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Original Research Article

Correlation Between Mean Platelet Volume and Retinal Vein Occlusion

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Abstract:

Background: Retinal vein occlusion (RVO) is one of the major causes of vision loss, resulting from the development of a thrombus within the retinal veins. Platelet activation is a key factor in this process, and mean platelet volume (MPV) serves as a recognized indicator of platelet activity.

Aim: To evaluate the correlation between mean platelet volume and retinal vein occlusion.

Materials and Methods: Eighty RVO patients from Mata Gujri Memorial Medical College & L.S.K Hospital in Kishanganj, Bihar, were enrolled in this prospective observational study over a 12-month period. MPV values were measured using an automated hematology analyzer and correlated with RVO subtypes.

Results: The mean MPV was significantly higher in RVO patients (11.8 ± 1.5 fL) compared to normal reference ranges. MPV was notably elevated in central retinal vein occlusion (12.3 ± 1.4 fL) compared to branch retinal vein occlusion (11.4 ± 1.3 fL). There was a favorable association found between elevated MPV and severity of RVO.

Conclusion: Elevated MPV is significantly associated with retinal vein occlusion and may reflect increased platelet activation contributing to its pathogenesis. MPV can be considered a useful marker for risk assessment in RVO patients.

Keywords: Platelet Activation, Mean Platelet Volume, Retinal Vein Occlusion, Thrombosis.

Introduction

A frequent vascular condition of the retina that contributes significantly to visual loss is retinal vein occlusion (RVO) worldwide, especially among the elderly population [1]. It occurs due to the leading to impaired venous drainage, obstruction of retinal veins, retinal ischemia, and subsequent vision impairment [2]. Systemic disorders include hypertension, diabetes mellitus, hyperlipidemia, and hematological abnormalities are all part of the multifactorial pathophysiology of RVO. Among hematological parameters, platelet indices have gained attention for their potential role in thrombotic events [3].

The average size of the platelets in the blood is shown by the mean platelet volume (MPV) and serves as an indirect marker of platelet activation and function. Larger platelets are more reactive, contain denser granules, and have a higher thrombotic potential compared to smaller platelets. Elevated MPV levels have been associated with various vascular and thrombotic diseases, including myocardial infarction, stroke, and deep vein thrombosis [4,5].

Recent studies suggest a possible correlation between increased MPV and the occurrence of retinal vein occlusion, implicating platelet activation in the disease's pathophysiology. Understanding the relationship between MPV and RVO could help in identifying individuals at risk and guide therapeutic interventions to prevent vision-threatening complications [6,7].

To evaluate the correlation between MPV and the occurrence of RVO in affected patients.

Materials and Methods

Study Design and Place: Eighty RVO patients from Mata Gujri Memorial Medical College & L.S.K Hospital in Kishanganj, Bihar, were enrolled

in this prospective observational study over a 12-month period.

Study Duration: The study was conducted from [start month/year] to [end month/year], covering a total duration of 12 months.

Study Population: A total of 80 patients diagnosed with retinal vein occlusion (RVO) were enrolled in the study.

Inclusion Criteria:

- Patients diagnosed clinically and confirmed by fundoscopy or fundus fluorescein angiography as having retinal vein occlusion (central or branch RVO).
- Patients of both sexes aged 18 years and above.

Exclusion Criteria:

- Patients with other retinal vascular diseases.
- Patients on antiplatelet or anticoagulant therapy.
- Patients with hematological disorders affecting platelet indices.
- Patients with recent history of infection, surgery, or trauma.

Data Collection: Detailed demographic and clinical data were recorded for all patients. Blood samples were collected under aseptic conditions for complete blood count analysis, including mean platelet volume (MPV), using an automated hematology analyzer. MPV values were compared with standard reference ranges and correlated with the clinical severity of RVO.

Statistical Analysis: Data were analyzed using appropriate statistical software. The correlation between MPV and RVO was assessed using Pearson's correlation coefficient. A p-value of <0.05 was considered statistically significant.

Results

The study comprised eighty patients with retinal vein occlusion (RVO). There were 52 (65%) male patients and 28 (35%) female patients, with a mean age of 58.4 ± 10.2 years. Thirty patients (37.5%) had central retinal vein occlusion (CRVO), and fifty patients (62.5%) had branch retinal vein occlusion (BRVO).

Patients with RVO had a significantly higher mean platelet volume (MPV) than those in the normal reference range (8.0–11.0 fL). The mean MPV was 11.8 ± 1.5 fL overall. The mean MPV was statistically significant ($p = 0.02$) for CRVO patients (12.3 ± 1.4 fL) when compared to BRVO patients (11.4 ± 1.3 fL) when subtypes were compared.

Higher MPV values were linked to more extensive retinal involvement and worse visual acuity, and there was a positive correlation seen between raised MPV and the degree of retinal vein obstruction. However, there was no statistically significant change in the platelet count between the CRVO and BRVO groups ($p = 0.45$), suggesting that platelet size, not platelet number, may be more important in the pathophysiology of RVO.

Parameter	BRVO (n=50)	CRVO (n=30)	p-value
Mean Age (years)	57.2 ± 9.8	60.1 ± 10.7	0.18
Male: Female ratio	32:18	20:10	0.67
Mean Platelet Volume (fL)	11.4 ± 1.3	12.3 ± 1.4	0.02*
Platelet Count (×10^3/μL)	220 ± 45	230 ± 50	0.45

*Statistically significant ($p < 0.05$)

Discussion

RVO and elevated MPV were found to be significantly correlated in this study. Patients with CRVO had higher MPV values than those with BRVO. According to the findings, a key role in the pathophysiology of RVO may be played by enhanced platelet activation, which is reflected in bigger platelet size. Elevated MPV in RVO patients has been documented in similar investigations.

Kurtul et al. found that patients with RVO had noticeably higher MPV levels than controls, which is consistent with the theory that platelet activation plays a role in retinal vein thrombosis. In line with our findings, Yılmaz et al. similarly discovered higher MPV levels in RVO cases, with a larger correlation in CRVO than BRVO. The idea that MPV can be a helpful haematological measure for identifying patients at risk for RVO is supported by this research [8,9].

Platelet hyperactivity can cause thrombus formation in the retinal veins, which is part of the pathophysiology of RVO. Because they contain more thromboxane A2 and have denser granules, larger platelets have a higher prothrombotic potential and can aid in the formation of clots. Therefore, elevated MPV could be a sign of an increased thrombotic condition that is causing venous occlusion in the retina [10]. Nevertheless, some research has produced contradictory findings. Because of variations in study design, sample size, or demographic factors, Kaya et al. could not find a significant difference in MPV between RVO patients and controls. This emphasises the necessity

of more extensive, multifaceted research to elucidate MPV's function [11,12].

The current study contains a number of shortcomings. First, because of the small sample size, the results might not be as widely relevant as they could be. Second, the patient population's diversity was limited because the study was only carried out at one location. Third, potential confounding factors such as systemic disorders (e.g., diabetes, hypertension) that can influence MPV were not extensively controlled. Finally, consistency may be impacted by variations in MPV levels among various haematology analysers and sample handling.

To confirm the results, larger, multicenter cohorts with matched controls should be a part of future research. Examining the long-term variations in MPV before and during RVO treatment may shed light on its predictive significance [13]. Additionally, investigating the combined effect of MPV with other platelet activation indicators and systemic risk variables may improve risk categorisation and therapeutic approaches. Therapeutically focusing on platelet activation may help lower the frequency and severity of RVO [14].

Conclusion

Particularly in patients with central retinal vein occlusion, this study shows a strong correlation between increased MPV and RVO. According to the results, elevated thrombotic activity caused by platelet activation, as indicated by larger MPV, may have a role in the pathophysiology of RVO. MPV may be a practical, affordable biomarker for determining which patients are at risk and directing early intervention tactics. To further validate these findings and investigate the possible role of antiplatelet therapies in the management of RVO, larger multicentric studies are required.

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