Acute interface infectious keratitis with multidrug resistant *Klebsiella* and *Escherichia Coli* following deep anterior lamellar keratoplasty

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Acute interface infectious keratitis (AIIK) is a rare and devastating complication following lamellar keratoplasty. Here, we report a case of AIIK following deep anterior lamellar keratoplasty (DALK) caused by double gram-negative bacilli and required urgent therapeutic penetrating keratoplasty (TPK). Microbiology revealed co-infection with *Klebsiella* and *E. Coli* sensitive only to colistin. Donor rim culture also grew *Klebsiella*. TPK was successful in controlling the infection and the patient responded to topical fortified amikacin and ciprofloxacin. Since optical quality tissue was used, the patient regained 20/40 vision postoperatively. This report highlights that immediate TPK and intense antimicrobial therapy can salvage these eyes with good visual outcome.

Key words: Deep anterior lamellar keratoplasty, interface infection, multidrug resistance, therapeutic keratoplasty

Nowadays deep anterior lamellar keratoplasty (DALK) is preferred over penetrating keratoplasty for the treatment of corneal stromal pathologies.[1,2] Postoperative acute interface infectious keratitis (AIIK) following DALK is a rare, devastating, and potentially sight-threatening complication, mainly caused by *Candida spp*.[3-5] There are only three published reports about AIIK following DALK due to *Klebsiella pneumoniae*.[6-8] Gram-negative bacteria are common nosocomial pathogens, and sometimes corneas from hospitalized donors are contaminated. These organisms are notorious for being multi-drug resistant (MDR).[9,10] Since the exudates are trapped in the potential space between the donor cornea and host Descemet membrane (DM), surgical management in the form of therapeutic penetrating keratoplasty (TPK) is often required.[5]

In this case report, we describe the successful management of a case of AIIK following DALK with double MDR organisms, *Klebsiella pneumoniae*, and *Escherichia coli*.

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Case Report

A 20-year-old male presented with diminished vision in the right eye due to vascularized corneal scar with lipid keratopathy and had reduced corneal sensations [Fig. 1a and b]. The probable diagnosis was post herpes simplex virus keratitis (HSVK) scar. Preoperative best-corrected visual acuity (BCVA) was 20/400 and ultrasonography (USG) B-scan was unremarkable. After taking informed written consent, DALK was planned under general anesthesia.

Intraoperatively, there was DM microperforation, which was managed with fibrin glue. Postoperatively, the patient received topical prednisolone acetate, moxifloxacin, and prophylactically oral acyclovir 400 mg twice daily. On the first postoperative day, there was mild graft edema and BCVA was 20/120. The anterior chamber was quiet, and the graft was attached to the underlying host DM.

On the second postoperative day, the patient presented to an emergency with decreased vision and redness, but he did not complain of pain or photophobia. The vision had decreased to hand motion and slit-lamp examination revealed infiltrates along the graft host junction, interface exudates, and hypopyon [Fig. 2a and b]. The interface exudates caused the host DM to detach from the graft as seen in anterior segment optical coherence tomography [Fig. 2c]. Our provisional diagnosis was a donor-related bacterial infection. USG B-scan showed no involvement of the posterior segment.

Since there was extensive interface involvement, urgent full-thickness TPK was done on the same day using optical quality donor tissue. Host trephination was oversized by 0.50 mm from the prior surgery. Thorough irrigation of the interface was done with fortified vancomycin (50 mg/ml) and fortified amikacin (40 mg/ml) to prevent further contamination of host cornea. This was followed by the removal of the host Descemet-endothelial layer, and the anterior chamber was also irrigated thoroughly. New donor cornea was secured with 16 interrupted 10-0 nylon sutures.

A standard microbiology workup was performed with the excised infected corneal button and exudates. Immediate 10% potassium hydroxide (KOH) mount examination showed no fungal filaments and Gram stain showed gram-negative bacillus (GNB). Based on these findings, postoperative treatment was hourly topical fortified amikacin, ciprofloxacin, atropine, and oral ciprofloxacin (750 mg) twice daily for 7 days. Prior medications were stopped.

The excised tissue was plated directly on multiple solid media and incubated at 37°C. Gram staining and biochemical characteristics confirmed mixed GNB infections – *Klebsiella*

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pneumonia and *Escherichia coli*. The sensitivity pattern by Kirby-Bauer disc diffusion method with 27 drugs showed extended drug resistance with sensitivity only to colistin. The donor rim culture of the tissue used for DALK also grew *Klebsiella pneumonia* with a similar antibiotic sensitivity pattern.

Since the patient was improving clinically, and no further signs of infection were seen, the medications were not changed. Three days after TPK, BCVA was 20/200 and the graft was clear. The fortified amikacin and ciprofloxacin drops were reduced to 8 times and topical prednisolone and oral acyclovir were restarted. Seven days after TPK, BCVA had improved to 20/80 and the patient was asked to continue topical ciprofloxacin for 2 weeks more and topical prednisolone 4 times was continued. After a 3-months follow-up, the patient had BCVA of 20/40 [Fig. 3a and b] and he was on topical prednisolone in tapering doses, and oral acyclovir 400 mg twice daily.

Discussion

In this case, we described AIIK following DALK with double pathogen - *Klebsiella pneumonia* and *Escherichia coli;* and treated successfully with TPK. To the best of our knowledge, this the first report of interface infection following DALK caused by two GNBs.

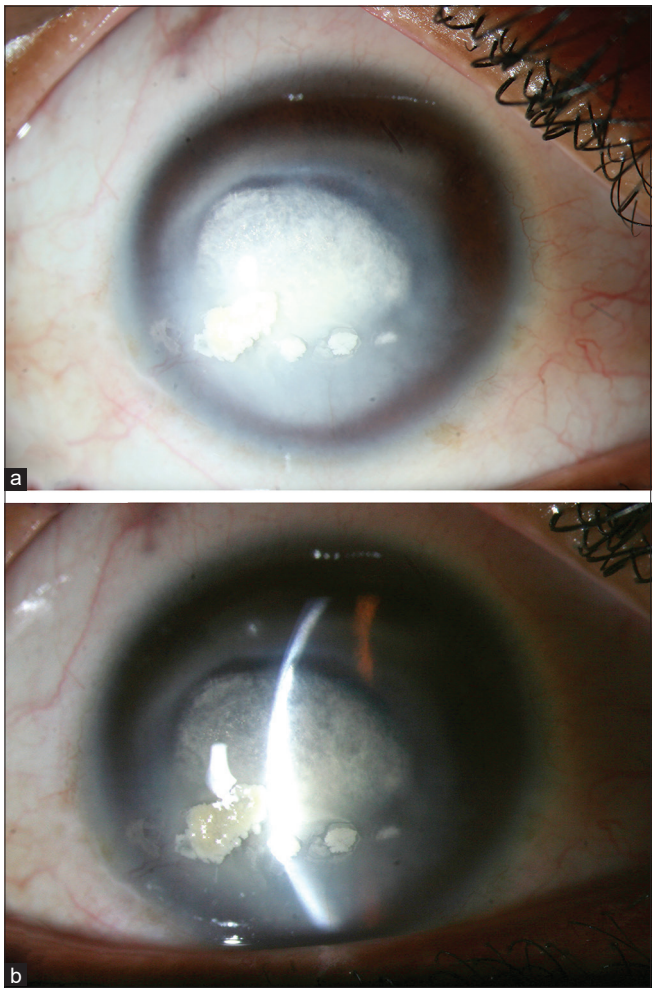

Figure 1: (a and b) Preoperative clinical photograph

In prior reports of Klebsiella-related acute interface infection following DALK, TPK, or donor button replacement was required to control the infection. Two of the three cases were due to MDR organisms.[6-8]

Klebsiella and *E. coli* are common nosocomial pathogens both worldwide and in India, and are often MDR.[9,10] Hospital-acquired *Klebsiella* can be harbored in the conjunctiva and sometimes cause serious ocular infection in patients during the hospital stay.[11] The *Klebsiella* and *E. Coli* isolate in this case was extended drug resistant and sensitive only to colistin. Treating such infections is very difficult, but fortunately in our patient TPK was successful. Since the postoperative period was quiet and patient was improving, we did not change to topical colistin.

In our case, the donor, a diabetic, was admitted for a week and the cause of death was renal failure. The mate cornea was used for penetrating keratoplasty and had an uneventful postoperative period, and mate donor rim did not show any growth.

What is unusual about this case is co-infection with dual organisms. First, while *Klebsiella* was isolated from the donor rim, *E. coli* was not. This contamination was probably either from the operation theatre or the patient environment. However, all other surgeries performed on the same day in the same operating room had an uneventful postoperative period. Second, the trapped exudates caused DM detachment in our case. This was due to microperforation during DALK dissection intraoperatively. Third, the patient did not complain of pain during the entire postoperative period. This is probably due to suspected HSVK being the underlying cause with loss of corneal sensation.

Conclusion

Acute interface infection following DALK is a rare but sight-threatening complication. Donor contamination is the usual source of infection, and if the donor was hospitalized, MDR strains might be making the medical treatment more difficult. With prompt surgical management under adequate antibiotic cover, it is possible to save these eyes with favorable visual outcomes.

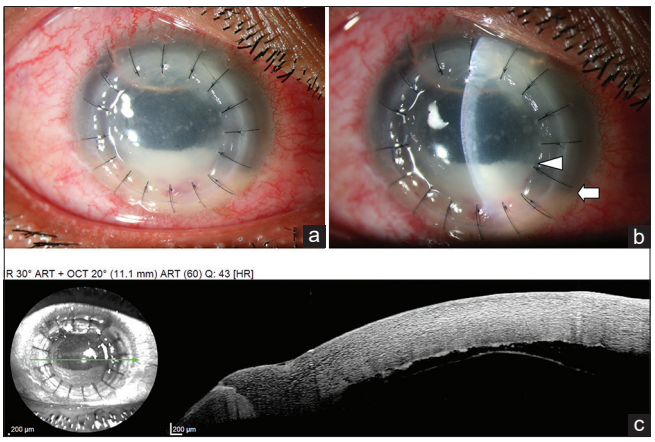

Figure 2: (a and b) Acute interface infectious keratitis on second postoperative day. Two levels of hypopyon noted in slit section (b) arrowhead – interface level and arrow – anterior chamber level. (c) Anterior segment OCT in same day showing Descemet membrane detachment with hyperreflective exudates in the interface

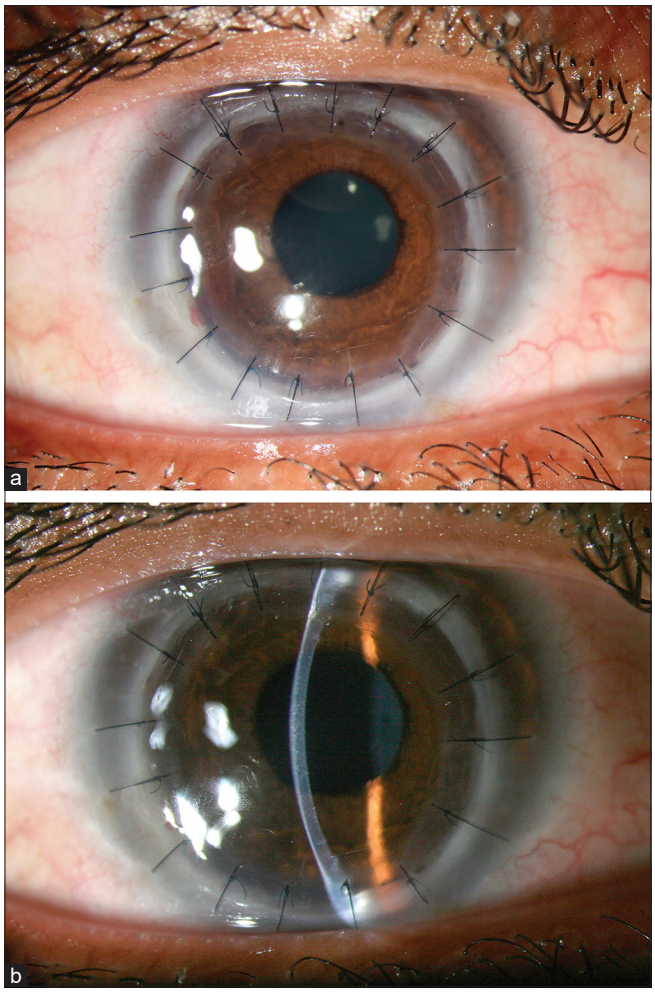

Figure 3: (a and b) Postoperative 3 months after therapeutic keratoplasty. Clear and compact graft maintained

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) 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.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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