

Development of traumatic bilateral horseshoe-shaped macular tear without vitreous traction: Case report

Tsuyoshi Mito, Takeshi Joko, Atsushi Shiraishi

To report our findings in a case with bilateral horseshoe-shaped macular tears. Both eyes of a 68-year-old woman developed horseshoe-shaped macular tears in the absence of vitreous traction due to prior vitrectomy in one eye and a posterior vitreous detachment in the other eye. Vitrectomy with the inverted internal limiting membrane flap technique led to a successful closure of the macular tear bilaterally, and an improvement of her visual acuity in both eyes. The cause of horseshoe-shaped macular tear was most likely due to a retinal rupture from a blunt trauma.

Key words: Blunt ocular trauma, horseshoe-shaped macular tear, inverted internal limiting membrane flap technique, vitreous traction

Blunt ocular trauma can lead to retinal damage including preretinal and subretinal hemorrhages, peripheral retinal tears and dialysis, and macular holes (MHs). Several cases of an unusual tear called a "horseshoe-shaped macular tear" have been reported.^[1-4] These tears can be caused by blunt trauma that leads to a sudden traction by the vitreous on the retina leading to the macular tear. We report a case that had horseshoe-shaped macular tears bilaterally that developed without vitreous traction. The tears were successfully closed by vitrectomy using the inverted internal limiting membrane (ILM) flap technique.

Case Report

A 68-year-old woman suffered from physical abuse from her housemate often and had undergone vitreous surgery, lensectomy with removal of the lens capsule for a dislocated crystalline lens of the right eye at another hospital on August 2015. An intraocular lens was implanted and sutured because the lens capsule had been removed. No complications developed postoperatively and her visual acuity (VA) improved

to 20/25. Slit-lamp examination of the left eye just prior to the surgery on the right eye showed a mild cataract and the VA was 20/20.

Two years later in August 2017, she was referred to our hospital with a severe reduction of her vision in both eyes following a blunt ocular trauma. At the initial visit, her VA was light perception in the right eye and 20/2000 in the left eye, and the intraocular pressure was 6 mmHg in both eyes. Ophthalmoscopy revealed retinal dialysis and total retinal detachment in the right eye but the macula could not be assessed because of the overhanging retinal detachment [Fig. 1a]. Ophthalmoscopy of the left eye showed a dislocation of the crystalline lens and a horseshoe-shaped macular tear of approximately 2-disc diameters [DD; Fig. 1b].

She underwent intraocular surgery on the right eye, and a horseshoe-shaped macular tear of about 1 DD was found beneath the detached retina even though there had been no vitreal traction because of the earlier vitrectomy [Fig. 2a]. We performed the inverted ILM flap technique under perfluorocarbon liquid [PFCL; Fig. 2b and c] followed by silicone oil (SO) tamponade. We did not use a scleral buckle because of the lack of vitreous traction and proliferative changes on the retinal dialysis. We drained subretinal fluid from a newly created hole which was located outside the vascular arcade so as not to peel the residual macular ILM flap. Postoperatively, the macular hole (MH) was closed, and her VA improved to 20/400.

Two weeks later, she underwent vitreous surgery on the left eye, and a posterior vitreous detachment (PVD) was confirmed. A horseshoe-shaped macular tear was found even

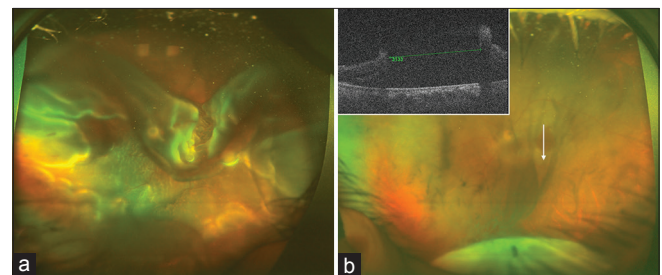


Figure 1: Preoperative fundus photographs of a 68-year-old woman who had horseshoe-shaped macular tears in both eyes. (a) Fundus photograph of the right eye showing retinal dialysis and total retinal detachment. The vitreous is liquefied because of an earlier vitrectomy. The macular area cannot be seen because of the overhanging retinal detachment. (b) Fundus photograph of the left eye showing a dislocated crystalline lens and horseshoe-shaped macular tear. Optical coherence tomographic image shows a retinal tear size of approximately 3133 μ m (white arrow)

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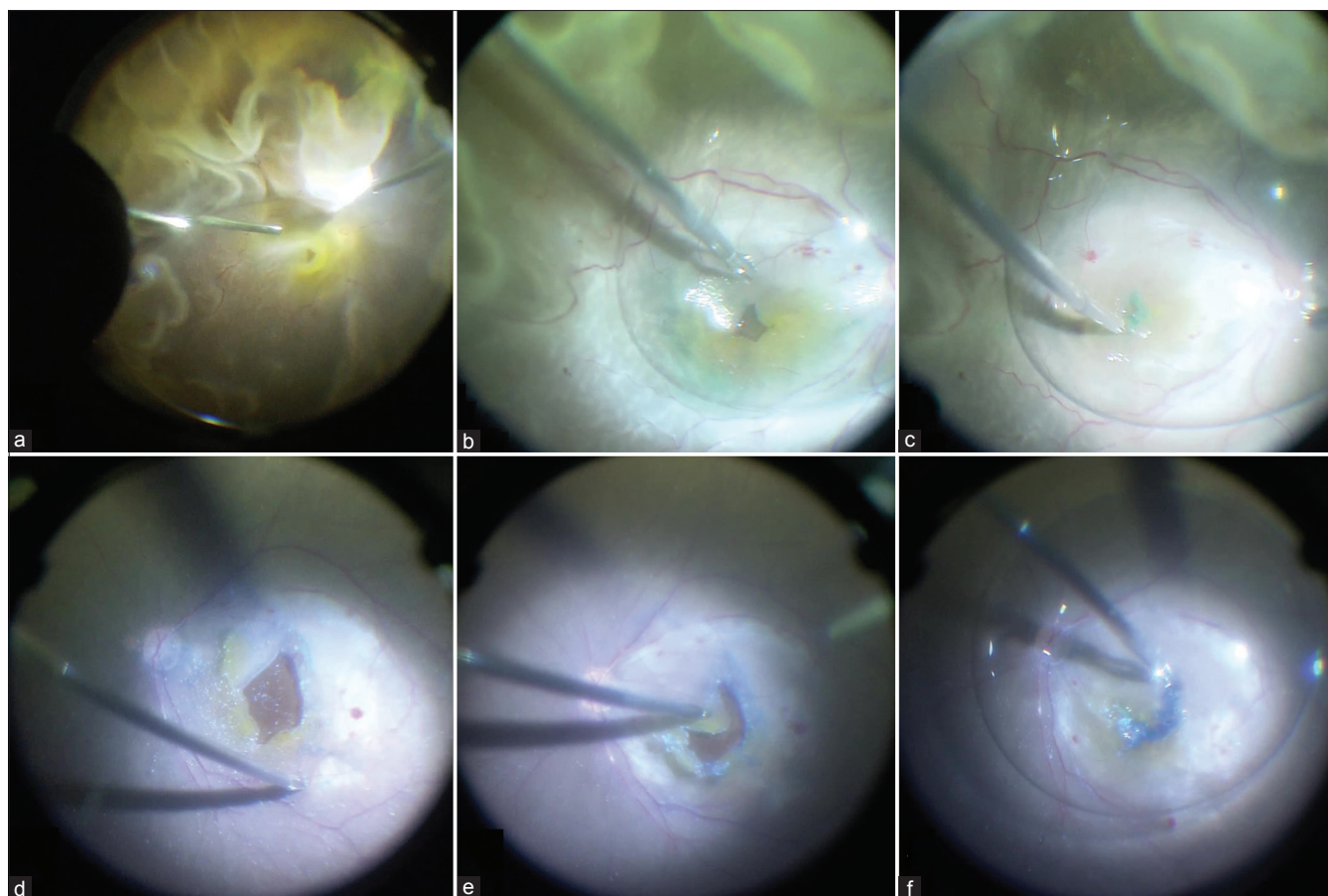


Figure 2: Intraoperative fundus photographs of both eyes. (a) Intraoperative photograph of the right eye showing total retinal detachment and horse-shoe-shaped macular tear. (b) The ILM flap was peeled. (c) Peeling the ILM allowed the retina to expand and the ILM flap was used to cover the tear. (d) Intraoperative findings of the left eye showing that a posterior vitreous detachment was already present, and there was no vitreous traction on the horseshoe-shaped tear. (e) Inverted ILM flap technique was performed with enough tissue to cover the tear. (f) Inverted ILM peeling under the perfluorocarbon liquid

though there was no vitreous traction on the flap because of the PVD [Fig. 2d]. The inverted ILM flap technique following brilliant blue G (BBG) staining under the PFCL was performed to close the macular tear [Fig. 2e and f]. Then, SO was injected to tamponade the retina. The SO was removed from both eyes 3 months later.

Optical coherence tomography (OCT) showed that the macular tears were closed [Fig. 3], and the VA had improved to 20/200 OD and 20/400 OS one year, postoperatively.

Discussion

Horseshoe-shaped macular tears are rare, and the size of the tear is usually relatively large at 0.75 to 1.5 DDs.^[1-4] It has been reported that severe traction by the vitreous on the retina leads to the macular tears in cases of branch retinal vein occlusion^[3] and idiopathic^[4] horseshoe-shaped macular tears. Karaca *et al.* suggested that asymmetrical vitreous traction on the macula might be responsible for the formation of horseshoe-shaped macular tears.^[1] Thus, the most likely cause of horseshoe-shaped macular tears is vitreous traction although only a few cases have been reported.

It is already known that a PVD does not develop in most of the traumatic MH patients.^[5] The main cause of a traumatic

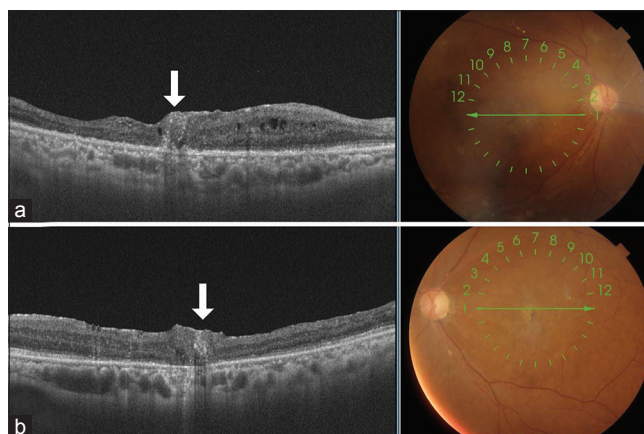


Figure 3: Fundus photograph and optical coherence tomographic image showing the macular tear closure with an internal limiting membrane flap (arrow) 1 year after the surgery. (a) Right eye. (b) Left eye

MH has been suggested to be a dehiscence of the fovea from an equatorial expansion or a stretching of the posterior pole by a blunt ocular trauma.^[6] In fact, Huang *et al.* reported that traumatic MHs are generally highly asymmetrical in shape with

jagged and irregular edges. The basal diameter in these MHs was larger than the typical circular idiopathic MH.^[7]

The traumatic horseshoe-shaped macular tears in our case occurred in the right eye that lacked the vitreal core because of an earlier vitrectomy, and the left eye that had a PVD. Thus, there was no traction on the retina by the vitreous in both eyes. We suggest that it is more likely that the blunt trauma caused a tear in a retina with dehiscence of the fovea.

The treatment for traumatic horseshoe-shaped macular tears has not been conclusively established. Karaca *et al.* reported a case of spontaneous closure of a macular tear,^[1] and Goel *et al.* reported a case of surgical intervention for the closure of a macular tear.^[2] The inverted ILM flap technique was recently recommended for the treatment for large traumatic MHs, and this technique led to 100% closure rate.^[8] We suggest that because a larger ILM flap was needed to cover the MH, this allowed the underlying retina to stretch more easily. The flap may have also acted as a scaffold for glial cell migration to close the MH.^[9] Thus, the inverted ILM flap technique may have functioned well for the horseshoe-shaped macular tear in our case. Furthermore, the PFCL-assisted procedure^[10] allowed the surgeons to manipulate the ILM during the detachment closure which could be helpful for the successful closure.

In conclusion, we report our findings in a case of bilateral traumatic horseshoe-shaped macular tears that developed without vitreous traction. The tears were most likely due to blunt trauma on an underlying retinal rupture at the macula. Our results showed that the inverted ILM flap technique can close the horseshoe-shaped macular tears.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published

and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

References

1. Karaca U, Durukan HA, Mumcuoglu T, Erdurman C, Hurmeric V. An unusual complication of blunt ocular trauma: A horseshoe-shaped macular tear with spontaneous closure. *Indian J Ophthalmol* 2014;62:501-3.
2. Goel N, Sharma R, Mandal M, Choudhry RM. Posttraumatic horseshoe-shaped macular tear. *Indian J Ophthalmol* 2014;62:1103-4.
3. Karim-Zade K, Bilgic A, Bartz-Schmidt KU, Gelissen F. Horseshoe-like macular tear following recurrent branch retinal vein occlusion. *Graefes Arch Clin Exp Ophthalmol* 2007;245:1221-3.
4. Kubota M, Shibata T, Gunji H, Tsuneoka H. Idiopathic horseshoe-like macular tear: A case report. *Int Med Case Rep J* 2016;28:219-22.
5. Yanagiya N, Akiba J, Takahashi M, Shimizu A, Kakehashi A, Kado M, *et al.* Clinical characteristics of traumatic macular holes. *Jpn J Ophthalmol* 1996;40:544-7.
6. Hirata A, Tanihara H. Ruptured internal limiting membrane associated with blunt trauma revealed by indocyanine green staining. *Graefes Arch Clin Exp Ophthalmol* 2004;242:527-30.
7. Huang J, Liu X, Wu Z, Sadda S. Comparison of full-thickness traumatic macular holes and idiopathic macular holes by optical coherence tomography. *Graefes Arch Clin Exp Ophthalmol* 2010;248:1071-5.
8. Abou Shousha MA. Inverted internal limiting membrane flap for large traumatic macular holes. *Medicine* 2016;95:e2523.
9. Michalewska Z, Michalewski J, Adelman RA, Nawrocki J. Inverted internal limiting membrane flap technique for large macular holes. *Ophthalmology* 2010;117:2018-25.
10. Okamoto Y, Okamoto F, Oshika T. Perfluorocarbon liquid-assisted membrane staining and peeling technique for macular diseases. *Jpn J Ophthalmol* 2018;62:592-7.