Anterior Lens Capsule Flap Transplantation for the Management of Refractory Large Macular Hole: A Case Report

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Running title: Anterior capsule graft for refractory macular hole

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Dear Editor,

Kelly and Wendel [1] first introduced vitrectomy to treat macular holes (MHs) in 1991, and Eckardt et al. [2] reported internal limiting membrane (ILM) peeling during MH surgery in 1997. Currently, the primary surgical treatments for MH are pars plana vitrectomy (PPV), ILM peeling, and gas tamponade. Although the primary hole closure rate reaches more than 90% with current methods, the failure rate is much higher in cases with high myopia, chronic MH, non-idiopathic condition or large MH, defined as a hole diameter bigger than 400 µm [3]. Recently, Ch’ng et al. reported a closure rate of 76% in MHs > 650 µm [4]. Various secondary surgical options have been proposed for recurrent and persistent MHs, such as additional ILM peeling, ILM flaps, and lens capsule transplantation [3]. Chen and Yang [5] demonstrated lens capsular flap transplantation to treat refractory MH and showed hole closure and visual improvement. Herein, we report a case of refractory large MH successfully treated with anterior capsular flap transplantation after a failed primary surgery. Informed consent for the publication of this case report and relevant images was obtained from the patient.

A 66-year-old female patient presented with metamorphopsia and decreased vision in her left eye for more than one week. She had well-controlled diabetes and hypertension as underlying diseases. Her best-corrected visual acuity (BCVA) was 20/20 in the right eye and 20/1000 in the left eye. The intraocular pressure was 14 mmHg in both eyes. The anterior segment examination was unremarkable, and she had mild cataracts in both eyes. Fundus examination revealed full-thickness MH in the left eye (Fig. 1A). On optical coherence tomography (OCT) scans, the MH size was 694 µm at the minimal diameter and 1276 µm at the base diameter (Fig. 1B). To treat a large MH, PPV, ILM peeling, and intravitreal injection of 10% C3F8 were performed under local anesthesia by KWB. During the operation, the ILM was stained with 0.05% indocyanine green (Pulsion Medical Systems AG, Munich, Germany) and was widely removed up to the major arcades. Postoperatively, we recommended maintaining the head-down position for one week. One month postoperatively, the MH was still not closed (Fig. 1C-1D), and a second operation was conducted after a thorough and careful discussion with the patient. We considered autologous anterior capsular flap transplantation to close the refractory MH. Under local anesthesia, phacoemulsification and posterior chamber intraocular lens insertion was first performed. An anterior capsule flap was obtained during cataract extraction (Fig. 1E) and introduced into the vitreous cavity by ILM forceps (Fig. 1F). While positioning the capsular graft on the MH, the infusion was temporarily turned off to ensure that the flap did not dislocate from the intended position. In addition, a small amount of Discovisc (hyaluronic acid 1.6%–chondroitin sulfate 4.0%, Alcon Laboratories, Fort Worth, TX, USA) was injected around the MH to secure the graft in place (Fig. 1G). After transplantation, fluid-air exchange was carefully performed to avoid displacing the flap until the end of the
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operation (Fig. 1H). Finally, surgery was completed after an intravitreal injection of 14% C₃F₈ (Supplementary Video 1). Postoperatively, the patient was asked to maintain a head-down position for one week. Complete hole closure was validated by OCT scans 1 month after the second operation (Fig. 1I-1J). Three months after the capsule graft operation, her BCVA improved to 20/40 in the left eye, and the MH remained closed. Notably, significant recovery of the outer retinal layer of the fovea, including the external limiting membrane, ellipsoid zone, and interdigitation zone, was observed on the OCT images.

In conclusion, we reported a case of refractory large MH that was successfully treated with anterior capsule flap transplantation. To the best of our knowledge, this is the first report of a refractory large macular hole successfully treated with reoperation using an anterior lens capsule graft in Korea. Our case suggests that despite initial surgical failure, subsequent intervention has the potential to yield anatomically and functionally satisfactory improvement, thereby offering a favorable prognosis. Autologous anterior capsular flap transplantation is an effective treatment option for refractory MH.
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Fig. 1. Findings of the left eye of a patient with macular hole (MH). (A) At the first visit, fundus photograph shows full-thickness MH. (B) Optical coherence tomography (OCT) reveals that the MH size is 694 µm in a minimal diameter and 1276 µm in a base diameter. (C) One month after pars plana vitrectomy, internal limiting membrane (ILM) peeling, and intravitreal injection of 10% C3F8, fundus photograph shows that the MH has not closed, and (D) MH size is 656 µm in a minimal diameter and 1167 µm in a base diameter on OCT. For refractory MH, anterior capsular flap transplantation is performed. (E) An anterior capsule flap is obtained during the cataract extraction (white arrow) and (F) introduced into the vitreous cavity by ILM forceps. (G) A small amount of viscoelastic is injected around the MH to secure the graft in place (white arrow). (H) After fluid-air exchange, the anterior capsule flap is in situ. (I, J) One month after the second operation, fundus photograph and OCT shows closure of the MH.