

Management of Traumatic Endophthalmitis with Retained Intraocular Foreign Body Caused by Streptococcus Mitis/Oralis During the Covid-19 Pandemic – First Case Report

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INTRODUCTION

Infective endophthalmitis following penetrating intraocular trauma is a potentially devastating complication with a relatively poor prognosis¹. Eyes with retained intraocular foreign bodies (IOFB) are more likely to develop endophthalmitis than those penetrating injuries with no foreign bodies². The prevalence of traumatic infective endophthalmitis in eyes with retained IOFB has been reported between 5 and 13% and the timing of vitrectomy in the setting of retained IOFB without evidence of endophthalmitis is a controversial issue however pars plana vitrectomy may reduce the incidence and severity of endophthalmitis as a treatment for these cases^{1,2}.

A wide range of microbes can cause infective endophthalmitis following trauma and the microbes are derived from the normal flora around the eye lid area or be carried out into the wound by contaminated injury causing objects. Gram positive cocci are the most frequently identified causative organism followed by Bacillus species, fungi and mixed infections³.

Management of endophthalmitis with retained IOFB is a challenging subject, despite advancement in vitreous surgery, a large number of eyes can be saved⁴. Visual prognosis however is affected by the complexity of many contributing factors.

The use of temporary keratoprosthesis in combined procedures has acted as an intraoperative bridge between the anterior and posterior segments of the eye. This helped in better anatomical restoration of the retina and removal of the IOFB.

In this article we report the first case of a post traumatic endophthalmitis with retained IOFB caused by streptococcus mitis/oralis operated during the covid 19 pandemic highlighting our management and we discuss in addition risk factors affecting final outcomes.

CASE PRESENTATION

A previously healthy 31-year male presented to the accident and emergency department with a history of trauma sustained during work to the left eye while hammering. The patient was complaining of eye pain and dropped vision in the left eye.

Visual acuity on ophthalmic examination was 6/6 OD, Hand Motions OS. The eye was congested and there was a horizontal corneal laceration inferiorly measuring 5 mm from 5 till 7 o'clock. Seidel's test was positive with pressure. The iris behind the corneal wound had a round defect with corresponding cataractous changes in the lens. Patient was taken for primary corneal repair on the same day. There was no view to the fundus because of dense vitreous hemorrhage. Orbital

X-ray done pre-operatively and B scan ultrasound post-operatively confirmed the presence of an echogenic intra-ocular metallic foreign body (IOFB) just in front of the retina on the posterior pole with vitreous hemorrhage and partial posterior vitreous detachment with no signs of retinal detachment (Figure 1).

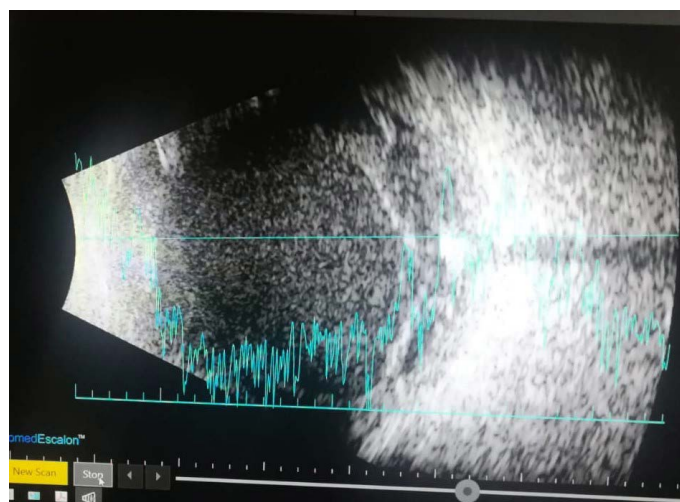


Figure 1: B scan ultrasound revealing the presence of a foreign body in front of the retina with transmitting echo defect in the orbit

The patient developed clinical signs of endophthalmitis 48 hours after presentation with an increase in pain and further drop in vision to light perception (LP), the examination of the anterior segment revealed hazy and edematous cornea and no further view to the posterior segment (Figure 2). On the same day an emergency pars plana vitrectomy (PPV) and empirical (ceftazidime 2.5mg and vancomycin 1mg) intravitreal antibiotic injection was done, the intraocular foreign body was not removed due to very poor visualization through the cornea despite attempted phacoemulsification of the lens. During the extraordinary time setting with Covid-19, there was no availability of tectonic corneal graft and because of a semi-lock down situation proceeding to order a fresh donor cornea was not feasible and limited at the time. The Culture of vitreous sample revealed Streptococcus mitis. A second vitrectomy and injection of intravitreal vancomycin was planned 3 days later aiming to further washout of debris from the anterior segment and vitreal cavity (Figure 3). With the previously mentioned complex case scenario a decision was made to liaise with our department's corneal surgeon to perform a temporary K-pro procedure using Landers Keratoprosthesis combined with a PPV in order to remove the IOFB and then re-suture the patient's own cornea which had developed a considerable amount of haze and opacification due to the severe endophthalmitis

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with a retained IOFB. The patient underwent the planned procedure 7 days from the initial day of presentation. During surgery 7 mm trephination of the patients cornea was performed , removal of dense exudative membranes from the anterior segment followed by suturing of the Landers Keratoprosthesis . Iris hooks were used to further dilate the pupil and maximize the view to the posterior segment. 23-gauge standard pars plana vitrectomy was done. The retina was covered with extensive membrane formation and organized purulent material. Due to severely necrotic retina very gentle delamination and segmentation was attempted without exerting further traction on the retina. The foreign body was found to be resting on the macula and having caused an apparent tear on the fovea . A serrated forceps was used to grab and remove the FB through an anterior approach through the prosthesis. 360° laser was done as well to any iatrogenic breaks. Tamponade with silicon oil 5000cc was used (Figure 4,5,6,7,8).



Figure 2: Acute presentation of endophthalmitis with hypopyon

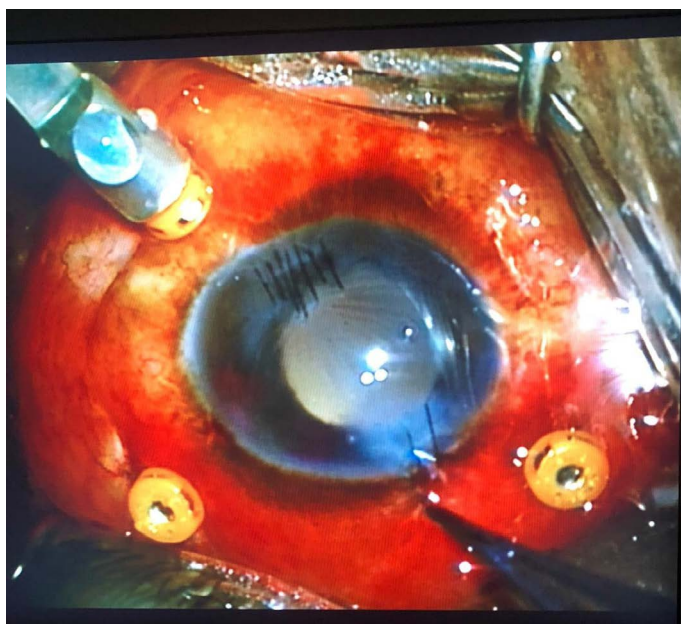


Figure 3: Second vitrectomy following removal of dense debris from the anterior chamber

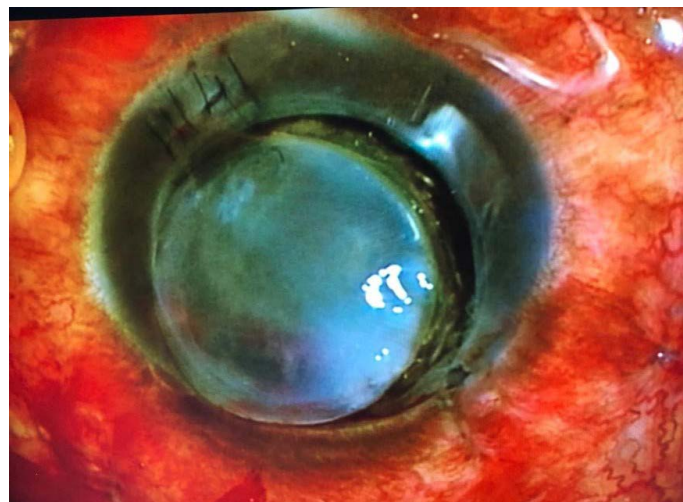


Figure 4: Trephination of the patient's cornea

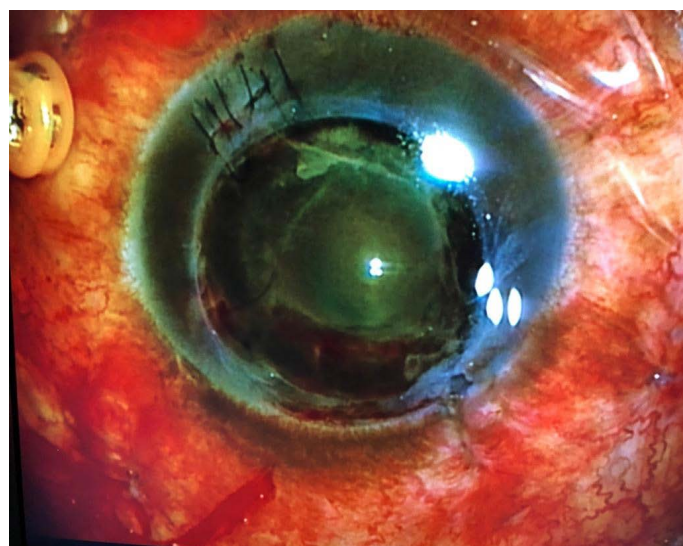


Figure 5: Dense exudation in the anterior chamber

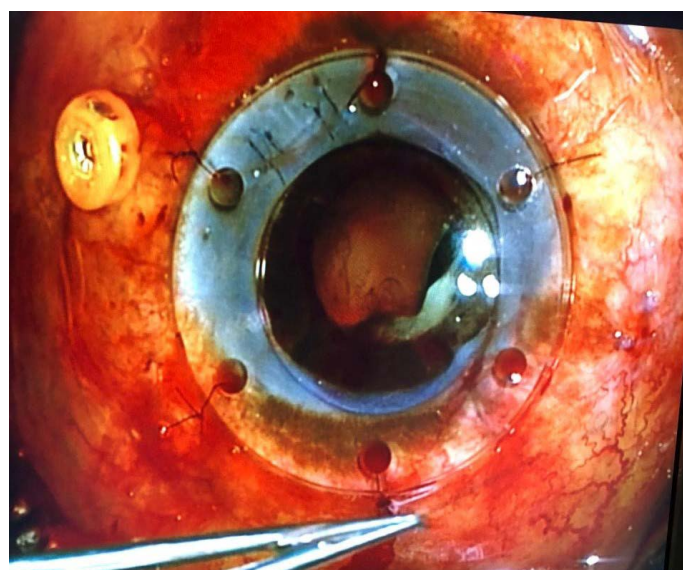


Figure 6: Suturing of the Landers KP

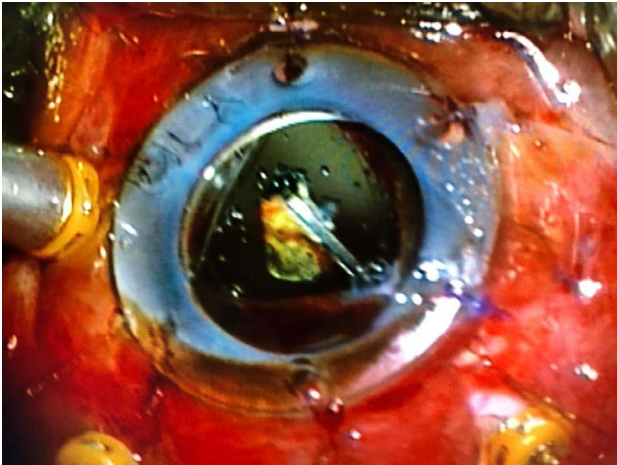


Figure 7: Removal of the metallic FB through the anterior segment

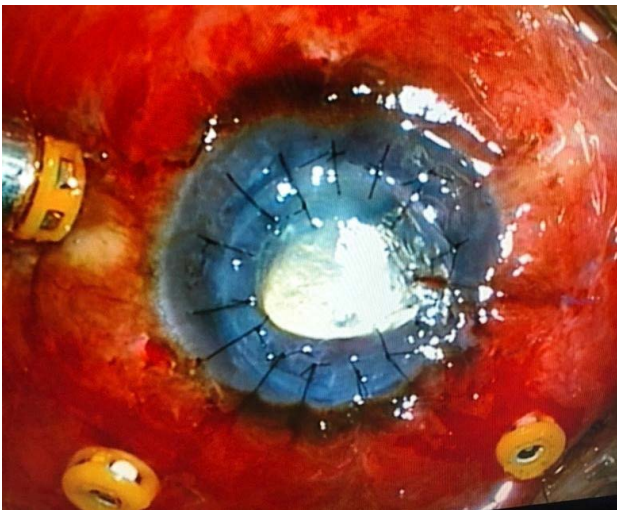


Figure 8: Re-suturing the patient's cornea

Postoperatively the patient's vision improved to hand motions and he had recovered from the pain. 3 days after the surgery he developed another exudative membrane which was treated with intracameral TPA which helped resolve the membrane and his cornea maintained reasonable clarity. Topical medications with fortified vancomycin and steroids was continued as well as dilating drops, lubrication. He was also given ten days of oral fourth generation cephalosporin (Figure 9).

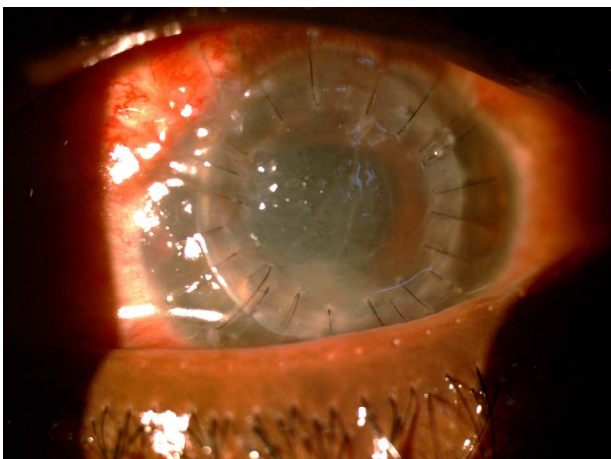


Figure 9: 2 week post operative clinical picture

DISCUSSION

Streptococcus mitis/oralis part of the Viridans group streptococci (VGS), a genetically heterogeneous group of bacteria, are the predominant bacteria in the human oropharynx. *Streptococcus mitis* is a rarely encountered but potentially devastating ocular pathogen.

Albini et al reported the most common streptococcus related endophthalmitis cases to be related to post-operative scenarios where invasive intervention had been performed and despite prompt treatment majority of patients had poor outcomes⁵. This is the first reported case of traumatic endophthalmitis due to *Streptococcus mitis*. The visual outcome with our patient was also poor despite maximum measures to control the infection.

The development of temporary keratoprosthesis has allowed the surgical repair of eyes that have experienced anterior and posterior segment trauma, providing the opportunity to salvage those eyes with injuries requiring penetrating keratoplasty and pars plana vitrectomy⁶.

Several retrospective studies have reported the use of temporary keratoprosthesis (KP) and successful anatomical and surgical outcome in combined KP followed by PPV and finally penetrating cornea transplant⁷⁻⁹. In our case an included challenge was distortion of corneal anatomy due to primary corneal perforation repair, edema, and haze which obscured the view and prevented vitreoretinal surgery. Therefore, the surgical decision of combined KP/PPV/IOFB/PKP took place.

X Dong et al reported the largest series of 107 eyes with corneal and vitreoretinal pathologies with a mean follow-up of 25 months. (Dong) 14/107 eyes (13%) had corneal laceration repair and IOFB. A successful outcome was defined in an attached retina and clear graft which was met in 78/92 eyes (73%)⁸.

Sigrid Roters et al reported a total of 34 severely injured eyes with a mean follow-up of 30 months. (Sigrid) 14/34 eyes (41%) had IOFB due to projectile injury and needed the combined procedure. The outcomes showed removal of all IOFB were successful and the best-corrected VA on final visit improved in only 7/34 (21%)⁷.

Albert S. Khouri et al reported a total of 24 eyes who underwent combined KP/PPV/PKP, describing the anatomic and functional outcomes with a mean follow-up of 36 months (Albert). 12/24 eyes (74%) had a history of trauma with ruptured globe repair prior to the combined procedure. 22/24 eyes (92%) had the retina reattached at the end of the follow up. Best corrected visual acuity improved in 8/24 (40%), was stable in 8/24 (40%), and worsened in 4/24 (20%)⁹.

In our case, corneal opacification and inflammation mandated the surgical decision of KP/PPV/IOFB removal/PKP to provide a wide view to the posterior segment and debulk inflammatory debris, remove the foreign body and restore the cornea, providing the best anatomical and functional outcome. We faced an exclusive challenge of not being able to provide a donor cornea for our patient. The global COVID-19 situation had affected our eye bank to urgently provide us with a donor cornea to implant. Transportation delay with couriers was another obstacle in that scenario leaving us with no option but to suture the patient's own cornea in an emergency situation.

The risk factors for the development of endophthalmitis in the setting of trauma are the presence of an IOFB, delay in primary repair, disruption of the crystalline lens and rural setting and there have been several previous studies suggesting that early vitrectomy and IOFB removal reduces the risk of infection¹. Duan et al reported highest incidence with plant and metallic foreign bodies at 27% and 16% respectively. Also, that IOFB location played a role with incidence being higher

in the vitreous than that in the wall of the eyeball or being retained within the crystalline lens¹⁰. The removal of a retained IOFB within 24 hours markedly reduces the risk of developing endophthalmitis. Jonas et al also concluded that removal of retained IOFB within 24 hours after injury may in some clinical situations reduce the risks of endophthalmitis and proliferative vitreoretinopathy where they noticed that endophthalmitis developed significantly more often in late intervention group than early intervention group^{2,11}.

In our case despite no delay in primary repair, the patient developed endophthalmitis over night with the retained IOFB which was awaiting a vitreoretinal service the following morning. The presence of an aggressive bacterial species might have played a role in the rapid progression of the clinical picture in our case. The question arises about the incentive for early vitrectomy and removal of the IOFB once endophthalmitis has already established. The role of pars plana vitrectomy in endophthalmitis has been challenged by the Endophthalmitis Vitrectomy Study whereby vitrectomy was only beneficial in eyes with endophthalmitis following cataract surgery with perception of light¹². In traumatic cases however the situation mandates more caution. Knox et al concluded in his study that immediate injection of intravitreal antibiotics with delayed IOFB removal is a possible alternative to immediate removal of the IOFB where four out of nine patients had a final outcome of 6/18 or better¹. In contrary Aggarwal et al reported that endophthalmitis with retained IOFB must be treated with early vitrectomy and intravitreal injections, taking proper samples to determine the pathogen is mandatory for proper diagnosis and management². Mieler et al mentioned in their study that the prompt role of removal of the IOFB along with the use of IV antibiotics in reducing the incidence of endophthalmitis remains uncertain. They reviewed 27 cases where none of the eyes developed signs of endophthalmitis ,yet 7 cases had positive cultures from the removed intraocular material. All eyes presenting within 24 hours of injury underwent immediate surgery. All seven eyes with positive cultures retained excellent visual acuity of 20/70 or better at final follow up¹²⁻¹⁴.

CONCLUSION

The management of endophthalmitis after trauma with the presence of an IOFB still remains a topic of debate when it comes to the timing or urgency of vitrectomy. Many factors lead to challenges in maintaining good final visual acuity despite standard modalities of treatment. Intravitreal antibiotics need to be injected as soon as the clinician suspects the development of endophthalmitis. Further surgical management including multidisciplinary teams needs to be supported and encouraged to remove the IOFB whenever possible to enable saving the eye and hopefully functional visual acuity.

Authorship Contribution: All authors share equal effort contribution towards (1) substantial contributions to conception and design,

acquisition, analysis and interpretation of data; (2) drafting the article and revising it critically for important intellectual content; and (3) final approval of the manuscript version to be published. Yes.

Potential Conflict of Interest: None.

Competing Interest: None.

Acceptance Date: 08 June 2021

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