Autologous Sensorial Retinal Transplantation for the Treatment of Degenerative Myopia Related Retinal Detachment with Giant Macular Hole and PVR

Gökçen Deniz Gülpınar İkiz[1], Ece Özdemir Zeydanlı[2], Şengül Özdek[3]

ABSTRACT

In this case report, we aimed to present the autologous sensorial retina transplantation technique and its result in the treatment of recurrent retinal detachment due to giant macular hole in a patient with degenerative myopia. This was a 34-year-old female patient who had vitreoretinal surgery using silicone oil tamponade twice for recurrent retinal detachment associated with degenerative myopia in the left eye in elsewhere. She was referred to our clinic for recurrent retinal detachment with silicone oil bubble in the anterior chamber and subretinal bands and PVR under the silicone oil. Retina totally detached after silicone oil removal and a giant macular hole become apparent. Following removal of the dense PVR membranes and thick subretinal bands and the shortened retina was relaxed with temporal retinotomy. A piece of autologous sensorial retina graft was prepared from the retinotomy site and put into the macular hole area to seal it. Silicone oil was used as tamponade, and it was removed at the 3rd postoperative month. Following removal of silicone oil, retina stayed attached, the hole was closed, and visual acuity increased to 0.05 at the 6th postoperative month. In conclusion, autologous sensorial retina graft may be a practical, cost-effective and long-term solution for the treatment of recurrent retinal detachment due to giant macular hole in degenerative myopic eyes.

Key words: Degenerative myopia, giant macular hole, autologous sensorial retina graft

BACKGROUND

Treatment of Macular holes (MH), secondary to degenerative myopia has been challenging. Retinal detachment (RD) can be encountered often, which complicates the scenario and leads to poor surgical and visual outcomes, requiring successive interventions[1,2]. Pars plana vitrectomy (PPV) is the cornerstone for the surgical approach to these cases, which can be supported by macular buckles[3,4]. There are certain particular techniques to improve the surgical outcomes for successfull close of MHs. The most common among these, is the use of internal limiting membrane (ILM) flaps[5]. However, it is much more harder than usual to peel the ILM in the eyes with degenerative myopia, due to the advanced choroidal atrophia, extra thin retina, decreased contrast and consequent inequate visualisation. Moreover, these flaps often can not provide adequate tissue for the closure of giant MHs. Greval and Mahmood proposed the utilisation of autologous sensorial retinal graft (ASRG) as a potential alternative for these challenging cases[5]. They also published the satisfactory long- term and multicenter results of this technique[6]. Our aim is to present the efficacy and long-term results of the use of ASRG when dealing with a degenerative-myopic eye, with giant MH and consequent recurrent RD and proliferativvitreoretinopathy (PVR).

CASE PRESENTATION

A 34-year-old female patient, followed up for degenerative

1 Private Eye Clinic, Ankara, Türkiye
2 Bilkent City Hospital, Ankara, Türkiye
3 Gazi University Hospital, Ophtalmology Department, Ankara, Türkiye

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Correspondence author:
Gökçen Deniz Gülpınar İkiz
Email: gokcengulpinar@hotmail.com

myopia, presented to our clinic with recurrent retinal detachment. The patient's history revealed that she had undergone phacoemulsification combined with pars plana vitrectomy (PPV) and silicone oil tamponade for RD in her left eye at an external center one year prior. Following silicone oil removal at the 5th postoperative month, recurrent RD developed, and a second surgery was performed. At the one-month follow-up, recurrence under the silicone oil was detected, and it was stated that no further surgery could be performed, and the patient was referred to our clinic. On ophthalmological examination, visual acuity (VA) in the right eye was 0.5 with -17.0 -1.00x80, while it was Hand Motions (HM) in the left eye. Anterior segment examination revealed a normal right eye, while an anterior chamber intraocular lens was present in the left eye, with silicone oil filling ½ of the anterior chamber. Fundus examination revealed a tigroid retina and 360-degree peripheral laser scars in the right eye. In the left eye, the retina was very dimly illuminated, with shallow detachment under the silicone oil and peripheral laser scars. Revision surgery under general anesthesia was recommended for this eye. During surgery, after silicone oil removal, the retina was found to be totally detached, with a giant tear of 2 optic disc diameters in the macula, 360-degree retinectomy scars, and widespread preretinal and subretinal bands. After all PVR membranes were peeled with the aid of dyes, the retina was found to be shortened, and the subretinal bands were preventing it from settling. Bimanual maneuvers were attempted to remove the membranes through a small retinotomy, but they were too tightly adhered to the retina to be peeled. Therefore, a wide retinotomy was created from the temporal periphery to achieve full access to the posterior surface of the retina, allowing these thick subretinal membranes to be peeled. Due to the existing peripheral retinotomy, a full-thickness ASRG was created from the temporal periphery. A free graft, prepared to be slightly larger than the hole, was placed into the macular hole. Endolaser was applied posterior to the retinotomy-retinectomy area. The surgery was terminated after a fluid-air-silicone oil exchange. In the postoperative period, the retina was attached, and visual acuity was counting fingers at 50 cm (Figure 1A&B). 3 months following silicone oil removal, the retina remained attached, and visual acuity reached 0.05 on postoperative 6th month. At the two-year follow-up, vision remained stable, and OCT showed that MH was completely closed by the ASRG was fully integrated into the retina at the edges (Figure 2A-C).

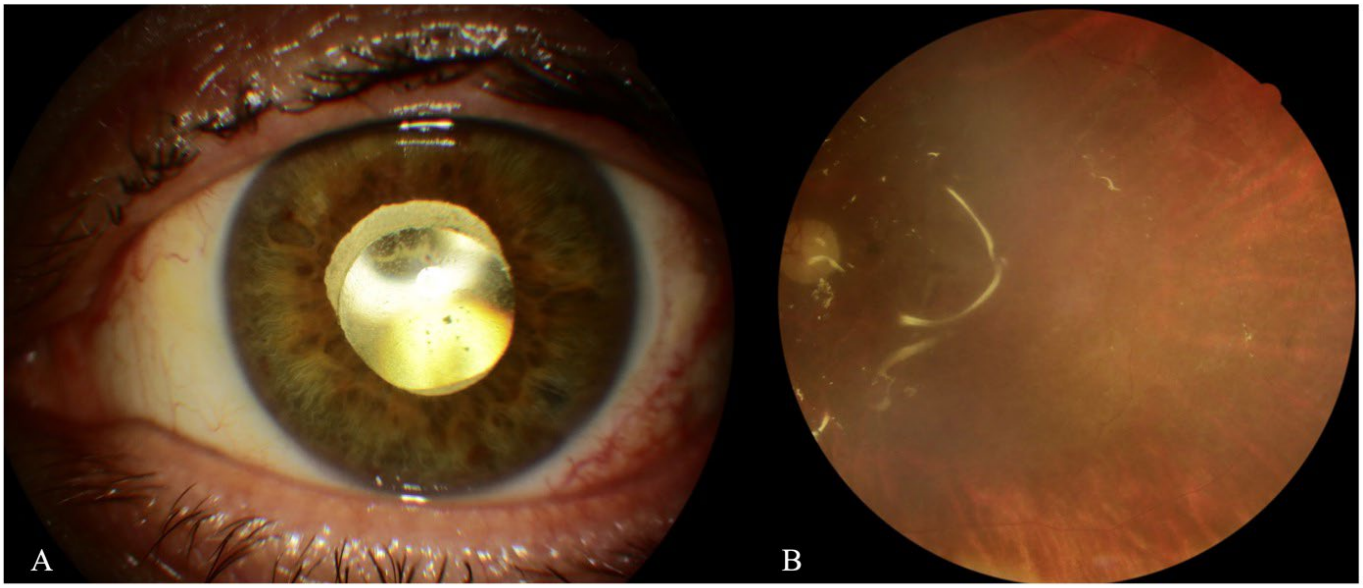

Figure 1 *A: Left eye, postoperative 1st month anterior segment; IOL central. B: Postoperative 3rd month; retina attached under SiO, hole closed.*

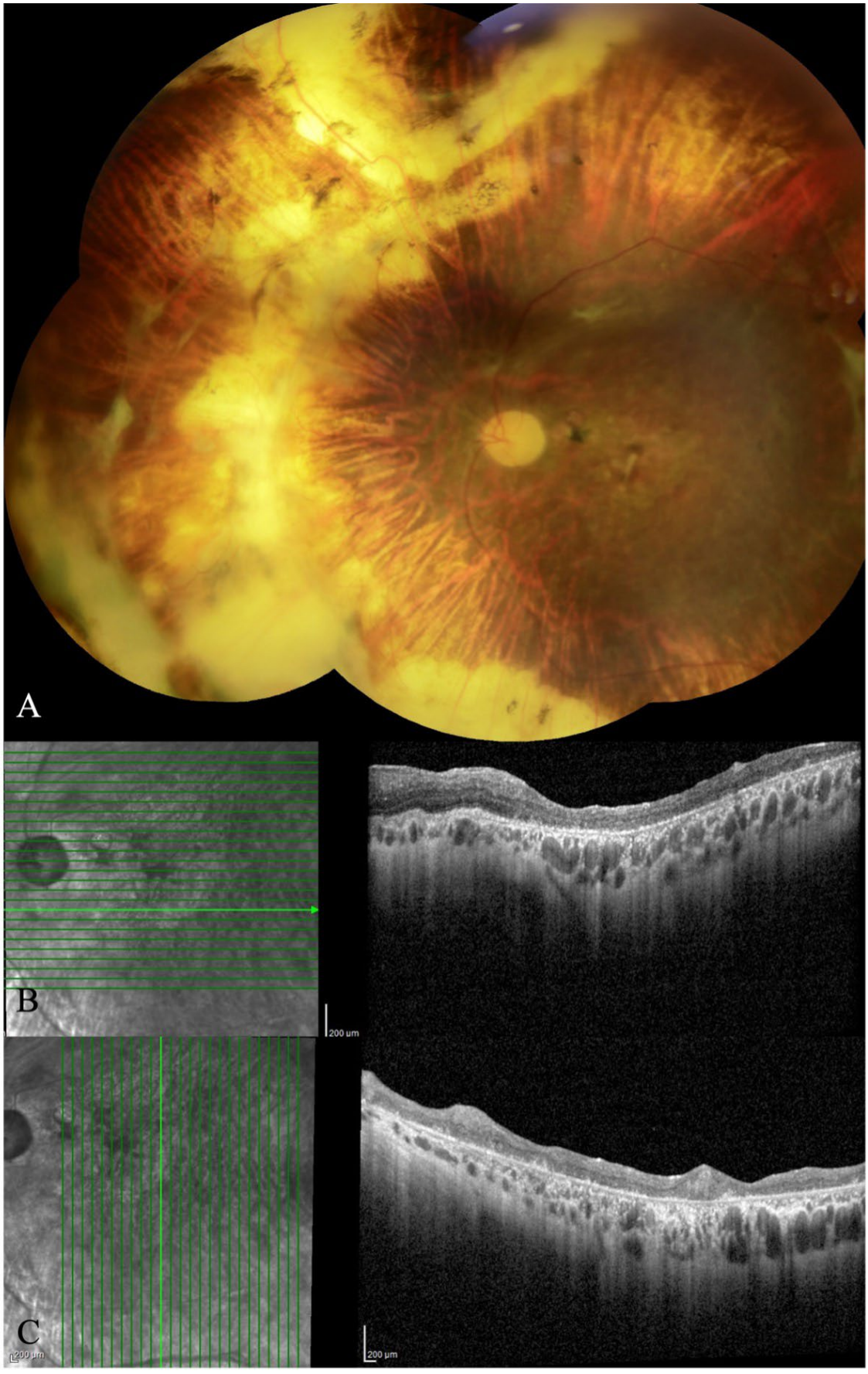

Figure 2 *A: 2 years following SiO removal, retina attached. B&C: OCT; MH closed with the graft, fully entegrated to the edges, indistinguishable from the retina.*

Surgical management of MH related RD's in eyes with degenerative myopia is challenging, and it is known that these MHs have a poorer prognosis and relatively high recurrence rates[2]. This case demonstrates that long-term functional and anatomical success can be achieved when ASRG is combined with detachment repair to close the MH upon intraoperative detection of a giant MH in a degeneratively myopic eye with recurrent PVR-RD after two previous vitreoretinal surgeries. The purpose of ASRG transplantation is to prevent MH-related recurrent RDs by acting as a seal in closing the MH. On the other hand, ILM peeling and the creation of inverted flaps in eyes with degenerative myopia can sometimes be very difficult for various reasons; these reasons include the ILM being very thin, difficulty in staining due to low contrast resulting from choroid-RPE atrophy secondary to posterior staphyloma, and the inability of the forceps to reach the posterior pole due to the long axial length[3]. For these reasons, the free ASRG technique is a appealing alternative in cases where the ILM is absent in the foveal and perifoveal region due to previous peeling or when flaps cannot be created due to technical reasons[4,5]. Furthermore, the chance of closing such a large MH with the inverted flap technique is also quite low.

The disadvantage of this technique is that in eyes with macular detachment without RD, a new retinotomy is required to prepare the graft. What makes this case slightly different from other autologous free retinal graft techniques is that, since a retinotomy has already been performed to allow the shortened retina to settle due to preretinal and subretinal PVR, a piece can be taken from the edge of the existing retinotomy to create the graft without requiring a new retinotomy. This eliminates the disadvantage of this technique.

The bimanual approach is improves manipulating detached and mobile retina, significantly. Additionally, it significantly simplifies the preparation of the free graft. Since it is known that the prepared retinal graft tends to contract and shrink, it is important to take the graft slightly larger than the hole and tamponade it with silicone. The initial primary aim of this technique was to close the MD anatomically by sealing it with tissue, thereby preventing RD caused by MD, especially in degenerative myopic eyes. Over time, it has been observed that the graft integrates completely with the retinal edges of the hole and functional gains are achieved, which has contributed to the technique's increasing popularity. In terms of visual potential, creating a graft from the peripheral retina, which has a low photoreceptor density, can be considered a negative factor. On the other hand, the possibility of retinal cells migrating from around the fovea to the "new fovea" should also be taken into account with this technique.

Another method that can be used to seal the macula in this patient group is amniotic membrane grafting[9]. The literature reports high macular hole closure rates with amniotic membrane grafts. Caparossi et al., in their study evaluating the results of amniotic membrane use in the treatment of recurrent macular holes, reported success rates of 97.2% with a single surgery and 100% when including cases where secondary surgery was performed[10]. Grewal et al., in their study evaluating the results of autologous retinal transplantation in the treatment of macular holes in highly myopic eyes, reported a success rate of 89.3%[6]. Another prominent feature of the amniotic membrane is the absence of the risk of PVR and associated retinal detachment that can be triggered secondary to retinectomy, as well as the absence of reservoir shortage in large MHs. On the other hand, its disadvantages compared to autologous retina include cost, preoperative preparation process and the need for cold storage, and the risk of contraction and recurrence in grafts placed upside down due to difficulty in identifying the correct surface in large grafts.

Other alternatives include the use of the lens capsule or Descemet's membrane to close the macular hole detachment [11-13]. The lens capsule has been proposed as an easily obtainable option in cases where the ILM has been previously peeled, and in cases to be combined with cataract surgery. Due to its greater rigidity, the anterior lens capsule can form a stable plug in small retinal holes without the need for perfluorocarbon. On the other hand, larger retinal holes require perfluorocarbon support or fluid-air exchange for capsule stabilization[11]. Another advantage is that it does not require a new retinectomy, thus offering the chance to avoid the risk of PVR formation associated with it[11]. This case demonstrates that the ASRG transplantation technique is a practiacal method that provides good long-term anatomical and functional outcomes in the treatment of recurrent PVR-RD secondary to degenerative myopic giant MH. However, larger case series are needed in the literature for this specific clinical subgroup.

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