• Clinical Research •

Visual and anatomic outcomes of epiretinal membrane surgery in highly myopic eyes with varying axial lengths

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Abstract

● **AIM:** To observe the clinical features and the surgical outcomes of the high myopic (HM) patients with epiretinal membranes (ERM).

● **METHODS:** This was a retrospective study enrolled HM patients diagnosed with ERM who underwent vitrectomy between May 2012 and November 2021. Three groups were divided according to axial length (AXL): 26-<28 mm (*n*=43), 28-<30 mm (*n*=22), and ≥30 mm (*n*=11). Baseline characteristics and postoperative visual and anatomical outcomes were analyzed.

● **RESULTS:** Totally 76 consecutive eyes of 73 HM patients (27 males), with a mean age of 60.5±9.2y (range: 38-84y) were enrolled. The initial best-corrected visual acuity (BCVA) of the three groups was not significantly different (*P*=0.498). Longer AXL was associated with a higher incidence of both inner and outer macular retinoschisis (MRS), ellipsoid zone (EZ) disruption, and foveal retinal detachment (all *P*<0.05). Only the eyes in the 26-<28 mm group showed a significant improvement in postoperative BCVA. BCVA was improved in 77.6% of the eyes. Among the eyes with BCVA not improved, 58.8% belonged to the group 26-<28 mm. The postoperative macular hole was seen in 1 (1.32%) eye. Multivariate linear regression analysis indicated that initial BCVA (*P*<0.001) and epiretinal proliferation (*P*=0.010) influenced the final BCVA.

● **CONCLUSION:** AXL is not significantly associated with visual recovery. Early operative intervention might have better visual and anatomical outcomes in HM-ERM patients.

● **KEYWORDS:** high myopia; epiretinal membrane; axial length; pars plana vitrectomy; visual acuity

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INTRODUCTION

High myopia (HM) is characterized by a highly negative refractive error (<−6 diopters) and eye elongation (>26 mm)[1]. As the axial length (AXL) increases, some complications of HM can arise, such as macular retinoschisis (MRS), foveal retinal detachment (fRD), and lamellar or full-thickness macular hole (MH). Other HM-related abnormal vitreoretinal interface changes, such as epiretinal membrane (ERM), can produce pre-retinal forces that exert traction on the retina to aggravate myopic traction maculopathy[2-3]. Recently, epidemiological studies have found an association between HM and ERM. A recent study from Singapore indicated that the prevalence of ERM was 2.0% in myopic eyes and 5.6% in HM eyes[3].

Currently, there have been relatively comprehensive studies on the clinical characteristics and surgical prognosis of idiopathic ERM (iERM), while the studies on ERM in HM patients were insufficient. Pars plana vitrectomy (PPV) combined with ERM and inner limiting membrane (ILM) peeling is considered a standard procedure with a high anatomical and functional success rate in iERMs[4-7]. However, HM can be associated with an abnormal vitreoretinal interface, posterior staphyloma, myopic traction maculopathy, and chorioretinal atrophy that could influence surgical outcomes. Earlier studies have compared the surgical outcomes for HM-ERMs without tractional maculopathy and those for iERMs, finding no significant differences in outcomes for anatomical, visual acuity (VA), and surgical complications[2,7-8].

However, as the AXL grows and the ERM contracts, the structure of the macular inevitably undergoes corresponding changes, such as retinoschisis (RS), photoreceptor damage, and retinal detachment (RD). The distinct anatomical environment of the HM eye—characterized by a thin choroid and retina, attenuated retinal vessels, and a deformed posterior pole—fundamentally differs from that of emmetropic eyes[9-10]. Consequently, the behavior of ERMs and the surgical outcomes

of PPV with ERM peeling in this population are postulated to be unique and potentially less predictable. Although several studies have compared the surgical outcomes of HM-ERM without myopic traction maculopathy with iERMs, a detailed, stratified analysis correlating a continuous spectrum of AXLs with specific clinical features and post-operative outcomes in HM-ERM patients is lacking.

Therefore, the primary aim of this study is to investigate and compare the baseline clinical characteristics and the visual and anatomic outcomes following ERM surgery in HM eyes, stratified by varying AXL.

PARTICIPANTS AND METHODS

Ethical Approval This study conformed to the tenets of the Declaration of Helsinki and were approved by the Ethics Committee of Beijing Tongren Hospital (Approval number: TREC2025-KY147). Informed consent was obtained from all individual participants included in this study.

The medical records of 76 eyes of 73 consecutive highly myopic patients with ERM who had undergone PPV with ERM and ILM removal from May 2012 to November 2021 were reviewed. Exclusion criteria: 1) diabetic retinopathy, RD, non-myopia-related macular scarring, uveitis, trauma, retinal vein occlusion; 2) previous ocular surgical history other than simple cataract surgery; 3) eyes with full-thickness MH; 4) coexisting ocular disease that could affects image quality and visual measurements, such as corneal opacities, dense cataract, amblyopia, glaucoma, and optic neuropathies.

Examinations Each patient underwent comprehensive ophthalmic examinations. Best-corrected visual acuity (BCVA) was measured for each eye separately under standardized conditions by a certified optometrist. AXL was measured by the IOL Master (IOL Master Biometry; Carl Zeiss Meditec, Dublin, CA, USA). Fundus color photography was performed using a TRC50LX (Topcon, Tokyo, Japan).

Each eye of the enrolled patient was evaluated with spectral domain optical coherence tomography (SD-OCT) images (Cirrus high-definition OCT; Carl Zeiss Meditec, Dublin, CA, USA). The OCT system operates in two patterns: macular cube 512×128 scans and five-line raster scans. MRS was defined as the intraretinal splitting of the inner and outer retinal layers in the macula. According to the retinal layers that MRS involved, we recorded them as inner MRS (I-MRS), outer MRS (O-MRS), and both inner and outer MRS (I/O-MRS), respectively[11-12]. Epiretinal proliferation (EP) is characterized by a mound of homogeneous medium reflectivity tissue without any contractile nature at the epiretinal surface[13-14]. Central foveal thickness (CFT) was calculated automatically through the built-in software of the machine. The other HM complications, including fRD, lamellar MH (LMH), and ellipsoid zone (EZ) disruption were also identified by OCT imaging.

Surgical Procedure All eyes underwent a standard 23-gauge PPV. The ILM was peeled over the area of at least two disc diameters after peeling off all visible ERM, using 0.25% indocyanine green dyes to stain and then remove the ILM. At the end of the surgery, the vitreous cavity was filled with sterile air or 14% perfluoropropane (C_3F_8) gas. C_3F_8 was used in 5 eyes (Figure 1). Laser photocoagulation was applied when retinal degeneration and breaks were observed. Twelve and one of the 76 eyes were pseudophakic and aphakia respectively before PPV. In the remaining 63 eyes, 48 performed PPV combined with phacoemulsification and intraocular lens (IOL) implantation, and 15 performed PPV only.

Statistical Analysis Statistical analysis was performed using IBM Statistical software (SPSS for Mac, version 29.0.1.0, IBM-SPSS, Chicago, IL, USA). All quantitative data were described as mean±standard deviation (SD). Descriptive statistics obtained the prevalence of MRS, fRD, LMH, and EZ disruption. Fisher exact test and Kruskal-Wallis H test were performed to compare the data among the three groups. The paired sample Wilcoxon signed-rank test was applied to compare the measurements before and after the operation. The factors that affected the final BCVA were determined by the univariate linear regression analysis and multivariate stepwise regression analysis. Binary logistic regression analysis was used to analyze the factors associated with the postoperative BCVA improvement. $P<0.05$ was considered statistically significant.

RESULTS

Baseline Characteristics The study included 76 eyes of 73 patients (27 males and 46 females), with a mean age of 60.5±9.2y (range: 38-84y). The mean baseline AXL was 28.1±1.7 mm and the mean baseline BCVA was 0.6±0.4 logMAR (Snellen: 20/80). The mean CFT at the baseline was 466.8±108.2 μm. The mean symptom duration was 20.3±16.0mo. The mean follow-up period was 12.5±9.8mo. Among the 76 records, 63 eyes (82.9%) were phakic, 12 eyes (15.8%) were pseudophakic, and 1 eye (1.3%) was aphakic before the surgery. The detailed baseline clinical features of all enrolled patients in this study are shown in Table 1.

Comparison of Baseline Clinical Characteristics of the ERM Patients with Different AXL Table 2 shows the clinical characteristics of patients in different AXL groups. The number of eyes in the group 26–<28, 28–<30, and ≥30 mm were 43, 22, and 11, respectively. The mean age of the patients in group ≥30 mm was the oldest among the three groups ($P=0.022$). In the eyes with ≥30 mm, the proportion of I/O-MRS ($P<0.001$), EZ disruption ($P=0.023$), and fRD ($P=0.021$) was the highest compared to those in the other two groups. However, there were no significant differences in gender ($P=0.635$), baseline

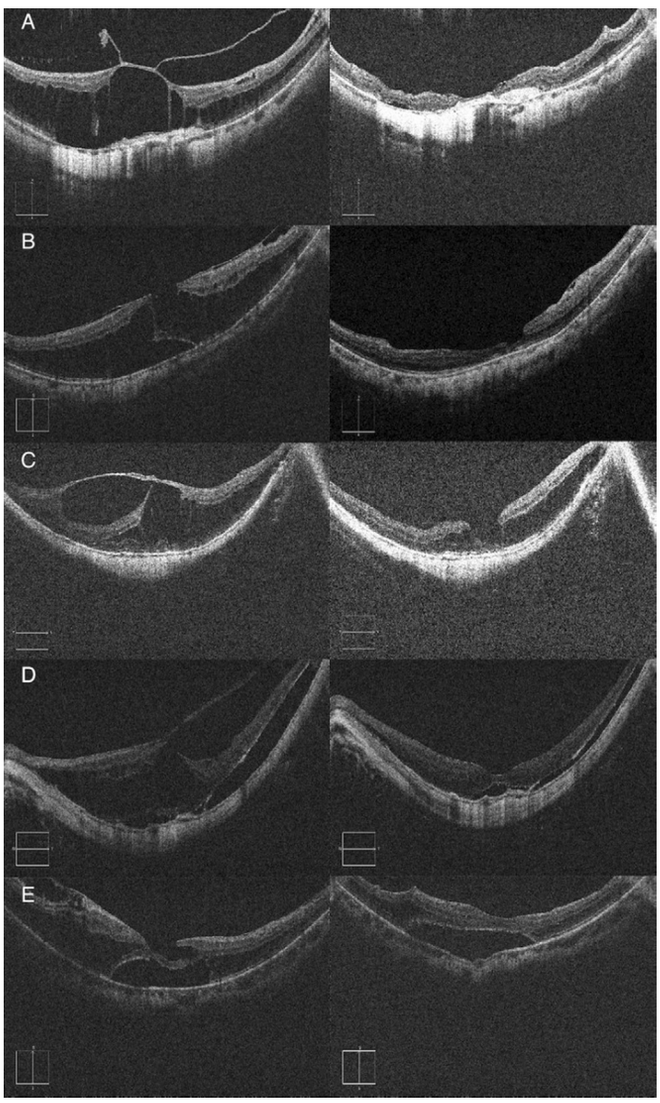

Figure 1 Preoperative and postoperative SD-OCT images of 5 eyes tamponade with C_3F_8 A: A 63-year-old woman with widefield MRS and LMH. Although experiencing macular atrophy, the retina was reattached at the 24-month follow-up examination after the ERM surgery, and the MRS nearly disappeared. The AXL was 28.6 mm. B: A 69-year-old woman with HM-ERM companies by fRD and widefield MRS at baseline examination. After a 24-month follow-up postoperatively, the retina was reattached and the MRS recovered. The AXL was 27.6 mm. C: A 68-year-old man with HM-ERM companies by widefield MRS at baseline. The MRS showed a significant improvement in the patients after treatment (10mo after surgery). The AXL was 32.2 mm. D: A 70-year-old man with HM-ERM coexisting widefield MRS, fRD, and LMH. However, the patient only had follow-up data at 1mo after surgery. There is still a certain degree of fRD. The AXL was 33.9 mm. E: A 43-year-old man with HM-ERM coexisting widefield MRS, fRD, and LMH. The follow-up time for this patient is also relatively short, only 4mo. Although fRD still exists, MRS has significantly improved compared to preoperative. The AXL was 29.0 mm. SD-OCT: Spectral domain optical coherence tomography; C_3F_8: Perfluoropropane; MRS: Macular retinoschisis; LMH: Lamellar macular hole; ERM: Epiretinal membrane; AXL: Axial length; HM-ERM: High myopia-epiretinal membrane; fRD: Foveal retinal detachment.

Table 1 Baseline characteristics of highly myopic patients with epiretinal membrane *n* (%) or mean±SD

Parameters	Data
No. of eyes (patients)	76 (73)
Gender	
Male	27 (36.99)
Female	46 (63.01)
Age, y	60.5±9.2 (38-84)
Affected eye	
Right	38 (50)
Left	38 (50)
Symptom duration, mo	20.3±16.0 (2-72)
Follow-up periods, mo	12.5±9.8
Baseline BCVA, logMAR (mean Snellen)	0.6±0.4 (20/80)
Axial length, mm	28.1±1.7
Intraocular pressure, mm Hg	15.1±3.6
Central foveal thickness, μm	466.8±108.2
Lens status	
Phakic	63 (82.89)
Pseudophakic	12 (15.79)
Aphakic	1 (1.32)
EZ disruption	43 (56.58)

BCVA: Best-corrected visual acuity; logMAR: Logarithm of the minimal angle of resolution; EZ: Ellipsoid zone; SD: Standard deviation.

BCVA (*P*=0.498), symptom duration (*P*=0.968), and follow-up periods (*P*=0.312) among the three groups.

Visual and Anatomical Outcomes Mean logMAR BCVA improved significantly, from 0.6±0.4 (Snellen: 20/80) at baseline to 0.3±0.3 (Snellen: 20/40; *P*<0.001) at the final follow-up. As shown in Table 3, except for the eyes in the 26–<28 group, which showed significantly improved postoperative BCVA, there was no significant difference in BCVA in the other two groups between the final and the baseline BCVA. In total, the BCVA of 59 (77.6%) eyes improved after the operation. Among the 17 eyes with decreased or unchanged BCVA, 10 (58.8%) eyes were in the group 26–<28, 4 (23.5%) eyes were in the group 28–<30, and 3 (17.6%) eyes were in the group ≥30. When comparing the follow-up time between the 59 eyes with VA improved and the 17 eyes with VA unimproved, no significant difference was found (12.8±9.8mo *vs* 11.4±10.0mo, *P*=0.623).

After surgery, the mean CFT was significantly thinner both in total (318.7±85.4 μm *vs* 466.8±108.2 μm, *P*<0.001) and in each group (Table 3). At the last follow-up, 11 out of 21 (52.4%) eyes with baseline O-MRS, 20 out of 22 (90.9%) eyes with baseline I-MRS, and 8 out of 16 (50.0%) eyes with baseline O/I-MRS were fully recovered, respectively. Among the 43 eyes with preoperative EZ disruption, 11 (25.6%) eyes recovered the continuity. Nine of the 11 (81.8%) eyes belonged to the group 26–<28. The fRD was reattached in 2 eyes (33.3%). After surgery, an MH appeared in 1 eye (1/76, 0.01%), as shown in Figure 2.

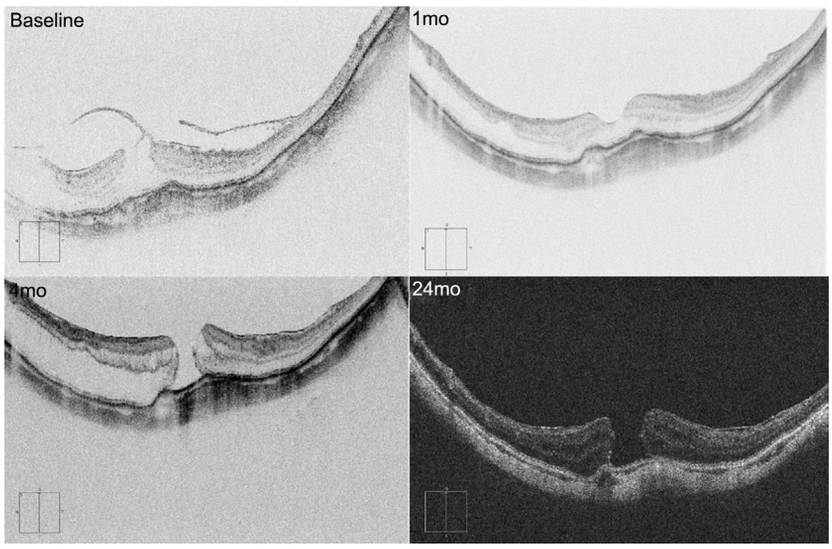

Figure 2 Preoperative and postoperative OCT images of the patient who developed MH after ERM surgery An 84-year-old man was found to have an MH at the 4-month follow-up after ERM surgery. The AXL is 31.16 mm. The patient refused to undergo another surgery, so at the last follow-up, MH still existed. OCT: Optical coherence tomography; ERM: Epiretinal membrane; MH: Macular hole; AXL: Axial length.

Table 2 Compare the baseline characteristics among the three groups with different axial lengths *n* (%) or mean±SD

Parameters	26–<28 (*n*=43)	28–<30 (*n*=22)	≥30 (*n*=11)	*P*
Age, y	59.5±8.5	58.8±9.2	67.8±9.0	0.022[a]
Gender/male	18 (41.8)	7 (31.8)	3 (27.2)	0.635[b]
Baseline BCVA, logMAR (Snellen)	0.5±0.3 (20/66)	0.6±0.4 (20/80)	0.6±0.4 (20/80)	0.498[a]
Symptom duration, mo	19.6±15.2	20.8±16.6	22.0±18.8	0.968[a]
Follow-up periods, mo	11.4±9.7	15.7±10.4	10.1±7.6	0.312[a]
No. of eyes with O-MRS	8 (18.6)	10 (45.5)	3 (27.3)	0.080[b]
No. of eyes with I-MRS	18 (41.9)	4 (18.2)	0	0.008[b]
No. of eyes with I/O-MRS	4 (9.3)	5 (22.7)	7 (63.6)	<0.001[b]
No. of eyes with EP	5 (11.6)	6 (27.3)	1 (9.1)	0.246[b]
No. of eyes with fRD	1 (2.3)	2 (9.1)	3 (27.3)	0.021[b]
No. of eyes with EZ disruption	24 (55.8)	9 (40.9)	10 (90.9)	0.023[b]

[a]Kruskal-Wallis *H* test, [b]Fisher exact test. BCVA: Best-corrected visual acuity; logMAR: Logarithm of the minimal angle of resolution; O-MRS: Outer macular retinoschisis; I-MRS: Inner macular retinoschisis; I/O-MRS: Inner and outer macular retinoschisis; EZ: Ellipsoid zone; EP: Epiretinal proliferation; fRD: Foveal retinal detachment; SD: Standerd deviation.

Table 3 Changes of the BCVA and CFT in each group after the epiretinal membrane surgery

Parameters	Time point	Group			*P*
		26–<28	28–<30	≥30	
BCVA, logMAR	At baseline	0.5±0.3 (20/66)	0.6±0.4 (20/80)	0.6±0.4 (20/80)	0.498[a]
	At final follow-up	0.2±0.3 (20/33)	0.3±0.3 (20/40)	0.3±0.2 (20/40)	0.298[a]
	P	<0.001[b]	0.239[b]	0.226[b]	
CFT, μm	At baseline	485.3±107.1	429.3±81.2	469.5±145.4	0.148[a]
	At final follow-up	345.9±77.7	274.8±72.1	300.3±103.0	0.002[a]
	P	<0.001[b]	<0.001[b]	<0.001[b]	

[a]Kruskal-Wallis *H* test, [b]Paired-samples *t*-test. logMAR: Logarithm of the minimal angle of resolution; BCVA: Best-corrected visual acuity; CFT: Central foveal thickness.

Factors Related to the Final BCVA Univariate linear regression analysis indicated that the baseline BCVA (F=14.675, P<0.001), the presence of EP (F=4.628, P=0.035), the integrity of the EZ (F=5.135, P=0.026), and the presence of LMH (F=4.991, P=0.028; Table 4) were significantly correlated with the final BCVA. According to the step-wise multiple linear regression analysis, adjusting for other parameters, the baseline BCVA [P<0.001, 95% confidence interval (CI): 0.163–0.466], and the presence of EP (P=0.010, 95%CI: 0.048–0.346) were significantly associated with the final BCVA (F=11.406, P<0.001).

According to binary logistic regression analysis, after adjusting for other parameters, patients with the presence of LMH (OR=0.086, 95%CI: 0.019–0.389, P=0.001) before surgery are

Table 4 Univariate linear regression analysis of risk factors for the final BCVA after the ERM surgery

Parameters	Univariate linear regression analysis		
	β coefficient (95%CI)	*F*	*P*
Age, y	−0.004 (−0.011, 0.002)	1.785	0.186
Gender/male	0.015 (−0.113, 0.142)	0.052	0.821
Baseline BCVA, logMAR	0.302 (0.145, 0.459)	14.675	<0.001
Baseline CFT, μm	0.000 (0.000, 0.001)	0.408	0.525
Symptom duration, mo	0.000 (−0.003, 0.004)	0.056	0.813
Follow-up periods, mo	−0.002 (−0.009, 0.004)	0.554	0.459
AXL, mm	0.012 (−0.024, 0.048)	0.440	0.509
Presence of O-MRS	0.023 (−0.114, 0.161)	0.115	0.735
Presence of I-MRS	0.051 (−0.084, 0.186)	0.563	0.455
Presence of I/O-MRS	−0.004 (−0.155, 0.147)	0.002	0.961
Presence of EP	0.177 (0.013, 0.341)	4.628	0.035
Presence of fRD	0.135 (−0.092, 0.361)	1.406	0.240
Presence of LMH	0.173 (0.019, 0.327)	4.991	0.028
EZ disruption	−0.137 (−0.257, −0.017)	5.135	0.026

BCVA: Best-corrected visual acuity; logMAR: Logarithm of the minimal angle of resolution; CFT: Central foveal thickness; AXL: Axial length; O-MRS: Outer macular retinoschisis; I-MRS: Inner macular retinoschisis; I/O-MRS: Inner and outer macular retinoschisis; EP: Epiretinal proliferation; fRD: Foveal retinal detachment; LMH: Lamellar macular hole; EZ: Ellipsoid zone; CI: Confidence interval.

more likely to have an improvement in BCVA after surgery.

We also observed the effect of ERM peeling in HM eyes without retinoschisis. In 17 eyes without MRS, the average AXL was 27.3±1.1 mm, the preoperative BCVA was 0.5±0.3 logMAR, and the final BCVA was 0.2±0.3 logMAR (P=0.001). Correlation analysis shows no significant relationship between AXL and final VA (P=0.950).

No statistical correlation was found between AXL and the mean logMAR BCVA or VA improvement.

DISCUSSION

The main findings of our study were that most patients with highly myopic eyes with ERM will achieve good visual and anatomical results after surgery. Although the eyes with longer AXL are more likely to have retinal structure damage, no significant association was found between AXL and final visual recovery. Miura *et al*[8] compared the outcomes after ERM surgery in the eyes with long AXL to those with normal AXL. They found no significant difference in the postoperative BCVA between the two groups at the final follow-up examination. However, previous studies mostly compare the surgical results between the myopic eyes with long AXL to those in the eyes with normal AXL. Those eyes with severe retinal structure damage were not enrolled in the studies.

We compared three groups of eyes with different AXLs and found that, in eyes with an AXL of 30.0 mm or greater, patients were older, more likely to develop I/O-MRS, and more susceptible to having photoreceptor damage and more fRD. Abnormalities of the vitreoretinal interface are considered the major cause of iERM[15]. Previous studies have found that myopia is a risk factor for developing ERM[16-17]. In HM eyes, the presence of vitreous liquefaction, vitreoschisis, peripheral retinal abnormalities, posterior staphyloma, and chorioretinal atrophy makes the vitreoretinal interface more complex in the macular area[18]. Apart from abnormal vitreomacular tractions and ERM contractions, longer AXL, and posterior staphyloma can also exacerbate the influence of these traction forces on HM eyes promoting the development of MRS, photoreceptor damage, LMH, MH, and fRD[19-21]. However, although the group with longer AXL suffered severe structural damage, there was no statistically significant difference in BCVA among the three groups.

After surgical removal of the ERM and abnormal vitreoretinal traction, the anatomical structure of most patients has been significantly improved. Despite some eyes developing retinoschisis-like features after the operation, we only conducted a statistical analysis on the postoperative recovery of patients who had MRS before surgery. Our research found that 90% of the cystoid spaces disappeared after ERM surgery in patients who only had I-MRS before surgery. I-MRS is more common in patients with shorter AXL. Previous literature has shown that the retinoschisis caused by axial elongation is mostly located in the outer nuclear layer, while these changes caused by ERM traction are mostly located in the inner nuclear layer[22-24]. Therefore, in eyes with shorter AXLs, the effect of axial elongation is relatively small, mostly due to damage caused by ERM contraction. After removing the traction between the vitreoretinal interface, including vitreous, ERM, ILM, and the damage to the retina is easier to recover. In eyes with longer AXL, in addition to the abnormal vitreoretinal interface, longer AXL, posterior staphyloma, and chorioretinal atrophy can also have impacts on the retinal structure which cannot be resolved through PPV surgery.

Our results demonstrate that the VA, after the ERM surgery, was improved by 77.6% of the HM-ERM patients. In eyes with 26–<28 mm, the BCVA was improved in 76.7% of the eyes, in highly myopic eyes with 28–<30 mm, the BCVA was improved in 81.8% of the eyes, and in eyes with ≥30 mm, the BCVA was improved in 72.7% of the eyes; this difference was not significantly different (P=0.863). The mean final BCVA was not significantly different among the three groups. Among eyes with no improvement in postoperative BCVA, 58.8% (10/17) belonged to Group A, 23.5% (4/17) to Group B, and 17.6% (3/17) to Group C. After excluding differences in follow-up time, we compared the baseline characteristics between the 59 eyes with postoperative BCVA improved and the 17 unimproved. We found that the eyes with BCVA unimproved had a better initial BCVA than those improved [0.4±0.3 logMAR (Snellen: 20/50) *vs* 0.6±0.4 logMAR

(Snellen: 20/80), *P*=0.019]. In addition, the proportion of baseline LMH was more frequent (41.1% *vs* 11.8%, *P*=0.011) in the eyes with postoperative BCVA unimproved. Although the proportion of patients without concomitant cataract surgery was relatively high in the eyes with BCVA unimproved, it did not reach a significant level (35.2% *vs* 15.2%, *P*=0.087). Our results indicated that visual improvement of the patients with good initial BCVA, and baseline LMH tends not to have satisfactory results after the operation.

PPV surgery was challenging in highly myopic eyes because of axial elongation, posterior staphyloma, strongly adherent hyaloid, and chorioretinal atrophy, which may cause difficulty in peeling ERM and ILM. The mechanical traction of removal of the strongly adherent hyaloid, ERM, and ILM off the fovea could induce a break of the macular tissue. Full-thickness MH is a serious complication after the vitrectomy in highly myopic eyes with a prevalence of 5%–21%[24-26]. In our study, only one patient presented with delayed onset MH after ERM surgery at 4mo. The study reported by Polito *et al*[26] also observed a similar situation. Because no recurrent traction was found, they speculated that the steep staphyloma and increasing tension on the inner retina over time led to neurosensory retina breaking after complete ILM peeling at the macula.

Our univariate linear regression analysis revealed that the baseline BCVA, the presence of EP, EZ integrity, and the presence of LMH (all *P*<0.05) were significantly correlated with the final BCVA. And after adjusting for other factors, BCVA and EP remains key factors affecting postoperative VA recovery. Baseline BCVA is a crucial factor influencing the final BCVA, which is consistent with the results in iERM patients[4-6]. The EP, which presents a chronic pathogenesis process, was commonly seen in lamellar MHs and full-thickness MHs, and was negatively associated with visual outcomes[14,27]. In this study, eyes with EP had a significantly worse BCVA than those without EP. To further investigate the independent factors that influence postoperative BCVA improvement, we conducted a binary logistic regression analysis, adjusting for potential confounding variables. Our analysis identified that the presence of LMH before surgery was a significant predictor of postoperative BCVA improvement. Eyes without LMH at baseline were more likely to have an improvement in BCVA after ERM peeling.

There are some limitations in this study. First, the study was limited by its retrospective design. Second, the patients enrolled in this study had different follow-up times. However, when analyzing the postoperative outcomes, we compared the follow-up time between the groups to ensure the comparability of the results. Third, 19.7% of the eyes did not undergo cataract surgery which could bias the results of visual recovery. Nevertheless, no significant difference in the percentage of combined cataract surgery rate was found between the eyes with or without VA improved. Finally, the sample size of the eyes studied was relatively small, especially those with AXL of 30.0 mm or more. Therefore, the results of our study should be evaluated by a large series of prospective case studies.

In conclusion, ERM surgery combined with ILM peeling can have visual and anatomical benefits for highly myopic eyes with different AXL. Highly myopic eyes with longer AXL results can also get satisfactory anatomical and functional outcomes comparable to those with shorter AXL. Attention should be paid to the occurrence of MHs during postoperative follow-up. The results of our study can help readers further deepen their understanding of the prognosis of this disease.

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