Case Report
A Combination of Surgical Techniques to Repair a Giant Traumatic Macular Hole

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A 38-year-old man with a traumatic full-thickness macular hole (FTMH) presented to our eye casualty department with a sudden deterioration of his right eye vision to hand movements over the past one week. The suspected traumatic FTMH was present since he was 13 years old from a direct impact of a golf ball in his right eye and his best-corrected visual acuity (BCVA) has always remained at 1/60 Snellen vision. On examination, he had a very large FTMH measuring 1635 \( \mu \)m with central foveal retinal detachment. Pars plana vitrectomy combined with large inverted internal limiting membrane (ILM) peel flap, 5000 Cs silicone oil tamponade, and autologous platelets implantation was performed. Follow-up visits revealed that the FTMH was closed under silicone oil. The silicone oil was removed six months after the surgery and the FTMH remained close with the retina remaining attached. His BCVA was restored to his previous baseline level of 1/60 Snellen vision. With the advent of multiple techniques to repair FTMH such as the ILM flaps, we have combined this technique with older proven techniques such as silicone oil tamponade and autologous platelets implantation to close the giant traumatic FTMH. This case study demonstrates that combining techniques can help close a FTMH that is otherwise deemed impossible in the past.

1. Introduction

Traumatic FTMH has been reported to be in the incidence of 1-9% and more common in the younger male population [1–4]. In most cases of traumatic FTMH, surgical repair is often delayed due to the possibility of spontaneous closure [5–9]. In our case, the FTMH was present for more than 10 years and as there was an associated foveal RD and deterioration of vision, we have decided to proceed with surgical repair of the FTMH to prevent the loss of his peripheral visual field.

2. Case Study

A 38-year-old man with traumatic macular hole presented to the emergency eye department with a sudden painless deterioration of his right vision to hand movements (HM) and loss of peripheral vision for the past four days. He denied any recent trauma but past ophthalmic history revealed a suspected traumatic full-thickness macular hole (FTMH) which was present since he was 13 years old from a direct impact of a golf ball. The best-corrected visual acuity (BCVA) in the right eye had always remained at 1/60 Snellen vision after the accident. There was no other significant past medical history. On examination, his BCVA in his right eye was HM vision and left eye is 6/6. Anterior segment and intraocular pressure were normal in both eyes. Crystalline lenses were clear in both eyes. Dilated fundal examination in the right eye revealed a large FTMH measuring 1635 \( \mu \)m with central foveal retinal detachment extending to the arcades (Figure 1). There were no peripheral retinal tears found. A partial posterior vitreous detachment (PVD) was present. There was also a Bergmeister’s papilla. The left retina was normal. Following informed consent with the patient regarding the guarded risk of visual prognosis for the surgery, a pars plana vitrectomy (PPV) approach to repair the FTMH was performed. Autologous platelets were collected on the day of the surgery through a process of centrifugation of platelet rich plasma from whole blood. The surgery was performed under general anaesthesia. A standard 23-gauge three-port sclerotomy was performed. Core vitrectomy was performed followed by the
induction of a PVD. A PVD that extended as far as possible
to the vitreous base was created, followed by vitreous shaving
with scleral indentation. The presence of PVD was confirmed
with the use of intravitreal triamcinolone acetonide. The
internal limiting membrane was stained with dual membrane
blue dye. A large internal limiting membrane (ILM) inverted
flap of two disc diameters was created to cover the FTMH.
Following that, fluid-air exchange was performed and an
internal tamponade of 5000 Cs silicone oil was inserted. Four
droplets of autologous platelets were injected into close to the
FTMH before the surgery was completed. All sclerotomies were
sutured. At the end of the procedure, subconjunctival
cefuroxime and dexamethasone were injected. Postoperative
combined antibiotic-steroid drops (dexamethasone 1mg/ml,
neomycin sulphate 3500 IU/ml, and polymyxin B sulphate
6000 IU/ml) were used 4 times a day for four weeks and
cyclopentolate 1% drops was used 2 times a day for one
week. The patient was instructed to position his face down
for one week. One month after the surgery, the FTMH had
closed under silicone oil (Figure 2(a)) but a cataract had
developed. After six months, the silicone oil was subsequently
removed together with a phacoemulsification and intraocular
lens implantation. The FTMH remained closed with the
retina attached (Figure 2(b)). His BCVA improved back to his
baseline level of 1/60 Snellen vision.

3. Discussion

Since the advent of PPV to repair FTMH by Kelly and
Wendell [10], closure rate of FTMH especially idiopathic
ones has improved and reported to be in the range of 85 to
100% [11–14]. Closure rate of traumatic FTMH is reported
to be about 85% with a single operation [15]. There are
multiple surgical techniques that have been described to
close idiopathic FTMH that remains open after the first
surgery, traumatic FTMH, and Stage IV FTMH. The current
surgical techniques include standard PPV to remove the
posterior hyaloid, ILM peeling, and intraocular gas. Other
additional steps include the use of silicone oil tamponade
[16], autologous platelets implantation [17, 18] to the most
recent techniques such as the inverted ILM flaps [19–21].
Traumatic FTMH from a blunt ocular trauma is formed
from a contrecoup mechanism where a sudden decrease in
the globe’s anterior-posterior diameter with a compensatory
equatorial expansion leads to horizontal forces and splitting
of the retinal layers at the fovea. This causes an irregular
configuration of the hole in a traumatic FTMH compared to
an idiopathic FMTM [15]. As our patient had a giant FTMH,
we have decided to proceed with the combination of multiple
surgical techniques that have been described in the literature
to maximise the chance of the hole closure. The techniques
include the addition of a wide inverted ILM flap, silicone
oil tamponade, and autologous platelets implantation to the
standard surgical repair of a FTMH. Inverted ILM flaps are
useful for large FTMH because it has been hypothesised that
if a segment of the ILM is left attached to the FTMH, it will
provokes gliosis inside the retina and surface of the ILM as
well as providing a scaffold for tissue proliferation [20–22].
The indication of the use of autologous platelets was similar to
the inverted ILM flap which was to further stimulate the glial
cell proliferation in the hole to aid closure and this was first
described to be successful by Chow et al. where 94% of their
16 eyes with traumatic FTMH achieved hole closure [23].
Although gas would have provided a better surface tension

Figure 1: Optical coherence tomography (OCT) demonstrating the size of the large traumatic FTMH. There is an associated foveal retinal
detachment around the traumatic macular hole.
and visual outcome in most patients, we felt that our patient would have difficulty adopting his strict face down posture to achieve hole closure. Therefore silicone oil tamponade was used instead. Furthermore, silicone oil use in traumatic FTMH has been shown to have a comparable closure rate in a retrospective study by Bor’i et al. of 90% compared to 94% in perfluoropropane gas [16]. In our case, the combination of long-term tamponade and the addition of two techniques to promote glial cell proliferation in the hole led to the successful closure of the FTMH and flatten the retina.

This case study demonstrated that combination of surgical techniques can help close a FMTH that would have been deemed impossible before in the past. However, these techniques ideally should be tailored to each individual case as it may not be indicated in all patients.

Disclosure
This case report has been presented as a poster presentation in the 18th EuRETINA Congress (Vienna, 20-23rd September 2018). There are no external funders that have played a role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

Conflicts of Interest
All authors have no conflicts of interest in the production of this manuscript.

Authors’ Contributions
All authors should have made substantial contributions to all of the following: (1) the conception and design of the study, acquisition of data, or analysis and interpretation of data, (2) drafting the article or revising it critically for important intellectual content, and (3) final approval of the version to be submitted.

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