Case Report

Management of Pseudophakic Myopia Using Implantable Phakic Contact Lens with A 'Piggy Back' Technique

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Abstract

Purpose: *We report a case of a pseudophakic myopic patient who received placement of an implantable phakic contact lens (IPCL) via a 'piggyback technique' resulting in improved visual acuity.*

Case report: *A 35year old male patient with both eyes pseudophakic myopia came with complaints of diminution of vision in the right eye more than his left eye. After evaluating all available optical and surgical options, he received off-label placement of a posterior chamber IPCL with a piggyback technique for the pseudophakic right eye with a manifest refraction of -20.0 Ds. Best-corrected distance visual acuity improved from 20/60 to 20/30.*

Conclusion: *Our case demonstrates the successful use of an implantable phakic contact lens (IPCL) in a pseudophakic myopic patient by a piggyback technique, resulting in improved visual acuity. This off-label use of IPCL offers a good alternative treatment option for pseudophakic patients with high refractive error.*

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Keywords: *Implantable Phakic Contact Lens(Ipcl), Piggyback Technique, Pseudophakic Myopia*

Introduction

Refractive errors post-cataract surgery conflict with the patient's expectations of emmetropia especially a large refractive error that causes significant visual difficulty. Refractive changes should be anticipated while operating on children with myopic errors even years after primary intraocular lens (IOL) implantation either due to A-scan errors, wrong choice of IOL formula in patients with short axial length, human error, mislabeling of an implanted IOL, or postoperative myopic shift.[1,2,3] In order to correct residual refractive error post cataract surgery, there are multiple options available such as glasses, contact lenses, lens exchange or supplementation surgery[4] and corneal refractive surgery such as PRK or LASIK.[5]

We present a case of a patient with pseudophakic high myopia in right eye and pseudophakic myopic astigmatism in left eye who requested evaluation for available refractive procedures. With the goal of offering emmetropia, patient received off-label placement of posterior chamber implantable phakic contact lens (IPCL) with a piggyback technique for the right eye.

Case Report

A 35-year-old male patient having high myopia in both eyes after cataract extraction and posterior chamber intraocular lens (PCIOL) implantation following congenital cataract during childhood, presented with a diminution of vision in the right eye more than the left eye. His other past, personal, family and medical history was not contributory. Patient did not give history of intake of any medications, allergies or addictions.

A comprehensive ophthalmic examination was done. The corrected visual acuity in right eye was 6/18 (20/60) on Snellens's chart and N6 on roman's test type with manifest refraction of -20.0DS with addition of +2.5DS and in left eye was 6/9 (20/30) and N6 with refraction of -9.0DS/ -3.0DC @110 with addition of +2.5DS. On slit-lamp examination, an irregularly shaped pupil with peripheral iridotomy and multiple posterior synechiae along with an IOL in the capsular bag in both eyes was noted (Figure 1). Examination of the posterior segment with 90D lens and indirect ophthalmoscopy of both eyes showed disc, macula, and periphery within the normal limit (Figure 2). Intraocular pressures (IOP) by applanation tonometer were normal in both eyes. Corneal tomography revealed normal corneal thickness and architecture bilaterally. Refractive analysis revealed high myopia in the right eye with myopic

Figure 1: *Pre-operative anterior segment image of right eye showing irregularly shaped pupil with peripheral iridotomy and multiple posterior synechiae along with an IOL in the capsular bag*

Table 1: Pre-operative data- Both eyes

Eye	BCVA	Manifest refraction	WTW (mm)	ACD (mm)	Keratometry (D)	ECD (Cells/ mm2)	CCT (micron)	Angles (ASOCT)	Axial Length (mm)
OD	6/18 N6P	-20DS ADD+2.5DS	11.2	3.15	OPTICAL K1-43.05 @147 K2-44.35 @57 MANUAL K1-43.3 @129.1 K2-44.5 @50.9	2396	573	Nasal-37^0 Temporal-40	28.75
OS	6/9 N6	-9.0DS 3.0DC @110 ADD +2.5DS	11.2	3.34	OPTICAL K1-41.98 @109 MANUAL K1-42.3 @163.5 K2-44@16.5	2884	553	Nasal-44^0 Temporal-58	26.63

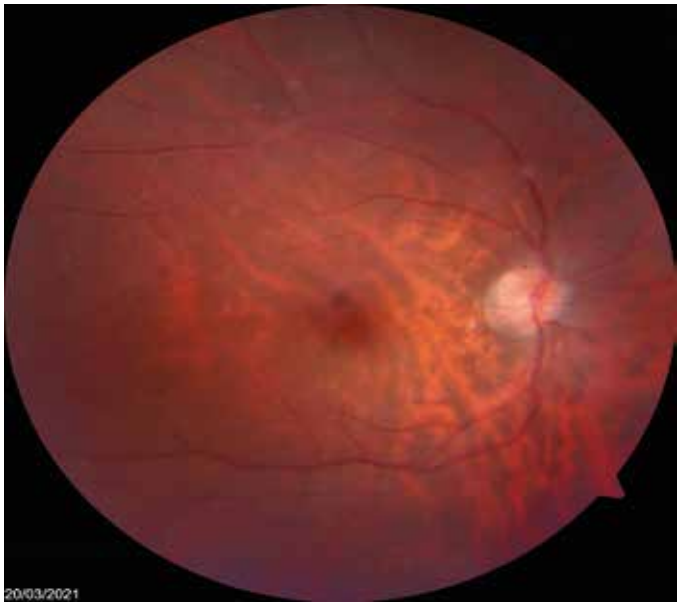

Figure 2: *Pre-operative posterior segment image- fundus image of right eye*

astigmatism in the left eye. Pre-operative refractive data was collected using various instruments and documented. (Table 1)

After giving consideration to a variety of surgical options, the patient elected for the placement of implantable lens in his right eye with a piggyback technique. A-scan was performed using an ultrasound biometer on pseudophakic mode and confirmed on optical biometer. Keratometry using both optical biometer and baush and lomb keratometer was done. The size (length) of the implanted IPCL was determined based on the patient's white-to-white (WTW) measured by digital calipers and anterior chamber depth (ACD) on optical biometry. The pre-operative biometry data was sent to the manufacturer and the IPCL power from the modified vertex formula was calculated with target emmetropia. The Implantable Lens power of the right eye was -21.50 D with length 12.0 mm and an optical diameter of 6.6 mm.

Surgical Procedure

After maximum possible mydriasis using a combination of topical medications, and peribulbar block, 2 side ports were made to provide for IPCL positioning spatula. Self-sealing clear corneal tunnel of size 3mm was created at 180-degree axis temporally. Anterior chamber was formed with ophthalmic viscosurgical device (OVD), and an attempt was made to release the posterior synechiae with iris repositor. However, it was noted that the stability of the previous IOL was getting disturbed hence synechiae were left as it is. The IPCL was loaded onto the cartridge, which was lubricated with OVD and injected into the anterior chamber. The haptics of IPCL were then carefully dialled in between iris and IOL plane into the sulcus. Rotation of IPCL to achieve 0-180 degree placement was attempted, but it was not possible due to posterior synechiae. Since the IPCL had only spherical power, it was rotated until it was found to be stable closest to the horizontal axis. Patency of peripheral iridotomy was confirmed. The viscoelastic material was removed by irrigation and aspiration. Air bubble was injected into AC. Edges of the clear corneal tunnel incision and side ports were hydrated. Antibiotic drop was instilled in the conjunctival cul-de-sac and the eye was patched for 24 hours. Postoperative steroid and antibiotic drops were given for 4 times a day initially and tapered as required.

Follow-up

On postoperative day 1, patient's uncorrected visual acuity (UCVA) in his right eye was hand movements close to face. The slit-lamp examination of right eye showed a secured temporal corneal wound, quiet anterior chamber with 60% air bubble and IPCL in the sulcus with PCIOL in situ. His postoperative IOP was constant with all angles open. At 1-week follow-up, patient reported subjective improvement in his vision with UCVA finger counting 3metres. The slit-lamp examination was notable for well apposed healed temporal wound, quiet anterior chamber, and visualization of the IPCL in the sulcus anterior to his PCIOL with space present between the two implants.

At 3 weeks, patient did not report any new visual complaints. Absorption of air bubble and resolution of postoperative inflammation lead to gradual improvement in vision with UCVA of right eye 6/12(20/40) and BCVA 6/9 (20/30) N6 with manifest refraction of +2.0dc@ 30 add +2.5ds. Intraocular pressure was 16mmHg on non-contact tonometry and IPCL in situ. The patient is under further monthly follow-up to monitor for visual acuity, intraocular pressure and any long-term complications. After ensuring safe outcome of right eye, similar procedure will be planned for left eye.

Discussion

Amongst the various treatment options available for pseudophakic anisometropia as seen in our patient, spectacles are an inconvenient approach as due to anisometropia, binocular refractive balancing may be required that prevents achieving emmetropia. Contact lenses are the best available non-surgical treatment option. However, they have potential risks of allergy, intolerance to contact lens, infections, difficulty in insertion and removal besides being of no interest to our patient(6). IOL exchange is a feasible option but in cases of longstanding treated congenital cataract such as our patient, adherence of lens to the capsular bag is usually present, which may lead to potential complications such as capsular tear, vitreous loss, retinal detachment, PCIOL dislocation and excessive tissue handling thereby causing postoperative inflammation.

Corneal refractive surgeries such as photorefractive keratectomy (PRK) and LASIK can be used to correct/ lower the amount of refractive error when the corneal thickness is in the safe range, but complications such as haze, corneal scarring, flap associated complications and regression may be seen . In case of high refractive error, such procedures require ablation of too much tissue, hence unable to maintain adequate residual corneal thickness.[5] In such cases, the posterior chamber implantable lens provides an alternative approach.

Myopic shift following primary IOL implantation in children is a common refractive concern as reported by David et al.[7] showing a mean myopic shift of 4.60 D over an average of 5.8 years postoperatively in children who are operated at the age of 2 or 3 years. Such refractive shift was also observed in our patient.

Our case illustrates the off-label 'piggyback' use of intraocular phakic contact lens in pseudophakic myopic patient to achieve emmetropic surgical refractive goal. The principle of piggybacking is to use two or more IOLs in the posterior chamber of the same eye.

The first reported use of phakic intraocular lens in pseudophakic eyes was performed in 2010 by Kojima et al.[8], where piggyback insertion of a toric IOL to correct residual refractive error was done in 8 pseudophakic eyes of 5 adult patients and was found effective with predictable results. Hsuan et al.[9] in 2002 reported six pseudophakic adult patients with anisometropia ranging from 2.00 to 7.9D who underwent Implantable Collamer Lens insertion showing diminution in anisometropia to asymptomatic levels with an average reduction of 3.15D.

Sachdev and Singh et al.[10] in 2019 compared retrospectively implantation of two types of posterior chamber phakic intraocular lenses: Visian Implantable Collamer Lens and Implantable Phakic Contact lens in 322 eyes with myopia and myopic astigmatism and found similar efficacy and safety profile in both the groups.

The results from the patient presented in this report are similar to those previously reported, as he had improved BCVA. This off-label technique offers an alternative to standard methods of treating pseudophakic myopia. IPCL, which is implanted in our patient, is made from reinforced hybrid hydrophilic acrylic material with six haptic pads for better stability in the ciliary sulcus. Its availability over wide range of power for ametropia correction, long term effectiveness and economical affordability are some of its advantages.

Conclusion

Pseudophakic myopia can be safely treated by placing implantable phakic contact lens by piggyback technique after ensuring regular postoperative follow-up to monitor for visual acuity, intraocular pressure and inflammation.

References

1. Holladay JT (1999): How to prevent refractive surprise. RevOphthalmol 6:97–98, 10: 1.
2. David A, Hal K, Derek T, Naval S & Daniel E (2002): Refractive change in pediatric pseudophakia: 6-year follow-up. J Cataract Refract Surg 28: 810–815.
3. Schempf T, Jung H, C: Off-Label Use of Phakic Intraocular Lens with a "Piggyback" Technique. Case Rep Ophthalmol 2018;9:465-472. doi: 10.1159/000494712
4. Venter JA, Oberholster A, Schallhorn SC, Pelouskova M. Piggyback intraocular lens implantation to correct pseudophakic refractive error after segmental multifocal intraocular lens implantation. J Refract Surg. 2014;30:234–9.
5. Jin GJ, Merkley KH, Crandall AS, Jones YJ. Laser in situ keratomileusis versus lens-based surgery for correcting residual refractive error after cataract surgery. J Cataract Refract Surg. 2008;34:562–9.
6. Eissa, S. A. (2016). Management of pseudophakic myopic anisometropic amblyopia with piggyback Visian®implantable collamer lens. Acta Ophthalmologica, 95(2), 188–193. doi:10.1111/aos.13203
7. David A, Hal K, Derek T, Naval S & Daniel E (2002): Refractive change in pediatric pseudophakia: 6-year follow- up. J Cataract Refract Surg 28: 810–815
8. Kojima T, Horai R, Hara S, Nakamura H, Nakamura T, Satoh Y, et al. Correction of residual refractive error in pseudophakic eyes with the use of a secondary piggyback toric Implantable Collamer Lens. Journal of refractive surgery (Thorofare, NJ: 1995) 2010;26((10)):766-9.
9. Hsuan JD, Caesar RH, Rosen PH, Rosen ES, Gore CL. Correction of pseudophakic anisometropia with the Staar Collamer implantable contact lens. Journal of Cataract & Refractive Surgery. 2002 Jan 1;28(1):44-9.
10. Sachdev GS, Singh S, Ramamurthy S, Rajpal N, Dandapani R. Comparative analysis of clinical outcomes between two types of posterior chamber phakic intraocular lenses for correction of myopia and myopic astigmatism. Indian journal of ophthalmology. 2019 Jul;67(7):1061.

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