INTERFACE INFECTIOUS KERATITIS AFTER ANTERIOR AND POSTERIOR LAMELLAR KERATOPLASTY

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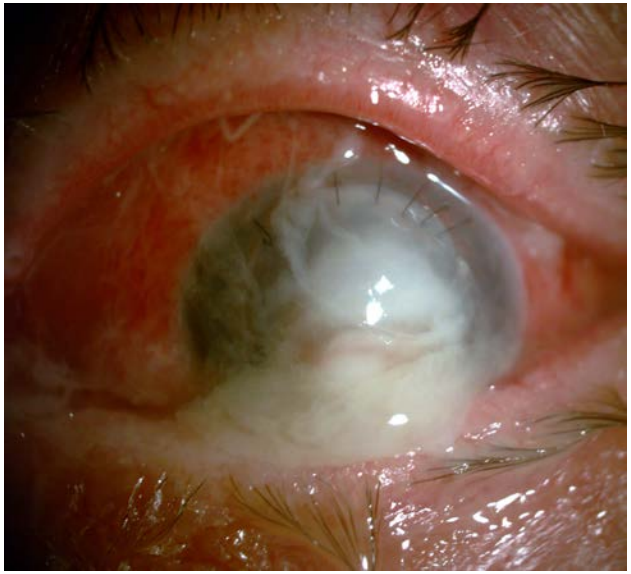
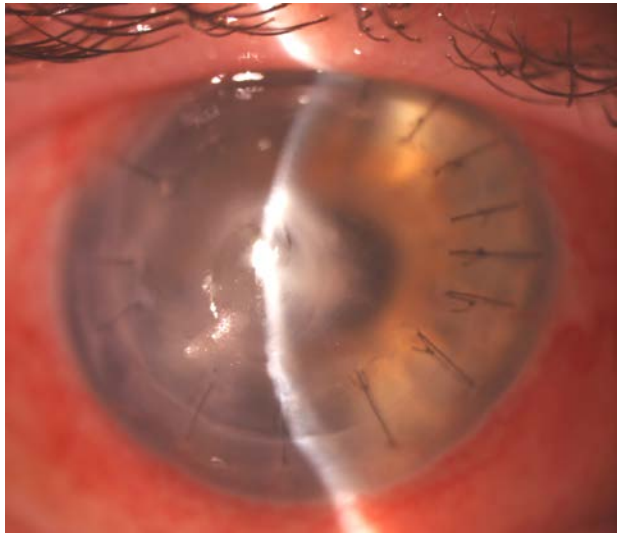
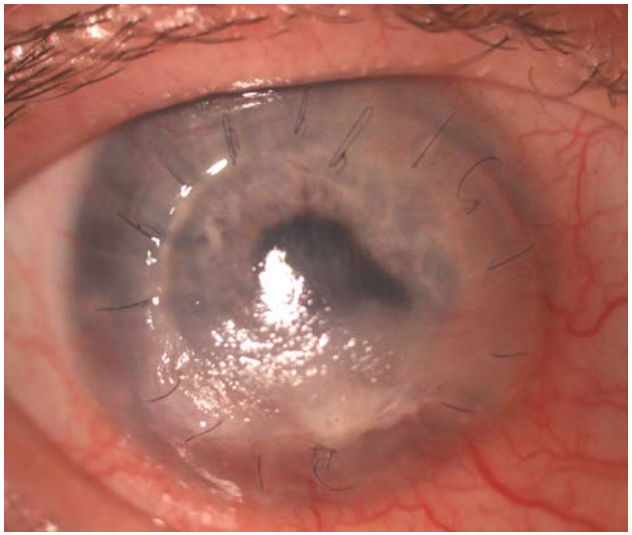
Infectious keratitis after PK

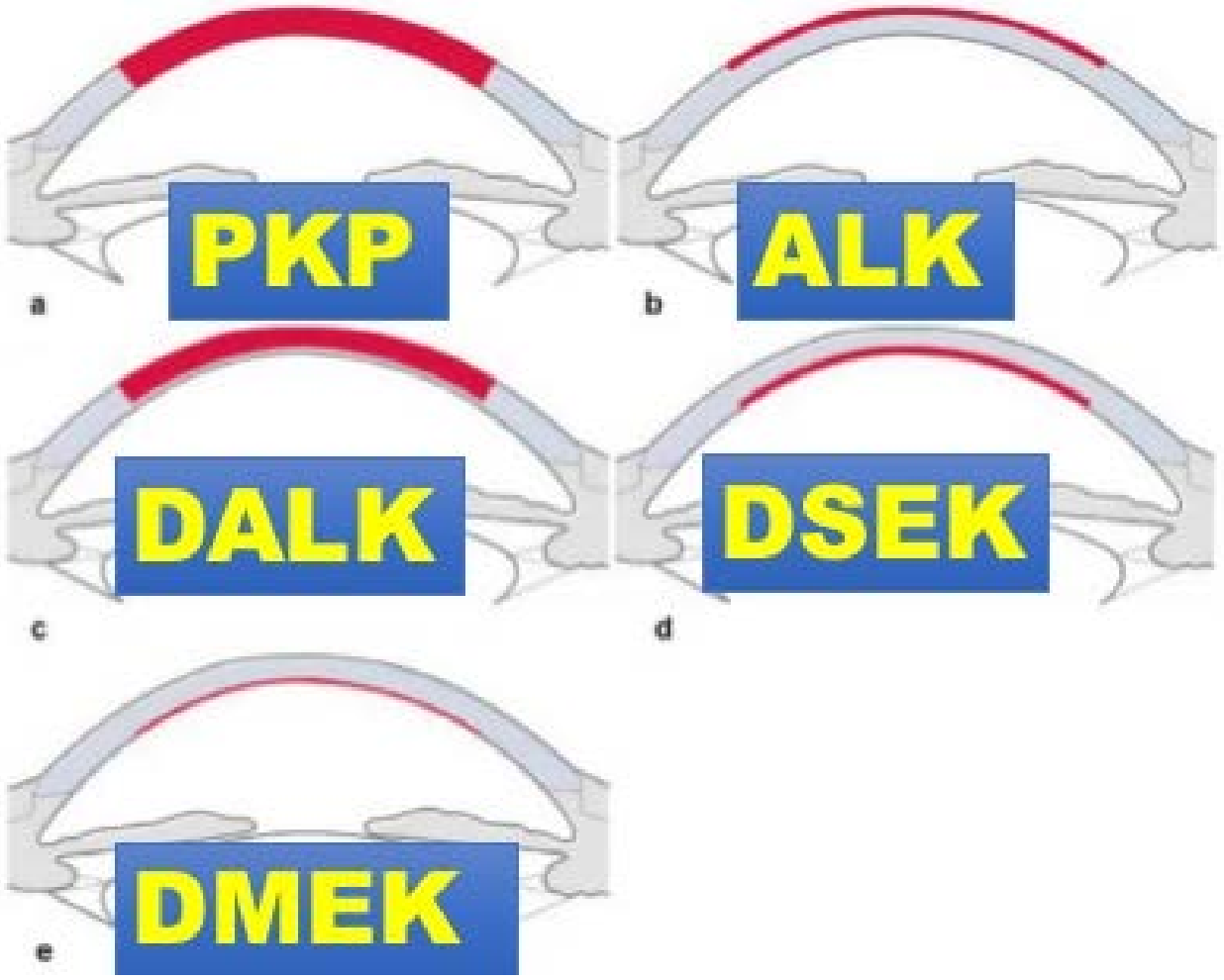
- Corneal sutures
- Ocular surface disease
- Dry eye syndrome
- Lids malposition
- Donor cornea



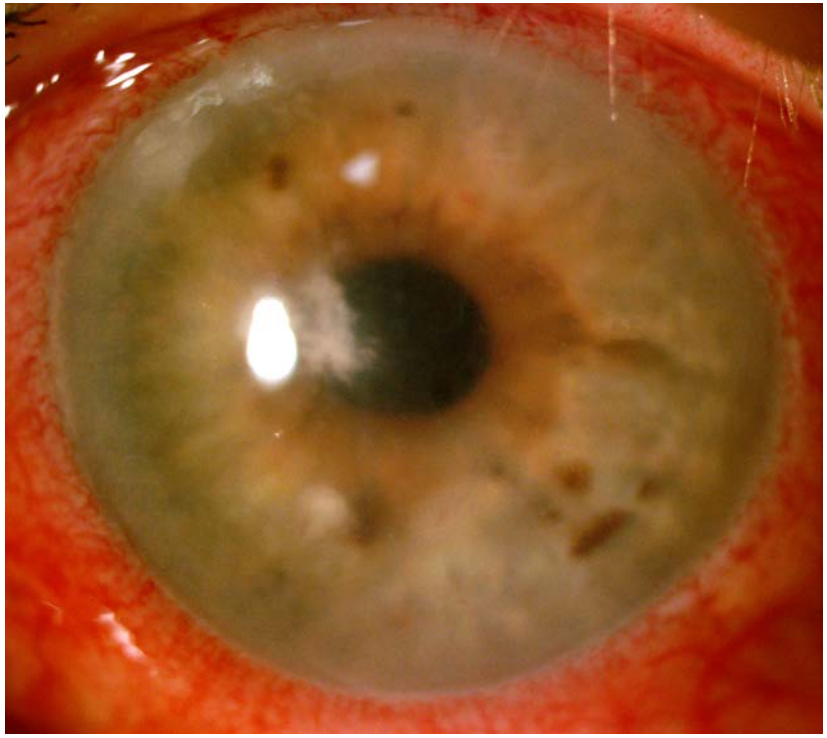


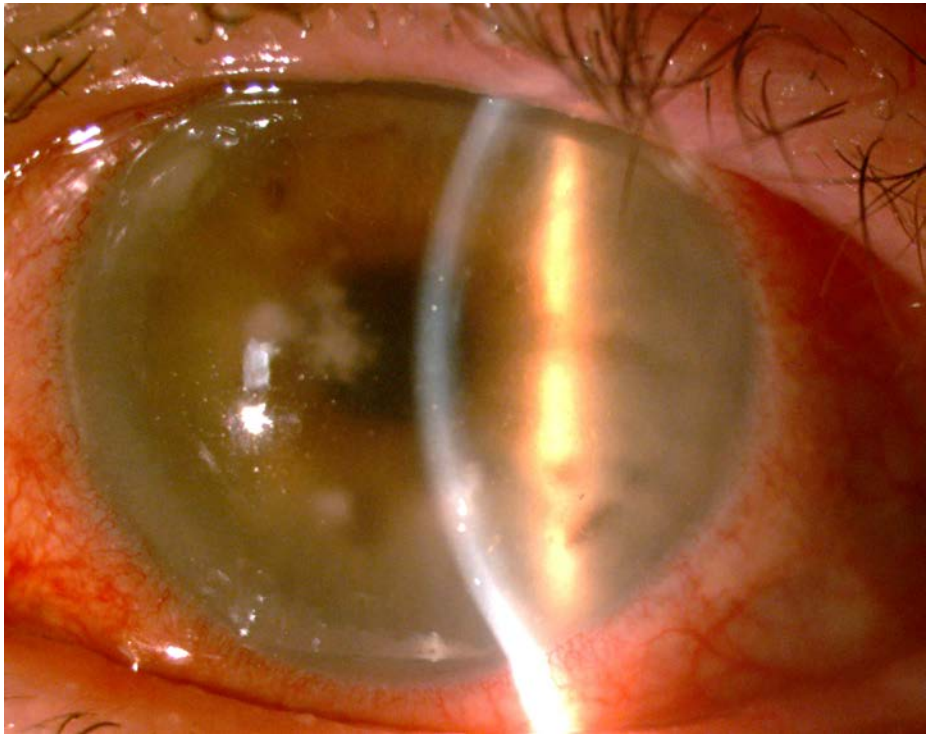


Keratoplasty evolution



Interface Infectious Keratitis (IIK)





Interface Infectious Keratitis (IIK)

- Interface Infectious Keratitis a novel corneal infection
- Rare complication after DALK and EK
- Fungi (Candida) most frequent microorganism
- Frequency 0.023% after LKs and 0.012 after PK
- Frequency 0.052% after DALK and 0.022% after EK

- 11 IIK reported after DALK since 1999
- 31 IIK reported after EK since 2009

- Increasing trend ?

Aldave et al. Cornea 2013

Candida albicans Interface Infection After Deep Anterior Lamellar Keratoplasty

Luigi Fontana, MD, PhD,† Gabriella Parente, MD,* Bruna Di Pede, MD,‡ and Giorgio Tassinari, MD**

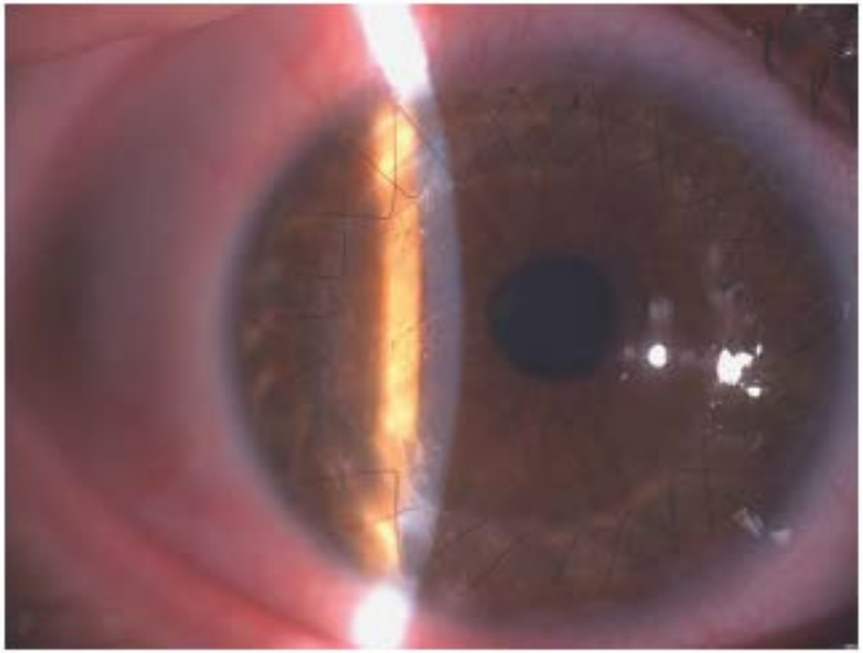


FIGURE 1. *C. albicans* interface infection. Multiple whitish infiltrates are visible at the graft–host interface 28 days after surgery.

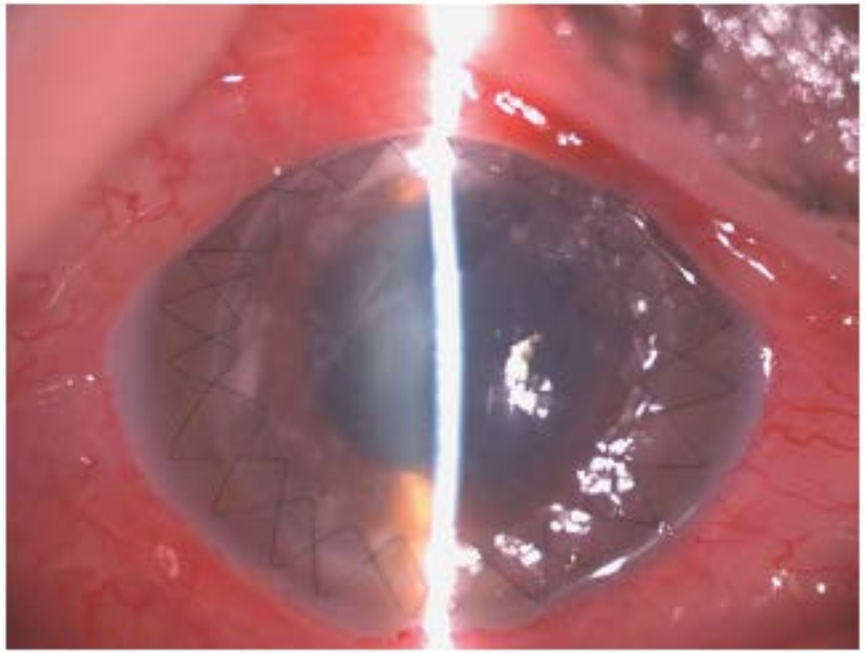


FIGURE 2. *C. albicans* interface infection. Worsening of the interface infection with enlargement of the infiltrates and graft edema.

Fontana et al. Cornea 2007

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Interface infectious keratitis after anterior and posterior lamellar keratoplasty. Clinical features and treatment strategies. A review

Luigi Fontana,[1] Antonio Moramarco,[1] Erika Mandarà,[1] Giuseppe Russello,[2] Alfonso Iovieno[1,3]

Fontana L, et al. Br J Ophthalmol 2018

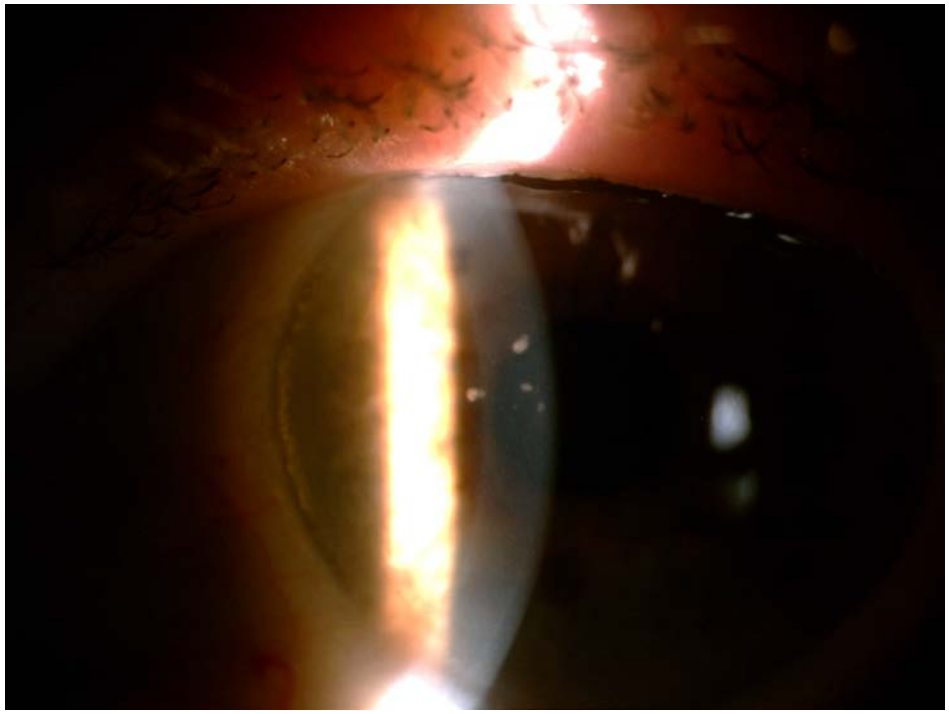


Figure 4. *Candida glabrata* interface infection developed 28 days after DMEK.

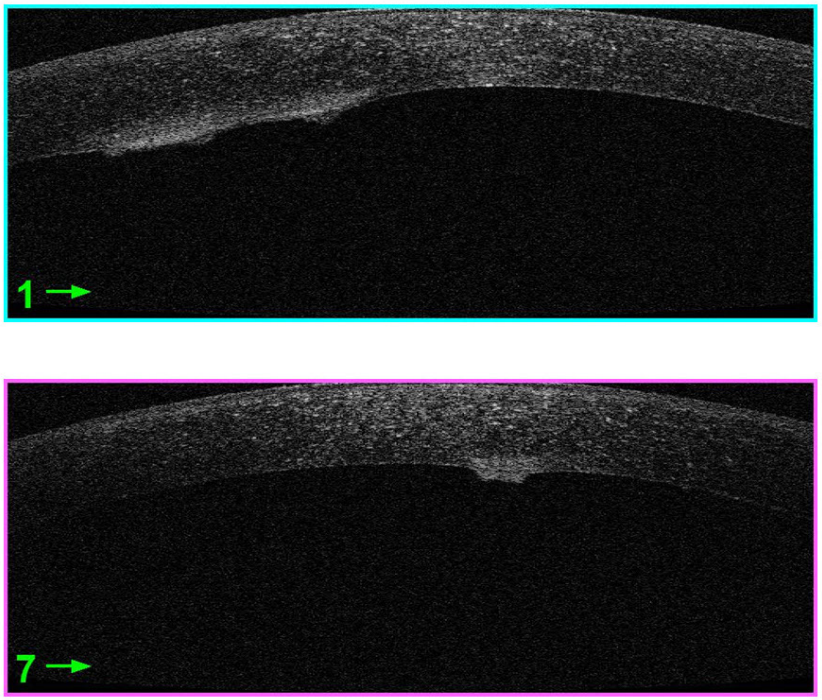
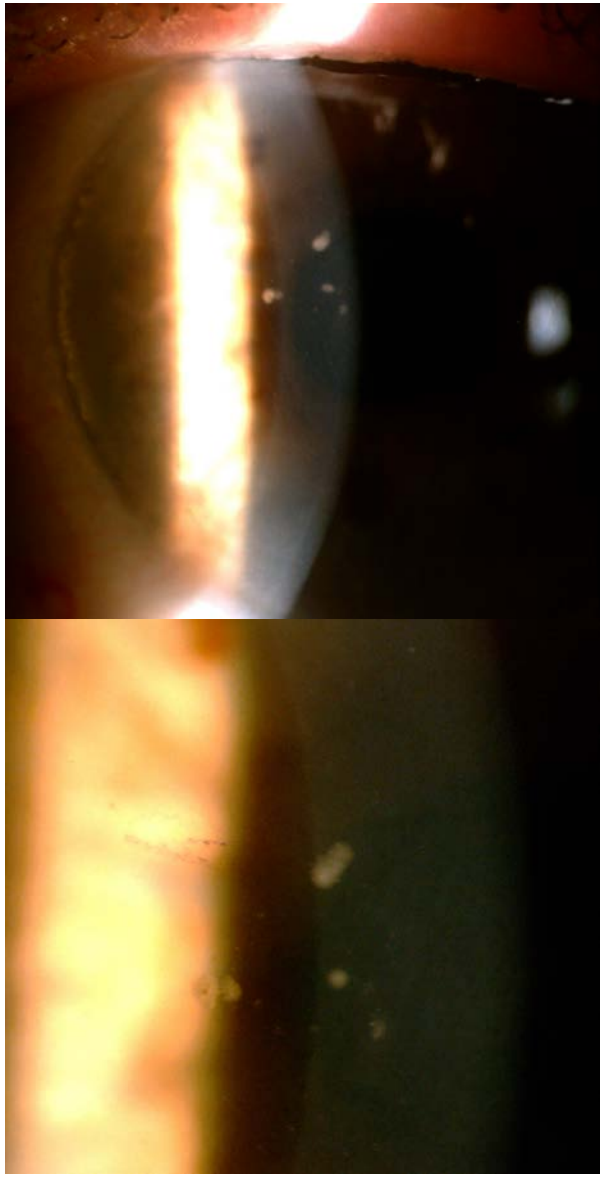


Figure 5. *Candida glabrata* interface infection. OCT showing infiltrates placed in the graft-host interface

IIK early signs of the infection

- slow development (30 days average; 3-90 days range)
- minimal inflammatory signs and symptoms
- single – multiple whitish infiltrates
- cornea is clear
- AC quiet until late
- misdiagnosis rejection/ down-growth



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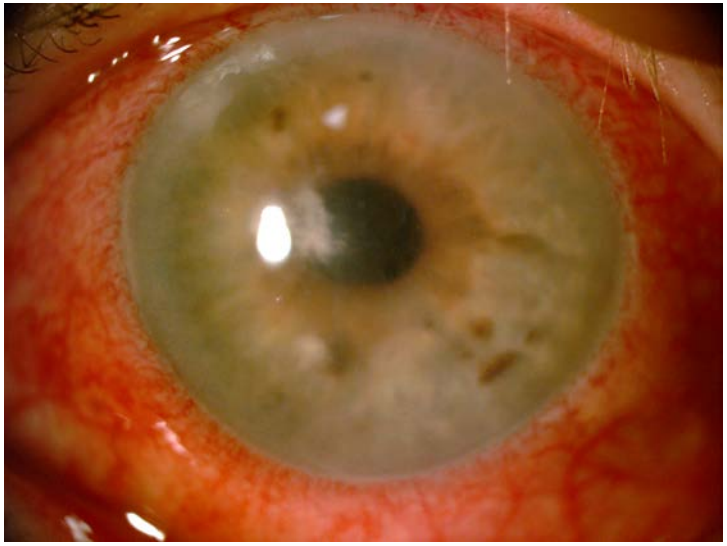
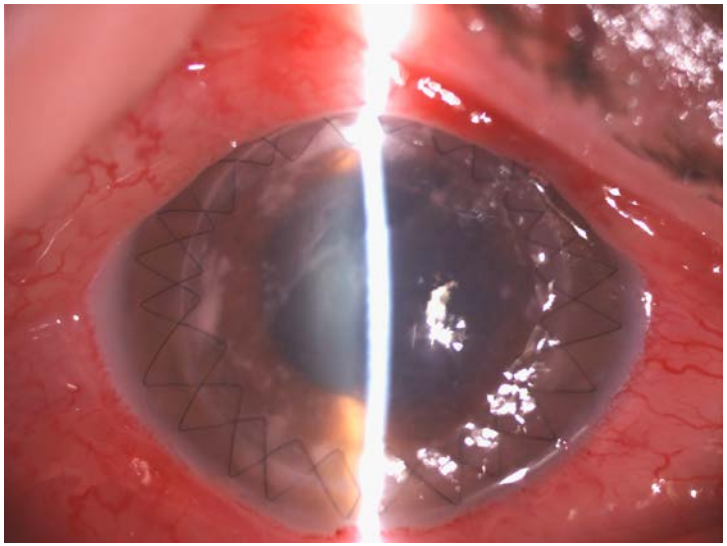
IIK worsening of the infection

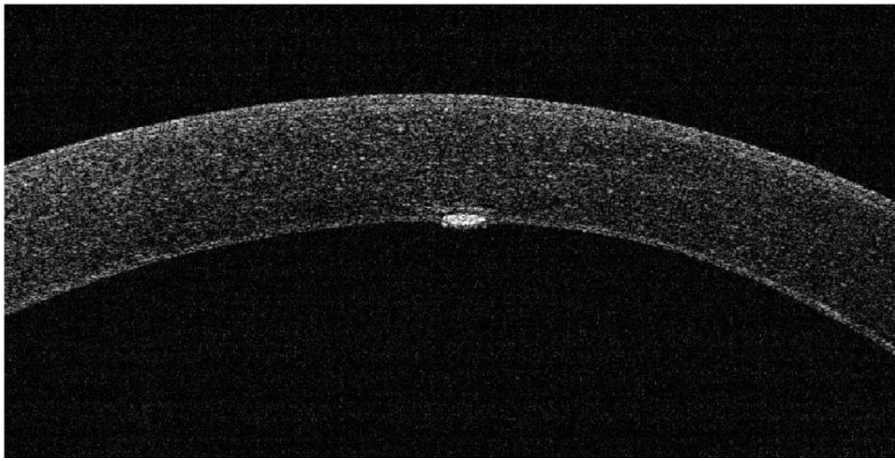
- ocular redness
- coalescence of the infiltrates
- corneal edema
- AC cells +/- hypopion
- ocular pain and photophobia

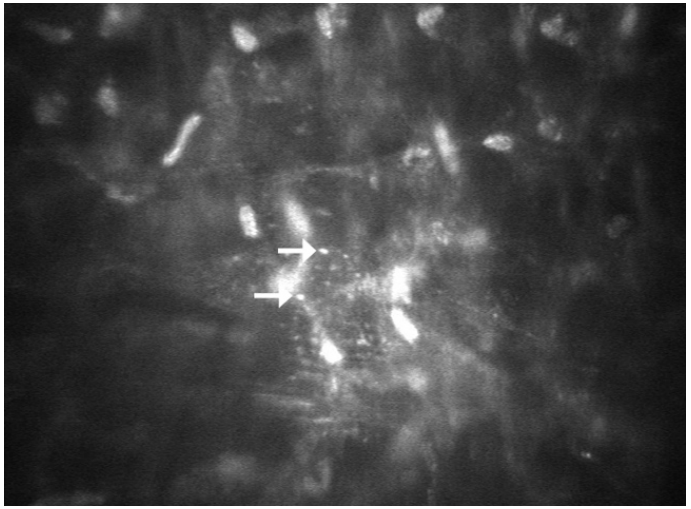




IIK diagnostic difficulties

- remote location in the deep stroma
- impossible to conduct microbiology routine
- AC tap negative until late
- IVCFM limited diagnostic value
- graft removal + culture
- donor rim culture

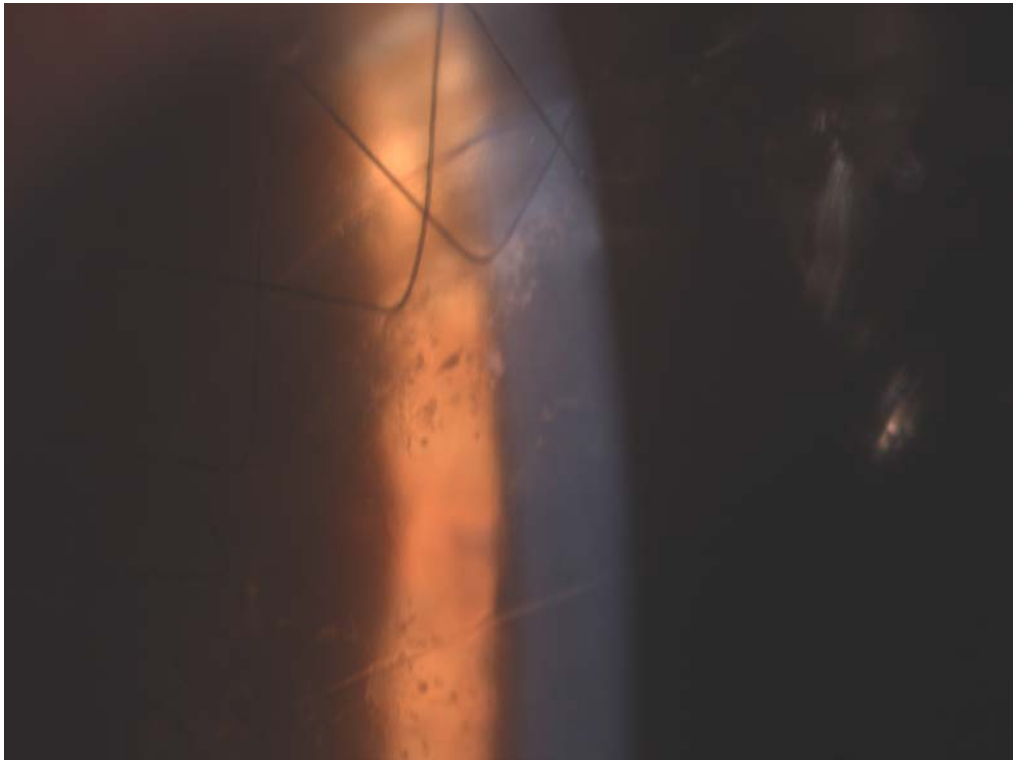




Tu E. et al. Cornea 2017
Lee WB et al. Ophth Surg Lasers Imaging 2011

IIK after DALK: microorganisms involved

- *Candida spp.* 63%
- *Klebsiella pneumoniae*
- *Rhodotolura spp.*
- *Actinomyces spp.*
- *Mycobacterium spp.*



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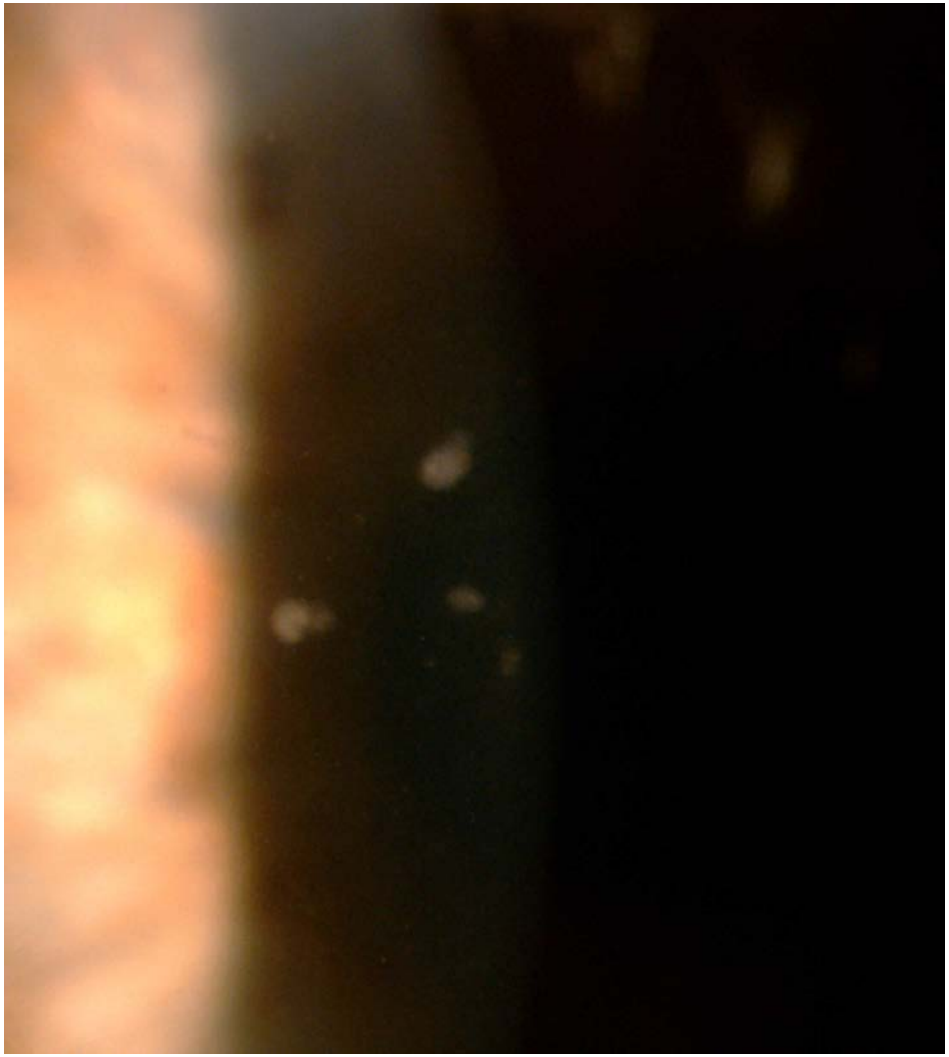
IIK after EK: microorganisms involved

- *Candida spp.* 75%
- *Aspergillus fumigatus*
- *Staphilococcus aureus*
- *Staphilococcus ep.*
- *Enterococcus fecalis*
- *Nocardia spp.*



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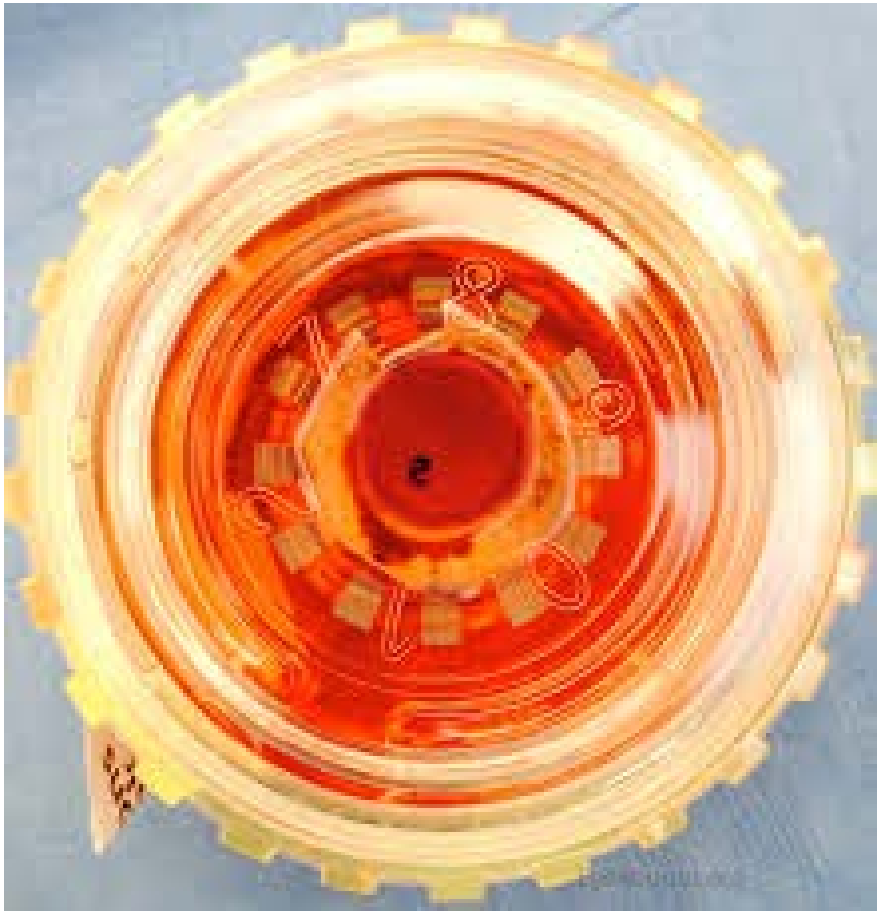
Donor to host transmission of infection

- High correspondence between donor and host cultures.
- *Candida spp.* highest correspondence.
- Donor rim cultures available early after surgery (5.5 days average; 3-14 days range)



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Is organ culture a risk for Candida transmission?

TABLE 1. Microorganisms Isolated During Organ Culture Storage

Species	No. (%)
Staphylococcus epidermidis	9 (23%)
Staphylococcus aureus	10 (27%)
Enterococcus species	4 (10%)
Escherichia coli	2 (5%)
Pseudomonas aeruginosa	7 (18%)
Acinetobacter species	2 (5%)
Candida albicans	3 (8%)
Candida lipolitica	1 (2%)
Other fungi	1 (2%)
Total	39

TABLE 2. Microorganisms Isolated From Positive Donor Rim Cultures Divided by Type of Cornea Storage Used

Microorganisms Isolated From Rims of Corneas Stored at 4°C		Microorganisms Isolated From Rims of Corneas Stored at 31°C	
Staphylococcus epidermidis	7	*Candida albicans*	2
Staphylococcus aureus	4	*Candida lipolitica*	2
Staphylococcus coagulase negative	1	*Pseudomonas aeruginosa*	2
Enterococcus	2		
Streptococcus	1		
Pseudomonas aeruginosa	1		
Candida species	2		
Total	18	Total	6

Fontana L. et al. Cornea 2007;26:552-556

IIK treatment strategies

Medical

- Topical
- Systemic

Parasurgical

- Intracameral injections
- Intrastromal injections

Surgical

- Graft removal
- Graft exchange
- Excisional PK + intracameral antimicrobials

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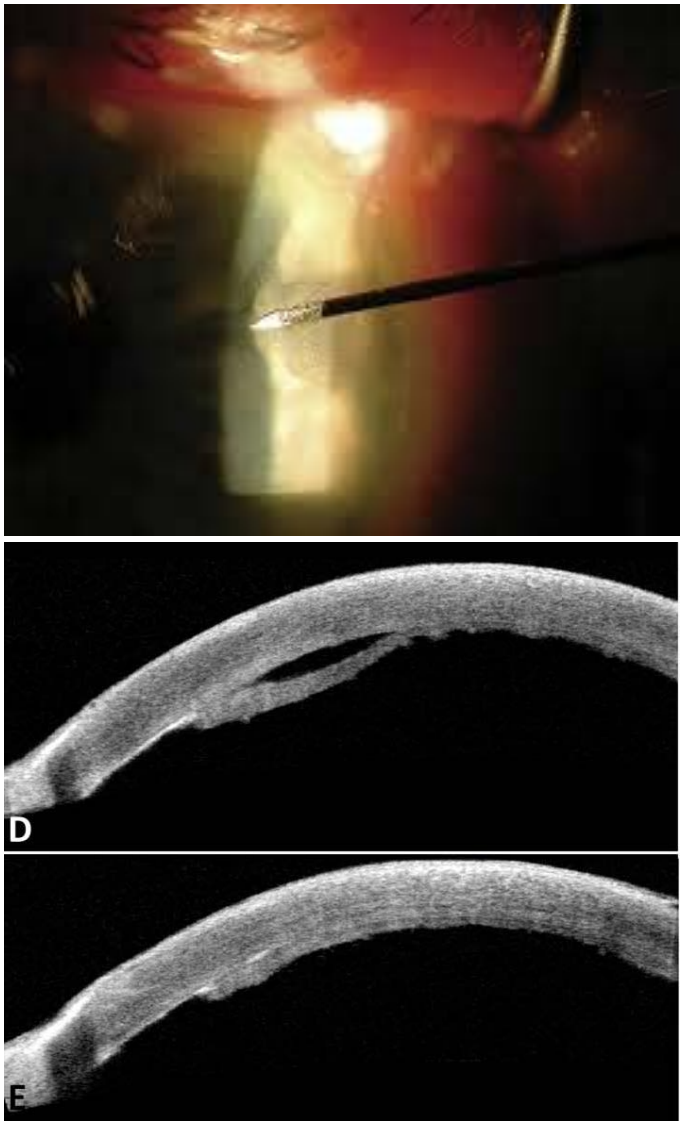
Intrastromal injection

- Repeated injection of antifungals in the interface at the slit lamp.
- Amphotericin B 5 μg/mL
- Voriconazole 50 μg/mL
- Seldomly effective (2 cases reported)
- Risk of DM perforation in DALK and graft dislocation in EK
- Risk of interface scarring



Tu E. et al. Cornea 2017

Excisional PK

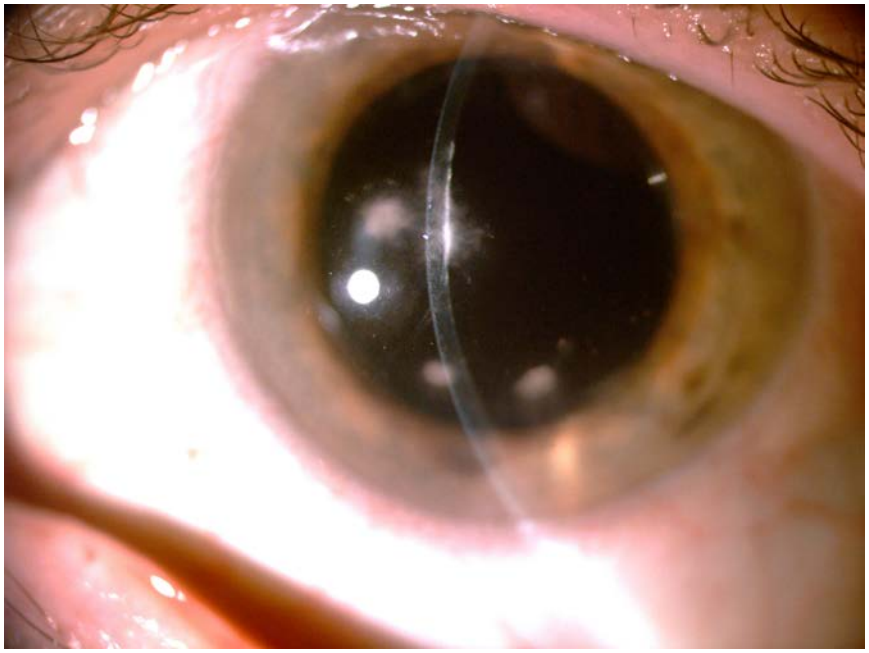


Figure 6. *Candida glabrata* interface infection developed after DMEK. Slit-lamp photography showing worsening of the infection with infiltrates enlargement displaying a fluffy appearance.

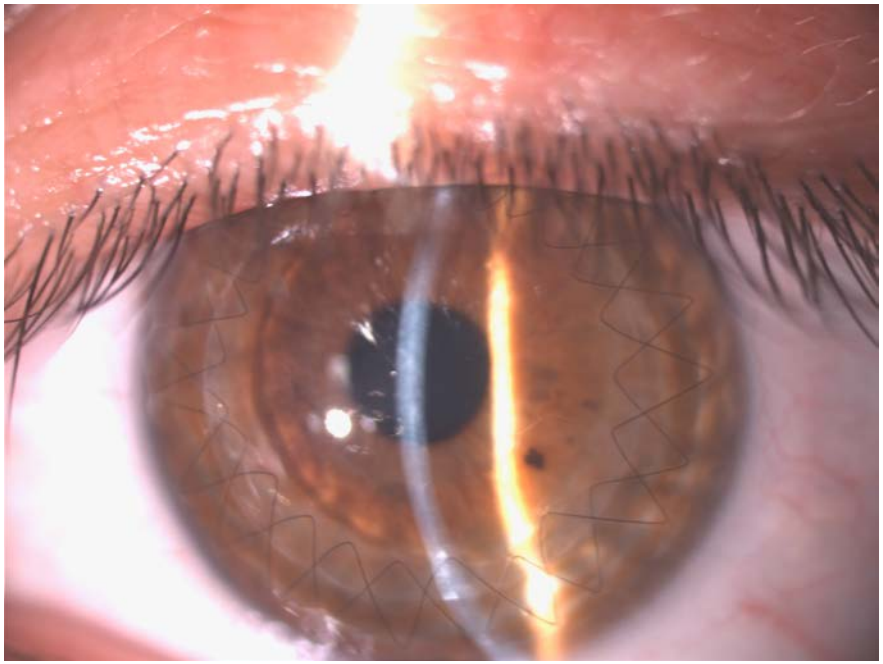


Figure 7. Same patient 6 months after PK

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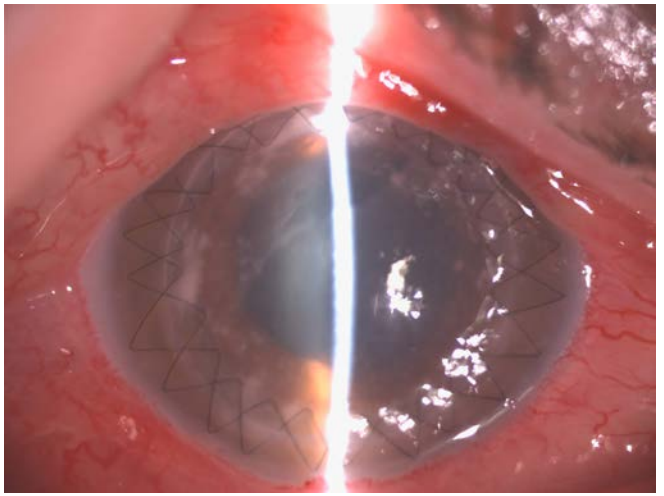
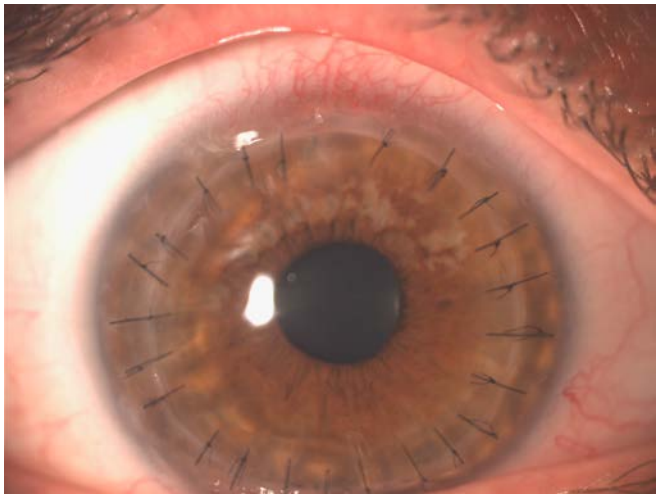
Complications and Outcomes

- Relevant risk of endophthalmitis if surgical treatment is delayed in EK patients (5/31 patients)
- High risk of graft failure after EK
- Risk of cataract formation, secondary glaucoma (PAS) and CME
- Median BSCVA 20/30 in DALK patients after excisional PK
- Median BSCVA 20/40 in EK patients after excisional PK. 10% of patients with severe vision loss





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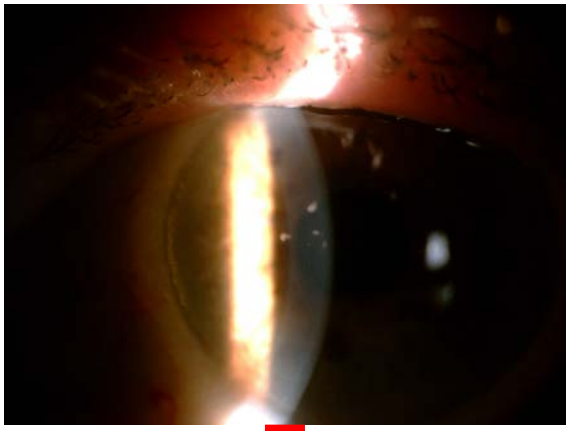
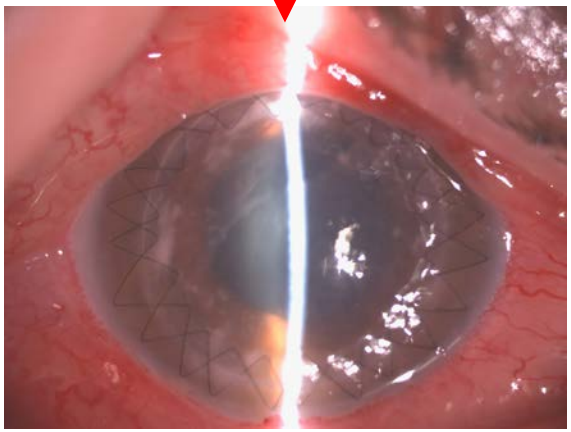
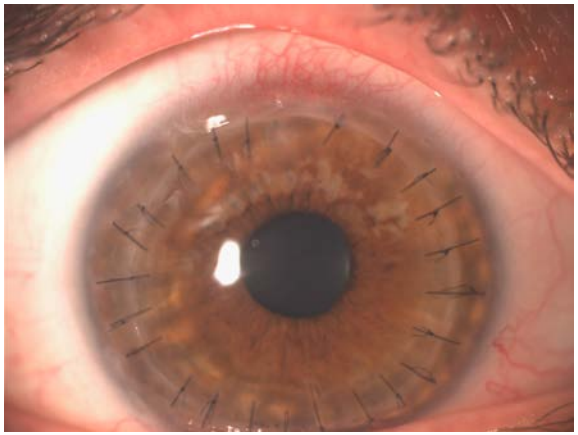
Treatment algorithm







Conclusions

- Patients with positive rim cultures should be reviewed weekly for 3 months after surgery.
- Early onset of small infiltrates in the interface should be considered infectious particularly if the donor rim is cultured positive.
- Donor rim culture is highly predictive of the infectious agent.
- Intrastromal injection may be attempted in early cases.
- Excisional PK + intracameral antimicrobials is the most effective treatment.