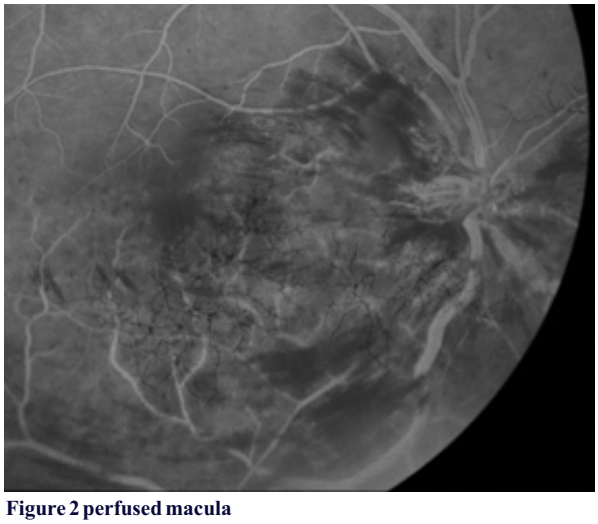

Figure 2 perfused macula

Table - 2 Hemorrhage Pattern Variations With Macular Perfusion Status

FUNDUS FINDINGS		GROUP A (Non perfused macula)	GROUP B (Perfused macula)	TOTAL
HEMORRHAGE PATTERN	FLAME SHAPED	**5 (16.13%)**	**11 (35.48%)**	**16 (51.61%)**
	NONFLAME SHAPED	**12 (38.71%)**	**3 (9.68%)**	**15 (48.39%)**
TOTAL		**17 (54.84%)**	**14 (45.16%)**	**31 (100%)**

DISCUSSION-

The most common vascular cause of unilateral visual impairment is retinal vein occlusion. Vision loss in retinal vein occlusion is contributed by macular edema, macular ischemia and hemorrhage.

In our study predominantly flame shaped hemorrhagic pattern was observed in 16 eyes (51.61%) and nonflame shaped hemorrhagic pattern in 15 eyes (48.39%). Out of 16 eyes having flame shaped hemorrhage, 11 eyes (68.75%) were noticed to have nonischemic macula. Of the 15 eyes with nonflame shaped hemorrhage, 12 eyes (80%) had ischemic macula. Statistically significant difference was found between both the groups (p=0.0113). The study done by **Muraoka Y et al(2016)(24)** also observed that eyes with flame shaped hemorrhage (67.2%) had nonischemic macula and eyes with nonflame shaped hemorrhage (32.8%) had predominantly ischemic macula (68.4% of nonflame shaped hemorrhage) and p value was strongly significant (p<0.001). This association of hemorrhagic pattern with macular perfusion status may be due to pathomorphological changes in the retinal nerve fiber layer (RNFL). The arrangement of retinal nerve fibers in a bundle shape in nonischemic macula, whereas disorganized retinal nerve fibers in ischemic macula.

Macular ischemia can be evaluated by fundus fluorescein angiography and optical coherence angiography but in developing countries like India many centre has not facilties of these expensive ancillary investigation. Through this study we can relate the haemorrhage pattern with macular ischemia in retinal vein occlusion which would be helpful for such peripheral centres to determine patients of reitinal vein occlusion which required early investigation and intensive management inspite of wait and watch. Because macular ischemia may lead to disruption of photoreceptor layer and permanent visual loss.

Small sample size and inter observer variation during assessment of macular ischemia and haemorrhage pattern are some limitations of our study.

CONCLUSION

Macular ischemia can be predict from non flame (dot & blot) shaped haemorrhage at posterior pole on fundus examination with some extent but this finding needs further investigation for confirmation. However, this could be an alert sign for macular ischemia.

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