



FREQUENCY AND RISK FACTORS OF EPIRETINAL MEMBRANE ON OCT IN VITRECTOMIZED EYES

Dr Faiza Mushtaque^{1*}, Dr Zaheer Sultan², Prof Nisar Siyal³, Dr Fizzah Farooq⁴,
Prof Mazhar Ul Hasan⁵, Dr Faiz Ur Rab⁶

^{1*}Senior Medical Officer, Department Of Ophthalmology And Visual Sciences, Dr Ruth KM Pfau Civil Hospital, Karachi

²Assistant Professor, Department Of Ophthalmology, Liaquat National Hospital, Karachi

³Professor Of Ophthalmology, OJHA Institute, Dow University Of Health Sciences, Karachi

⁴Women Medical Officer, Department Of Ophthalmology And Visual Sciences, Dr Ruth KM Pfau Civil Hospital, Karachi

⁵Professor, Department Of Ophthalmology And Visual Sciences, Dr Ruth KM Pfau Civil Hospital And Dow University Of Health Sciences, Karachi

⁶Associate Professor, Department Of Ophthalmology And Visual Sciences, Dr Ruth KM Pfau Civil Hospital And Dow University Of Health Sciences, Karachi

***Corresponding Author:** Dr Faiza Mushtaque

^{*}Senior Medical Officer, Department of Ophthalmology and Visual Sciences, Dr Ruth KM Pfau Civil Hospital, Karachi

ABSTRACT

Objective: to assess the frequency of Epiretinal Membrane (ERM) after vitrectomy and identify associated risk factors using Optical Coherence Tomography (OCT).

Methodology: This cross-sectional observational study was conducted at Ophthalmology department and Visual Sciences, Dr. Ruth K. M. Pfau Civil Hospital, Karachi from February 2023 to July 2023. Patients aged 15 years and older who had undergone vitrectomy were included in the study. Baseline ophthalmologic assessments were conducted, including visual acuity, refraction, slit-lamp biomicroscopy, and fundoscopy. Post-operative OCT findings were analyzed to confirm ERM development at a single follow-up three months post-vitrectomy to assess ERM formation. ERM was classified based on the presence or absence of posterior vitreous detachment (PVD) and retinal traction.

Results: A total of 82 patients underwent vitrectomy, and 36.6% developed ERM postoperatively. Age, gender, and eye site were not significant risk factors ($p > 0.05$). Laser therapy significantly increased ERM risk ($OR = 4.3$, $p = 0.001$), while patients who underwent vitrectomy combine with cataract surgery were 5.675 times more likely to develop ERM ($p = 0.007$). Silicone oil tamponade showed a borderline association ($p = 0.054$), whereas Cryotherapy, perfluorocarbon liquid (PFCL), and gas tamponade were not significant ($p > 0.05$).

Conclusion: ERM was observed among 36.6% patients after vitrectomy, with certain factors having a stronger influence, like laser therapy emerged as the most significant risk factor, increasing the likelihood of ERM formation by 4.3 times. Silicone oil tamponade and vitrectomy with cataract surgery also showed a potential association with higher ERM risk.

Key words: Vitrectomy, OCT, ERM, Frequency, Risk factors, Macula; Retina

INTRODUCTION

ERM is a fibro-cellular proliferation occurring on the inner surface of the retina, mostly at the macula, which may produce visual disturbances like metamorphopsia and decreased visual acuity.¹ However, the availability of optical coherence tomography “OCT”, which has become a vital tool in clinical practice, has markedly improved the diagnosis and classification of ERMs, allowing for even more precise cross-sectional assessment of retinal anatomy.² ERMs may be idiopathic or they may arise as secondary to ocular pathologies such as diabetic retinopathy, retinal detachment or vitreoretinal interface disorders.³ Vitrectomy, a common surgical technique for removing vitreous gel in patients with retinal issues, is frequently implicated in postoperative development of ERM—potentially impacting visual recovery.⁴

Prevalence of ERM development after vitrectomy is consistent among numerous studies, but varies based on surgical technique, underlying retinal disease and postoperative management. According to a study 2.4% of patients underwent ERM surgery following pars plana vitrectomy “PPV” for hematogenous retinal detachment with a mean time interval of 19.5 months from initial PPV to ERM surgery performed.⁵ Another study, found the higher incidence of ERM formation with 12.1% of the eyes developing ERMs within one year after PPV for RRD; 76.9% of the cases occurred within the first three months after surgery.⁶ These results emphasize the importance of not only continuous follow-up of patients after surgery but also how standardized diagnostic criteria are essential for accurate estimation of ERM prevalence following vitrectomy.

It is important to identify risk factors for the development of ERM after vitrectomy, so that we can optimize surgical outcomes and counsel patients. Various patient-related and surgical factors associated with the development of postoperative ERM have been reported. However, it has been associated with increased risk of ERM formation after vitrectomy. It suggested that postoperative ERMs were significantly more likely to develop when there was preoperative PVR, attributed to residual vitreous cell proliferation and inflammatory mediators.⁷ Patients with diabetes mellitus, particularly type 2, are at increased risk of developing an ERM as a result of chronic micro-vascular alterations and ongoing intraocular inflammation.⁸ Excessive intraoperative laser photocoagulation has been associated with the development of ERM, and increased laser energy causes retinal pigment epithelial cell dispersion and response of the inflammation.⁹ It has been found that prolonged SOT during vitrectomy leads to greater rates of ERM formation. Retention of silicone oil within the eye for prolonged periods can be associated with inflammatory responses and proliferation of the fibrocellular tissues.¹⁰ Replacing a decision to peel the internal limiting membrane, as well as instruments for surgery strongly influences on ERM. Studies indicate less trauma and inflammation in the retina with smaller-gauge instruments, and ILM peeling may lead to a lower incidence of ERM by removing a scaffold required for proliferation of the cells.¹¹

Knowledge of risk factors for ERM formation after vitrectomy is critical in the attempt to improve intraoperative technique and postoperative outcome. A distinct suggestion has been shown that, in meticulous surgical planning, minimizing manipulation of retina and with the available of small gauge instruments, peeling ILM may still reduce the postoperative ERM.^{12,13} In addition, the identification of patients with functional risk factors preoperatively, such as PVR or diabetes mellitus, can guide surgical strategy tailored to the individual and more intense postoperative monitoring. The recent developments in OCT imaging as well as automated analysis tools could further allow for early detection and management of ERMs, thus improving visual rehabilitation on patients after vitrectomy. Although some literature exists on postoperative ERM, reported prevalence and risk factors vary, highlighting the need for further investigation. Novel technologies in OCT can enhance the precision of ERM detection, also including subclinical disease that may not involve outward clinical manifestation. Recent studies on the prevalence and risk factors for developing ERM following vitrectomy are necessary to guide surgical approaches and postoperative management, as they may lead to visual improvement in these patients.

MATERIAL AND METHODS

A cross-sectional observational study was conducted at the Department of Ophthalmology and Visual Sciences, Dr. Ruth K. M. Pfau Civil Hospital, Karachi, and the SMBB Trauma Center, Dow University of Health Sciences, Karachi. The study period extended from February 2023 to July 2023. Ethical approval for the study was obtained from the Institutional Review Board (IRB) of Dow University of Health Sciences (IRB-/DUHS/Approval/2022/1081). All participants provided written informed consent before enrollment, and confidentiality of patient data was strictly maintained throughout the research process. All the patients aged 15 years or older, both genders, who underwent vitrectomy and provided informed consent. Patients with preoperative ERM, prior intraocular surgeries (e.g., cataract or glaucoma surgery), or a history of intraocular inflammatory conditions (e.g., uveitis) were excluded. Non-probability consecutive sampling technique was applied. The sample size for this study was determined using the Epi Info sample size calculator. Based on findings from previous studies, the prevalence of ERM in vitrectomized eyes was estimated to be approximately 7.6%⁹. To achieve a 95% confidence level with a margin of error of 5%, the minimum sample size required was calculated as 82 participants. At the time of enrollment, all participants underwent a detailed ophthalmologic examination, which included assessments of visual acuity, refraction, slit-lamp biomicroscopy, and fundoscopy. Preoperative OCT imaging was performed to thoroughly evaluate the retinal layers and confirm the absence of pre-existing ERM. To maintain objectivity, the OCT scans were interpreted by a single experienced ophthalmologist who was unaware of the patients' demographics and clinical history. Predictor variables were collected to assess potential risk factors associated with ERM formation. ERM was assessed through OCT imaging at a single follow-up three months post-vitrectomy. Based on OCT findings, ERM was classified using a standardized grading system that categorizes ERM according to the presence or absence of posterior vitreous detachment (PVD). Statistical analysis was performed using SPSS software, version 26. Descriptive statistics were applied to summarize the demographic and clinical characteristics of the study population. Continuous variables, such as age computed as means and standard deviations, while categorical variables, including ERM frequency and its related risks factors were presented as frequencies and percentages. Logistic regression analysis was employed to examine associations between predictor variables and ERM formation based on $p < 0.05$ as statistically significant.

RESULTS

According to the demographic characteristics of the patients with and without Epiretinal Membrane (ERM), the mean age was slightly lower in the ERM group (53.60 ± 7.60 years) compared to the non-ERM group (54.85 ± 6.90 years) ($p = 0.409$). On the gender distribution males were more prevalent in both groups, with 76.7% in the ERM group and 62.2% in the non-ERM group. On the site of the affected eye, the slightly more ERM cases were observed in the left eye (53.3%) compared to the right (46.7%). Etiological basis of vitrectomy, Diabetes Mellitus was the most common cause in 40% of ERM cases, followed by Rhegmatogenous Retinal Detachment (36.7%). Other causes included Vitreous Hemorrhage (13.3%), Endophthalmitis (3.3%), Trauma (3.3%), and Vitritis (3.3%). However, the differences in vitrectomy indications were not statistically significant ($p = 0.787$) between the groups.

Table:1 Baseline and clinical statistics of the patients with and without ERM n=112

Variables		ERM		Total	p-value
		Yes (n=30)	No (n=82)		
Age (mean +SD)		53.60+7.60	54.85+6.90	54.51+7.08	0.409
Gender	Male	23	51	74	0.152
		76.7%	62.2%	66.1%	
	Female	7	31	38	
		23.3%	37.8%	33.9%	
	Right	14	48	62	

Site of eye		46.7%	58.5%	55.4%	0.263
	Left	16	34	50	
		53.3%	41.5%	44.6%	
Etiology of vitrectomy	Diabetes Mellitus	12	24	36	0.787
		40.0%	29.3%	32.1%	
	Endophthalmitis	1	2	3	
		3.3%	2.4%	2.7%	
	Intraocular Lens Drop	0	4	4	
		0.0%	4.9%	3.6%	
	Nucleus Drop	0	4	4	
		0.0%	4.9%	3.6%	
	Rhegmatogenous retinal detachment	11	29	40	
		36.7%	35.4%	35.7%	
	Trauma + Intra ocular foreign body	1	4	5	
		3.3%	4.9%	4.5%	
	Vitreous Hemorrhage due to vein occlusion	4	12	16	
		13.3%	14.6%	14.3%	
	Vitritis	1	3	4	
		3.3%	3.7%	3.6%	

Frequency of ERM was observed 26.80% as shown in fig: 1

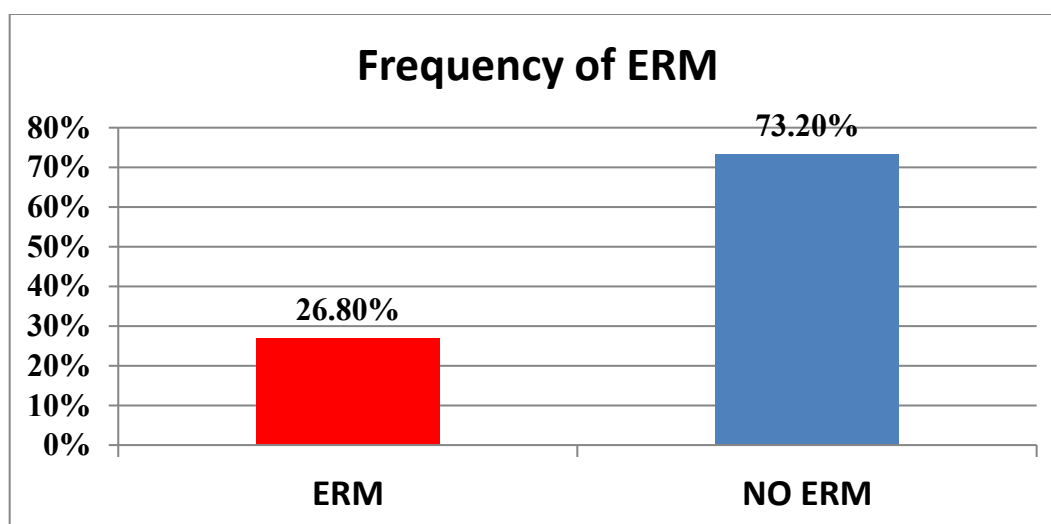


Fig: 1. Frequency of ERM n=112

The logistic regression analysis identified key risk factors associated with Epiretinal Membrane (ERM) development. Laser therapy was found to be the strongest predictor, significantly increasing the risk of ERM by 4.3 times ($p = 0.001$). Silicone oil tamponade also showed a potential increase in ERM risk, with patients being 4.76 times more likely to develop ERM; however, this result was on the borderline of statistical significance ($p = 0.054$).

Other factors, including gender, eye site, use of perfluorocarbon liquid (PFCL), gas tamponade, and cryotherapy, did not show statistically significant associations with ERM risk. While males appeared to have a lower likelihood of ERM ($OR = 0.506$), and the right eye showed a slightly higher risk ($OR = 1.59$), these findings were not statistically significant. Cryotherapy and PFCL use also showed some association with ERM but did not reach significance. Additionally the vitrectomy combine with cataract surgery significantly increases the risk of ERM development, as the patients who underwent vitrectomy combine with cataract surgery were 5.675 times more likely to develop ERM ($p = 0.007$). Table.2

Table.2 Risk Factors associated with to ERM n=82

Independent variables	B	S.E of B	p-value	Exp(B) (Odds ratio)	95% CL (upper – Lower)		
Gender (male)	-.680	0.490	.680	0.165	0.506	0.194	
Site (Right)	0.464	0.433	0.283	1.591	0.681	3.718	
Vitrectomy with cataract surgery (Yes)	1.736	.640	0.007	5.675	1.618	19.907	
Use of PFCL	.369	.447	.409	1.446	.602	3.476	
Tamponading agent	GAS	.230	.881	.794	1.258	.224	7.071
	Silicon oil	1.562	.810	.054	4.767	.975	23.307
Laser therapy	1.467	.462	.001	4.336	1.754	10.722	
Cryotherapy	.537	.764	.482	1.711	.383	7.646	

DISCUSSION

Epiretinal membrane is an important posterior segment disease that develops after vitreoretinal surgeries. This study has been conducted to evaluate the prevalence and risk factors associated with ERM in vitrectomized eyes with respect to optical coherence tomography (OCT) and the reported overall prevalence of ERM in this study was 26.8%, which is corresponding to other studies conducted by the Lee IJ et al¹³ found higher rate of ERM as 70.6%, and Ishikawa K et al¹⁴ found a lower rate of ERM formation 4.6% during 6 months. The variation in prevalence rates of frequency across the studies may due to the difference in the selected populations of studies, surgical techniques, and postoperative follow-up periods. The occurrence of ERM post-vitrectomy is commonly attributed to remnant vitreous cortex, inflammation, or retinal changes secondary to the surgery.¹⁵ Additionally our findings were consistent with the study by Gkizis I et al¹⁶, who found ERM prevalence from 7% to 29% and Erden B et al¹⁷, which found an ERM prevalence of 37% in vitrectomized eyes, which provides further support to the suggestion that surgical intervention particularly in surgically challenging cases involving complex retinal pathology predisposes the retina to postoperative epiretinal membrane formation. Moreover, the development of ERM in eyes after vitrectomy could be dependent on the primary retinal pathologies instead of the procedure itself.

In this study overall mean age of the patients was 54.51 ± 7.08 years, and there was a male predominance (66.1%) over female patients (33.9%). The existence of gender-related differences in ERM prevalence is still controversial. Like other studies by Shabnum et al¹⁸ have reported that males and females are affected almost equally, and that the mean age has been 60.25 ± 17.5 years. On other hand Mastropasqua et al¹⁹ also found almost equal gender distribution in another study on microvascular alterations after vitrectomy with internal limiting membrane peeling and a mean age of 59.8 ± 9.6 years. Consistent with this, our findings indicated that the gender is not likely a strong predictor of ERM development. A lower likelihood of ERM in males was observed in our cohort; however, larger population-based studies are needed to ascertain if this trend is due to biological and/or lifestyle factors.

In this study the Rhegmatogenous retinal detachment was 35.7% and diabetes mellitus associated complications 32.1% were the most common reasons for vitrectomy among the study population. Although these conditions are recognized for causing retinal stress and inflammation, their exact role in relation to ERM formation is still unclear. These findings were consistent with a study by Switania A et al,²⁰ where most of the patients 45.1% underwent vitrectomy for diabetic retinopathy, finding a higher prevalence of ERM likely due to their chronic inflammatory reactions and fibrovascular proliferations. On the other hand, some studies have indicated that because patients with Rhegmatogenous retinal detachment had extensive posterior hyaloid removal at the time of surgery, they therefore had lower ERM risk postoperatively. However the accurate etiology of the ERM remains largely unclear, as the majority of patients occur without any associated ocular abnormality.

Comparatively, secondary ERMs may develop due to conditions such as retinal detachment, diabetic retinopathy or the procedures related to retinal detachment.¹⁶

In this study, the laser therapy found as strongest predictor for ERM, which increased the risk of developing ERM by 4.3 times ($p=0.001$). Consistently Cakir B et al²¹ presence of ≥ 750 laser spots and female sex as independent risk factors for ERM development after PPV for RRD, each with an odds ratio of 2.4. Szigiato AA et al²² also reported that the during surgery cryotherapy, over 1000 shots of the laser, laser photocoagulation 360° and choroidal separation were risk factors for the formation of ERM $p < 0.01$. The Laser therapy causes the scarring and inflammation of the retina, which can induce the proliferation of glial cells and subsequently result in the formation of ERM.²³ Additionally the Silicone oil tamponade, an important risk factor noted in our study, was found to pose a 4.76 times risk for ERM. This is consistent with results from Kadhim AA et al,²⁴ where a significant proportion, specifically 71.80%, of individuals who were part of the silicone oil group experienced the development of epiretinal membranes. Silicone oil is pro-inflammatory and may promote development of fibrocellular membranes and subsequent appearance of ERMs.

In this study the combined surgery of vitrectomy with cataract surgery was significantly associated with a higher risk of ERM “OR = 5.675, $p = 0.007$ ”, increasing the likelihood of developing ERM by 5.68 times compared with vitrectomy alone. In aligns to these findings, other studies showed that the combined surgery causes postoperative inflammation that results in more fibrocellular proliferation and ERM formation.²⁵ Similarly, Motta L et al²⁴ reported that the patients undergoing combined cataract surgery and pars plana vitrectomy was associated with a 3.3-fold increased risk of cystoid macular edema compared to PPV alone and insignificant ERM formation. The process of phacoemulsification may also initiate cytokine discharge, causing disruption of the blood-retinal barrier and causing cellular proliferation, in addition to vitreous hydration, which has been linked to the pathogenesis of ERM. Meanwhile, other studies indicate a protective action due to earlier removal of the crystalline lens, minimizing vitreous traction and lowering the risk of ERM development, Berrod JP et al.²¹ given the conflicting findings regarding the effect of combined surgery is a reliable and effective option for epiretinal membrane treatment. It provides quicker and more stable anatomical and visual improvements while eliminating the necessity for a subsequent surgical procedure, further studies are needed to determine the precise influence of combined surgery on ERM formation. With the valuable insights, this study possesses several limitations, including a single-center nature, limited sample size, and a lack of functional assessment and unmeasured confounding, such as systemic inflammation and surgeon experiences. However the larger multicenter cohorts with longer follow-up periods studies are recommended validate the findings for ERM progression. Additionally comparative analysis of surgical techniques might reduce the risk of ERM, while a visualization of functional and structural vision assessments would reinforce a more clinical picture.

CONCLUSION

Study revealed that the 36.6% of patients developed ERM after vitrectomy, with certain factors having a stronger influence, like laser therapy emerged as the most significant risk factor, increasing the likelihood of ERM formation by 4.3 times. Silicone oil tamponade also showed a potential association with higher ERM risk. Additionally, patients who underwent vitrectomy with cataract surgery were 5.67 times more likely to develop ERM. Findings highlight the need for careful selection of surgical techniques and post-operative management strategies to reduce the risk of ERM. Patients undergoing laser therapy or silicone oil tamponade should be closely monitored with OCT for early detection and intervention. Future research should focus on optimizing surgical approaches and evaluating additional risk factors to improve patient outcomes after vitrectomy.

Ethical permission: Ethical approval was obtained from IRB , DUHS. ERC letter No: IRB-/DUHS/Approval/2022/1081

REFERENCES

1. Takamidou Y, Mizuguchi T, Sugimoto M, Tanikawa A, Horiguchi M. Risk factors for epiretinal membrane surgery after initial pars plana vitrectomy for rhegmatogenous retinal detachment. *J Ophthalmol*. 2022;2022:8874915.
2. Ishida Y, Iwama Y, Nakashima H, Ikeda T, Emi K. Risk factors, onset, and progression of epiretinal membrane after 25-gauge pars plana vitrectomy for rhegmatogenous retinal detachment. *Ophthalmol Retina*. 2020;4(3):284-288.
3. Moon H, Lee J, Lee S. Risk factors for epiretinal membrane formation and peeling following pars plana vitrectomy for rhegmatogenous retinal detachment. *J Retin Vitre Dis*. 2022;7(1):34-41.
4. Pan Q, Gao Z, Hu X, Wu Q, Zheng JW, Zhang ZD. Risk factors for epiretinal membrane in eyes with primary rhegmatogenous retinal detachment that received silicone oil tamponade. *Br J Ophthalmol*. 2023;107(6):856-861.
5. Fung AT, Galvin J, Tran T. Epiretinal membrane: a review. *Clin Exp Ophthalmol*. 2021;49(3):289-308.
6. Xiao W, Chen X, Yan W, Zhu Z, He M. Prevalence and risk factors of epiretinal membranes: a systematic review and meta-analysis of population-based studies. *BMJ Open*. 2017;7(9):e014644.
7. Kato Y, Inoue M, Hirakata A. Effect of foveal vitreous cortex removal to prevent epiretinal membrane after vitrectomy. *Graefes Arch Clin Exp Ophthalmol*. 2019;257(4):817-823.
8. Wong Y, Poon W, Lai W, Wong R, Lai W. Incidence and risk factors of epiretinal membrane formation after vitrectomy in diabetic patients. *Retina*. 2021;41(3):560-568.
9. Kang S, Lim J, Kim J, Lee C. Association between intraoperative photocoagulation energy and postoperative epiretinal membrane formation. *Ophthalmic Surg Lasers Imaging Retina*. 2020;51(5):263-270.
10. Pan Q, Gao Z, Hu X, Wu Q, Zheng JW, Zhang ZD. Risk factors for epiretinal membrane in eyes with primary rhegmatogenous retinal detachment that received silicone oil tamponade. *British Journal of Ophthalmology*. 2023 Jun 1;107(6):856-61.
11. Lee J, Kim Y, Moon H. Protective role of ILM peeling in preventing postoperative epiretinal membrane formation: a meta-analysis. *Am J Ophthalmol*. 2023;246:67-74.
12. Akiyama K, Fujinami K, Watanabe K, Tsunoda K, Noda T. Internal limiting membrane peeling to prevent post-vitrectomy epiretinal membrane development in retinal detachment. *American Journal of Ophthalmology*. 2016 Nov 1;171:1-0.
13. Lee IJ, Benjamin JE, Ghorayeb GR. Incidence of Epiretinal Membrane Formation After Pars Plana Vitrectomy for Giant Retinal Tear-Associated Retinal Detachment. *Clinical Ophthalmology*. 2023 Dec 31:1415-20.
14. Ishikawa K, Akiyama M, Mori K, Nakama T, Notomi S, Nakao S, Kohno RI, Takeda A, Sonoda KH. Drainage retinotomy confers risk of epiretinal membrane formation after vitrectomy for rhegmatogenous retinal detachment repair. *American journal of ophthalmology*. 2022 Feb 1;234:20-7..
15. Ghasemi Falavarjani K, Nguyen QD. Epiretinal membrane formation following vitrectomy: Pathophysiology and risk factors. *J Ophthalmic Vis Res*. 2017;12(3):258-265
16. Gkizis I. Presentation of cases who underwent vitrectomy for the management of idiopathic epiretinal membranes (iERM). *Acta Ophthalmologica*. 2024 Jan;102.
17. Erden B, Kapran Z. Evaluation of factors affecting epiretinal membrane surgery outcomes. *Beyoglu Eye Journal*. 2019 Aug 9;4(2):69-75..
18. nabi Var S, Handoo PA. CLINICAL PROFILE AND VISUAL OUTCOME AFTER ERM REMOVAL-AN EXPERIENCE FROM A TERTIARY CARE REFERRAL CENTER IN NORTH INDIA. *International Journal of Retina*. 2022 Feb 22;5(1):10-.
19. Mastropasqua L, Borrelli E, Carpineto P, Toto L, Di Antonio L, Mattei PA, Mastropasqua R. Microvascular changes after vitrectomy with internal limiting membrane peeling: an optical coherence tomography angiography study. *International ophthalmology*. 2018 Aug;38:1465-72.

20. Switania A, Girsang W, Soedarman S, Agustiawan R. Vitrectomy for the Management of Vitreous Hemorrhage: Clinical Characteristics and Surgical Outcomes. *Ophthalmologica Indonesiana*. 2023;49(S2).
21. Cakir B, Peacker BL, Zeng R, Tracy JH, Feng Y, Miller JB. Extensive Endolaser During Vitrectomy for Primary Rhegmatogenous Retinal Detachment Is Associated With Epiretinal Membrane Formation. *Ophthalmic Surgery, Lasers and Imaging Retina*. 2024 Jun 1;55(6):326-33.
22. Szigiato AA, Antaki F, Javidi S, Touma S, Duval R, Cordahi G, Olivier S, Rezende FA. Risk factors for epiretinal membrane formation and peeling following pars plana vitrectomy for primary rhegmatogenous retinal detachment, an OCT guided analysis. *International Journal of Retina and Vitreous*. 2022 Sep 30;8(1):70.
23. Kadhim AA, Al Shalchi A, Bananzada A. Incidence of Postoperative Epiretinal Membrane Development Following 23-Gauge Pars Plana Vitrectomy for Complex Diabetic Tractional Retinal Detachment: A Comparative Study of Silicone Oil and Balanced Salt Solution Tamponade. *Open Access Macedonian Journal of Medical Sciences*. 2024 Feb 9;12(1):88-92..
24. Motta L, Frisina R, Ripa M, Gius I, Greggio A, Tozzi L, De Salvo G, Meduri A. Postoperative complications after successful primary rhegmatogenous retinal detachment repair. *BMC ophthalmology*. 2023 Feb 24;23(1):77.
25. Berrod JP, Hubert I, Naoun K, Badet JC, Bazard MC. Combined vitrectomy with ILM peeling and phaco/IOL surgery for epiretinal membrane. *Investigative Ophthalmology & Visual Science*. 2004 May 1;45(13):1991-.