https://doi.org/10.29309/TPMJ/2024.31.04.7850

The Professional Medical Journal
www.theprofesional.com
2024, Volume, 31 Issue, 04

ORIGINAL ARTICLE

Epiretinal membrane formation after rhegmatogenous retinal detachment repair (RRD): A single center study.

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Article Citation: Gulnaz, Chaudhry HA, Sualeh IA, Tariq M, Salim K, Ahsan M. Epiretinal membrane formation after rhegmatogenous retinal detachment repair (RRD): A single center study. Professional Med J 2024; 31(04):607-612. https://doi.org/10.29309/TPMJ/2024.31.04.7850

ABSTRACT… Objective: To determine the frequency of patients developing ERM (epiretinal membrane) after surgical procedure for RRD. **Study Design:** Retrospective study. **Setting:** Department of Ophthalmology, Madina Teaching Hospital Faisalabad. **Period:** November 2021 to October 2022. **Methods:** Involving patients of primary RRD; 160 patients enrolled before the operation, each patient had both of their eyes assessed, and then again after one month, and then three months after the procedure. These assessments comprised a comprehensive ophthalmological evaluation, which consisted of slit-lamp biomicroscopy, OCT scans. On the basis of ERM formation, the participants were divided into two distinct groups. Age, gender, length of retinal detachment in days, existence of PVD, type of surgery done for RRD, and presence or absence of postoperative ERM were some of the demographic and clinical data that were obtained. **Results:** A total of 160 patients' data was evaluated, and 47 (29.4%) of them had ERM formation following RRD repair. No factor such as age, gender, side of the eye involved and type of surgery has any influence on the outcome of ERM as the p value <0.05. **Conclusion:** According to the results it can be concluded that ERM is a prevalent complication after SB and PPV surgery dome for RRD but no associations were seen with age, gender, side of the eye involved and type of surgery has any influence on the outcome of ERM.

Key words: ERM, Epiretinal Membrane, OCT, RRD, Retinal Detachment, Retina.

INTRODUCTION

Epiretinal membranes (ERM) refer to fibrocellular contractile growth that develops on the surface of the retina's internal limiting membrane, commonly found in the macular region. These membranes can either be idiopathic or arise as a result of other ocular conditions. The prevalence of this condition ranges from 4% to 12.8%, with the higher percentage observed in patients with secondary ERM caused by retinal detachment. Bilateral occurrences are found in approximately 10-20% of cases, usually displaying asymmetry between the affected eyes. While the exact underlying mechanisms remain partially understood, it is believed that posterior vitreous detachment plays a significant role in its development.[1]

A local study reported that ERM is a common complication seen among the patients of retinal surgery, affecting around 3.5% to 6.9% of the population, with a higher incidence in older individuals. The development of ERM is believed to be associated with glial cells migrating through defects in the internal limiting membrane (ILM), leading to the formation of ERM on the surface of the ILM. Clinically, ERM can manifest as either dense and opaque tissues or fine, transparent membranes. The condition exerts tangential traction on the retina, resulting in retinal changes such as thickening of retinal layers, surface wrinkling, or nerve fiber layer (NFL) fibrillation. These changes can cause a decline in visual acuity and the appearance of metamorphopsia. To address progressing clinical symptoms, treatment options may include pars plana vitrectomy and ERM peeling to alleviate the condition.[2]

Factors that increase the likelihood of developing

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Article received on: 11/09/2023
Accepted for publication: 19/01/2024

ERM (epiretinal membrane) after repairing a retinal detachment include age, different types of breaks in the retina, freezing treatment (cryopexy), undergoing multiple operations, having proliferative vitreoretinopathy, involvement of the central vision area (macular), poor vision before the surgery, and having multiple and/or large breaks in the retina.[3]

According to studies, the frequency of ERM development after PPV alone done for treatment of RRD is comparable to the incidence observed when using scleral buckling as the treatment approach.[4] After the epiretinal membrane (ERM) was surgically removed, BCVA significantly improved; nevertheless, eyes in which the macula had been detached had a lower final BCVA.[5] According to retrospective research, primary ILM peel in RRD repair may reduce postoperative ERM and reduce the need for PPV /membrane peel.[6]

We chose to undertake a retrospective study involving a considerable number of patients who underwent either primary PPV or initial SB surgery for uncomplicated primary rhegmatogenous retinal detachment (RRD). Our primary objective for this investigation was to assess the frequency of ERM (epiretinal membrane) development after repairing RRD.

METHODS

This was a study that looked at patients' medical records to see if they had received an initial pars plana vitrectomy (PPV) or scleral buckling (SB) treatment for primary RRD that was simple. Each patient who took part in this research project was required to fill out and sign an informed consent form before they were included. In this particular study, there were a total of 160 patients enrolled at the Department of Ophthalmology, Madina Teaching Hospital Faisalabad**.** Data collection was done during the period of November 2021 to October 2022 after approval from ethical committee (8-11-22).

Before the operation, each patient had both of their eyes assessed, and then again after one month, and then three months after the procedure. These assessments comprised a comprehensive ophthalmological evaluation, which consisted of slit-lamp biomicroscopy, OCT scans. On the basis of ERM formation, the participants were divided into two distinct groups. Age, gender, length of retinal detachment in days, existence of PVD, type of surgery done for RRD, and presence or absence of postoperative ERM were some of the demographic and clinical data that were obtained.

SPSS version 26, which was employed for all of the analyses, was the tool that was utilized for carrying out all of the statistical work. The findings from the qualitative variables were presented in the form of frequency and percentage, while the findings from the quantitative variables were presented in the form of means and standard deviations. The Chi-square test was applied in order to analyze the differences that were found in the categorical data, whereas the unpaired t-test was utilized in order to compare the continuous data that was obtained from eyes that had and did not have ERM. Both of these tests were performed in order to determine whether or not there were significant differences between the eyes that did and did not have ERM.

RESULTS

The data of the patients who participated in this trial was evaluated. The patients enrolled had a mean age of 48.2 + 6.7 years. Table-I shows the information about the patient's age groups and gender. The male to female ratio was approximately 1:1, indicating that both genders were equally involved.

A total of 160 patients' data was evaluated, and 47 (29.4%) of them had ERM formation following RRD repair. Patients were evaluated regularly at intervals on follow up visits for complications such as ERM development. We divided all of the patients into two groups: those who had ERM development and those who did not. Table-I shows the patient's age, gender, the side of the eye involved, the history of posterior vitreous detachment, and the surgical treatment performed (SB surgery and PVD surgery).

		Total Patients (n=160)		With ERM (n=47)		Without ERM (n=113)		
		No.	%	No.	%	No.	%	
Age	<50	88	55	29	61.7	59	52.2	0.299
	>50	72	45	18	38.3	54	47.8	
	Mean	48.2 + 6.7 years		47.2 + 6.3 years		48.6 + 6.8 years		
Gender	Male	75	46.9	20	42.6	55	48.7	0.493
	Female	85	53.1	27	57.4	58	51.3	
Side of eye	RT	95	59.4	28	59.6	67	59.3	0.99
	LT	65	40.6	19	40.4	46	40.7	
PVD	yes	75	46.9	22	46.8	53	46.9	
Surgery done	SB	100	62.5	30	63.8	70	61.9	0.859
	PPV	60	37.5	17	36.2	43	38.1	

Table-I showing the details of various age, ender, and side of eye noted and analyzed. (n=160)
ERM= epiretinal membrane; PVD= posterior vitreous detachment; SB= scleral buckling; PPV= pars plana vitrectomy

Patients having a history of ERM were assessed further after admission, and additional surgical operations were performed as needed to reduce morbidity among these patients.

The data analysis showed that no factor such as age, gender, side of the eye involved and type of surgery has any influence on the outcome of ERM as the p value <0.05

ERM	No. (%)
Yes	47 (29.4%)
No	113 (70.6%)
Total	160 (100.0%)

Table-II. Showing the details of frequency of ERM noted among the patients operated for RRD. (n=160)

According to the findings of our study, the incidence of ERM formation in the post operational period was higher among the patients who underwent SB surgery, and the incidence was comparatively higher in females.

DISCUSSION

ERM can be idiopathic (unknown cause), primary, or can arise as a result of various factors such as trauma, previous ocular surgeries, retinal vascular issues, or diabetic retinopathy. When ERMs develop without a clear reason, they are considered idiopathic.[7] Severe ERMs have the potential to exert traction on the retina, leading to structural abnormalities and potentially causing central vision impairment and metamorphopsia (visual distortion). OCT is highly effective in detecting ERMs, which is crucial for managing patients experiencing symptoms associated with these membranes.[8]

The information collected from the patients who took part in this study was analyzed. The mean age of the participants was 48.2 years, with a standard deviation of 6.7 years. The demographic information of the patients, including their ages and genders, is presented in Table-I. The ratio of males to females was roughly equal, which suggests that individuals of both genders were part in the study. The data from a total of 160 individuals were examined, and it was discovered that 47 of those patients experienced ERM development after RRD repair. Follow-up appointments were scheduled at regular intervals to check on the patients and look for any issues, such as the development of ERM. The incidence of ERM formation in the post-operative period was higher among the patients who had SB surgery, and the incidence was relatively higher in females.

In a comprehensive investigation, a substantial cohort of 2239 cases underwent PPV for the correction of RRD and development of epiretinal membranes (ERM) following vitrectomy treatment over a period of 6 months was accessed. As the follow-up examination took place after the six-month period, it was revealed that ERM had emerged in 104 of the cases, accounting for approximately 4.6% of the total cohort. These findings shed light on the occurrence and

prevalence of ERM as a potential post-surgical complication in patients who underwent PPV for RRD correction. Researchers identified a significant association between the surgical approach and the development of ERM. Specifically, eyes that were treated with a combination of PPV and drainage retinotomy were found to have a higher probability of manifesting ERM after the surgery. This particular finding underscores the importance of considering the surgical procedure employed in PPV and its potential impact on post-operative outcomes, specifically in relation to ERM formation. The results underscore the need for vigilant follow-up care and consideration of different surgical approaches to optimize visual outcomes and minimize potential complications for patients undergoing PPV for RRD correction. However, further research and ongoing studies are necessary to gain a deeper understanding of the underlying mechanisms and refine treatment strategies to enhance patient outcomes in the field of vitreoretinal surgery.[9]

A thorough follow-up is necessary in cases that had a long axial length before RRD repair, low visual acuity, the use of 20-gauge vitreous surgery instruments, and a lack of ILM peeling.[10] In a study that analyzed data from the past, researchers had a look at 309 eyes that had their initial procedure for primary RRD that did not involve any complications. Patients were assessed prior to and after surgery, as well as at 1, 3, 6, and 12 months after the procedure. The study came to the conclusion that the incidence of postoperative epiretinal membrane was 28.5%, with 42.7% of cases falling into the severe category and requiring removal of the epiretinal membrane. The findings of the study were presented in the form of findings. Huge retinal tears and horseshoe tears were found to be significant predictors of the development of postoperative epiretinal membranes when the technique of logistic regression was utilized. In conclusion, the research demonstrates that horseshoe tears and huge retinal tears are risk factors for the development of postoperative epiretinal membranes. However, staining with triamcinolone acetonide has a protective effect on the formation of these membranes. In addition, a second round of PPV was carried out, and this procedure also involved the removal of the membrane. Despite the fact that the patient was only able to recover a small amount, this led to a large improvement in the patient's final best-corrected visual acuity when it was measured at the most recent follow-up.[11]

Another study looked at 312 eyes that had PPV surgery for primary RRD and using a prospective interventional case series design. Epiretinal membrane (ERM) formed in 28 eyes (8.97%) throughout the postoperative period. A separation at the equator was more common in eyes with ERM than in eyes without ERM. The results showed that the incidence of ERM following PPV alone was similar to that described following scleral buckling.[5]

Five hundred and eighty-seven eyes had one retinal detachment fixed each. During the time period of follow-up, the incidence rates for ERM were 35.1% and for CME they were 15.2%. The combined PPV and scleral buckling procedure resulted in a significantly higher (p 0.0001) incidence of ERM (48.4%) compared to PPV alone (31.2%). In order to help rule out CME/ERM, patients may benefit from increased OCT and FA use.[12]

CONCLUSION

According to the results it can be concluded that ERM is a prevalent complication after SB and PPV surgery dome for RRD but no associations were seen with age, gender, side of the eye involved and type of surgery has any influence on the outcome of ERM.

LIMITATION OF THE STUDY

We must acknowledge several study limitations. Our sample size of 160 participants was reasonable, but it may not fully represent a larger and more diverse population. The study also lasted about a year, which may limit our ability to detect long-term trends or changes. A specific data collection method may introduce biases or limitations, so exploring alternative methods may provide a more complete understanding of the topic. Demographic composition may not reflect

the target population's diversity. Our findings may only apply to the study's context, so they should be interpreted cautiously. Finally, the study's cross-sectional design makes causality and change tracking difficult, and resource constraints like funding and access may have limited its scope. These limitations can inform future research and improve understanding.

CONFLICT OF INTEREST

No conflict of interest exists between the authors.

SOURCE OF FUNDING

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

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