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Case Report

Refractory Myopic Retinal Detachment and Macular Hole Closure with Autologous Neurosensory Retinal Free Flap

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Keywords

Retinal detachment · Macular hole · Myopia · Autologous neurosensory retinal free flap

Abstract

The purpose of this case report is to describe a modified technique involving the use of an autologous neurosensory retinal free flap for closure of a macular hole (MH) during retinal detachment (RD) surgery. A 50-year-old female presented with sudden vision loss (light perception only) and a recurrent myopic RD associated with an MH. An autologous neurosensory retinal free flap was obtained and moved toward the MH. Silicone oil was used as an endotamponade and removed after 6 months. Two months after oil removal visual acuity improved to 20/400 and remained stable thereafter; however, the patient developed central retinal atrophy. One year after surgery the MH was closed and the retina attached. This modified technique with the use of an autologous neurosensory retinal flap provides an alternative approach for recurrent MH in RD procedures.

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Introduction

Achieving success in retinal detachment (RD) surgery can be challenging, particularly in refractory cases of highly myopic eyes (HME) when associated with a macular hole (MH) [1]. The surgical management of RD in HME with MH generally has a rather poor visual prognosis [2]. Pars plana vitrectomy (PPV) is the main procedure of choice to repair macular hole retinal detachments (MHRD) and is often combined with other techniques in order to achieve a higher success rate [3, 4]. MH surgery has experienced great improvements in recent years with the development of multiple different approaches to peel the internal limiting membrane (ILM) enabling the closure of almost all types of MH [5]. However, MHRD in HME is a highly complex pathology and alternative approaches to enhance surgical outcomes have been looked for in recent years [2]. In 2016, Grewal and Mahmoud [6] described a technique in which an autologous neurosensory retinal free flap was used as a plug in a myopic MH providing an alternative scaffold for its closure. Since then, this approach seems to have been a useful tool for a few surgeons [7–9]. Nonetheless, there is no detailed description of this technique in HME with MHRD.

The purpose of this report is to describe a detailed modified technique involving the use of an autologous neurosensory retinal free flap for closure of a refractory myopic MH during an RD repair.

Case Report

A 50-year-old female presented to our department with sudden vision loss in her right eye. Ophthalmological evaluation revealed a myopic retinal re-detachment (retina only attached from 12 to 2 o'clock periphery) with an approximately 1-disc-diameter MH (Fig. 1). Visual acuity in this eye was light perception only. The patient's past medical history included a pars plana vitrectomy with ILM peel for an inferior MHRD 1 year prior to this complication. The eye involved was known to have high myopia (–15 diopters) and moderate amblyopia. The fellow eye did not present any particular features and visual acuity was 20/20. The patient was proposed for pars plana vitrectomy, 20 G (Constellation; Alcon), under general anesthesia (see online suppl. Video, which demonstrates this modified technique; for all online suppl. material, see www.karger.com/doi/10.1159/000500275). Informed consent was obtained from the patient as well as a written statement for photograph and surgical video publication.

At first, the retina was stabilized with perfluorocarbon liquid. Afterwards, the surgeon tried to obtain an autologous ILM flap, but this attempt was unsuccessful. A full-thickness neurosensory retinal free flap was then obtained and moved towards the MH. The site selected for harvesting was the inferior retina, anterior to the equator, as it was already detached, and it had been the primary location of the RD. The surgical technique employed took into account two main steps: the harvesting of an autologous neurosensory retinal free flap and its positioning over the MH. The surgeon filled the eye with perfluorocarbon liquid, leaving the most peripheral retina unattached. Using a bimanual approach, an inferior retinectomy was performed with scissors and the vitrectomy cutter in one port, and the forceps in the other to hold the edge of the flap (Fig. 1). A 2-disc-diameter full-thickness neurosensory retinal free flap was obtained and moved towards the MH. For this purpose, the heavy liquid was drained leaving a small bubble. With the help of forceps and enlargement of the bubble, the autologous free flap was stretched in order to lay flat and cover the edges of the MH (Fig. 1). Retinal vessels

were used to maintain correct orientation of the graft. Afterwards, the surgeon performed a fluid-air exchange, and endolaser barricade was applied posterior to the retinectomy site. In the fluid-air exchange, the tip of the flute was first positioned in the area the retina was harvested and then, in a slow pace with low aspiration, the fluid was drained across the superior and inferior arcades and finally at the optic disc. Silicone oil was used as an endotamponade.

On the first day postoperatively the retina graft was covering the MH. Two months after surgery, visual acuity had improved to 20/400 with central retinal pigment epithelium atrophy and the MH remained closed. Silicone oil removal was planned at 6 months postoperatively and the patient maintained her vision during the following year without MH re-opening or RD recurrence (Fig. 2).

Discussion

Surgical management of refractory MHRD in HME is a rather challenging procedure. Myopic MH have worse prognosis and re-opening rates are higher [2]. This report provides a detailed description of a technique that could be a valuable option in severe cases with multiple failed interventions.

The aim of the autologous retinal transplant is to prevent re-detachment as it works as a plug for the MH. An alternative to this technique is to harvest an autologous ILM flap. However, this procedure is difficult to perform in HME because the peripheral ILM is extremely thin and difficult to stain [3]. The technique described in this report can be rather useful when there is no ILM left in the foveal and perifoveal areas and no anterior capsule to act as a scaffold. Nonetheless, other options can be considered such as the posterior lens capsule [4]. In our modified technique there was no need to induce a localized RD as the retina was already detached. Using the inferior RD to obtain the graft tissue is generally supported by different authors as it seems the best location to minimize complications. The bimanual approach is one of the key steps of this surgery because of the difficulties in dealing with a floating retina. Besides, the use of silicone oil is useful as it seems that retinal grafts tend to shrink in size [8] and the oil keeps the flap well over the MH, allowing time for retinal cells proliferation and migration [10]. Oil removal should be performed 6 months after surgery if one looks for a better visual outcome. Longstanding silicone oil should be an option in eyes with poor visual prognosis and high risk of recurrence. The authors believe that even in eyes with very poor visual prognosis this technique should be attempted in order to look for the best visual outcome possible. The primary goal of the surgery is to close the MH and avoid refractory RD. However, one could suppose that by harvesting a peripheral retinal patch, visual prognosis could be poorer due to the lack of photoreceptors in that area. Nevertheless, it is unclear whether this surgery allows migration of retinal cells that are adjacent to the MH into the “new” fovea, allowing better improvements in final visual acuity. Regardless of the use of a 20-G vitrectomy set, a 23 or 25 G seem to be safe options and might even reduce turbulence during surgery.

The authors would like to emphasize that this technique has been successfully used in our department in similar cases. However, larger consecutive series are warranted to reinforce this procedure as a good alternative option for MHRD.

In conclusion, the autologous neurosensory retinal free flap could be a valuable option for closing MH during RD procedures in HME. The technique provides an alternative scaffold for MH closure compared to conventional procedures such as inverted ILM flap, autologous ILM flap, or a lens capsule.

Statement of Ethics

All procedures performed were in accordance with the tenets of the 1964 Helsinki Declaration and its later amendments. Informed consent was obtained from the patient involved in the study as well as a written statement for photograph and surgical video publication.

Disclosure Statement

None of the authors have any proprietary interests or conflicts of interest related to this submission. No financial support was received by any author related to this submission.

Author Contributions

F.S.N. made a substantial contribution to the acquisition and interpretation of data, was involved in drafting the manuscript, gave approval of the version to be published, takes public responsibility for appropriate portions of the content, and agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy and integrity of any part of the work are appropriately investigated and resolved. J.B. made a substantial contribution to the acquisition of data, was involved in drafting the manuscript, gave approval of the version to be published, takes public responsibility for appropriate portions of the content, and agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy and integrity of any part of the work are appropriately investigated and resolved. P.S. was involved in revising the manuscript critically for important intellectual content, gave approval of the version to be published, takes public responsibility for appropriate portions of the content, and agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy and integrity of any part of the work are appropriately investigated and resolved. M.B. made a substantial contribution to the acquisition and interpretation of data, gave final approval of the version to be published, was involved in revising the manuscript critically for important intellectual content, takes public responsibility for appropriate portions of the content, and agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy and integrity of any part of the work are appropriately investigated and resolved. All authors read and approved the final paper.

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Fig. 1. **a** Intra-operative view of the posterior pole at the beginning of the surgery with the 1-disc-diameter macular hole. **b** The full-thickness neurosensory retinal free flap is being held by the forceps. **c** Positioning of the retinal flap over the macular hole with the help of a small heavy liquid bubble.

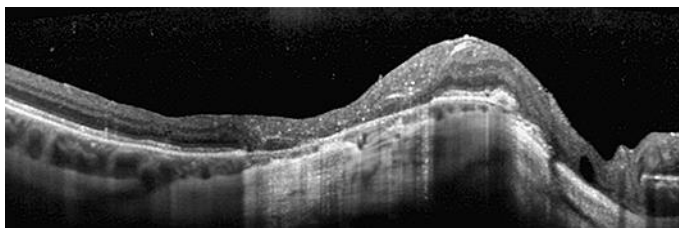


Fig. 2. Autologous retinal free flap covering the closed macular hole 1 year after surgery. The retinal pigment epithelium and external retinal layers are absent and inner layers show structural disorganization (spectral-domain optical coherence tomography – horizontal macular scan including the fovea).