Case Report

Autologous retinal graft for closure of large chronic macular hole with old retinal detachment : A report of two cases

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ABSTRACT

Purpose: To report 2 cases of the use of autologous retinal graft for the surgical treatment of traumatic atrophic large macular holes with old retinal detachment.

Case report: The patients had pars plana vitrectomy with membrane peeling and flattening of the retina under perfluorocarbon liquid, and autologous retinal graft to close the large atrophic macular holes. Post-operative reviews show closure of the macular holes, attachment of the retina and some improvement of visual acuity.

Conclusion: Autologous retinal free patch transplantation may offer a new solution for treatment of large chronic traumatic macular holes with old retinal detachment.

INTRODUCTION

Macular hole is a full-thickness break of the neurosensory retina involving the fovea. It is commonly idiopathic in origin; other known risk factors are age, myopia, inflammation and trauma. Although not fully understood, it is postulated that the general pathogenesis of macular holes is due to tangential traction of vitreous on the fovea, leading to formation of cysts and subsequent breaks in the fovea.

While some macular holes can seal up without any surgical intervention, the mainstay of treatment of macular hole is pars plana vitrectomy (PPV) and internal limiting membrane (ILM) peeling with intraocular gas tamponade. Even with the apparent success of this surgical technique, it is seen that large pre-operative macular hole diameter greater than 400μm, especially when chronic, is often a poor prognostic factor for successful closure after PPV and ILM peeling. This is made worse with ocular co-morbidities such as old retinal detachment. Thus, adjuvant surgical techniques such as use of inverted ILM flap on the large macular holes have been used to enhance closure of chronic and large macular holes. In addition, incorporation of surgical techniques to re-attach the retina are required in cases with retinal detachment.

In this report of two cases, we describe our surgical technique of autologous retinal graft from peripheral retina to close large traumatic atrophic macular holes and surgical reattachment of detached retina in two patients. We also report the post-operative anatomical and functional condition of the fovea, the graft site and the posterior pole of the retina in both eyes.

CASE REPORT 1

A 26 year old male patient presented to us with a 1 year history of blunt trauma and subsequent loss of vision to his right eye. Visual acuity at presentation was perception of light. Dilated fundoscopy with a slit-lamp biomicroscope and +90D lens showed closed funnel retinal detachment with no view of the posterior pole. Findings in his left eye were normal. Using the Alcon Constellation Vision System (Alcon Laboratories, INC, South Freeway, Fort

Key words: *"Autologous retinal grafts", "large macular holes', "old retinal detachment".*

Worth, TX 76134-2099 USA) and under local anesthesia, pars plana vitrectomy was done with 23-G cannulas via four sclerotomy ports to allow for bimanual technique, infusion and endo-illumination. Perfluorocarbon liquid (PFCL) was introduced into the eye after posterior vitreous detachment and vitrectomy to ensure proper apposition of the retina to the choroid. A large atrophic macular hole of about one-and-a-half times the size of the optic disc was noted. Also, areas of atrophy were seen in peripheral retina. Peeling of retinal membranes around the large macular hole was done, followed by 360° retinectomy after 360° retinal cauterization. Four rolls of endo-laser was done around the periphery to the margins of the remaining retina to ensure proper adhesion of the retina to the choroid. The harvesting site for the retinal graft was identified on the nasal retinal quadrant. To minimize bleeding and still maintain the vascular integrity of the harvested flap, light endo-diathermy was done in a circular manner around and beyond the exact site from where the graft was harvested. Using intraocular forceps and intraocular scissors, a retinal graft of sufficient size to seal the large macular hole was taken from the nasal periphery within the cauterized area, and then apposed onto the large macular hole under PFCL. Endo-laser was then applied around the margins of the donor site to ensure proper sealing, followed by a pan-retinal photocoagulation with sparing of the posterior pole. The four sclerotomy ports were closed, and the patient was instructed to maintain a 'face-up' position for one day. Twenty four hours later, using three sclerotomy ports we did a direct PFCL-silicon oil exchange. The retina was then examined with the aid of the endo-illuminator to ensure that there was good apposition of the retinal patch on the macula. The patient was instructed to maintain a 'face-down' position for seven days.

Three weeks post-op, visual acuity improved from perception of light to hand movement at one-third of a meter. There was apposition of the retinal patch on the macula with some closure of the macular hole. At 20 weeks post-operative, visual acuity is counting fingers at 1/2m. There was complete closure of the large macular hole on OCT, and the entire posterior pole was also well apposed over the choroid.

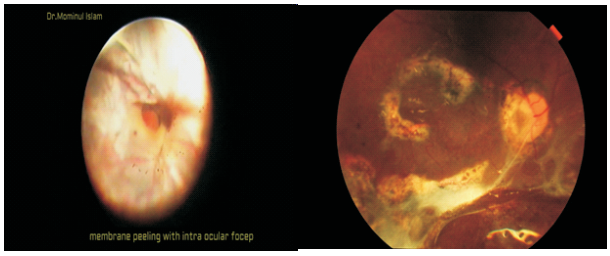

Figure 1A: Intra-operative image showing large atrophic macular hole and atrophic detached retina of the right eye of the patient. **Figure 1B:** 20-week post-operative color fundus photograph showing complete closure of macula hole and flat retina with areas of retinotomy and retinal fibrosis.

CASE REPORT 2

A 13 year old male had penetrating eye injury with traumatic cataract on his right eye, and presented to us 3 months after his corneal repair and cataract extraction. On examination visual acuity was hand movement close to face. He had corneo-scleral sutures, aphakia, old resolving vitreous hemorrhage and rhegmatogeneous retinal detachment with a large macular hole of one disc diameter. The left eye was normal with visual acuity of 6/6. Two weeks later he had a 4 sclerotomy ports pars plana vitrectomy (using the machine described above). Following the same method as described in the above case, an autologous retinal graft was taken to seal the large macular hole. A direct PFCL - silicon oil exchange was done the same day; the 4 sclerotomy ports were closed. Eight weeks later, visual acuity had improved to counting finger at 1/4 of a meter. OCT of the macula shows good apposition of the retinal graft and flat retina with silicon oil in situ.

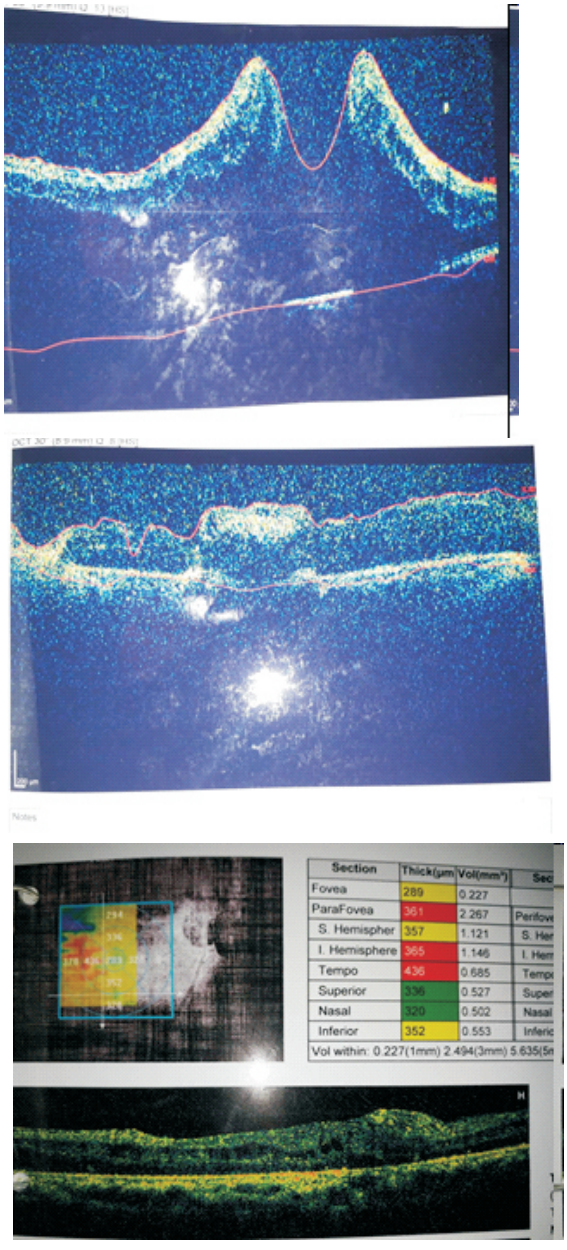

Figure 2A: Pre-operative OCT of the second patient showing a large macular hole and retinal detachment.

Figure 2B: 1 week post-operative OCT showing a flat retina with graft over the large macular hole.

Figure 2C: 8 week post-operative OCT showing a flat retina with complete closure of the large macular hole.

DISCUSSION

Asides an idiopathic etiology (which is by far the most common), trauma is one of the well-known causes of macular hole. Also, trauma and retinal detachment are established associates in ophthalmology. Poor closure rates and high re-opening rates are associated with macular holes in eyes with retinal detachment even after successful surgical reattachment of detached retina. Confronted with these challenges, the use of autologous retinal flap was considered as the option to ensure proper closure of the chronic and large macular holes in these patients with old retinal detachment.

Although not fully understood, it is postulated that the autologous neurosensory retinal flap on the macular hole would act as a scaffold to stimulate apposition of retinal elements around the macular hole. Also, it would serve to prevent further traction on the fovea, allowing retinal pigment epithelium cells to pump out residual sub-retinal fluid. These postulated mechanisms could eventually lead to closure of large macular holes.

In a similar report by Grewal *et al* on autologous retinal free flap for closure of refractory myopic macular hole in a patient that also had retinal detachment, a scleral buckle was done in addition. In our procedure, we decided not to do a scleral buckle as we planned to and performed a 360° retinectomy due to the extensive peripheral retinal atrophy from the chronicity of the retinal detachment. Retinectomy is known to improve the surgical outcome of vitrectomy for old retinal detachment with features of proliferative vitreoretinopathy, even without scleral buckle.

Also, in the report of Grewal *et al* the patient had direct PFCL-silicon oil exchange the same day. In a similar report by Giacinto *et al* the patient had PFCL-air exchange. In the procedure by Giacinto *et al* expansive gas would suffice in acting as tamponade to keep the flap on the macula, as their case was not associated with retinal detachment. The

case by Grewal et al and our cases required the use of silicon oil as tamponade because the cases were associated with retinal detachment. However, in our first case, we decided to leave PFCL in the eye for 24 hours before the PFCL-silicon oil exchange to ensure proper apposition of the atrophic retina.

We report and improvement in visual acuity, complete apposition of the retinal graft, complete closure of the macular hole and apposition of the posterior pole retina on the choroid. The post-operative outcome in our cases, albeit chronic and associated with old retinal detachment and atrophic retinal conditions, were similar to findings by Giancinto *et al* and Grewal *et al.*

The main limitation of our reported technique is poor knowledge of the long-term visual and anatomical outcome, and poor knowledge of possible complications. More studies in large scales and on the long-term would be required to ascertain the post-operative outcome and the possible complications of this surgical technique. Nevertheless, autologous retinal free patch transplantation may offer a new solution for treatment of large and chronic macular holes with old retinal detachment.

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