IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 24, Issue 7 Ser.1 (July 2025), PP 28-31
www.iosrjournals.org

A comparative analysis of retinal vascular occlusions before and during the covid – 19 pandemic – a retrospective observational study

Dr. Chitra Sunov[1], Dr. Deepa Ajitkumar[2], Dr. Jaydeep Nayse[3]
[1](Department of Ophthalmology, L N Hospital and Research Centre, C.G. India)
[2](Department of Ophthalmology, N. K.P Salve Institute of Medical Sciences and Research Centre. Nagpur, India)
[3](Department of Community Medicine, N. K.P Salve Institute of Medical Sciences and Research Centre. Nagpur, India

Abstract:
Background*: This study aims to compare the incidence of retinal vascular occlusions, before and during the pandemic at a tertiary care hospital*
Materials and Methods*: A retrospective, record based, observational study of all newly diagnosed cases of vascular occlusions was conducted for a period of four years between May 2018 and April 2022 of a Tertiary Care Center. The study period was divided into two phases – the pre-COVID period (May 2018 - April 2020) and the Pandemic period (May 2020 - April 2022). The study analyzed the demography, changes in incidence and visual prognosis of the patients*
Results*: In our study the incidence of all Retinal vascular occlusions (RVO) increased significantly during the pandemic period (P=0.00095). The chi-square test shows a P value of <0.0001and OR of 8.75 showing a high risk of vascular occlusions with COVID.*
Key Word*: Covid-19, Pandemic, Retinal vascular occlusions, central retinal vein occlusion, visual prognosis, hypercoagulability*

Date of Submission: 20-06-2025 Date of Acceptance: 03-07-2025

I. Introduction

COVID-19, was declared a pandemic on 11th March 2020.[1] Its manifestations were acute respiratory distress syndrome, cardiac, renal complications, and multiple organ failure. Additionally, hypercoagulability resulted in venous thrombosis, pulmonary embolism, and strokes in these patients.[2] Retinal vessel occlusion is vision threatening condition with similar risk factors and pathogenesis to ischemic stroke,[3] suggesting a possible link between vascular occlusions and SARS Cov-2.[4,5] To the best of our knowledge few studies have compared and analysed the incidence of retinal vascular occlusion during this period. This highlights the need for further research to understand changes in occurrence and contributing factors.

II. Material And Methods

After approval from the institutional ethical committee, a hospital based, retrospective, observational study was done in the department of Ophthalmology. The data registry of outpatient department was analysed and all cases of vascular occlusion were noted. Patients belonging to all age groups were included. Patients with diagnosis of anterior ischemic optic neuropathy and those who did not come for follow-up were excluded. All the patients were divided according to the time period of admission. Group A (Pre covid – January 2018 to March 2020) and Group B (April 2020 to June 2022). Data collected from all patients included demographic data, systemic and personal history and detailed ocular examination, Additional history of Covid infection and the time lapse between diagnosis of covid and onset of symptoms was also noted for each patient. Data of ocular examination noted which included, best corrected visual acuity (BCVA), the findings of dilated fundus examination, type of vascular occlusion, treatment given and final BCVA at the end of 3 months for each patient.

The results of investigations conducted to rule out systemic diseases, such as hypertension, diabetes mellitus, hypercholesterolemia, atherosclerotic diseases, thrombotic disorders were documented for all patients. Ocular investigations analysed were, fundus fluorescein angiography (FFA) and Optical Coherence Tomography (OCT).

The collected data was entered in a master chart, then analyzed, tabulated and results were drawn. Statistical analysis was performed using openepi[TM] calculator with a significance level of P<0.05 .The findings were presented in percentage form for clarity and comparison.

III. Result

In the present study records of 150 patients attending retina clinic for sudden diminution of vision was analyzed. A total of 128 patients fulfilling eligibility criteria were identified for study. They were divided into 2 groups according to the timeperiod. Group A had forty-two patients and Group B had eighty-six new patients diagnosed with retinal vascular occlusions. The age distribution of patients is shown in table 1.

Table 1: Distribution of patients according to Age

AGE (in years)	Group A	Group B
>70	12	19
60-69	11	19
50-59	12	24
40-49	7	19
30-39	0	4
20-29	0	1

The gender distribution was 23 males and 19 females in Group A, while it was 49 males and 37 females in Group B. In Group A right eye was involved in 23 patients and left eye in 19 patients, similarly in Group B right eye involvement was seen in 47 and left eye in 39 cases.

On analysis of the records, systemic comorbidities found in Group A was 95%(n=40) cases and in group B it was 62% (n=54). We further analyzed the history of covid infection and co-morbidities in Group B and the result is shown in Table 2. On application of chi-square test to this data the P value is <0.0001(HS) and the odds ratio 8.75, which shows a highly significant relation between covid and vascular occlusion.

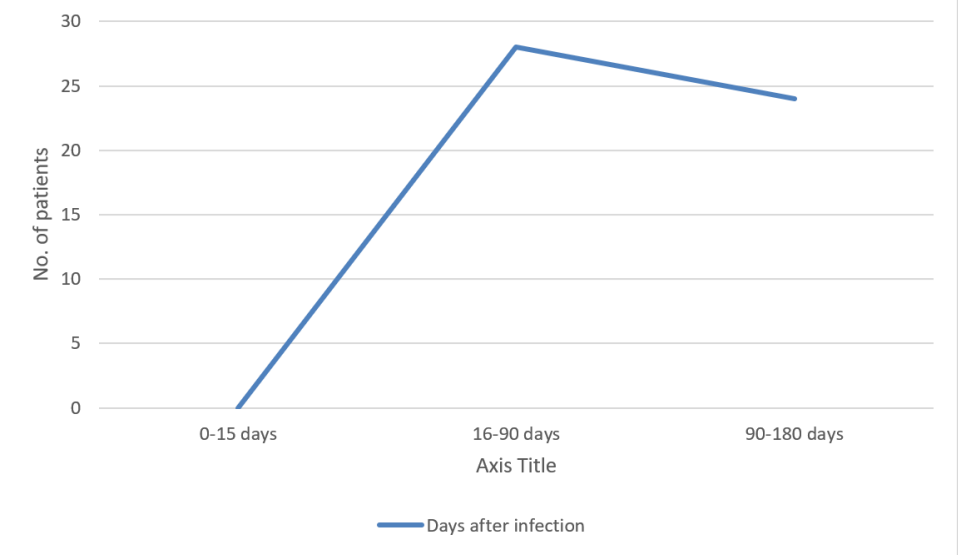
Table 2: Relation between history of Covid and co-morbidities in patients with vascular occlusions

	No. of patients with comorbidities	No. of patients without comorbidities	total
No H/O covid	30	4	34
H/O covid	24	28	52
Total	54	32	86

Chi square=15.58 p<0.0001 OR=8.75

Patients visited the retina clinic following diminution of vision after their COVID-19 infection. The time elapsed between the COVID-19 diagnosis and the onset of vision deterioration was also analyzed. Figure 1. shows that the earliest symptom of decreased vision was seen after 15 days of infection. The decrease in vision as seen in 53%(n=28) patients were between 15 days and 3 months, while in 47% (n= 24) patients it was between 3 months to 6 months.

Figure 1: Duration of time between covid-19 and diminution of vision



The vascular occlusions were divided according to the vessel affected as shown in Table 3.

Table 3: Type of vascular occlusion pre and post -Covid

Types of occlusions	Retinal Artery Occlusion		Retinal Vein Occlusion	
	Group A n(%) (N=5)	Group B n(%) (N=13)	Group A n(%) (N=37)	Group B n(%) (N=73)
Central	2(40)	5(36)	12(32)	19(26)
Branch	2(40)	6(49)	19(51)	43(58)
Cilio retinal artery occlusion	1(20)	2(14)		
Hemi retinal vein occlusion			6(16)	11(15)

The visual acuity at presentation in these patients were recorded and analyzed in table 4

Table 4: Visual acuity at presentation in patients with retinal vascular occlusion

Visual acuity	Retinal Artery occlusion		Retinal vein occlusion	
	Group A	Group B	Group A	Group B
≥20/50	1	0	9	13
20/50-20/200	2	7	15	36
<20/200	2	6	8	22
PL			5	2

All patients were treated and visual recovery at the end of three months were recorded. The results were analyzed according to the vessels affected as shown in Table 5.

Table 5. Visual recovery in retinal vascular occlusions

	With comorbidities(N=24)		Without comorbidities(N=28)	
	Retinal Artery Occlusion	Retinal Vein Occlusion	Retinal Artery Occlusion	Retinal Vein Occlusion
>=20/50	0	11	0	19
20/50-20/200	1	8	2	5
<20/200	3	1	1	1

IV. Discussion

SARs-CoV-2 caused inflammation and release of cytokines which led to coagulation disorder and thromboembolic phenomenon seen in patients during the Pandemic.[4] This inflammation whether directly caused by the virus or as a systemic reaction to it, caused vascular occlusive events seen during this period.[5] The number of patients with retinal vascular events increased significantly from 42 to 86 (P=0.00095) during the pandemic period. Similar results were also seen in study by Al-Moujahed et al.[6]

The average age was 62.06 in group A and 58.18 in group B (P=0.4562) which was not significant, but a few of the patients had vascular occlusion earlier than the normal average. This was different from Shiroma et al. [7]who found the average age of 47.97 during the pandemic. Gender and laterality of eye were not significantly different in either group, which was same as found by Al-Moujahed et al. [6]. History of Covid -19 infection was found in a significant (P =0.014) number of patients in Group B, similar to the finding by Xing et.al. and others.[8-11] The percentage of increase in new cases of arterial and venous occlusion were same during the pandemic period, with p value for arterial occlusions being 0.85 and that for venous occlusion was 0.59 which was not significant. The difference in visual acuity at presentation for patients of group A and group B with visual acuity > 20/50 was P= 0.25, patients with presenting Visual acuity 20/50 -20/200 was P=0.31 while Visual acuity with <20/200 was P=0.20 which were not significant. This was similar to the study by Al-Moujahed et al. [6]

V. Conclusion

There was an overall increase in patients with retinal vascular occlusions during the pandemic. The number of patients having vascular occlusions without any co-morbidities were higher during covid period. The study shows that venous occlusions were more than arterial occlusions. The visual recovery was better in patients without any co-morbidities compared to patients who had diabetes, hypertension and other co-morbidities along with covid -19.

VI. Limitations

The study was limited to patients presenting in the OPD. Incidence may be underestimated as patients who had severe covid 19 illness, who were not stable enough to be seen in OPD were not included. The covid vaccination status and its impact was not identified and also patients with asymptomatic vascular injury signs could not be detected.

References

[1]. Huang C, Wang Y, Li X, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *The Lancet*. 2020;395(10223):497-506. doi:https://doi.org/10.1016/s0140-6736(20)30183-5

[2]. Lu R, Zhao X, Li J, et al. Genomic characterisation and epidemiology of 2019 novel coronavirus: implications for virus origins and receptor binding. *Lancet*. 2020;395(10224):565-574. doi:10.1016/S0140-6736(20)30251-8

[3]. Singhal T. A Review of Coronavirus Disease-2019 (COVID-19). *Indian J Pediatr*. 2020;87(4):281-286. doi:10.1007/s12098-020-03263-6.

[4]. Vinayagam S, Sattu K. SARS-CoV-2 and coagulation disorders in different organs. *Life Sci*. 2020;260:118431. doi:10.1016/j.lfs.2020.118431.

[5]. Sen M, Honavar SG, Sharma N, Sachdev MS. COVID-19 and Eye: A Review of Ophthalmic Manifestations of COVID-19. *Indian J Ophthalmol*. 2021;69(3):488-509. doi:10.4103/ijo.IJO_297_21

[6]. Al-Moujahed A, Boucher N, Fernando R, et al. Incidence of Retinal Artery and Vein Occlusions During the COVID-19 Pandemic. *Ophthalmic Surg Lasers Imaging Retina*. 2022;53(1):22-30. doi:10.3928/23258160-20211209-01

[7]. Shiroma HF, Lima LH, Shiroma YB, et al. Retinal vascular occlusion in patients with the Covid-19 virus. *Int J Retina Vitreous*. 2022;8(1):45. Published 2022 Jun 23. doi:10.1186/s40942-022-00371-7

[8]. Li JX, Wei JC, Wang YH, Bair H, Hsu SB, Lin CJ. RETINAL VASCULAR OCCLUSION AND COVID-19 DIAGNOSIS: A Multicenter Population-Based Study. *Retina*. 2024;44(2):345-352. doi:10.1097/IAE.0000000000003952

[9]. Park HS, Lee NK, Lee CS, et al. Retinal Artery and Vein Occlusion Risks after Coronavirus Disease 2019 or Coronavirus Disease 2019 Vaccination. *Ophthalmology*. 2024;131(3):322-332. doi:10.1016/j.ophtha.2023.09.019

[10]. Yeo S, Kim H, Lee J, Yi J, Chung YR. Retinal vascular occlusions in COVID-19 infection and vaccination: a literature review. *Graefes Arch Clin Exp Ophthalmol*. 2023;261(7):1793-1808. doi:10.1007/s00417-022-05953-7

[11]. Modjtahedi BS, Do D, Luong TQ, Shaw J. Changes in the Incidence of Retinal Vascular Occlusions After COVID-19 Diagnosis. *JAMA Ophthalmol*. 2022;140(5):523-527. doi:10.1001/jamaophthalmol.2022.0632