CASE REPORT

Successful re-implantation of implantable collamer lens after management of post-ICL methicillin-resistant *Staphylococcus epidermidis* endophthalmitis

Manpreet Kaur, Jeewan S Titiyal, Namrata Sharma, Rohan Chawla

Department of Ophthalmology,
Dr RP Centre, All India
Institute of Medical Sciences
(AIIMS), New Delhi, India

Correspondence to
Professor Jeewan S Titiyal,
titiyal@gmail.com

Accepted 3 November 2015

SUMMARY

A 29-year-old man presented with acute onset pain, redness and diminution of vision in the right eye 5 days after implantation of an implantable collamer lens (ICL). A diagnosis of postoperative endophthalmitis was made based on examination and ultrasonography. A vitreous tap was taken and intravitreal antibiotics (vancomycin 1 mg/0.1 ml+piperacillin-tazobactam 225 µg/0.1 ml) were administered. The vitreous culture revealed presence of methicillin-resistant *Staphylococcus epidermidis*. There was minimal improvement after 48 h; hence the ICL was explanted and repeat injection of intravitreal antibiotics administered. Following this, the endophthalmitis resolved and the patient achieved a corrected distance visual acuity of 20/25 4 weeks later. A repeat implantation of ICL was performed 9 months after the first surgery, following which the patient regained uncorrected distance visual acuity of 20/20. To our knowledge, this is the first case in which an ICL was re-implanted after successful resolution of endophthalmitis.

BACKGROUND

Phakic intraocular lens (phakic IOL) implantation is a safe and effective procedure for correction of moderate to high refractive errors.¹ Endophthalmitis is a potentially sight-threatening complication with an incidence of around 1 case per 6000 after posterior chamber phakic IOL implantation.² The management is similar to post-surgical endophthalmitis; however, a phakic IOL explantation may additionally be required in cases with dismal visual outcomes.^{3–6}

We describe the successful management and visual rehabilitation of a case of acute postoperative endophthalmitis that developed after implantation of a posterior chamber phakic IOL.

CASE PRESENTATION

A 29-year-old man presented to a tertiary care centre with high myopia of −9.0 DS OD and −10.0 DS OS. The patient was intolerant to contact lens use and did not wish to continue wearing glasses. The corrected distance visual acuity (CDVA) was 20/20 in both eyes. The endothelial cell density was 2883 cells/mm² OD and 2941 cells/mm² OS. The white to white diameter was 12 mm and anterior chamber depth (from

endothelium) was 3.5 mm in both eyes. The patient was planned for implantation of implantable collamer lens (ICLV4c, Visian, STAAR Surgical Co, California, USA) in both eyes. Informed consent was obtained after explaining the potential risks of surgery, according to the Helsinki Declaration. A V4c ICL (VICM013.7–10.5) was implanted in the right eye, followed by implantation of V4c ICL (VICM013.7–11.0) in the left eye on the third day. The patient was discharged on the fourth day on topical moxifloxacin hydrochloride 0.5% three times a day and prednisolone acetate 1% four times a day. At discharge, the postoperative uncorrected distance visual acuity (UDVA) was 20/20 in both eyes; there was no corneal oedema and 1+ cells were present in the anterior chamber (AC). The ICLs were in situ with a vault of 350 µ OD and 400 µ OS on anterior segment optical coherence tomography (ASOCT, Visante, Carl Zeiss, Germany). The corneal incisions were well apposed with no leakage on Seidel's test. The intraocular pressure was 14 mm Hg OD and 15 mm Hg OS.

The patient re-presented 24 h after discharge with acute onset blurring of vision, pain and redness in the right eye for 6 h. There was no history of trauma, foreign body falling in the eye or rubbing of the eye. On examination, the visual acuity in the right eye was perception of hand movements close to the face, with accurate projection of rays in all four quadrants. There was presence of circumciliary congestion and mild corneal oedema. Hypopyon of <1 mm was present in the anterior chamber with 4+ cells, and fibrinous membranes were seen both anterior and posterior to the ICL (figure 1A). The pupillary reactions were sluggish and the fundus details were not appreciated because of the presence of grade 4 media haze (figure 1B). The left eye had UDVA of 20/20. The ICL was in situ with a vault of 405 µ as observed on ASOCT. The intraocular pressure in both eyes was 15 mm Hg.

INVESTIGATIONS

Ultrasonography B scan of the right eye revealed presence of multiple mild to moderate amplitude echoes in the vitreous cavity, suggestive of vitreous exudates (figure 1C). A systemic work up did not reveal an underlying immunosuppressed state or any other systemic disorder.

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To cite: Kaur M, Titiyal JS, Sharma N, et al. *BMJ Case Rep* Published online: [please include Day Month Year] doi:10.1136/bcr-2015-212708

Figure 1 (A) Anterior segment examination on fifth postoperative day showing corneal oedema, anterior chamber cells 4+ and hypopyon <1 mm. The vaulting of the implantable collamer lens (ICL) cannot be seen. (B) Posterior segment photograph showing media haze 4+. (C) Ultrasonography B scan of the right eye showing presence of multiple mild to moderate amplitude echoes in the vitreous cavity suggestive of vitreous exudates.

DIFFERENTIAL DIAGNOSIS

A diagnosis of acute postoperative endophthalmitis was made in the right eye, based on the clinical examination and ultrasonography findings.

TREATMENT

Intravitreal vancomycin (1 mg/0.1 mL) and intravitreal piperacillin-tazobactam 225 µg/0.1 mL were injected under aseptic precautions on the same day. Aqueous and vitreous taps were obtained and sent for bacterial and fungal culture. The patient was started on topical moxifloxacin hydrochloride 0.5% every hour, prednisolone acetate 1% every 4 h and homatropine hydrobromide 2% four times a day.

After 48 h, minimal improvement was noted on clinical examination. There was decrease in the anterior chamber fibrinous reaction, the AC cells were 4+ and the height of the hypopyon decreased to 0.2 mm. There was no improvement in the best corrected visual acuity and the anterior vitreous exudates persisted on B scan ultrasonography. The bacterial culture of the vitreous aspirate revealed the presence of methicillin-resistant *Staphylococcus epidermidis*. The strain was sensitive to fluoroquinolones, vancomycin, gentamicin and cephalosporins. The patient was planned for explantation of the ICL with repeat injection of intravitreal antibiotics. The pre-existing 3.2 mm temporal corneal incision was opened and a Viscocohesive OVD (Healon, AMO Inc, California, USA) was instilled in the anterior chamber. Caution was taken to avoid damage to the underlying crystalline lens. The ICL was grasped with ICL holding forceps and gently pulled out from the anterior chamber under the shell of Viscocohesive OVD. The residual OVD was removed using bimanual irrigation-aspiration and the corneal

incisions were sutured with a 10-0 monofilament suture. Intravitreal vancomycin (1 mg/0.1 mL) and intravitreal piperacillin-tazobactam 225 µg/0.1 mL were administered and the vitreous tap along with the explanted ICL was sent for bacterial and fungal cultures.

Postoperatively, the patient received topical fortified tobramycin sulfate (15 mg/mL) every 2 h, vancomycin (50 mg/mL) every 2 h, prednisolone acetate 1% every 4 h, homatropine hydrobromide 2% four times a day and a brimonidine-timolol combination twice a day. Apart from this, oral moxifloxacin 400 mg once a day, prednisone 1 mg/kg/day and acetazolamide 250 mg four times a day were also given. The cultures obtained from the ICL did not reveal any growth.

Following explantation of the ICL, the AC cells decreased to 2+ on the first postoperative day, the hypopyon resolved and the media haze was 3+. On the fourth postoperative day, the AC cells were 1+ and the CDVA was 20/125. The vitreous exudates started resolving and, 1 week later, the CDVA was 20/63. The macular optical coherence tomography (OCT) revealed a central macular thickness of 225 µm with no evidence of macular oedema. The vitreous membranes were present inferiorly. The oral steroids were tapered after 1 week of surgery. After 4 weeks, the CDVA in the right eye was 20/25. A few anterior vitreous opacities were present in the inferior vitreous cavity. There were no cells in the anterior chamber. Thereafter, the patient was kept on monthly follow-up and the topical medications were decreased in frequency and stopped after 8 weeks.

During follow-up, the patient was counselled regarding various options for visual rehabilitation. Since the patient was intolerant to contact lens use, a repeat implantation of the ICL was planned in the right eye after explaining the potential risk for a recurrence, post-ICL implantation. The anterior segment and posterior

Figure 2 (A) Anterior segment examination showing resolution of inflammation 4 weeks after explantation of the implantable collamer lens (ICL). (B) Posterior segment photograph showing resolution of the vitreous exudates 4 weeks after explantation of the ICL.

segment examinations were unremarkable (figure 2A, B). The endothelial cell density in the right eye was 2694 cells/mm². The manifest refraction had changed to $-9\text{DS}/-0.75\text{DC}$ @ 20°.

A repeat ICL implantation was performed 9 months after the resolution of the initial episode of endophthalmitis. Before re-implantation of the ICL, a culture was performed of the conjunctival swab and was sterile. A V4c ICL (VICM 013.7–10DS) was implanted in the right eye. On the first postoperative day, the uncorrected visual acuity was 20/20. The vaulting was 300 μm and the intraocular pressure was 14 mm Hg. Dispersion of iris pigments was present on the surface of the ICL.

OUTCOME AND FOLLOW-UP

The postoperative course was uneventful with an uncorrected visual acuity of 20/20 3 months following a repeat ICL implantation (figure 3A–C).

DISCUSSION

S. epidermidis is an endogenous human skin flora and is easily transmissible in the hospital environment as well as in the community. Skin of patients and healthcare workers, medical equipment, clothing of personnel and environment surfaces can be

sources of antibiotic-resistant *S. epidermidis* strains.⁷ The patient did not have any underlying systemic disorder and was not in an immunocompromised state. He was admitted to the hospital for 3 days and may have acquired the infection during that period.

Limited literature exists on the incidence and outcomes of post-phakic IOL endophthalmitis due to the rarity of this complication.^{2–6 8–10} Conservative management in mild cases, with intracameral or intravitreal antibiotics, may result in optimal visual recovery.^{2 8–10} However, a pars plana vitrectomy may be needed in more fulminant cases with poor visual and anatomical outcomes.^{4–6}

In our case, a combination therapy with piperacillin and tazobactam was administered in addition to vancomycin due to the rise in the incidence of multidrug resistant hospital-acquired infections.^{11–13} Initial administration of intravitreal antibiotics did not lead to a complete resolution of the symptoms and a decision was made to explant the ICL. A timely explantation of ICL along with administration of intravitreal antibiotics hastened the resolution of endophthalmitis in our case. Caution is mandatory and surgical expertise is required to explant the ICL to prevent damage to the underlying crystalline lens. Explantation of the ICL removes the nidus of infection and

Figure 3 (A) Slit-lamp photograph of the anterior segment 1 month after successful repeat implantation of the implantable collamer lens (ICL). (B) Retroillumination photograph of the anterior segment 1 month after successful repeat implantation of the ICL. (C) Scheimpflug image of the anterior segment showing a crystalline lens and ICL in situ.

provides additional material for culture of organisms; this may help to identify the causative organism early and establish the antibiotic sensitivity pattern so that an early institution of appropriate antibiotics is possible.

Post-ICL endophthalmitis is treated following the general recommendations advocated for postcataract endophthalmitis, as separate guidelines for post-ICL endophthalmitis do not exist.¹⁴ In cases with worsening signs and symptoms despite intravitreal antibiotics, an early vitrectomy (which may or may not spare the crystalline lens) may be needed along with the ICL explantation. Existing guidelines also recommend vitrectomy in cases with a presenting visual acuity of perception of light or worse.¹⁴ The visual prognosis in such cases is generally poor.

After resolution of the endophthalmitis, visual rehabilitation may pose a challenge. Spectacles will lead to unacceptable anisometropia and contact lenses may not be acceptable to the patient. We have demonstrated that a repeat ICL implantation is a possibility in these cases provided the endophthalmitis has been appropriately and successfully treated.

Adequate screening should be performed prior to repeat implantation of ICL to assess the safety of the surgical procedure. Patient should be counselled regarding the risk of recurrence and a contact lens trial may be carried out as an alternative to ICL re-implantation. The endothelial cell density should be documented and compared with the preoperative cell counts. The anterior segment should be evaluated for formation of cataract as a result of the prior surgical interventions, which may preclude a repeat implantation of the ICL. The posterior segment should be carefully screened and complete resolution of exudates should be documented. The parameters required for calculation of ICL power should be re-assessed. A repeat refraction should be performed, as astigmatism may be induced by the surgical procedures undertaken to manage the endophthalmitis. In our case, a 0.75DC suture-induced astigmatism was present, which led to a minor change in the power of the second ICL. A few months should be allowed to elapse before re-implantation of an ICL to minimise inflammation and the risk of a recurrence. There is an increased risk of cataract forma-

tion because of repeat intraocular manipulations and all cases require lifelong follow-up at regular intervals.

To the best of our knowledge, this is the first case in which an ICL was re-implanted after successful resolution of endophthalmitis. Timely management with ICL explantation helps in successful resolution of endophthalmitis with preservation of the CDVA. Visual rehabilitation may pose a challenge and a decision to re-implant the ICL should be taken only after a detailed examination and counselling of the patient.

Contributors JST and NS made substantial contributions to the conception or design of the work. MK and RC were responsible for acquisition, analysis or interpretation of data. MK and RC undertook drafting the work. JST and NS were responsible for revising it critically for important intellectual content. MK, JST, NS and RC gave final approval of the version published. MK, JST, NS and RC were in agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Competing interests None declared.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

REFERENCES

- 1 Barsam A, Allan BD. Excimer laser refractive surgery versus phakic intraocular lenses for the correction of moderate to high myopia. *Cochrane Database Syst Rev* 2014;6: CD007679.
- 2 Allan BD, Argeles-Sabate I, Mamalis N. Endophthalmitis rates after implantation of the intraocular Collamer lens: survey of users between 1998 and 2006. *J Cataract Refract Surg* 2009;35:766–9.
- 3 Jalili M, Hashemi H, Jabbarvand M, et al. Aspergillus endophthalmitis in one eye subsequent to bilateral anterior chamber phakic intraocular lens implantation. *J Refract Surg* 2012;28:363–5.
- 4 Pérez-Santonja JJ, Ruiz-Moreno JM, de la Hoz F, et al. Endophthalmitis after phakic intraocular lens implantation to correct high myopia. *J Cataract Refract Surg* 1999;25:1295–8.
- 5 Oum BS, Lee JS, Choi HY, et al. Endophthalmitis caused by *Pseudomonas aeruginosa* after phakic posterior chamber intraocular lens implantation to correct high myopia. *Acta Ophthalmol* 2011;89:e209–10.
- 6 Diab F, Al-Rashaed S, Al-Motowa S. Endophthalmitis after Artisan phakic intraocular lens implantation for correction of high myopia. *J Refract Surg* 2006;22:332–3.
- 7 Haque N, Bari MS, Haque N, et al. Methicillin resistant *Staphylococcus epidermidis*. *Mymensingh Med J* 2011;20:326–31.
- 8 Davis MJ, Epstein RJ, Dennis RF, et al. Culture-positive endophthalmitis after implantation of intraocular Collamer lens. *J Cataract Refract Surg* 2009;35:1826–8.
- 9 Couto C, Rossetti S, Schlaen A, et al. Chronic postoperative *Mycobacterium gordonae* endophthalmitis in a patient with phakic intraocular lens. *Ocul Immunol Inflamm* 2013;21:491–4.
- 10 Chung JK, Lee SJ. *Streptococcus mitis/oralis* endophthalmitis management without phakic intraocular lens removal in patient with iris-fixated phakic intraocular lens implantation. *BMC Ophthalmol* 2014;14:92.
- 11 Mohanty S, Singhal R, Sood S, et al. Comparative in vitro activity of beta-lactam/beta-lactamase inhibitor combinations against gram negative bacteria. *Indian J Med Res* 2005;122:425–8.
- 12 Ozkiris A, Evreklioglu C, Egel D, et al. The efficacy of intravitreal piperacillin/tazobactam in rabbits with experimental *Staphylococcus epidermidis* endophthalmitis: a comparison with vancomycin. *Ophthalmic Res* 2005;37:168–74.
- 13 Miller DM, Vedula AS, Flynn HW Jr, et al. Endophthalmitis caused by *Staphylococcus epidermidis*: in vitro antibiotic susceptibilities and clinical outcomes. *Ophthalmic Surg Lasers Imaging* 2007;38:446–51.
- 14 [No authors listed]. Results of the Endophthalmitis Vitrectomy Study. A randomized trial of immediate vitrectomy and of intravenous antibiotics for the treatment of postoperative bacterial endophthalmitis. Endophthalmitis Vitrectomy Study Group. *Arch Ophthalmol* 1995;113:1479–96.

Learning points

- Post-phakic intraocular lens endophthalmitis is rare; prompt diagnosis and early institution of appropriate therapy is essential to prevent significant visual morbidity.
- Timely explantation of the implantable collamer lens (ICL) helps in successful resolution of endophthalmitis with preservation of the corrected distance visual acuity.
- Surgical expertise is required to explant the ICL, to prevent damage to the underlying crystalline lens.
- Visual rehabilitation after resolution of endophthalmitis may pose a challenge. A repeat ICL implantation may be performed in these cases after a detailed examination and counselling of the patient.

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