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Case Report

Internal Limiting Membrane Inverted Flap in Billiard Ball-Induced Traumatic Macular Hole

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Abstract

This paper aims to emphasize the benefits of surgery combined with internal limiting membrane (ILM) inverted flaps and platelet concentrate in the treatment of large traumatic macular holes.

We report the particular case of a 37-year-old woman presenting a left-eye visual loss after receiving the impact of a billiard ball. Her best-corrected visual acuity (BCVA) was 0.8 (20/25) for her right eye and hand motion for her left eye. In the slit-lamp examination, no remarkable findings were observed in the anterior segment of both eyes. Intraocular pressure (IOP) was 15 mmHg in both eyes. On funduscopic exploration, a macular hole larger than 1 papillary diameter is observed in her left eye, without signs of retinal tears nor conmotio retinae. The posterior hyaloid was adhered and there was an associated choroidal rupture. The presence of a full thickness-macular hole was confirmed by optical coherence tomography (OCT), measuring 1900 µm in diameter.

Surgery was performed, consisting of a pars plana vitrectomy (PPV), the use of ILM inverted flaps to restore the macular anatomical structure, and the injection of platelet concentrate.

The patient showed an improvement in VA, which was 0.1 for her left eye. Three months after surgery, fibrosis adjacent to the macular hole and pigmentary changes around the macula could be observed. The choroidal rupture remains stable. On OCT, the macular hole seems more closed, with an area of minimal subretinal fluid inferior to the macula. The patient's BCVA remains stable.

The combined use of autologous plasma concentrate with the internal limiting membrane flap is advantageous because plasma concentrate holds the internal limiting membrane in the proper position and promotes the proliferation of glial cells through growth factors.

More studies need to be carried out to compare and confirm the benefits of using adjuvant treatments and complementary techniques in VA improvement.

Keywords: Internal Limiting; Inverted Flap; Billiard Ball; Traumatic Macular Hole

Introduction

A macular hole is defined as a full-thickness defect of the retina that affects the macular area. Traumatic macular holes represent 10% of the total. They generally occur in young patients of the male sex, and they tend to be related to the practice of sports [1].

There are two theories regarding its pathogenesis. One postulates that anteroposterior traction of the vitreous causes a loss of foveal tissue. The other, that a decrease in the axial length of the eye causes tangential vitreoretinal forces that are transmitted to

the macula and centripetal forces that separate the neurosensory layers to the fovea, resulting in a central defect [2].

Case Report

We report the particular case of a 37-year-old woman presenting a left-eye visual loss after receiving the impact of a billiard ball. Her best-corrected visual acuity (BCVA) was 0.8 (20/25) for her right eye and hand motion for her left eye. In the slit-lamp examination, no remarkable findings were observed in the anterior segment of both eyes. Intraocular pressure (IOP) was 15 mmHg in both eyes. On funduscopic exploration, a macular hole larger than 1 papillary diameter is observed in her left eye, without signs of retinal tears nor conmotio retinae. The posterior hyaloid was adhered and there was an associated choroidal rupture. The presence of a full thickness-macular hole was confirmed by optical coherence tomography (OCT), measuring 1900 µm in diameter (Figures 1,2). A pars plana vitrectomy (PPV) 23G was performed a week later. Perfluorocarbon was injected in order to minimise blue-straining retinal toxicity. Under dual blue staining, the posterior hyaloid was dissected and the ILM was peeled, using it to perform an inverted flap to restore the macular anatomical structure. A fluid-air exchange was carried out and 0.1 mL of platelet concentrate was injected. Finally, an air-C3F8 at 12% exchange was conducted. A month after the surgery, the patient referred a subjective improvement in visual acuity (VA), which was 0.1 in her left eye. On OCT a partial closure of the whole was observed. Three months after surgery, fibrosis adjacent to the macular hole could be observed, as well as pigmentary changes around the macula. The choroidal rupture remains stable. On OCT, the macular hole seems more closed, with an area of minimal subretinal fluid inferior to the macula. The patient's BCVA remains stable.

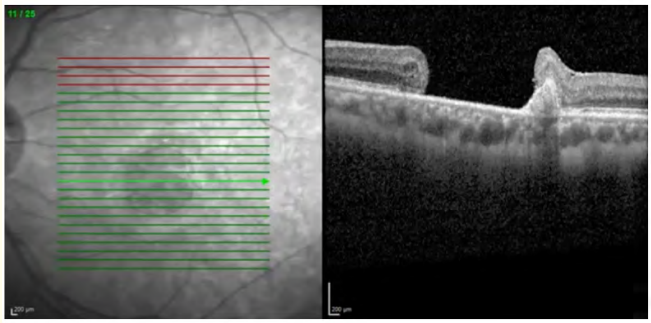

Figure 1: OCT of left eye showing a full thickness macular hole measuring 1900 µm in diameter.

Figure 2: Infrared image of left eye showing the macular hole.

Conclusions

Treatment for traumatic macular holes can be expectant since they can sometimes resolve spontaneously. In large macular holes like in our case, surgery should be considered. This consists in performing a posterior vitrectomy, associated or not with complementary techniques or adjuvant treatments. ILM peeling, ILM inverted flap, use of amniotic membranes, or the performance of a retinotomy to close the defect with retinal tissue, are all complementary techniques that can be used. Some of the most used adjuvant treatments are platelet concentrate and TGF-ß [1-4]. Vitreous surgery should be carried out within 3 months to prevent severe photoreceptor damage. Gas tamponade is more successful than silicone oil tamponade for the anatomical closure and VA improvement [1]. To this day, many surgical techniques have been reported to treat this entity. They offer a better prognosis than observation, but no significant differences have been reported in the outcome [1]. The combined use of autologous plasma concentrate with the internal limiting membrane flap is advantageous because plasma concentrate acts to hold the internal limiting membrane in the proper position and promotes the proliferation of glial cells through the presence of growth factors [3]. Until recently, the use of adjuvant therapies was said to be able to improve the restoration of anatomical function, but not the visual prognosis. A recent pilot study by Sánchez-Ávila., *et al*. shows an improvement in the VA of patients with macular holes treated with platelet concentrate as

an adjuvant to a PPV [5]. More studies need to be carried out in order to confirm this finding. In the case we present, the patient shows a favourable evolution after surgery, with a smaller macular hole and a discrete VA improvement. We have not been able to find published cases on billiard ball-induced traumatic macular holes to compare outcomes. In conclusion, large macular holes with an associated choroidal rupture may show an improvement with prompt surgical treatment, the use of ILM inverted flaps, and platelet concentrate. More studies need to be carried out in order to compare and confirm the benefits of the use of adjuvant treatments and complementary techniques in VA improvement.

Statement of Ethics

This study adhered to the tenets of the Declaration of Helsinki.

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Conflicts of Interest

The authors have no financial disclosures.

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