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# Case Study: Spontaneous Closure of Traumatic Macular Hole in a Paediatric Patient

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## Abstract

**Background:** A macular hole is a full-thickness retinal defect in the central macula. It is believed to be caused by vitreoretinal mechanical forces and is described as a traumatic macular hole if trauma causes these forces. **Case Report:** We describe a case of a traumatic macular hole in a 12-year-old boy after blunt trauma with a football in the right eye. The patient was followed up regularly with serial OCT, showing closure of the macular hole without intervention. **Conclusion:** Observation of a paediatric traumatic macular hole is a viable initial treatment option. Serial OCT imaging was useful in observing the natural history and mechanism behind spontaneous closure in this case.

## Keywords

Eye Injuries, Traumatic Macular Hole, Optical Coherence Tomography, Case Report

## 1. Introduction

Traumatic macular holes are quite rare (unlike the idiopathic aetiology which most commonly occurs in adults) and tend to be more frequent in a young male population subset involved in contact sports. [1]. Traumatic macular holes (MH) can occur in both younger children and adolescents. The mechanism behind the formation of a traumatic macular hole has been suggested to result from blunt trauma, which causes axial compression of the globe, subsequent compensatory equatorial expansion and then leads to centrifugal shearing forces on the macula [2]. The adhesion of the posterior hyaloid to the ILM is strong in children and young adolescents. It can be difficult to achieve a complete posterior vitreous detachment (PVD) mechanically in paediatric eyes, creating a particular challenge for successful surgery in the paediatric population [3]. Spontaneous closure of

paediatric traumatic MHs has been previously reported; however, the underlying mechanism is uncertain [4] [5]. The decision whether to operate or simply observe is still controversial. Spontaneous closure can more easily occur in children; although unpredictable, it usually occurs between 3 and 6 months and is related to improved final visual acuity [6]. However, several well-documented retrospective case series have actually shown very similar surgical outcomes for idiopathic and traumatic MH. The longer the delay the more likely photoreceptor damage can occur, and the consequences of a long period of waiting for the spontaneous closure of the macular hole in paediatric patients have not been determined [7].

## 2. Case Report

A 12-year-old boy presented to the ophthalmology emergency room complaining of reduced vision in his right eye. He had a history of blunt trauma to the same eye four days prior while playing football. No relevant systemic or previous ophthalmic history was elicited.

On examination, his visual acuity was 6/36 in the right eye and 6/6 in the left eye. Both pupils were normal with no relative afferent pupillary defect. Slit lamp examination showed an unremarkable anterior segment normal intraocular pressure. Dilated fundoscopy showed a full-thickness macular hole (FTMH) in the affected eye with an area of commotio retinae superiorly associated with intraretinal haemorrhages in the superior retina and a small inferotemporal vitreous haemorrhage. No tears were noted. The FTMH was confirmed on OCT, measuring 222 microns (**Figure 1**).

It was decided to proceed with a conservative approach. The patient was monitored every 2 weeks with dilated fundoscopy and OCT imaging and ongoing consideration of future surgical intervention. Topical NSAIDs three times daily were prescribed for the first month. By week 4, there was minimal improvement in thickening (**Figure 2**). After 2 months, the OCT showed restoration of the foveal contour with a small residual cystic change (**Figure 3**). The MH closed spontaneously after four months (**Figure 4**). The VA in the right eye had correspondingly improved to 6/6 by the fourth month. OCT and vision remained stable one year after spontaneous closure of the hole. The right fundus examination also showed remnant chorioretinal scarring in the area where the commotio used to be and RPE changes in the right fovea (**Figure 5**).

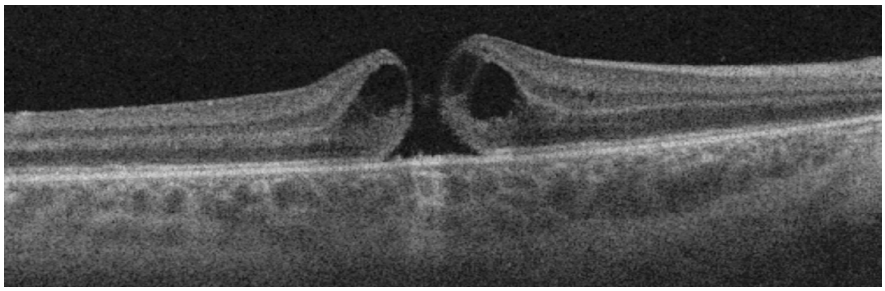

**Figure 1.** Right eye OCT at presentation, showing a full thickness macular hole (FTMH).

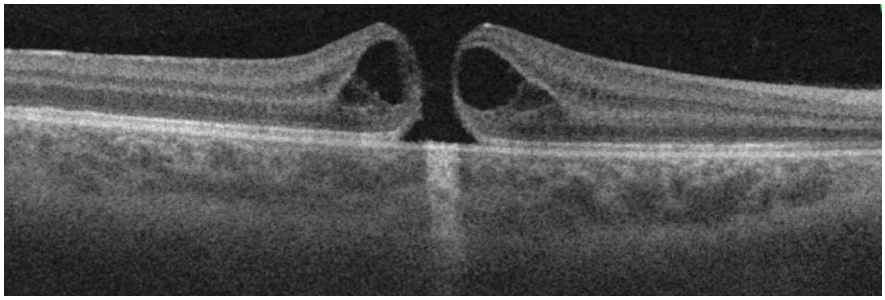

Figure 2. Right eye OCT 4 weeks after presentation, with persisting FTMH.

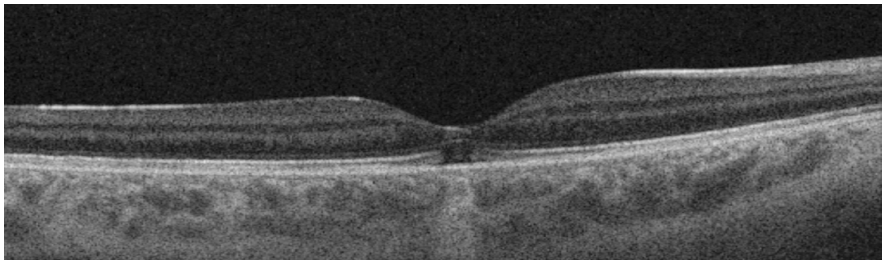

Figure 3. Right eye OCT 8 weeks after presentation with MH closure with minimal SRF subfoveally.

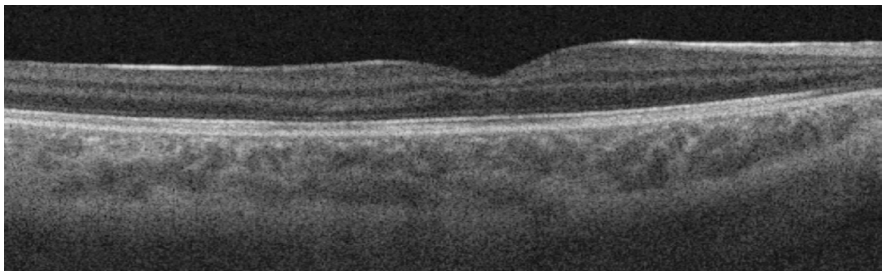

Figure 4. Right eye OCT 36 weeks after presentation with full MH closure.

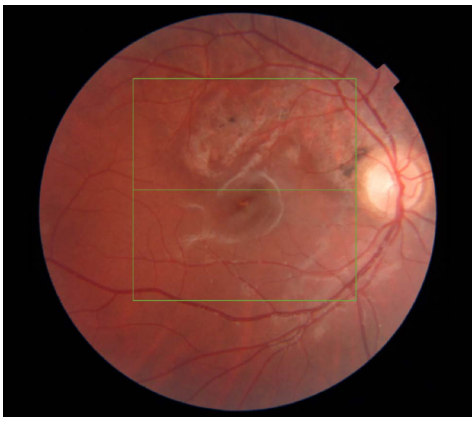

Figure 5. Right eye fundal photo 36 weeks after presentation.

## 3. Discussion

Paediatric traumatic MHs are more likely to close spontaneously than idiopathic

MHs in adults (2.7% to 6.2%) [6]. Favourable prognostic factors for traumatic MH closure include younger age, smaller holes, and the absence of a fluid cuff [8] [9]. Severe vision loss associated with traumatic MH may also stem from other sequelae, such as choroidal rupture, commotio retinae, and retinal detachment (RD) [4].

The mechanism behind hole closure in paediatric traumatic MH is as yet unclear. Theories include cell proliferation at the base of the hole, formation of a contractile epiretinal membrane (ERM) causing hole shrinkage, and detachment of the posterior hyaloid, which releases anteroposterior traction [3] [4]. The clinical approach to paediatric traumatic MHs requires considering the possible risks and benefits of observation vs surgical intervention. Most authors recommend a 4-month observation period before surgery if the MH fails to close [10]. However, the risk of amblyopia in younger patients with reduced visual acuity needs to be taken into account when considering the pros and cons of a surgical vs a conservative approach. In this specific case, this was not a concern due to the patient's age, and we could safely observe.

Pars plana vitrectomy (PPV), gas injection, with or without internal limiting membrane (ILM) peeling, and prone positioning have been associated with high rates of surgical success in traumatic MH. In a retrospective study by Liu *et al.* of 40 paediatric traumatic MHs, all patients were allowed an initial period of observation. 10 patients (25%) had spontaneous closure of MH, with an average time from trauma to MH closure of 63.2 days. Twenty-nine patients had surgical intervention, with a mean time from trauma to surgery of 12.5 months. All surgically-managed patients achieved anatomic closure, with 22 (75.9%) of 29 experiencing closure after initial PPV and the remaining eyes needing additional surgery [8] [10] [11]. The VA improved with closure of the traumatic MH, regardless of whether surgery was performed or not. However, the final VA was better in the spontaneous closure group (20/80) than in the surgical group (20/160) [6] [8]. In this case report, consistent with these findings reported in a retrospective study by Liu *et al.*, the patient had similar good visual outcome with spontaneous closure within approximately 2 - 3 months, suggesting that traumatic macular holes follow a similar pattern in most cases, and allowing a period of observation is an acceptable approach.

## 4. Conclusion

As cases of paediatric traumatic MH are limited, to date, no large, randomised controlled trial evaluating observation vs vitrectomy as initial management is available. However, both spontaneous closure and vitrectomy have been used in patient management. In conclusion, in this report, a case of spontaneous closure of a paediatric traumatic MH associated with corresponding improved visual acuity. Serial OCT imaging allowed us to observe and describe the mechanism behind hole closure. An initial period of observation is a viable management option to achieve good visual and anatomic outcomes in cases of paediatric traumatic MH.

## Declaration of Patient/Guardian Consent

The author certifies that she has obtained all appropriate patient/guardian consent. In the form, the patient/guardian has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published, and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

## Conflicts of Interest

The authors declares no conflicts of interest regarding the publication of this paper.

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