ISSN: 2640-9615

Journal of Clinical and Medical Images

Case Report

Inverted ILM Flap Technique Combined with Prophylactic Chorioretinectomy For Retinal and Choroidal Injury by A Macular Foreign Body

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Volume 4 Issue 9- 2020

Received Date: 15 June 2020

Accepted Date: 29 June 2020

Published Date: 06 July 2020

2. Key words

Intraocular foreign body; Chorioretinectomy; ILM peeling

1. Abstract

1.1. Aim: In the majority of patients with an intraocular foreign body located in the macula, the prognosis is poor already upon the traumatic event. None of the hitherto used treatments have yielded satisfactory results.

The purpose of the paper is to present a surgical technique aimed at modifying closure of macular defects after foreign body extraction.

1.2. Patient: A 36-year-old patient was admitted to the Ophthalmology Department due to open injury and intraocular foreign body (14 x 0.5mm). The foreign body, whose tip was deeply anchored in the retina and choroid, was removed using bimanual vitrectomy. Partial chorioretinectomy was also performed consisting of destruction and laser treatment of the retina and choroid in the temporal extrafoveal area, with preservation of the fovea. The central perifoveal segment of the defect was closed with an ILM flap.

1.3. Results: At 12 months of the intervention best corrected visual acuity was 1.0 on logMAR chart and the mean intraocular pressure was 15 mmHg. Retinal tear healed; no massive proliferation of epiretinal membranes was observed within the defect.

1.4. Conclusions: This surgical procedure may be recommended to safely remove a foreign body located in the macular area. Closure of the rupture with an ILM flap seems to facilitate retinal regeneration while partial chorioretinectomy results in a decrease of proliferative vitreoretinopathy.

3. Abbreviations: IOFB–Intraocular foreign body; PVR–Proliferative vitreoretinopathy; ILM–Internal limiting membrane; PFCL–Perfluorocarbon liquid

4. Introduction

In the emmetropic eye the macular foreign body can be defined as any object, substance or organism that is located within 2.5mm of the umbo of the macula, and does not result from an inflammatory or neoplastic process. They can be divided into those causing damage to the retina, those reaching the choroid and those penetrating to the subchoroidal space. Foreign bodies may become embedded in any area of the macula leading to partial or complete loss of vision [1,2].

Surgery to remove a foreign body is always associated with the risk of anterior and posterior segment complications, which can occur at any stage of the surgical intervention. Intraocular foreign bodies (IOFB) cause mechanical damage, but biologic or chemical reaction to retained IOFBs are also commonly seen [3,4].

The most severe late complications of vitrectomy, i.e., hemorrhage, retinal detachment and proliferative vitreoretinopathy (PVR), pose the biggest risk in patients with a macular foreign body. The devastating sequelae of such injury can be limited with prophylactic chorioretinectomy consisting of destruction and removal of the retina and choroid around the impact site [5,6]. Bearing in mind the advance and success rates of vitrectomy for macular holes, we attempted to modify closure of the macular defect using an internal limiting membrane flap covering the retinal and choroid defect [7].

5. Objective

To present a surgical technique aimed at modifying closure of macular defects after macular IOFB removal. Also, to discuss the option of partial chorioretinectomy and inverted flap technique for macular wound healing.

6. Patient

A 36-year-old male was seen with a metallic intraocular foreign body (14 mm in length) located in the macula figure 1. Preoperative examination revealed a 2 mm corneal wound, intumescent stage of traumatic cataract with damage to the anterior and posterior lens capsule. A- and B-scan ultrasound showed a metallic foreign body and massive vitreous hemorrhage. Computed tomography confirmed the presence of a foreign body (14 x 0.5mm) damaging the retina, choroid and sclera, but did not clarify whether

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Citation: Leszczyński R et al., Inverted ILM Flap Technique Combined with Prophylactic Chorioretinectomy For Retinal and Choroidal Injury by A Macular Foreign Body. Journal of Clinical and Medical Images. 2020; V4(9): 1-3.

scleral perforation had occurred. The patient gave his written consent and surgery was started.

Material was collected from the anterior chamber for microbiologic investigations; paracentesis was performed and a viscoelastic was injected to the paracentesis site. Capsulorhexis and phaco-aspiration of traumatic cataract were carried out. Due to posterior capsule tear caused by the foreign body, the procedure was discontinued, and trocars were placed for anterior and posterior vitrectomy and removal of cortical remnants. Artificial lens was placed in the ciliary sulcus and supported by anterior capsule remnants. Following central and peripheral vitrectomy, the posterior hyaloid was detached. Retinal laser photocoagulation was performed to prevent peripheral retinal detachment. An incision was made in the conjunctiva and sclera at 3 mm from the limbus to remove the foreign body. As it was firmly embedded in the sclera, the first attempt failed. The second was successful, and the foreign body was removed with rotational motion of Max Griptweezers.

Blood was evacuated from the oblong wound using a flute cannula. Partial chorioretinectomy was performed at the foreign body entry site. The central perifoveal segment of the defect was closed with an ILM flap. PFCL was administered and laser photocoagulation was applied in extrafoveal retina. Silicone oil tamponade was instilled (1000 U) and then removed after 3 months during the subsequent procedure

7. Results

At 12 months following the incident and the above described surgery, BCVA was1.0 on logMAR chart. Intraocular pressure was 15 mmHg and steady. The corneal scar was 1mm in length. The status of the retina before and at 12 months of surgery is presented in (Figure 1).

No scarring and PVR were found in the partial chorioretinectomy area. A tissue line was seen between the edges of the retina in the neighboring region. Some epiretinal membranes were noted in the paranasal area.

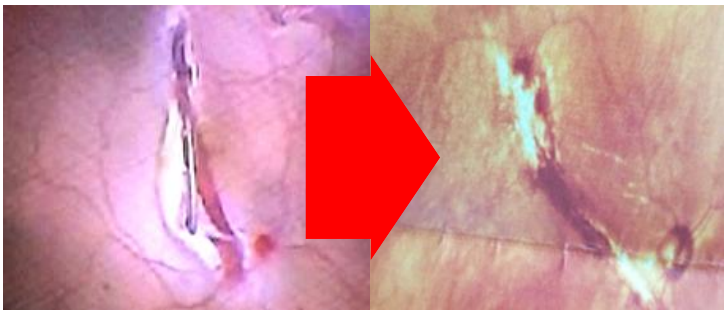

Figure 1: The posterior segment of the eye during surgery and at 12 months of the intervention
A- Foreign body embedded in the retina and choroid; retinal detachment
B- Bare temporal sclera; healed tissue in the central area; slight fibrosis in nasal macula

8. Discussion

During surgery aimed to remove a foreign body located in the macular area, we had to bear in mind two opposing tendencies of the wound healing process.

On one hand, we wanted to promote and accelerate the process, but, on the other hand, our aim was to limit the development of the epiretinal and subretinal membranes formation.

Prophylactic chorioretinectomy was necessary to prevent bleeding and PVR at foreign body entry site. However, performing this procedure in the macular area might have posed a threat to the major function of the macula, i.e., restoration of visual acuity might have proved unsatisfying [6,8]. Nevertheless, chorioretinectomy is of crucial importance for eyeball survival and vision preservation; therefore Ozdek et al. recommend this procedure despite the risk of iatrogenic loss of visual acuity [8]. Our chorioretinectomy technique helped markedly decrease epiretinal membranes proliferation and allowed fovea preservation. Another challenge faced during macular hole repair surgery is to successfully promote retinal healing and regeneration, which is of particular importance in the case of macular injury. Based on recent reports on surgical closure of primary, secondary, and traumatic macular holes, we gently approximated wound edges and covered the defect with an ILM flap [9,10]. Foreign bodies typically cause irregular tear-like wounds; yet the ILM flap technique facilitated healing and photoreceptor regeneration in the area with preserved RPE.

This type of surgical management significantly limited the proliferation process at the impact site. Slight development of traumatic epiretinal membranes was seen far from the chorioretinectomy site – at the nasal region of the wound.

9. Conclusions

This surgical procedure may be recommended to safely remove a foreign body located in the macular area. Closure of the rupture with an ILM flap seems to facilitate retinal regeneration while partial chorioretinectomy results in a decrease of proliferative vitreoretinopathy. It should be noted that retinal regeneration is only possible in the areas with undamaged retinal pigment epithelium and choroid.

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