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Double Anterior Chamber: A New Technique to Treat Interface Infectious Keratitis After Deep Anterior Lamellar Keratoplasty

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Abstract

Interface infectious keratitis is a rare complication of deep anterior lamellar keratoplasty. Because of the deep location of the donor-host interface, topical and systemic medications have proven ineffective at treating the infection. This paper describes a double anterior chamber technique used to achieve drug administration at the interface. A small amount of aqueous humor was drained from the anterior chamber, and the antibiotic was administered to the donor-host junction. The formation of a double anterior chamber was monitored with a handheld slit lamp. Further rounds of antibiotic injection and aqueous humor drainage were performed until the double anterior chamber was close to-although not touching-the iris or lens.

Keywords: *Double Anterior Chamber; Infectious Keratitis; Deep Anterior Lamellar Keratoplasty (DALK)*

Introduction

Deep anterior lamellar keratoplasty (DALK) has several advantages over penetrating keratoplasty for treating patients with a healthy endothelium. Those advantages include longer-term graft survival [1], no endothelial rejection, lower rate of endothelial cell loss [2], stronger wound, lower dose of steroids, and lower risk of glaucoma [3]. One of the disadvantages of DALK is the presence of an interface between the donor and host that is susceptible to infections. Interface infectious keratitis (IIK) is difficult to diagnose because of its similarity to an epithelial ingrowth in early stages. IIK is additionally hard to treat because of issues with access for sample taking and the need to achieve good drug bioavailability. Fortunately, IIK is a rare complication, although it generally requires treatment via penetrating keratoplasty – which reduces the patient's benefit of preserving their own endothelium. Therefore, we aimed to introduce a technique that could provide patients another option for preserving DALK.

Surgical technique

Patients were first anesthetized with topical anesthesia in the operating room. A 30-gauge needle attached to a 3-ml syringe (Terumo 3-ml Luer Lock syringe, Terumo, Japan) was used to puncture the anterior chamber through the peripheral host cornea and drain 0.1 ml of aqueous humor. This was performed to expand the space to accommodate the future double anterior chamber (DAC). A suture is removed to facilitate access to the donor-host interface and then blunt cannula (Viscoelastic Cannula - Angled 9 mm 25GX7/8 in, Rumex, USA) attached to a syringe (Terumo 5-mL Luer Lock syringe, Terumo, Japan) loaded with the desired drug was inserted between the sutures in the donor-host junction until reaching the posterior layer of the DALK. Injection of 0.1 ml was performed, and the cannula was quickly withdrawn to avoid leakage. Then, the DAC was observed with a handheld slit lamp (HSL 150 hand-held slit lamp, HEINE, Germany) (Figure 1 and 2). If the DAC touches the iris or the lens, the donor-host junction is opened with a Sinskey Hook (Sinskey Hook Angled Titanium, Katena, USA) until a small amount of the drug drains. If the DAC is too far from the iris, another 0.1 ml of the desired drug is injected. If the DAC does not expand, a new puncture of the anterior chamber can be made to increase the space for expansion. If a sufficiently expanded DAC is not achieved, a Barraquer Spatula (Barraquer Iris Spatula 0.5 mm, Katena, USA) is used to check if there are synechiae that can be free in the donor-host interface.

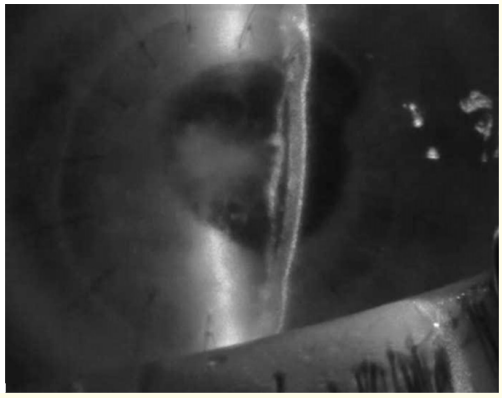

Figure 1: *Small double anterior chamber.*

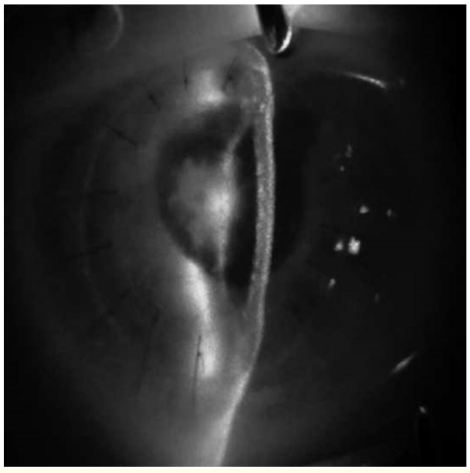

Figure 2: *Small double anterior chamber.*

The process of injection and drainage is repeated until either the DAC is close to the iris-without touching it-or the size of the DAC cannot be expanded with further injections.

Case 1

The patient underwent a manual DALK surgery to treat leucoma secondary to a penetrating cornea injury (Figure 3). Two months later, a deep abscess of the donor-host interface was diagnosed (Figure 4). Empirical treatment was initiated with vancomycin 2.5% (Colon pharmacy, Argentina) eye drops followed by ceftazidime 3% (Colon pharmacy, Argentina) eye drops every hour. Samples were taken, and *Clostridium perfringens* infection was identified. As a result, 500 mg of oral ciprofloxacin (Ciprofloxacina Richet, Argentina) was administered twice a day in addition to topical treatment. Although *C. perfringens* was sensitive to ceftazidime, the abscess reached the donor cornea boundaries after 2 days of local treatment. The patient underwent surgery to exchange the donor cornea, and a DAC was performed using ciprofloxacin (200 mg/100 ml). The patient continued treatment with oral ciprofloxacin and ceftazidime eye drops for 10 days. The DAC was spontaneous resolved after 48h. No further infection was observed (Figure 5). At follow-up 1 year later, the patient had an endothelial cell count of 1775/mm^2 and a transparent cornea. His CDVA was 20/60 (refraction -2 - 4 × 90). Cataract surgery is still pending.

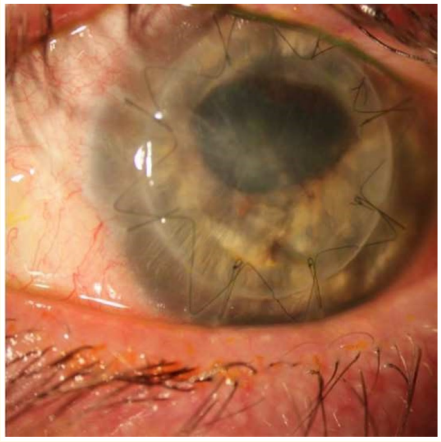

Figure 3: *Small double anterior chamber.*

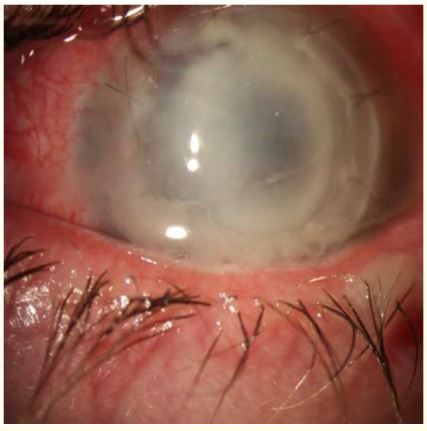

Figure 4: *Small double anterior chamber.*

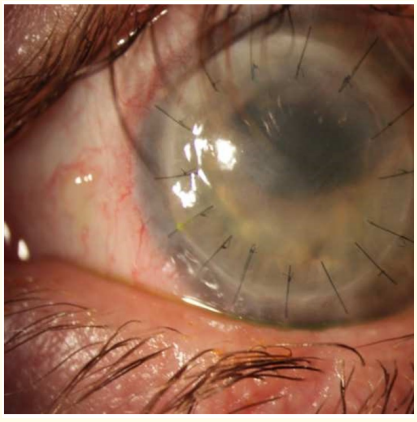

Figure 5: *Small double anterior chamber.*

Case 2

A 53-year-old patient presented with a penetrating corneal injury in which a wire penetrated his left eye and generated a traumatic cataract and vitreous prolapse in the anterior chamber. Primary wound closure was performed, and a week later, a complete vitrectomy was performed with aspiration of the lens remains. Seven months later, DALK was performed up to a predescemetic plane using a manual technique (Figure 6). One week later, the cornea was transparent, although without visual improvement. Macular edema was diagnosed and treated with one drop of bromfenac 0.09% (Fenac, Maxvision, Argentina) drops every 4h. After 15 days, the patient presented with pain in the eye, and IIK was diagnosed (Figure 7). The initial treatment consisted of ceftazidime 2.5% (Colon pharmacy, Argentina) and vancomycin 3% (Colon Pharmacy, Argentina) drops every hour. After a poor response, the donor cornea was exchanged. Samples sent to the laboratory were identified as PCR-positive for the fungus genome.

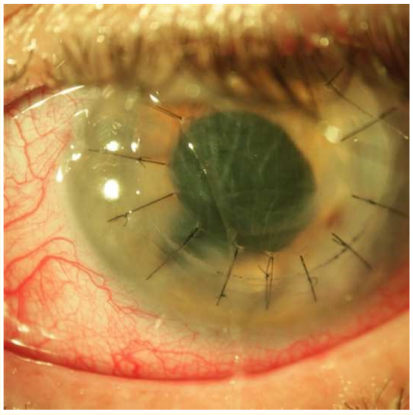

Figure 6: *Second case, first DALK.*

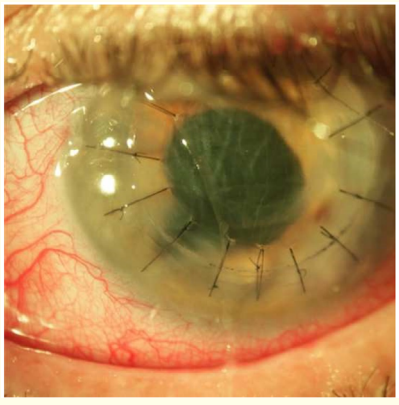

Figure 7: *Second case, corneal IIK image.*

An hourly dose of voriconazole 1% (Colon pharmacy, Argentina) was added to topical medication and oral voriconazole 200 mg (Vfend, Pfizer) twice a day. Whitish spots started to grow in the interface (Figure 8). A DAC was performed using fluconazole 200 mg/100 ml (Fluconazol Richet, Argentina) every 3 days with a total of 4 injections. Although the infection was stable, a penetrating keratoplasty was performed, and 0.1 ml of fluconazole (200 mg/100 ml) was injected into the anterior chamber (Figure 9). Four months later, the cornea was transparent with a CDVA of 20/50 with spherical + 12.00 diopters.

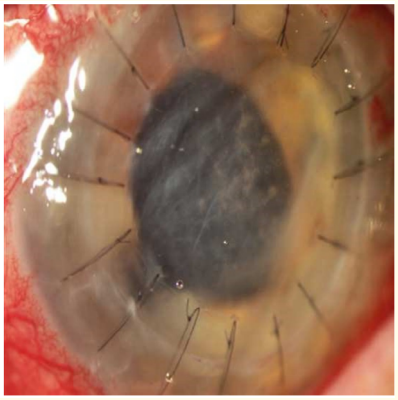

Figure 8: *Second case, whitish spots on interface after second DALK.*

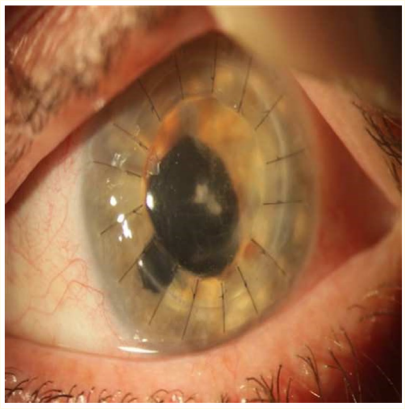

Figure 9: *Second case after PKP.*

Results

Two eyes that presented with IIK were treated with the DAC technique. One eye (50%) was successfully treated, while the other eye (50%) required a penetrating keratoplasty to cure the infection.

Discussion

IIK must be suspected upon the observation of any whitish opacity in the interface, and *Candida* etiology should be considered because of its high prevalence [4].

According to a review of the literature, topical and systemic treatment alone are unlikely to cure the infection, with most cases requiring one or more surgical interventions. Intrastromal drug injections, intracameral antibiotics, irrigation of the donor-host interface with or without graft exchange, and penetrating keratoplasty were described. Several perforations of the anterior chamber have been described while performing an interface irrigation. Our technique addresses this by using a side port to decrease eye pressure before drug injection, thus lowering the tension on the host bed and allowing it to more easily expand. Another advantage is that the expansion of the DAC is monitored by a slit lamp, providing for additional drug administration where necessary to prolong the treatment. Although a persistent DAC was not a complication that occurred in either case, it could be treated as usual after the infection is cured.

If the technique did not achieve the desired result, a penetrating keratoplasty can be performed.

Value Statement

What was known

- Interface infectious keratitis is a complication of deep anterior lamellar keratoplasty (DALK) that is difficult to treat because of poor bioavailability of the drug injected into the donor-host interface.

What this paper adds

- Antibiotics can be successfully injected into the DALK interface using the double anterior chamber technique.

Conclusion

Interface infectious keratitis is a complication of deep anterior lamellar keratoplasty (DALK) that is difficult to treat because of poor bioavailability of the drug in the donor-host interface. This article describes a technique with which it is possible to obtain high concentrations of antibiotics in the place where they are required. Although long-term results need to be studied, the low casuistry of this pathology makes it difficult to investigate.

Disclosure of Financial and Proprietary Interests

None to disclose.

Disclosure of Public and Private Support

None to disclose.

Bibliography

1. Sarnicola V., *et al*. "Long-term graft survival in deep anterior lamellar keratoplasty". *Cornea* 31 (2012): 621-626.

2. Kubaloglu A., *et al*. "Corneal endothelium after deep anterior lamellar keratoplasty and penetrating keratoplasty for keratoconus: a four-year comparative study". *Indian Journal of Ophthalmology* 60 (2012): 35-40.

3. Musa FU., *et al*. "Long-term risk of intraocular pressure elevation and glaucoma escalation after deep anterior lamellar keratoplasty". *Clinical and Experimental Ophthalmology* 40 (2012): 780-785.

4. Fontana L., *et al*. "Interface infectious keratitis after anterior and posterior lamellar keratoplasty. Clinical features and treatment strategies. A review". *British Journal of Ophthalmology* 103 (2019): 307-314.

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