CASE REPORT

Post laser-assisted in situ keratomileusis keratomycotic malignant glaucoma

Pranita Sahay, Prafulla Kumar Maharana, Namrata Sharma, Jeewan S Titilal

Dr. Rajendra Prasad Centre for Ophthalmic Sciences, All India Institute of Medical Sciences, New Delhi, India

Correspondence to

Dr Prafulla Kumar Maharana, drpraful13@gmail.com

Accepted 26 September 2017

SUMMARY

We report a case of a 24-year-old male patient with post-laser assisted in situ keratomileusis (LASIK) culture-proven mycotic keratitis who developed pupillary block glaucoma on day 19 of medical management. The case was initially managed with multiple Nd-Yag peripheral iridotomy along with systemic and topical antiglaucoma medications. However, an emergency therapeutic penetrating keratoplasty (TPK) with lens extraction was done in view of persistently raised intraocular pressure (IOP) and seclusio pupillae. On postoperative day 1, IOP was 10 mm Hg with graft clarity 2 plus and deep anterior chamber with no evidence of residual infection or recurrence. Pupillary block glaucoma can occur in cases of post-LASIK mycotic keratitis, which may necessitate emergency TPK.

BACKGROUND

Post-laser assisted in situ keratomileusis (LASIK) infective keratitis, though rare, is a devastating complication that can lead to permanent visual impairment. Its incidence varies from 0% to 1.5%.¹ It is classified based on its onset into early (within 2 weeks of the procedure) and late (after 2 weeks of the procedure).¹ The organisms implicated in early-onset infections are primarily bacteria, namely *Staphylococcus* and *Streptococcus* species, while in late onset are fungi, atypical mycobacteria and *Nocardia*.²

The term 'fungal malignant glaucoma' was first used by Jones *et al* in mycotic corneal ulcers.³ The proposed pathogenesis is penetration of fungus into the anterior chamber resulting in the formation of a pupillary membrane that causes aqueous

misdirection and raised intraocular pressure (IOP).³ It has also been referred to as 'keratomycotic malignant glaucoma' by Kuriakose *et al*.⁴ The management of such cases is difficult, and there are only two published case reports in this regard. Here, we report a case of keratomycotic malignant glaucoma in a case of post-LASIK mycotic keratitis.

CASE PRESENTATION

A 24-year-old male patient with a diagnosis of bilateral post-LASIK keratitis was referred to the cornea clinic in view of poor response to standard therapy. A careful evaluation of his past records revealed that the patient underwent both eye microkeratome-assisted LASIK 8 weeks prior to presentation, following which he had a good gain of vision. Six weeks post LASIK, the patient developed sudden onset pain, redness and diminution of vision in both eyes. The case was diagnosed to have bilateral post-LASIK keratitis by the primary surgeon. An anterior chamber wash for the right eye and partial amputation of flap in the left eye were performed along with medical treatment of ulcer. The microbiological report was suggestive of *Aspergillus fumigatus*. The patient was on topical natamycin 5% (Natamet; Sun Pharmaceutical) one hourly, moxifloxacin 0.5% (Vigamox; Alcon Lab) two hourly and homatropine 2% (Homide; Indoco Remedies) four times a day when he presented to us.

At presentation, the visual acuity was hand movement in the right eye and 0.18 logMAR in the left eye. The intraocular pressure (IOP) was within normal limit with sluggish direct and consensual pupillary reflex in the right eye. Slit-lamp examination of the right eye (figure 1) revealed deep stromal infiltrate measuring 4.5×4.5 mm with no overlying epithelial defect. The flap was not involved. Anterior chamber depth (ACD) was normal but total cataract was noted. The left eye (figure 2) had a partially amputated flap measuring 1.5×1.5 mm with superficial corneal infiltrate measuring 0.5×0.5 mm. Ultrasonography of the posterior segment was anechoic.

The patient was started on topical voriconazole 1% hourly and systemic voriconazole 200mg twice a day in addition to the ongoing treatment in view of the deeper involvement and poor response to natamycin that was started by the primary surgeon 14 days back. On day 5, the patient developed severe headache with increased ciliary congestion and watering in the right eye. IOP of the right eye was noted to be digitally high on examination. Slit-lamp examination revealed

Figure 1 Slit-lamp photograph of the right eye showing stromal infiltrates with total cataract.

CrossMark

To cite: Sahay P, Maharana PK, Sharma N, *et al*. *BMJ Case Rep* Published Online First: [please include Day Month Year]. doi:10.1136/bcr-2017-222525

Figure 2 Slit-lamp photograph of the left eye showing resolving keratitis with stromal infiltrate and surrounding scarring.

shallow anterior chamber more marked peripherally with 360° posterior synechiae and iris bombe formation (figure 3).

INVESTIGATIONS

Ultrasonography of the posterior segment was anechoic.

DIFFERENTIAL DIAGNOSIS

1. Post-LASIK keratomycotic malignant glaucoma
2. Post-LASIK infective keratitis with pupillary block glaucoma

TREATMENT

The patient was started on maximum tolerable antiglaucoma medications (intravenous mannitol 20%w/v, 5 mg/kg body weight, tab acetazolamide 250mg four times a day, syrup glycerol 50% 1g/kg three times a day, topical timolol maleate 0.5% and brimonidine tartrate 0.2% combination twice a day). On the next day, the IOP reduced with improvement in symptoms as well as corneal clarity. Multiple Nd-Yag peripheral iridotomy (PI) was attempted to relieve the iris bombe with some success. The iris bombe were relieved, although not completely, and anterior chamber depth improved (figure 4). However, on day 2 post PI,

Figure 4 Slit-lamp photograph of the right eye showing improved anterior chamber depth following peripheral iridotomy.

the patient again developed very high IOP with 360° iris bombe formation.

The patient was subsequently taken up for therapeutic penetrating keratoplasty (TPK) with lens extraction under general anaesthesia as an emergency procedure.

OUTCOME AND FOLLOW-UP

On first postoperative day, the patient was comfortable, visual acuity was counting fingers, IOP was 10 mm Hg, graft clarity was 2 plus (iris details were hazily seen) and ACD was deep with aphakia (figure 5). No evidence of residual infection was noted. Ultrasonography of the posterior segment was anechoic.

DISCUSSION

We report a case of post-LASIK infective keratitis with pupillary block glaucoma that was initially managed with laser iridotomy with limited success. Therapeutic penetrating keratoplasty was done eventually for the patient in view of iridotomy site blockage due to ongoing inflammation and iris bombe formation.

Acute pupillary block glaucoma following post-LASIK keratitis is a rare but devastating complication. Most of such

Figure 3 Slit-lamp photograph of the right eye showing shallow anterior chamber with iris bombe formation.

Figure 5 Slit-lamp photograph of the right eye following penetrating keratoplasty.

Table 1 Review of literature on keratomycotic malignant glaucoma

Author	n	Organism	Intervention	Outcome
Jain <i>et al</i> ⁶	1	<i>Aspergillus flavus</i>	PKP with lens extraction and bag wash followed by limited PPV 2 days later	At 3-month follow-up, VA was 20/400 with normal IOP
Kuriakose <i>et al</i> ⁴	3	Case 1— <i>Fusarium</i> sp	Surgical iridectomy with anterior chamber wash followed by PKP with lens extraction after 5 days. 180° cyclocryopexy for control of IOP	At 8-month follow-up VA of hand movement
		Case 2— <i>Fusarium</i> sp	PKP with lens extraction and peripheral iridectomy	At 5-month follow-up VA of finger counting
		Case 3— <i>Fusarium</i> sp	PKP with no lens extraction	Day 3 post surgery - graft oedema, iris tissue prolapse, high IOP non-responsive to standard antiglaucoma treatment, patient absconded
Current study	1	<i>Aspergillus</i> sp	Laser peripheral iridotomy followed by emergency PKP with lens extraction	1 week post surgery VA of counting fingers with IOP of 10 mm Hg

IOP, intraocular pressure; PKP, penetrating keratoplasty; PPV, pars plana vitrectomy; VA, visual acuity.

cases described in literature require emergency TPK with lens extraction and anterior vitrectomy.

In our case, initially Yag PI was attempted after medical control of IOP as the peripheral cornea was clear and we wanted to avoid an emergency TPK. The prognosis of emergency penetrating keratoplasty is poor when performed in such cases. In addition, there is a high risk of suprachoroidal haemorrhage (SCH) when keratoplasty is performed in the presence of persistently raised IOP.⁵ These were important considerations that led us to attempt Yag PI to avoid emergency penetrating keratoplasty (PKP). However, we believe that due to ongoing inflammation, the site of PI was blocked and resulted in a rise in IOP after a transient improvement. Eventually, an emergency TPK with lens extraction had to be performed under general anaesthesia taking all precautions to avoid SCH.

Review of literature

Jones³ first used the term 'fungal malignant glaucoma' to describe the clinical situation of acute rise in IOP in cases of fungal keratitis.³ It has also been referred to as 'keratomycotic malignant glaucoma'. Jain *et al*⁶ described a case of a 48-year-old woman with a 16-day history of pain, redness and diminution of vision (table 1). The patient had a severe corneal ulcer, caused by *Aspergillus flavus*, with shallow anterior chamber and high IOP. She was diagnosed with keratomycotic malignant glaucoma, which required emergency PKP with lens extraction⁵ and bag wash. On day 3 post surgery, she developed very high IOP with shallow anterior chamber non-responsive to medical treatment. Ultrasound in this case was suggestive of fluid pockets in the vitreous cavity suggestive of malignant glaucoma for which limited pars plana vitrectomy with anterior chamber reformation was done.⁶

Kuriakose and Thomas⁴ described three such cases of mycotic keratitis with acute rise in IOP.⁴ All cases were positive for *Fusarium* sp on microbiological tests. The first case was a 25-year-old man with complaints of pain, redness and diminution of vision since 15 days. The presenting visual acuity was hand movement with severe corneal ulcer and hypopyon. On day 3, uniformly shallow anterior chamber with high IOP non-responsive to maximum antiglaucoma treatment was noted for which surgical peripheral iridectomy with AC wash was done. On day 5 post-paracentesis, corneal perforation was noted for which an emergency PKP with lens extraction was performed. On the fifth day post PKP, high IOP non-responsive to medical treatment was noted for which 180° cyclocryopexy was done. At 8-month follow-up, visual acuity was hand movement with IOP within normal limits.

The second case was a 28-year-old man with a history of pain and diminution of vision since 15 days. Examination

revealed corneal ulcer measuring 5 mm with full-thickness corneal involvement and hypopyon. Two days later, flat anterior chamber with markedly raised IOP was noted non-responsive to maximum antiglaucoma medication. PKP with lens extraction and thorough anterior and posterior chamber wash was done. The postoperative period was uneventful except for severe uveitis, which responded to steroids. At 5 months of follow-up, the VA was counting fingers.

The third case was a 40-year-old man with a history of irritation and pain in the right eye since 5 days. The patient had a 4×5 mm ulcer involving anterior one-third of the cornea in the centre. The ulcer progressed with the development of hypopyon despite of topical and systemic antifungal treatment, and PKP was done with no lens extraction. On day 3 post surgery, the patient developed high IOP unresponsive to medical treatment with iris prolapse through the wound. No surgical intervention was done further as the patient did not give consent and absconded.

This case report highlights a rare but important complication of post-LASIK mycotic keratitis that has significant visual implications. Though there has been paucity of literature on this entity, a meticulous review of the current literature suggests that immediate therapeutic PKP may be the best option to preserve the visual function of these patients. The major problem while dealing with such cases of mycotic keratitis is that steroids are absolutely contraindicated, so temporary procedures like Yag PI and surgical PI fail due to ongoing inflammation.

Most of the cases undergoing refractive surgery are young and with high visual demands. We believe that prolonged rise in IOP can lead to irreversible optic nerve damage irrespective of status of corneal infection. Thus, emergency therapeutic PKP may be considered in all such cases irrespective of the severity of corneal ulcer. The term keratomycotic malignant glaucoma may not be the most appropriate term to describe such cases. We believe that the term

Learning points

- ▶ Post-LASIK keratomycotic malignant glaucoma is a rare but blinding complication that needs careful management.
- ▶ There is limited success in relieving the iris bombe seen in such cases with Nd-YAG peripheral iridotomy due to the ongoing inflammation and inability to start steroids.
- ▶ Early therapeutic penetrating keratoplasty in these cases can help salvage the eye.

pupillary block glaucoma is probably the most appropriate term to describe this clinical scenario.

Contributors PS has contributed to the manuscript preparation and data retrieval. NS has contributed in editing the manuscript. JST has contributed in final editing of the pictures as well as the manuscript. PKM is responsible for the concept, final editing of manuscript and photographs of the case.

Competing interests None declared.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

© BMJ Publishing Group Ltd (unless otherwise stated in the text of the article) 2017. All rights reserved. No commercial use is permitted unless otherwise expressly granted.

REFERENCES

- 1 Chang MA, Jain S, Azar DT. Infections following laser in situ keratomileusis: an integration of the published literature. *Surv Ophthalmol* 2004;49:269–80.
- 2 Haq Z, Farooq AV, Huang AJ. Infections after refractive surgery. *Curr Opin Ophthalmol* 2016;27:367–72.
- 3 Jones BR. Principles in the management of oculomycosis. XXXI Edward Jackson memorial lecture. *Am J Ophthalmol* 1975;79:719–51.
- 4 Kuriakose T, Thomas PA. Keratomycotic malignant glaucoma. *Indian J Ophthalmol* 1991;39:118.
- 5 Price FW, Whitson WE, Ahad KA, *et al*. Suprachoroidal hemorrhage in penetrating keratoplasty. *Ophthalmic Surg* 1994;25:521–5.
- 6 Jain V, Maiti A, Shome D, *et al*. Aspergillus-induced malignant glaucoma. *Cornea* 2007;26:762–3.

Copyright 2017 BMJ Publishing Group. All rights reserved. For permission to reuse any of this content visit <http://group.bmj.com/group/rights-licensing/permissions>.
BMJ Case Report Fellows may re-use this article for personal use and teaching without any further permission.

Become a Fellow of BMJ Case Reports today and you can:

- Submit as many cases as you like
- Enjoy fast sympathetic peer review and rapid publication of accepted articles
- Access all the published articles
- Re-use any of the published material for personal use and teaching without further permission

For information on Institutional Fellowships contact consortiasales@bmjgroup.com

Visit casereports.bmj.com for more articles like this and to become a Fellow