

Case report

Propionibacterium acnes endophthalmitis following transplantation of contaminated Descemet's membrane endothelial keratoplasty graft

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ABSTRACT

Purpose: To report the clinical outcomes of a case of Propionibacterium acnes (P. acnes) endophthalmitis following Descemet's membrane endothelial keratoplasty (DMEK) surgery.

Observations: Transplantation of non-sterile DMEK tissue led to development of a retroreticular white plaque confirmed through PCR testing to be the result of P. acnes endophthalmitis. Intraocular antimicrobial therapy, surgical scraping of the white plaque, and repeat DMEK tissue transplantation resulted in an excellent visual outcome (20/20).

Conclusion: This is the first reported case of P. acnes endophthalmitis following DMEK surgery. Re-transplantation may be a viable option for DMEK patients who experience post-operative endophthalmitis.

1. Introduction

Corneal transplantation requires sterile transplantation tissue to avoid transplant-related infections. While rare, infectious keratitis and endophthalmitis following endothelial corneal transplantation can be visually debilitating and may require repeat surgical intervention, with the major causative agent being Candida species.^{1,2}

Endophthalmitis due to Propionibacterium acnes (P. acnes) is usually indolent and often results in a favorable visual outcome.³ P. acnes, a gram positive rod, is a relatively rare cause of endophthalmitis, accounting for 4.7% of cases in one large review.⁴ P. acnes infections are difficult to diagnose, as cultures can take on average 10 days to grow, with some cases taking up to 25 days.⁵ This slow-growing organism can be difficult to eradicate, and recurrence often occurs following intravitreal injection of antibiotics.³ As such, some studies recommend pars plana vitrectomy with posterior capsulotomy and possible lensectomy for definitive treatment.³

Descemet's membrane endothelial keratoplasty (DMEK) involves replacing the host corneal endothelium with a single sheet of donor Descemet's membrane and endothelial cells.⁶ When compared to traditional full thickness corneal transplantation, this approach has shorter visual rehabilitation, decreased risk of rejection, and improved

graft survival.⁷⁻¹² DMEK complications include partial graft detachment and primary graft failure, allograft rejection, cataract formation, and cystoid macular edema. To date, post-operative P. acnes endophthalmitis has not been reported. To our knowledge, this is the first case of P. acnes as the causative organism of acute postoperative endophthalmitis following DMEK surgery.

2. Case report

An 83 year old woman without significant past medical history and a prior ocular history of bilateral cataract surgery, Fuchs endothelial dystrophy (FED), history of DMEK surgery in the right eye (OD), and pseudophakic DMEK surgery in the left eye (OS) two weeks prior to presentation was referred to Massachusetts Eye and Ear for evaluation of endophthalmitis OS. After the patient's pseudophakic DMEK surgery OS, the patient experienced prolonged corneal edema with a non-clearing graft. Six days following surgery, it was discovered that the non-sterile preloaded practice wet lab DMEK tissue in Optisol-GS was inadvertently implanted into the patient's eye. The transplant was removed the following day, an intracameral washout was performed, an aqueous tap and the explanted graft were sent for culture, and intracameral moxifloxacin and amphotericin were instilled. Sixteen days after the initial

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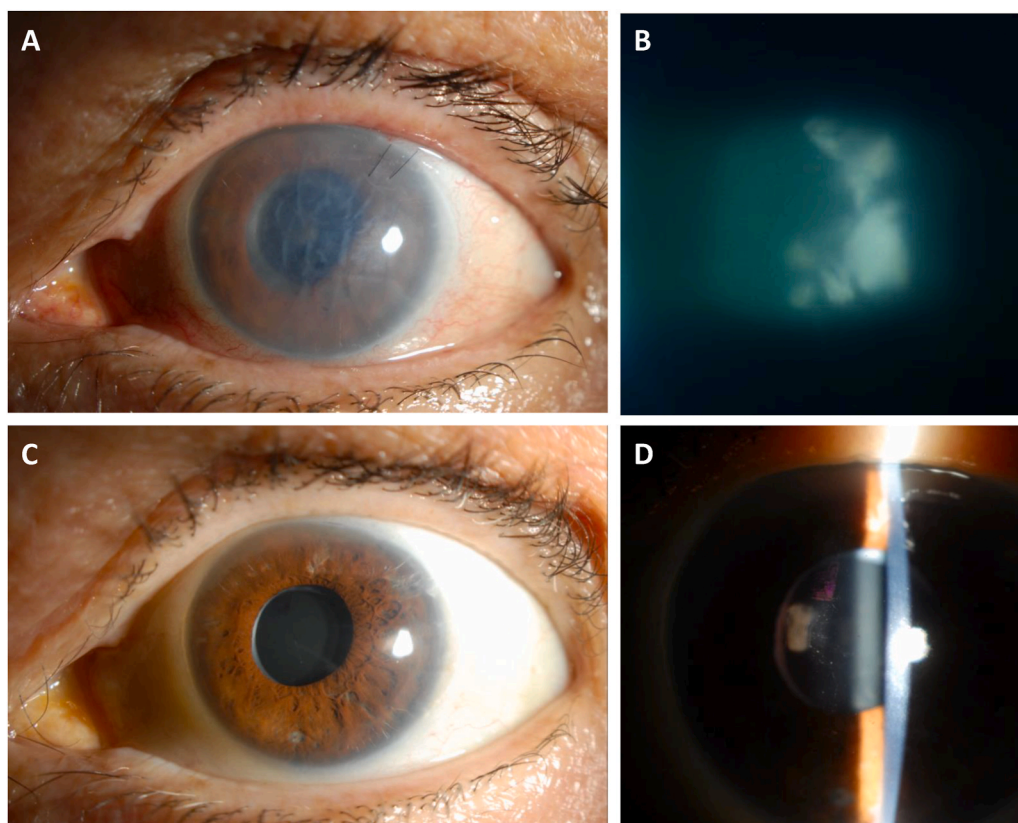


Fig. 1. (A) External slit lamp photograph of the left eye demonstrating minimal conjunctival injection and a diffusely hazy, edematous cornea. (B) External photograph demonstrating a white plaque on the posterior lens capsule as well as moderate flare in the aqueous fluid. (C) External photograph of the left eye six-months post-operatively, demonstrating resolution of corneal edema and conjunctival injection. (D) Slit lamp photograph demonstrating a clear posterior capsule and evidence of the 'F stamp' on the DMEK tissue superiorly.

surgery, the patient developed white opacities on the posterior capsule, and she underwent an AC tap for cultures and PCR along with intravitreal injection of vancomycin, ceftazidime and voriconazole.

On initial evaluation at our institution, visual acuity was 20/500 OS. There was no afferent pupillary defect. Intraocular pressures were normal. Slit lamp examination OS was notable for mild conjunctival injection, a diffusely hazy and edematous cornea with a lack of Descemet's membrane centrally, 1+ flare, and a PCIOL in the bag (Fig. 1A) with multiple white opacities on the posterior surface of the posterior capsule (Fig. 1B). Fundus examination OS revealed a hazy view but no vitreous opacities. Pachymetry showed a corneal thickness of 1096 μm . B scan ultrasound demonstrated an attached retina.

The patient subsequently underwent five intravitreal injections of vancomycin, ceftazidime and voriconazole, with taps for culture. Twenty-eight days after the initial culture was obtained at the outside institution, the PCR returned positive for *P. acnes*. Eye cultures remained negative despite a thirty-two day incubation period. Two days later, the patient underwent repeat DMEK transplantation after scraping of the retrocapsular plaque with a 30-gauge needle, and intravitreal injection of vancomycin, ceftazidime and voriconazole. Trypan blue was injected into the anterior chamber to visualize any residual Descemet's tags, which were removed using MST forceps. The DMEK graft of 7.25 mm preloaded in a Jones tube was injected by clear cornea incision. The graft was positioned and flattened and the anterior chamber was filled with 80% air to fixate the DMEK tissue. Subconjunctival dexamethasone was injected, and topical vancomycin 25 mg/ml, moxifloxacin 0.5% and prednisolone acetate 1% were used postoperatively.

Following repeat DMEK, the graft remained attached and clear without evidence of rejection. Cystoid macular edema developed but resolved with the use of topical NSAID drops. The white plaque, while not removed completely during the operation, eventually resolved after five months of follow up at which time visual acuity improved to 20/20 (Fig. 1C and D). There was no recurrence of the plaque at eight months follow up.

3. Discussion

This is the first reported case of *P. acnes* endophthalmitis as a result of DMEK surgery. Our patient had non-sterile transplant tissue present in the eye for roughly one week prior to removal, which resulted in low grade inflammation and a white posterior capsular plaque. After repeated intraocular antibiotic injections and surgical replacement of the DMEK issue, the visual outcome was excellent.

P. acnes most often results in delayed onset, chronic postoperative endophthalmitis, defined as infection presenting 6 weeks or later after surgery.¹³ In this case, the patient developed acute endophthalmitis, presumably due to the higher inoculum associated with transplantation of contaminated tissue. Another unique feature of this case is the unusual location of the plaque. The classic presentation of *P. acnes* infection after cataract surgery is the development of a white or gray plaque between the PCIOL and the posterior capsule.^{14,15} This is due to the organism gaining access to the eye at the time of surgery, when the capsular bag is open and the PCIOL is being placed. In contrast, in the present case, the plaque was located on the posterior surface of the posterior capsule (Fig. 2, diagram). Lastly, the implantation of contaminated transplantation tissue resulting from systems errors is a unique cause of acute endophthalmitis. This highlights the need for appropriate precautionary steps, such as a surgical time out, review of transplant material by the surgeon, and removal of practice tissue from the surgical field, to be implemented to ensure correct transplant materials are used at the time of surgery.

Treatment modalities for *P. acnes* infections have varied levels of success. Ninety three percent of cases recurred when the treatment consisted of intraocular injections alone.³ More invasive treatments such as vitrectomy still had a 50% recurrence rate. When vitrectomy was combined with capsulotomy, the recurrence rate was reduced to 26%. Vitrectomy with total capsulectomy and removal of the PCIOL has the best chance of complete eradication of *P. acnes*, with a zero percent recurrence rate.⁵ Rather unfavorable outcomes of *P. acnes*

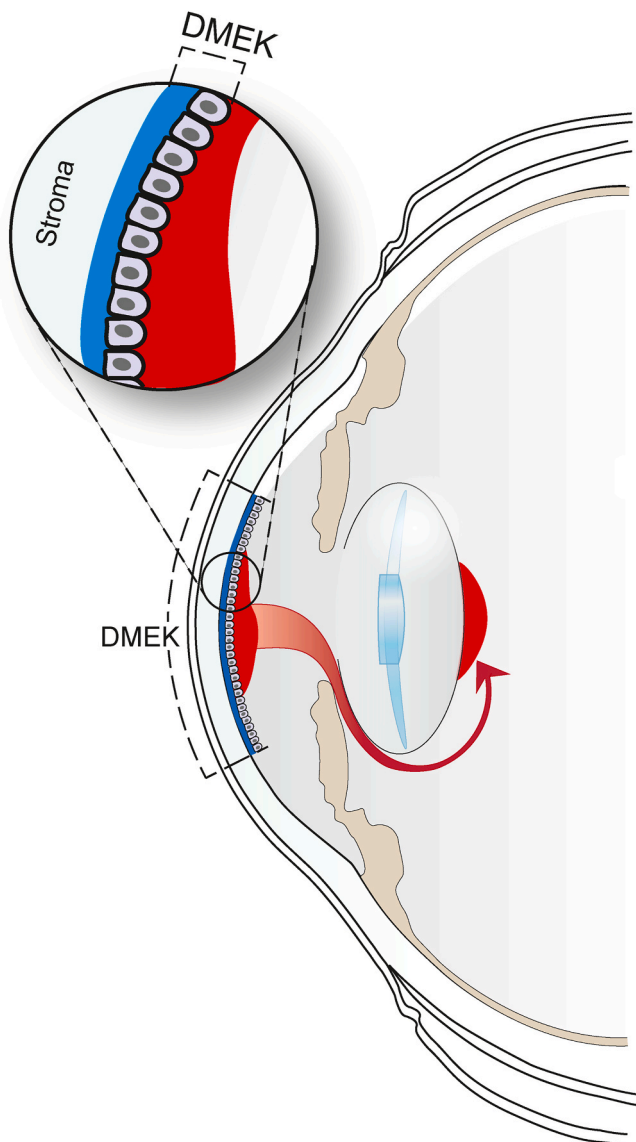


Fig. 2. Diagram demonstrating proposed mechanism of intraocular *P. acnes* migration from the DMEK tissue through the anterior chamber fluid with deposition onto the posterior lens capsule.

endophthalmitis, requiring more invasive measures to achieve full resolution, have been attributed to organisms growing in the anaerobic environment between the IOL and posterior capsule, isolated from host defenses and inaccessible to the intravitreally administered drugs. In the current case, full resolution of the endophthalmitis did not require vitrectomy or removal of the intraocular lens, indicating a favorable outcome likely associated with the unique location of the organism. During pseudophakic DMEK, the IOL is usually fully adherent to the anterior capsule, precluding access to the inner aspect of the posterior capsule. Therefore, during DMEK surgery, the infectious organisms likely travelled through the zonules to the vitreous cavity and attached to the posterior capsule, which is amenable to mechanical debridement and adequate drug exposure from intravitreal administration (Fig. 2, diagram).

The decision to perform the repeat DMEK during active infection was driven by two factors. First, the need to improve visualization through an edematous cornea; and second, microbiological evidence of *P. acnes* with lack of active infiltration or ulceration of the cornea, indicating that the infectious nidus was likely posterior. The quick resolution of edema after the repeat DMEK enabled monitoring of the plaque and overall

infectious course and supported quick visual recovery.

4. Conclusions

To our knowledge, this is the first report of *P. acnes* as the causative organism of acute postoperative endophthalmitis following DMEK surgery, in this case due to the transplantation of non-sterile donor tissue. This case illustrates that re-transplantation may be a viable option for DMEK patients who experience post-operative endophthalmitis.

Patient consent

Consent to publish the case report was obtained.

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Authorship

All authors attest that they meet the current ICMJE criteria for authorship.

CRediT statement

Grayson W. Armstrong MD MPH: conceptualization, writing – original draft, writing – review and editing, visualization. Shawn R Lin MD: conceptualization, writing – review and editing. Aviram Assidon MD: writing – original draft, writing – review and editing. Sarkis Soukiasian MD: writing – review and editing. Dean Elliott MD: conceptualization, writing – review and editing. Ula Jurkunas MD: conceptualization, writing – review and editing, visualization.

Declaration of competing interest

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