

MANAGEMENT OF LARGE IDIOPATHIC MACULAR HOLE WITH PARS PLANA VITRECTOMY AND MODIFIED MINIMAL ILM PEELING WITH SUPERIOR ILM FLAP

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Abstract

Introduction: Idiopathic macular hole is a neurosensory retinal discontinuity in the central area of the macula resulted from tractional forces on the foveola not related to other causes. Diagnosis and management of this condition requires knowledges, skills, and specific examinations to detect changes in the retina which is important for deciding the appropriate management.

Case Report: We present a case of 66-year-old man with idiopathic macular hole (IMH) in the right eye with initial best corrected visual acuity (BCVA) 20/1200. Fundus examination and optical coherence tomography (OCT) showed the presence of large full thickness macular hole with mean linear diameter 673 μm and posterior hyaloid still adhered to the optic nerve. The patient was managed with pars plana vitrectomy (PPV) surgery using modified minimal internal limiting membrane (ILM) peeling with superior ILM flap and SF6 gas tamponade. Two weeks after surgery OCT showed closure of the macular hole. BCVA at two and four weeks after surgery improved to 20/240 and 20/200 respectively.

Discussion: PPV with ILM peeling is one of the established procedures for IMH. Failure of macular hole closure with vitrectomy surgery or reopening of an initially closed holes may occur if the ILM was not removed due to ILM role as a scaffold for cell proliferation or attachment of contractile tissue that may create persistent vitreomacular traction. Variations of ILM peeling such as inverted ILM peeling has been used to improve rate of closure for large IMH and has showed favorable results both anatomically and functionally. Nowadays, to minimize the retinal microstructure damage caused by ILM peeling, new techniques intended to preserve the ILM for IMH was introduced. Minimal ILM peeling with superior ILM flap technique in this case was done to obtain MH closure with less microstructural retinal abnormalities and better visual outcomes.

Conclusion The management of large IMH with PPV and modified minimal ILM peeling with superior ILM flap in this case showed good results in both anatomical and functional outcomes.

Keywords: idiopathic macular hole, large, minimal ILM peeling, superior ILM flap

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INTRODUCTION

Macular hole (MH) is a neurosensory retinal discontinuity that develops in the central area of the macula. Most MHs are idiopathic, occurring at a rate of 8:100,000 persons/year. Idiopathic MH results from tractional forces on the foveola at the vitreoretinal interface not related to other causes.

Macular holes are more frequently found in females and usually happens in adults aged 55 years or older.¹⁻⁴

Generally, the patient will have symptoms such as metamorphopsia and decreased visual acuity. Some patients may experience progression to a central scotoma as the macular hole diameter enlarges. Classification system was first created by Donald Gass in the late 1980s, dividing idiopathic macular holes into four stages based on examination using contact lens biomicroscopy.¹⁻³ Currently, OCT can demonstrate alterations in the vitreomacular interface which is not apparent with biomicroscopy. OCT is now considered as the gold standard in diagnosing and also classifying macular holes.⁵

Diagnosis and management of MH requires knowledges, skills, and specific examinations to detect changes in the retina which is important for deciding the appropriate management.¹ Proper management is expected to prevent visual and functional impairment, improve visual function, and maintain or improve quality of life.¹⁻³

CASE REPORT

A 66-year-old male was referred to our vitreoretinal

clinic, complaining a painless loss of visual acuity in his right eye for the last 5 months with accompanying wavy vision. He had no remarkable history of systemic disease. At initial visit, the BCVA was 20/1200 in the right eye and 20/20 in the left eye. The anterior segments of both his pseudo phakic eyes were unremarkable. Fundus examination showed full thickness macular hole (FTMH) in the right eye with no Weiss ring. Optical coherence tomography (OCT) of right eye confirmed the presence of FTMH with mean linear diameter 673 μm with elevated edge and overlying operculum. The patient was diagnosed with large stage III idiopathic macular hole and then managed with 23 gauge, 3 ports pars plana vitrectomy surgery using modified minimal ILM peeling with superior flap. After performing a standard 23-gauge vitrectomy with additional triamcinolone acetonide, the ILM is stained using 0.5 mL Membrane Blue® (trypan blue ophthalmic solution 0.15%) dye for 60 seconds followed with immediate lavage. The ILM was then peeled away from the superior periphery towards the MH using intraocular forceps creating ILM flap in the superior retina. The edge of the ILM flap is hold and then inverted in order to cover the MH.

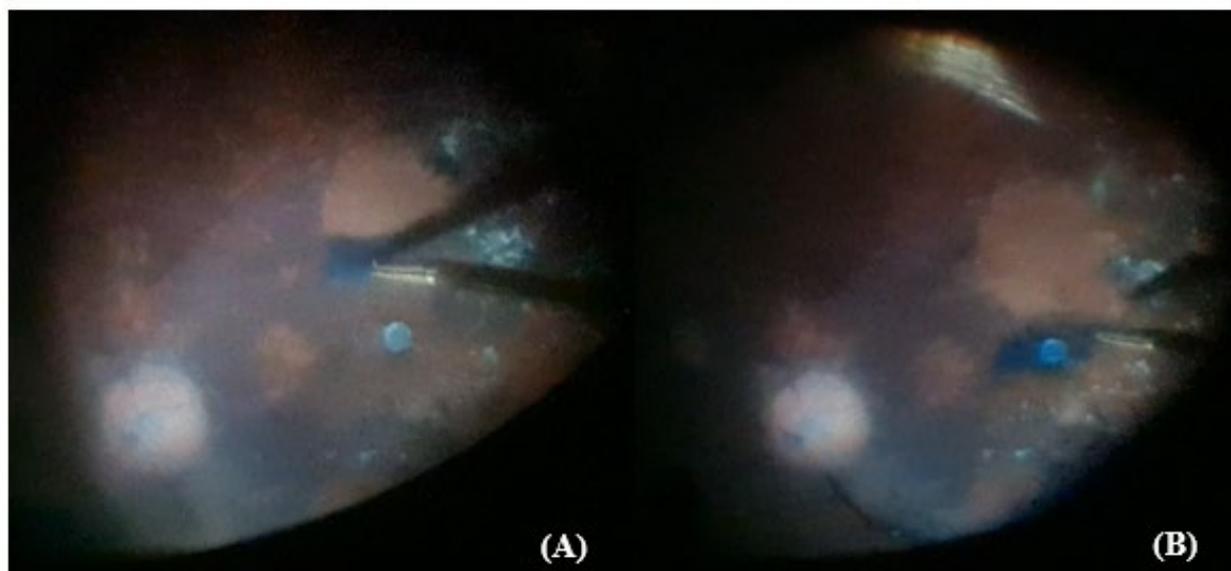


Figure 1. The ILM was peeled away from the superior periphery towards the MH using intraocular forceps, creating ILM flap. (A) The edge of the ILM flap was hold and then inverted in order to cover the MH. (B)

The peripheral retina then examined with scleral depression to identify any retinal breaks. Air-fluid exchange is done, and the vitreous cavity is filled with 20% sulfur hexafluoride (SF6) gas. Patient then suggested to stay in facedown position for 2 weeks. At 2 weeks follow up BCV improved to 20/240 and corresponding OCT showed closure of the MH. At 4 weeks follow up BCVA improved to 20/200.

The principle anatomic goal of the PPV for ensuring macular hole closure is to set apart the posterior cortical hyaloid from the macular surface.² Eckardt et al. in 1997 was the first to illustrate ILM peeling, which resulted in better closure rate for MH. In the management of MH, Soon et al. claimed 90% success rate with standard vitrectomy involving ILM peel and gas tamponade.⁷

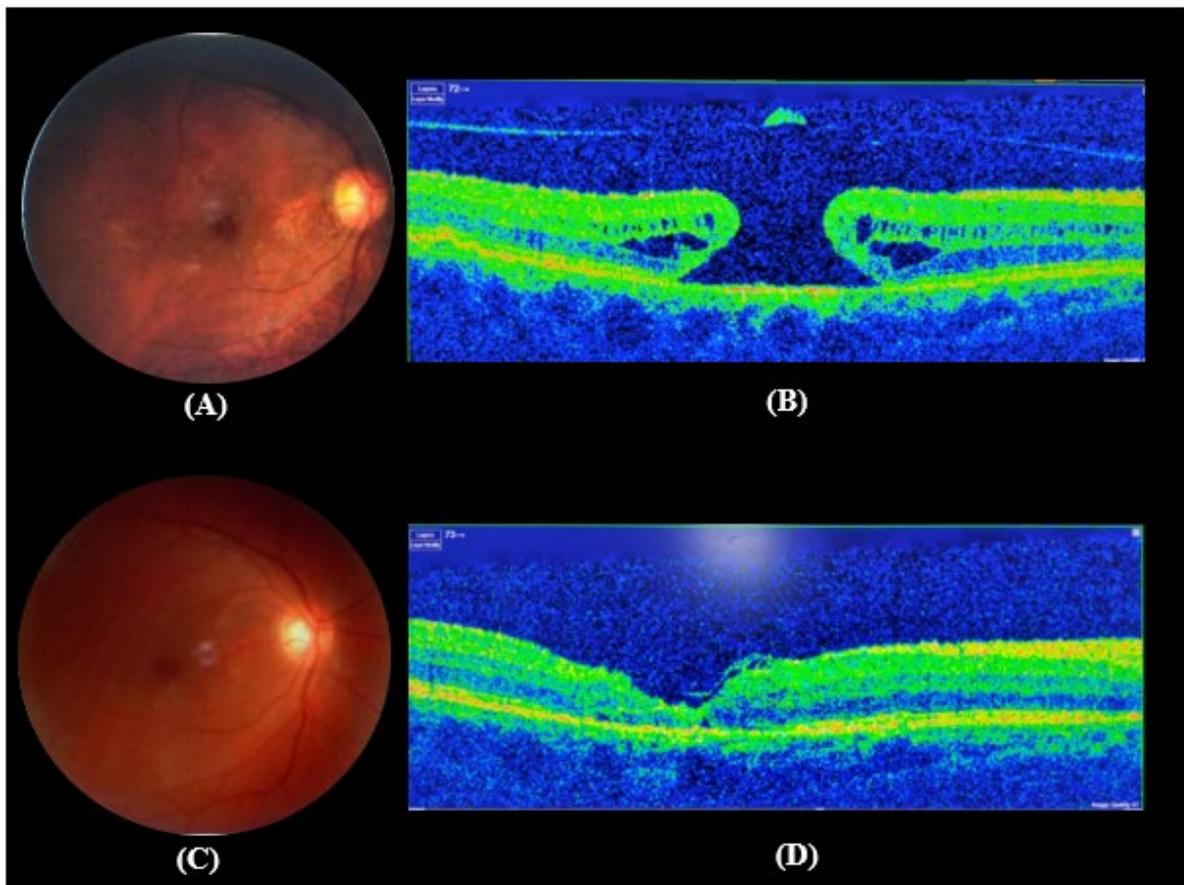


Figure 2. Preoperative fundus photo (A) and OCT (B) showing full thickness macular hole. At 2 weeks after surgery, postoperative fundus photo (C) and OCT (D) confirmed macular hole closure.

DISCUSSION

PPV surgery with additional ILM peeling, intraocular tamponade, and face down positioning remains the standard surgical approach in the management of IMH.⁶ Hirneiβ et al. reported 97% (57 of 59) patients achieved successful closure of MH 1 year after PPV surgery and significant improvements in both vision and quality of life.^{7,8}

ILM peeling has gained acceptance as one of the established procedures in IMH surgery.⁹ The ILM may act as a scaffold for cell proliferation or attachment of contractile tissue components that may create persistent traction in vitreomacular interface after vitrectomy. Therefore, failure of MH closure with the original vitrectomy surgery or reopening of an initially closed MH may occur if the ILM was not removed.

Spiteri et al. found that peeling of ILM compared with non-peeling in stage 2, 3, 4 IMH gives better anatomical success and reduced the need of additional surgical procedure. Besides, cost effective analysis also conclude that ILM peeling is more cost effective for the treatment of FTMH than non-peeling technique over a 6-month period.² Variations of ILM peeling, for instance inverted ILM peeling and ILM free flap are used by surgeons.⁷

ILM peeling is indeed favorable for closure of macular hole, mostly for those with large diameter, yet it may as well cause side-effects on the microstructure and function of the retina.^{9,10} The reported abnormalities of retinal microstructure after ILM peeling procedure include inner retinal dimplings, dissociated retinal nerve fiber layer (RNFL), and reduced parafoveal retinal thickness.¹¹⁻¹³ To minimize the damage of retinal microstructure caused by ILM peeling, new techniques aiming to preserve the ILM for IMH was introduced.^{14,15} A technique first reported by Michalewska et al., called the inverted ILM flap technique, has been reported to improve hole closure for large or chronic IMH.¹⁶ It is hypothesized that the inverted ILM flap may provide a scaffold for tissue proliferation. As a means to preserve the ILM and warrant IMH closure, minimal ILM peeling with ILM flap technique described by Zizhong Hu et al. has achieved favorable (100%) hole closure with better retinal microstructure (less inner retinal dimplings) and promising visual recovery for eyes with IMH.⁹

In this case, we chose to perform PPV with ILM peeling and ILM flap technique described by Zizhong Hu et al. with some modification where we did not make circular ILM peeling around the macula but just in the superior area. We also placed intravitreal SF6 gas to tamponade the macular hole. Overall, this technique may give advantages especially for new vitreoretinal surgeon by allowing

better learning curve and minimizing technical difficulties and complications associated with standard/extensive ILM peeling, while also preserving the retinal microstructure, ensuring easier MH closure, and improving the rate of closure for large macular hole.

CONCLUSION

In conclusion, the management of this patient's case showed good results in both anatomic and functional outcomes. Minimal peeling of the ILM may give better post operative retinal structure after surgery, while inverted ILM with superior flap make MH easier to close due to its function in acting as scaffold for glial cells to close the macular hole. However, longer follow up is needed to further corroborate the outcomes.

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