CASE REPORT

Piggy back intraocular lens for the correction of buckling surgery-induced refractive error in pseudophakia

Rajesh Sinha,¹ Reena Singh,² Vijay K Sharma,¹ Jeewan S Titiyal³

¹RP Centre, AIIMS, Delhi, India

²All India Institute of Medical Sciences, New Delhi, India

³Department of Ophthalmology, Dr RP Centre, AIIMS, New Delhi, India

Correspondence to

Dr Reena Singh,
reenasurvaar@gmail.com

Accepted 10 December 2016

SUMMARY

A 29-year-old man presented to us with bilateral pseudophakia with suboptimal vision in right eye. His uncorrected distance visual acuity (UDVA) on Snellen's chart was 6/36 and 6/9 in right eye (OD) and left eye (OS), respectively. It improved to 6/9 OD with $-5.00\text{DS}/-0.50\text{DC}$ at 90° and 6/6 OS with -0.5DC at 100° . He had undergone buckling surgery 1 year back for rhegmatogenous retinal detachment in right eye and subsequently developed a myopic refractive error. A spherical piggyback intraocular lens (IOL; Rayner Sulcoflex, East Sussex) was implanted in the sulcus for refractive correction. The postoperative UDVA at 4 weeks was 6/6p. The intraocular pressure was normal and there was no significant endothelial cell loss. Piggyback IOLs can be an effective tool to correct the induced refractive error due to an increase in axial length following buckling surgery.

BACKGROUND

Scleral buckling for retinal detachment has been reported to induce refractive errors. Type and amount of refractive errors depend on the extent and buckle segment lengths, and the amount of indentation and position in relation to limbus (radial or parallel).¹ These refractive changes may be due to anterior segment changes including lens-iris diaphragm and axial length changes.² Various treatment modalities have been reported that include glasses, contact lens³ and corneal laser-based surgeries.⁴ We herein report use of the piggyback intraocular lens (IOL) in the sulcus for the correction of myopic refractive error induced by buckling surgery in a pseudophakic patient.

CASE PRESENTATION

A 29-year-old man presented to us with bilateral pseudophakia with suboptimal vision in right eye. His uncorrected distance visual acuity (UDVA) on Snellen's chart was 6/36 and 6/9 in right eye (OD) and left eye (OS), respectively. It improved to 6/9 with a correction of $-5.00\text{DS}/-0.50\text{DC}$ at 90° OD and 6/6 with -0.5DC at 100° OS. The patient had undergone bilateral cataract surgery with the implantation of a posterior chamber IOL for developmental cataract at 24 years of age. Postoperatively the UDVA in both eyes was 6/6p on Snellen's acuity chart. Three years later the patient developed rhegmatogenous retinal detachment OD for which buckling surgery was performed with silicon band 240 and superonasal silicone tire 276.

INVESTIGATIONS

The axial length of the right eye on A scan was 29.88 mm (PacScan 300A; Sonomed, New York, USA), keratometry was 42.00D/43.00D/ at $110^\circ/13^\circ$ and the specular count was 2784 cells/mm². The axial length in the left eye was 30.13 mm, keratometry was 41.25D/44.00D at $30^\circ/140^\circ$ and specular count was 3456 cells/mm².

On anterior segment ultrasound biomicroscopy (VuMAX; Sonomed Escalon, New York, USA) the distance between corneal endothelium and the anterior surface of the IOL was 4.88 mm in the right eye and 5.07 mm in the left eye. Gonioscopy revealed an open angle and the ultrasonic (PacScan 300P; Sonomed, New York, USA) central corneal thickness was 491 μm OD and 501 μm OS. On reviewing the old records, his axial length in the right eye at the time of cataract surgery was found to be 27.10 mm.

TREATMENT

A piggyback IOL (Rayner Sulcoflex, East Sussex BN3 7AN, UK) of -7.00D was implanted in the sulcus in the right eye (figure 1). The IOL power calculation for the piggyback IOL was carried out based on the refractive error and the ocular parameters, which were incorporated into the calculation software provided by the company. Postoperatively the patient was prescribed moxifloxacin hydrochloride 0.5% eye drops three times a day, prednisolone phosphate 1% eye drops three times a day and tropicamide 1% eye drops two times a day for 4 weeks.

OUTCOME AND FOLLOW-UP

The UDVA on day 1 after surgery was 6/6p. The piggyback IOL was well centred and stable in the sulcus. At 4 weeks, the UDVA maintained at 6/6p in OD; there was no significant loss of endothelial cells (specular count: 2750 cells/mm²). The vaulting between the two IOLs noted with anterior segment optical coherence tomography (SD-OCT RT-VueR, Optovue, Fremont, California, USA) was 376 μm (figure 2).

DISCUSSION

An increase in axial length following buckling surgery has been reported.¹ This can induce refractive error in an otherwise emmetropic eye. The present case is an example of induced myopic refractive error due to axial elongation of the eyeball following buckling surgery. There was an increase of 2.7 mm in axial length after buckling

CrossMark

To cite: Sinha R, Singh R, Sharma VK, et al. *BMJ Case Rep* Published online: [please include Day Month Year] doi:10.1136/bcr-2016-217570

Figure 1 Slit-lamp retroillumination picture showing add on IOL in succession and previous to bag PCIOL. IOL, intraocular lens; PCIOL, posterior chamber intraocular lens implantation.

Figure 2 The postoperative anterior segment OCT (SD-OCT RT-VueR, Optovue, Fremont, California, USA) showing an entirely placed piggyback IOL with posterior concave surface and in the bag previously implanted IOL with a clear gap of 376 µm between the two IOLs. IOL, intraocular lens; OCT, optical coherence tomography.

surgery in the right eye, which resulted in an induction of a refractive error of $-5.00\text{DS}/-0.5\text{DC}$ at 90° . The induced refractive error nearly correlated with the change in the axial length of the eye. In a previous study, the axial length elongation due to buckling surgery showed an average change of refractive error by 2.45 D of spherical equivalent for each millimetre increase in axial length.⁵ The previously described methods for the treatment for buckling-induced refractive error are spectacles, contact lenses, IOL exchange and laser-based corneal surgeries. The present case had a unilateral high refractive error and hence the glasses could not be prescribed.

The patient was not tolerant to contact lenses and not willing for contact lens maintenance. Option of laser corneal surgery was not exercised in this case as the corneal thickness was 491 µm in the right eye, which might be considered thinner or borderline thin for the correction of the amount of induced refractive error ($-5.00\text{DS}/-0.5\text{DC}$ at 90°). We had the safe and reversible options of either exchanging the IOL or putting a piggyback IOL in the sulcus for correcting the refractive error.

Since the haptic of the IOL was fixed peripherally in a fibrosed capsule, we opted for implanting a piggyback IOL. The main advantage of piggyback IOL is that it is a reversible method with no associated complications of laser corneal surgery.

El Awady and Ghanem have compared the modalities of IOL exchange versus secondary piggyback implantation in 23 pseudophakic eyes and found that there was no statistically significant difference in postoperative best corrected visual acuity between the two groups.⁶

Piggyback implantation has advantages of safety and predictability over an IOL exchange.

Exchanging an IOL means implanting a new IOL in the partially fibrosed capsular bag or anterior to the bag in the sulcus. In the majority of such eyes, it is very difficult to open up the bag completely due to fibrosis and dense adhesion between the capsules. Moreover, the manipulation needed for explantation of the IOL can be more than desirable in an eye with a history of retinal detachment. Foldable piggyback IOLs can be implanted through a small incision with negligible intraoperative manipulation. Studies have proven that add on IOLs can help to decrease dependence on glasses for distance and is a reversible procedure in view of chances of further ocular surgery particularly in eyes with operated retinal detachment.⁷

To the best of our knowledge, there is no report of the use of sulcus-fixated add-on IOL for buckling-induced refractive errors. We conclude that piggyback IOLs can be considered as an effective management option for induced refractive error following buckling surgery.

Learning points

Through this case report, we want to highlight the importance of the use of sulcus-fixated add-on intraocular lens as an effective management option for buckling-induced significant refractive error in pseudophakic eyes.

Contributors RS was involved in planning, conduct, reporting, proof reading and finalisation of the case report. VKS and JST contributed to planning, proof reading and finalisation of the case report.

Competing interests None declared.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

REFERENCES

- 1 Rubin ML. The induction of refractive errors by retinal detachment surgery. *Trans Am Ophthalmol Soc* 1975;73:452–90.
- 2 Fiore JV Jr, Newton JC. Anterior segment changes following the scleral buckling procedure. *Arch Ophthalmol* 1970;84:284–7.
- 3 Beekhuis H, Talsma M, Vreugdenhil W, et al. Changes in refraction after retinal detachment surgery corrected by extended wear contact lenses for early visual rehabilitation. *Retina* 1993;13:120–4.
- 4 Sinha R, Dada T, Verma L, et al. LASIK after retinal detachment surgery. *Br J Ophthalmol* 2003;87:551–3.
- 5 Nassaralla JJr, Nassaralla BRA. Refractive changes after scleral buckling surgery. *Arq Bras Oftalmol* 2003;66:575–8.
- 6 El Awady HE, Ghanem AA. Secondary piggyback implantation versus IOL exchange for symptomatic pseudophakic residual ametropia. *Graefes Arch Clin Exp Ophthalmol* 2013;251:1861–6.
- 7 Falzon K, Stewart OG. Correction of undesirable pseudophakic refractive error with the Sulcoflex intraocular lens. *J Refract Surg* 2012;28:614.

Copyright 2016 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