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Traumatic Macular Hole: A Case Series

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Abstract

***Purpose:** To report a case series of traumatic macular hole.*

***Case presentations:** Case A was a 64-year-old male patient with prior blunt injury in the left eye. One month after trauma, his best corrected visual acuity (BCVA) was 0.05. Spectral-domain optical coherence tomography (SD-OCT) showed full-thickness macular hole (FTMH) with a narrowest diameter of 125 μm. The patient was treated by par plana vitrectomy in 23 gauge, lower semi-circular internal limiting membrane (ILM) peeling near lower part of FTMH, FTMH covered by upper semi-circular inverted flap of ILM, and C_3F_8 15% flushing. At the last follow-up, His BCVA improved to 0.1. The FTMH closed with foveal ellipsoid zone disruption. Case B was a 41-year-old male patient. His initial BCVA was counting finger. The FTMH presented after trauma with narrowest hole diameter of approximately 62.5 μm. After one-month follow-up, his BCVA increased to 0.1. Spontaneous closure of traumatic macular hole was found. Case C was a 10-year-old boy with right ocular blunt injury. The initial BCVA was light perception. The anterior segment examination showed total hyphema. After hyphema resolved, a FTMH was discovered. The parents of the child refused operational treatment and lost follow-up. Case D was a 32-year-old male patient with right ocular blunt injury and subsequent full-thickness scleral laceration with uvea incarceration. The initial BCVA was counting finger. Repair of the sclera laceration was performed. After the operation, a FTMH was discovered. But the patient refused the further intervention. The FTMH persisted and enlarged.*

***Conclusions:** Variable ages, etiologies, morphologies on SD-OCT, and clinical outcomes were observed in our case series of traumatic FTMH. Spontaneous closure or persistent opening of traumatic FTMH may occur. Small-gauge vitrectomy combined with ILM semi-circular inverted flap technique was useful to facilitate closure of traumatic macular hole.*

Keywords: *trauma; full-thickness macular hole; vitrectomy; internal limiting membrane peeling.*

Introduction

Macular hole is one of the complications secondary to trauma. Spontaneous closure or persistent opening of such holes can be found. We presented 4 cases of traumatic macular hole with different outcomes.

Case Presentation

Case A

A 64-year-old male patient with old central serous chorioretinopathy was treated by macular focal laser and subsequent photodynamic therapy 6 years ago in

the left eye. He suffered from left ocular blunt injury. His systemic medical history was unremarkable. The initial best-corrected visual acuity (BCVA) was 0.2 in the left eye. The intraocular pressure was 32.5 mm Hg. The anterior segment examination showed shallow anterior chamber with microscopic hyphema. Fundus examination was blurred. Following three-day topical hypotensive agents, the intraocular pressure was below 20 mm Hg. Spectral-domain optical coherence tomography (SD-OCT) showed foveal outer nuclear loss and ellipsoid zone disruption (Fig. 1A). His BCVA was still 0.2. One month after trauma. His best corrected visual acuity (BCVA) decreased to 0.05. Full-thickness macular hole (FTMH) with about 375 µm in base diameter and 312.5 µm in apex diameter was discovered on the SD-OCT. The narrowest hole diameter was approximately 125 µm (Fig. 1B). Cystic changes around macular hole were obvious. The patient underwent par plana vitrectomy in 23 gauge, lower semi-circular internal limiting membrane (ILM) peeling near lower part of FTMH, FTMH covered by upper semi-circular inverted flap of ILM, and C_3F_8 15% flushing (Fig. 1C). At the last follow-up, His BCVA improved to 0.1. The FTMH closed with foveal ellipsoid zone disruption (Fig. 1D).

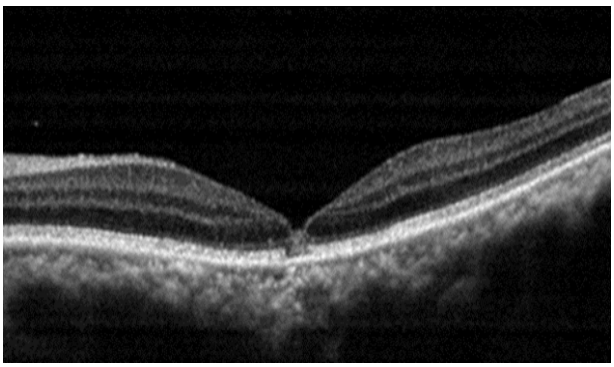

Figure 1A. *Spectral-domain optical coherence tomography showing outer nuclear loss and ellipsoid zone disruption in Case A*

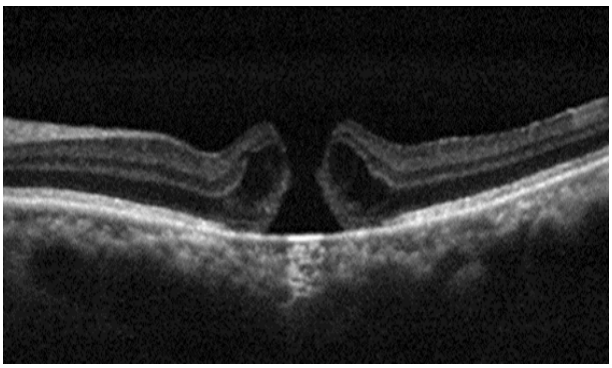

Figure 1B. *One month after trauma, a full-thickness macular hole discovered in Case A*

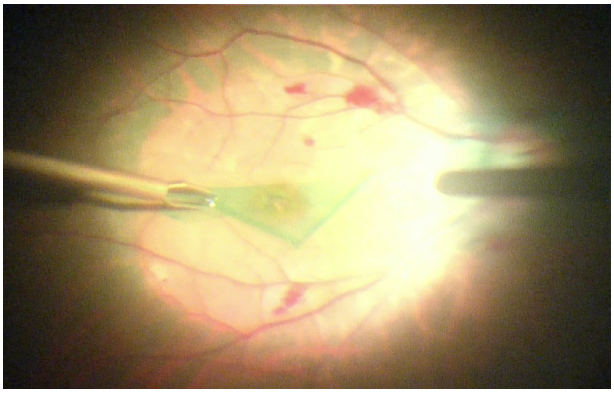

Figure 1C. *Lower semi-circular internal limiting membrane peeling near lower part of full-thickness macular hole and the hole covered by upper semi-circular inverted flap of internal limiting membrane in Case A.*

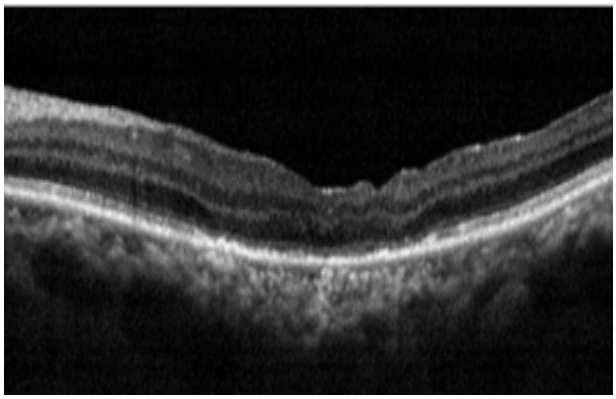

Figure 1D. *Closure of the traumatic macular hole with foveal ellipsoid zone disruption after the surgery in Case A.*

Case B

A 41-year-old male patient without underlying disease presented to emergency department with left ocular blunt injury by grinding wheel. The initial BCVA was counting finger. The intraocular pressure was 14 mm Hg. The anterior segment examination showed mild upward drift of the pupil. Fundus examination showed berlin's edema with macular hole. SD-OCT revealed FTMH with approximately 500 µm in base diameter and 125 µm in apex diameter (Fig.2A). The narrowest hole diameter was approximately 62.5 µm. No cystic change around the hole was noted. After one-month follow-up, his BCVA increased to 0.1. Spontaneous closure of traumatic macular hole, foveal outer nuclear loss, and foveal ellipsoid zone disruption were found (Fig. 2B). His BCVA further improved to 0.16 three months later.

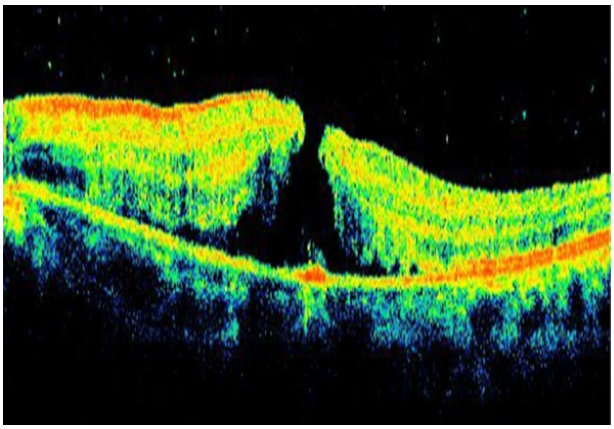

Figure 2A. *A trauma full-thickness macular hole discovered in Case B*

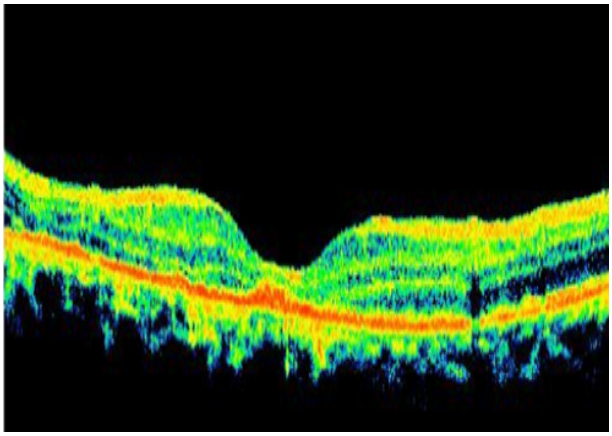

Figure 2B. *Spontaneous closure of traumatic macular hole, foveal outer nuclear loss, and foveal ellipsoid zone disruption found in Case B*

Case C

A 10-year-old boy without underlying disease came to emergency department with right eye hit by baseball. The initial BCVA was light perception in the right eye. The intraocular pressure was 25 mm Hg. The anterior segment examination showed central corneal epithelial defect and total hyphema. Ultrasonography showed no vitreous opacity or retinal detachment. Following use of topical hypotensive agents, the hyphema resolved gradually and intraocular pressure returned to normal level one week later. His BCVA increased to 0.3. SD-OCT showed the presence of a FTMH with approximately 125 μm in base diameter and 41 μm in apex diameter (Fig. 3). The parents of the child refused operational treatment and lost follow-up.

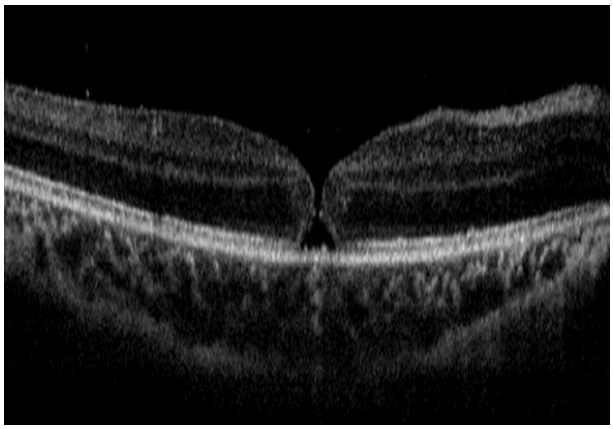

Figure 3. A trauma full-thickness macular hole noted in Case C, a 10-year-old boy

Case D

A 32-year-old male patient presented with right ocular blunt injury. The initial BCVA was counting finger in the right eye. The intraocular pressure was 12 mm Hg. The anterior segment examination showed a 3.5-mm full-thickness scleral laceration at 2 o'clock direction near cornea and with uvea incarceration. Microscopic hyphema was noted. Repair of the sclera laceration was performed. After the operation, ultrasonography showed vitreous hemorrhage. After 2-week follow-up, vitreous cavity and anterior chamber were clear, but his BCVA was still counting finger. The presence of a FTMH was found on SD-OCT with approximately 187.5 μm in base diameter and 125 μm in apex diameter (Fig. 4A). The patient refused the further intervention. The FTMH persisted and enlarged (Fig. 4B).

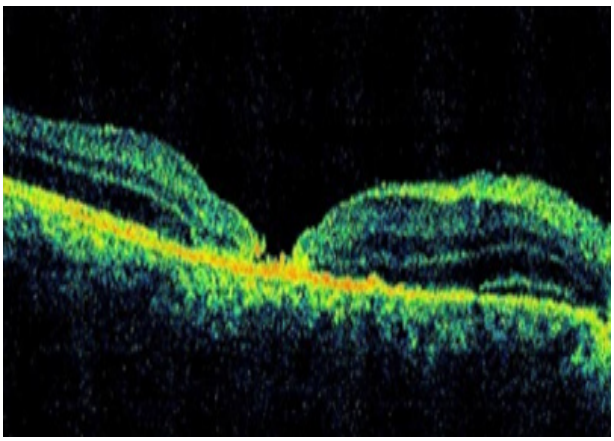

Figure 4A. *A traumatic macular hole found in case D*

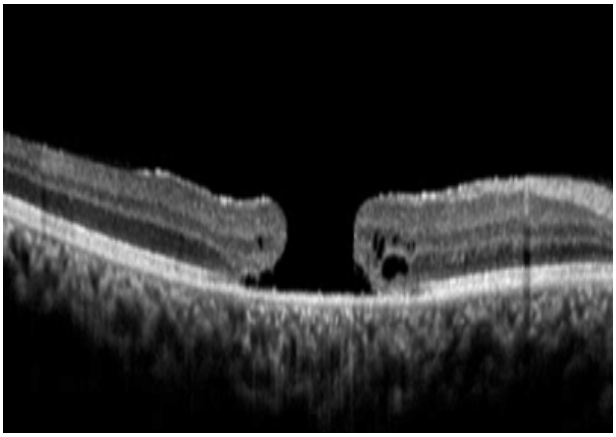

Figure 4B. *A traumatic macular hole found in case D persisted and enlarged after follow-up*

Discussion

In contrast to idiopathic macular holes, traumatic macular holes arise from a sudden extrinsic force, often blunt trauma, creating dynamic forces within the sclera and vitreous. Thus, traumatic macular hole occurred more often in the closed globe than in open globe injuries (1.4% of closed globe injuries and 0.15% of open globe injuries).[1,2] In our case series, 3 of the patients had closed globe injury and 1 had open globe injury, which were compatible with previous records.

There were 5 classifications of traumatic FTMH according to the morphologies on SD-OCT, including presence of cystic edema on the margin of the hole or not, submacular fluid or not.[3] In these 4 cases, some cases had cystic changes on the margin the hole, but someone not. One case had submacular fluid, and others not. They also found the duration of traumatic FTMH (from injury to presentation) was positively correlated with the retinal thickness. The cases with duration less than 90 days, the hole largely did not have cystic edema, but cystic edema around the hole mostly occurred in those more than 90 days. They postulated the progressively vitreous degeneration and traction on the hole happened following trauma. In Case A and D, we also observed the cystic space on the margin of the hole enlarged during follow-up.

Previous case series reports had shown spontaneous closure of traumatic macular hole could occur in more than 90% of the cases within 6 months.[1,2,4] They have shown, patients less than 24 years of age or with macular hole less than 0.2 disc diameters had the best chance of achieving spontaneous traumatic FTMH closure, especially when the hole was not complicated by other severe ocular injuries. About morphologies of macular hole, Chen and associates demonstrated absence of intraretinal cyst on SD-OCT could predict spontaneous closure of traumatic macular hole. In this article, spontaneous closure of traumatic FTMH was noted in the case B. Although the patient was 41 years old, the hole still closed spontaneously. It may be attributed to simple ocular injury, the small narrowest hole diameter, and absence of intraretinal cyst.

Currently, there is no standard treatment protocol for traumatic macular hole.[1,2,4] Important factors such as age, hole size, other ocular complication, should be considered. If the patients more than 24 years of age, with macular hole more than 0.3 disc diameters, complicated by other severe ocular injuries (such as retinal detachment), or with intraretinal cyst around the hole, the surgical intervention was suggested. Moreover, younger patients have strong adhesions of vitreous and retina—presenting a surgical risk. Thus, it may be better to observe such patients, but for no more than 6 months. If (1) symptoms persist, (2) the macular hole enlarges, or (3) the BCVA declines continuously during the observation period, it is also best to terminate observation and perform surgery.

Vitrectomy with circular ILM peeling have been widely used for idiopathic or myopic macular hole with great hole closure rate and visual improvement. Two modified techniques were introduced subsequently. The classic inverted ILM flap pushed remnant ILM on the edge of the hole inside the FTMH using the soft tipped cannula. The temporal (in prior study) or superior (in this study) inverted ILM flap technique removed semi-circular ILM, and lifted the other half ILM to cover the FTMH. A large series comparative study found the closure rate of simple ILM peeling was 78.75%, which was lower than that of classic inverted flap technique as 91.93% in idiopathic or myopic FTMH.[5] Abou reported 12 eyes with large traumatic macular hole all successfully closed following vitrectomy with classic inverted ILM flap.[6] Michalewska and coauthors conducted a prospective comparative study including 87 eyes with idiopathic FTMH. The result indicated that the temporal inverted ILM flap technique was as effective as the classic inverted ILM flap technique for the repair of large idiopathic FTMH, all having 100% closure rate.[7] In Case A, we performed vitrectomy with upper semi-circular inverted ILM flap technique

to repair traumatic FTMH. The macular hole closed successfully.

In conclusion, variable ages, etiologies, morphologies on SD-OCT, and clinical outcomes were observed in our case series of traumatic FTMH. Spontaneous closure or persistent opening of traumatic FTMH may occur. Small-gauge vitrectomy combined with ILM semi-circular inverted flap technique was useful to facilitate closure of traumatic macular hole.

References

[1] Gao M, Liu K, Lin Q, Liu H. Management Modalities for Traumatic Macular Hole: A Systematic Review and Single-Arm Meta-Analysis. Curr Eye Res 2017 Feb;42(2):287-296.

[2] Johnson RN, McDonald HR, Lewis H. Traumatic macular hole: observations, pathogenesis, and results of vitrectomy surgery. Ophthalmology 2001 May;108(5):853-7.

[3] Huang J, Liu X, Wu Z, Lin X, Li M, Dustin L, Sadda S. Classification of full-thickness traumatic macular holes by optical coherence tomography. Retina 2009 Mar;29(3):340-8.

[4] Haoyu Chen, Weiqi Chen, Kangken Zheng. Prediction of spontaneous closure of traumatic macular hole with spectral domain optical coherence tomography. Sci Rep 2015; 5: 12343.

[5] Rizzo S, Tartaro R, Barca F, Caporossi T, Bacherini D, Giansanti F. Internal limiting membrane peeling versus inverted flap technique for treatment of full-thickness macular holes: A comparative study in a large series of patients. Retina 2017 Dec 8. doi: 10.1097/IAE.0000000000001985. [Epub ahead of print]

[6] Abou Shousha MA. Inverted internal limiting membrane flap for large traumatic macular holes. Medicine (Baltimore) 2016 Jan;95(3):e2523.

[7] Michalewska Z, Michalewski J, Dulczewska-Cichecka K. Temporal inverted ILM flap technique versus classic inverted ILM flap: a comparative study. Retina 2015 Sep;35(9):1844-50.

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