



Partial detachment of internal limiting membrane flap and spontaneous re-covering of macular hole by flap

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ARTICLE INFO

Keywords:

Inverted internal limiting membrane flap
Macular hole
Pars plana vitrectomy

ABSTRACT

Purpose: To report a case in which an internal limiting membrane (ILM) flap that was used to cover an idiopathic macular hole (MH) during pars plana vitrectomy (PPV) with the inverted internal limiting membrane flap technique partially detached from the retina. Most interestingly, the flap fell back spontaneously to re-cover the MH.

Observations: A 70-year-old woman presented with a full-thickness MH, and her vision was 20/400. She underwent PPV with an inverted ILM flap and air tamponade. When the intraocular gas was absorbed, the ILM flap detached but was held to the retina where it had not been peeled and the MH was open. Her visual acuity at this time was 20/400. The patient did not want further treatment and was followed by observation alone. At three months after the initial surgery, the ILM flap was noted to have spontaneously re-covered the MH, and her visual acuity improved to 20/200. At 6 months after the re-covering, the flap remained over the MH and the visual acuity remained at 20/200.

Conclusions and Importance: Surgeons should be aware that it is possible for an ILM flap created by the inverted ILM flap technique to partially detach from the retina after the tamponade gas is resorbed. Most importantly, the flap can return to re-cover the MH spontaneously.

1. Introduction

The recent advances of surgery for idiopathic macular holes (MHs) including the inverted internal limiting membrane (ILM) flap technique have increased the rate of primary closures.¹ The inverted ILM flap technique has been shown to be especially helpful in closing large and chronic MHs. It was suggested that the successful closure of a MH by the inverted ILM flap method was because the flap provided scaffolding for the proliferating and migrating glial cells.² However, the exact mechanism has still not been definitively determined.

We present a case in which the flap created during the inverted ILM flap technique partially detached from the retina, and the MH reopened. Most interestingly, with observation alone, the ILM flap fell back to re-cover the MH.

2. Case report

A 70-year-old woman reported metamorphopsia and blurred vision in her left eye of six months duration. A full-thickness MH was detected

by her previous doctor, and she was referred to Chiba University hospital for treatment. At our initial examination, her vision was 20/400 in the left eye with a refractive error of -2.0 diopters and intraocular pressure of 16 mmHg in the right eye and 17 mmHg in the left eye. She had mild cataract and a stage 3 MH in her left eye. The diameter of the MH was 630 μm which is a relatively large size (Fig. 1).

She underwent pars plana vitrectomy (PPV) combined with phacoemulsification and implantation of an intraocular lens with a 25-gauge system by one of the authors (TB). Brilliant blue G (ILM blue, DORC, Netherland) was used to make the ILM more visible, and the superior half of the ILM adjacent to the MH was peeled off the retina. The flap was hinged at the superior border of the macular hole. Then the ILM was folded over but not pushed into the MH, and fluid-gas exchange was performed to tamponade the flap against the retina. The patient was instructed to maintain face-down positioning for three days.

The coverage of the MH by the ILM flap was confirmed on post-operative day 3 by optical coherence tomography (OCT; Fig. 2a). However, the MH was noted in the OCT images to be open at two weeks after the surgery. The ILM flap was not covering the MH but remained

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<https://doi.org/10.1016/j.ajoc.2021.101089>

Received 25 February 2020; Received in revised form 29 March 2021; Accepted 5 April 2021

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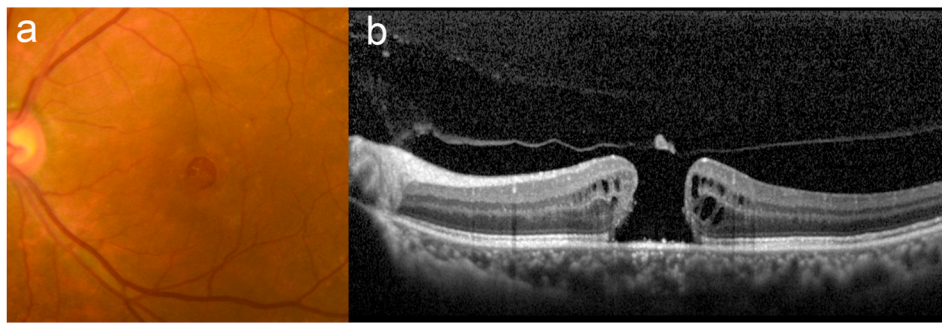


Fig. 1. Preoperative photograph and optical coherence tomographic image of a macular hole.

A stage 3 macular hole can be seen in the left eye of a 70-year-old Japanese woman. Her visual acuity was 20/400 (a). Optical coherence tomography (OCT) revealed a full-thickness macular hole with a diameter of 630 μm (b).

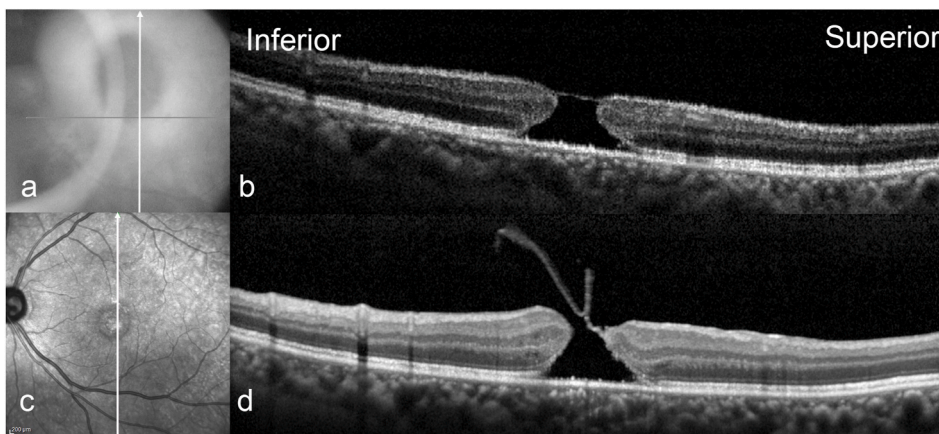


Fig. 2. Postoperative optical coherence tomographic (OCT) images of the retina following vitrectomy and inverted internal limiting membrane (ILM) flap.

The infrared (IR) fundus photograph at three days after the surgery. The white line indicates the location of the OCT image b. (a) The vertical OCT image through the MH shows the inverted ILM flap completely covering the hole (b). The IR fundus photograph at two weeks after the surgery. The white line indicates the location of the OCT image d. (c) The vertical OCT image shows the flap partially detached from the retina, and it does not cover the hole (d).

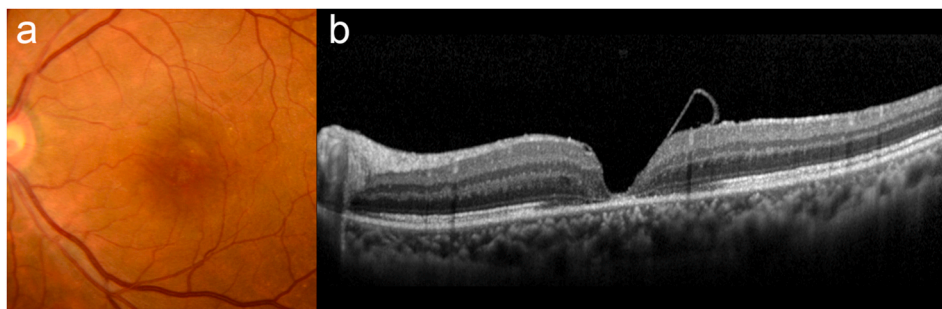


Fig. 3. The closed macular hole with an inverted internal limiting membrane (ILM) flap. The macular hole was closed spontaneously with gliosis at the base of the hole at three months after the surgery (a). Her visual acuity improved to 20/200 with a reduction of metamorphopsia. The horizontal optical coherence tomography (OCT) image showed the closure of macular hole covered with the ILM flap (b).

attached where it had not been peeled (Fig. 2b). Her BCVA was 20/400 at this time. We suggested a reoperation but the patient declined.

The patient was followed by observation alone, and at three months after the surgery, the detached flap had fallen back to completely close the MH. Her vision improved to 20/200 with a reduction of the metamorphopsia in her left eye (Fig. 3). At 6 months after the reclosing of the macular hole, the ILM flap was noted to completely cover the MH and her vision was stable as 20/200.

3. Discussion

Our results showed that the ILM flap, which is folded over an opened MH during the inverted ILM flap technique can detach from the retina after the gaseous tamponade is absorbed.¹ But most interestingly, the

flap can fall back and re-cover the opened MH, and the flap can remain over the MH for at least 6 months.

The original multi-layered ILM flap technique involved a peeling of the ILM, and the detached part of the ILM was pushed into the hole. More recently, the single-layer flap was just folded over the MH and the gas tamponade held it in place.³ It was expected that proliferative glial cells would then fix the flap to the retina. A better postoperative visual acuity has been reported in cases treated by the ILM cover than by the ILM insertion.⁴ The better acuity was suggested to be due to the deterring of the centripetal movement of photoreceptors by the ILM cover. Thus, the ILM covering the MH appears not only to close the MH but also to not obstruct the movement of the photoreceptors. Recently the usefulness of an autologous retinal transplantation was reported in 130 eyes with refractory and large MHs.⁵ For refractive MH which failed to be

closed by an inverted ILM flap, the autologous retinal transplantation might be beneficial.

The mechanism of how placing the ILM flap over the open MH leads to a permanent closure of the MH has not been conclusively determined. It has been suggested that the ILM flap acts as a bridge for the migration of glial cells into the MH.² In our case, it was not determined how the loose flap fell back to re-cover the MH, but we suggest that the loose flap may have fallen back while the patient was supine, e.g., sleeping, and the glial cells that had migrated into the hole had fixed the flap to the retina firmly. We suggest the use of a superiorly-hinged ILM flap because the flap may fall back by gravity and re-cover the hole even if the flap accidentally uncovers the MH during the postoperative period.

4. Conclusions

The inverted ILM flap that is created by the inverted ILM flap technique to close a MH can partially detach from the retina and float in the vitreous cavity attached to the retina only where it was not peeled. However, it can fall back to re-cover the MH within 3 months spontaneously. Thus, clinicians should be aware that a detached flap can spontaneously return to re-cover an open MH and surgery is not required.

Patient consent

The patient consented to publication of the case in writing.

Funding

No funding or grant support.

Authorship

All authors attest that they meet the current ICMJE criteria for

Authorship.

Declaration of competing interest

The following authors have no financial disclosures: YK, HY.

TB: personal fees from Bayer, Kowa, Santen, Senju, Alcon, grants and personal fees from Novartis, outside the submitted work.

SY: grants and personal fees from Santen, Jamecs, personal fees from Hoya, Pfizer, Senju, Alcon, Nidek, Kowa, Bayer, outside the submitted work.

Acknowledgements

The authors thank Professor Emeritus Duco Hamasaki of Bascom Palmer Eye Institute, University of Miami, FL, for providing critical discussions and suggestions to our study and editing of the final manuscript.

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