

Case report

Persistently poor vision in dim illumination after implantation of XtraFocus small-aperture IOL (Morcher)

Prateek Agarwal,¹ Samuel Edward Navon,¹ Praveen Subudhi,² Neha Mithal³

¹Eye Institute, Cleveland Clinic Abu Dhabi, Abu Dhabi, United Arab Emirates

²Ruby Eye Hospital, Berhampur, Odisha, India

³Ophthalmology, AlAhaliya Eye Care Center, Abu Dhabi, United Arab Emirates

Correspondence to

Dr Prateek Agarwal;
dr.prateekagarwal@gmail.com

Accepted 22 October 2019

SUMMARY

A 21-year-old patient presents to us with complaints of blurred vision and photophobia in the left eye, with an uncorrected visual acuity of 20/100 improving to 20/30 with pinhole and diagnostic rigid gas permeable lens trial. He had a history of trauma with subsequent cataract extraction, with residual irregular astigmatism and traumatic mydriasis. XtraFocus Pinhole intraocular lens (Morcher) was implanted in the left eye. One week postoperatively, the left eye uncorrected visual acuity improved to 20/30, uncorrected intermediate visual acuity improved to 20/40, and uncorrected near visual acuity improved to J4. The glare and photophobia resolved completely. Surprisingly, the patient complained of severely poor vision in dim illumination. His vision was limited to bare perception of objects and hand movements close to the face. He started facing difficulties in major activities such as driving at night and in dark ambient surroundings such as movie theatres, which persisted to the extent of necessitating explantation of the implant.

BACKGROUND

Traumatic mydriasis may be treated with pupiloplasty¹/iris prosthetic devices.² Ocular aberrations are directly proportional to the pupil diameter. Reducing the pupil diameter minimises higher order aberrations.³

Small-aperture intraocular lens (IOLs) are exciting tools that address refractive error and iris loss simultaneously.^{4,5} The XtraFocus Pinhole IOL addresses both irregular astigmatism as well as pupillary defects. We report a rare phenomenon of significantly poor vision in dim illumination almost to the magnitude of bare perception of large objects and hand movements close to the face due to the pinhole effect of the XtraFocus small-aperture IOL.

CASE PRESENTATION

A 21-year-old patient presents to us with complaints of blurred vision and photophobia in the left eye, with an uncorrected visual acuity of 20/100 improving to 20/30 with pinhole and diagnostic rigid gas permeable lens trial. He had a history of trauma, with subsequent cataract extraction and traumatic mydriasis. The patient was not diabetic and hypertensive. The patient gave a history of single solitary floater which was not very significant. Dilated retinal examination revealed small vitreous

condensation accounting for the floater and normal peripheries without any active retinal pathology. We did not anticipate and discuss prior to the surgery that the visual acuity is severely limited in dim illumination contrary to normal testing conditions.

INVESTIGATIONS

Ultrasound biomicroscopy revealed adequate anterior chamber depth of 3.4 mm and the pre-existing IOL in the bag. Corneal topography revealed irregular astigmatism of 2.15 dioptres. The total higher order corneal aberrations were 2.3 μm and coma was 0.77 μm .

TREATMENT

Under topical and monitored anaesthesia care, 2.4 mm temporal clear corneal incision was fashioned. The anterior chamber was filled with Provisc ophthalmic viscosurgical device, and the XtraFocus Pinhole IOL was implanted in the ciliary sulcus using Monarch D cartridge and Epsilon injector system. Intracameral Miochol was injected to obtain miosis and ensure proper centration of the IOL.

OUTCOME AND FOLLOW-UP

One week postoperatively, the left eye uncorrected visual acuity improved to 20/30, uncorrected intermediate visual acuity improved to 20/40, and uncorrected near visual acuity improved to J4. The glare and photophobia resolved completely. Nevertheless, the patient was excessively bothered by the substantial reduction in vision in dim illumination. We measured visual acuity at different illumination intensities, simulating day-to-day scenarios from extreme darkness to bright illumination.

The visual acuity was limited to bare perception of objects and hand movements close to the face in scotopic conditions with illumination less than 50 lux. The quality of vision was good between 100 and 500 lux of illumination, simulating normal office room and ambient lighting conditions.

Optical coherence tomography revealed healthy photoreceptors.

Ultrasound biomicroscopy revealed well-placed IOL in the ciliary sulcus. Slit lamp biomicroscopy revealed well-centred IOL (figure 1). The patient was followed up for 3 months with positive counselling, emphasising neuroadaptation after small-aperture implants. There was no improvement even



© BMJ Publishing Group Limited 2019. No commercial re-use. See rights and permissions. Published by BMJ.

To cite: Agarwal P, Navon SE, Subudhi P, et al. *BMJ Case Rep* 2019;**12**:e232473. doi:10.1136/bcr-2019-232473

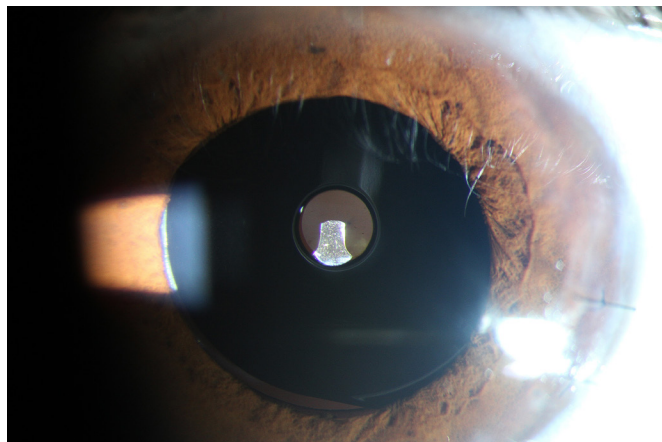


Figure 1 Postsurgery image showing well-centred XtraFocus Pinhole intraocular lens.

3 months after the surgery. The patient preferred to have his IOL explanted despite good visual outcome.

DISCUSSION

The XtraFocus Pinhole intraocular implant is manufactured by Morcher and received CE (Conformite Europeenne) mark in 2016.

The XtraFocus Pinhole IOL addresses both irregular astigmatism as well as pupillary defects.⁴ The pinhole device has a black opaque diaphragm with a 1.34 mm central opening without any refractive power. It is implanted in the ciliary sulcus in a piggy-back configuration. The haptics are thin and rounded to prevent any injury to the overlying uveal tissue. The haptics are angulated at 14°, thereby preventing contact with the uveal tissue, minimising the chances of iris chafing and pigment dispersion. The overall diameter is 14.0 mm, which is larger than most IOLs, thereby preventing decentration. The occlusive optic portion has a concave convex design which prevents contact with underlying IOL, thereby preventing interlenticular opacification.

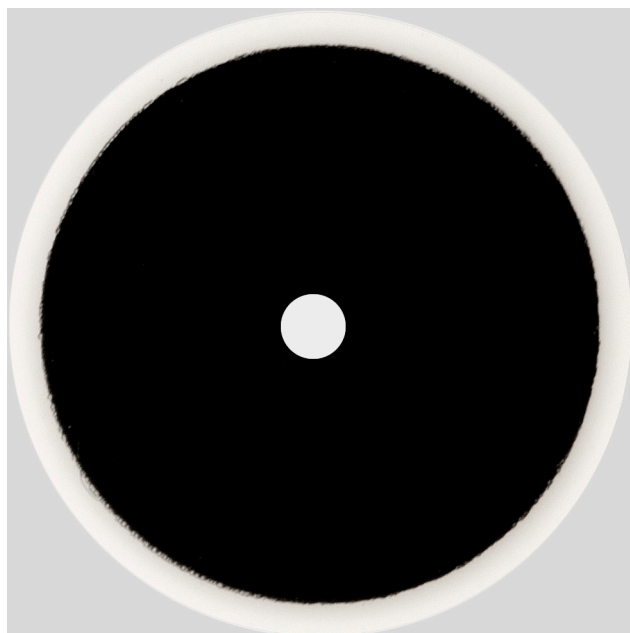


Figure 2 Soft pinhole contact lens.

In our case the patient was severely distressed with poor visual acuity in dim light. He was facing trouble with his activities of daily living. He could not drive at night due to poor vision and had difficulties moving around in extremely dim illumination, such as getting up at night and walking to the rest room.

Pupil functions dynamically over a wide range of illumination by regulating its size, thereby altering the amount of light inside the eye. The amount of light entering in the eye depends upon the pupil size. In dim illumination it allows 18 times more light as compared with bright ambient atmosphere as a function of pupil size. Small-aperture implants have fixed pinhole diameter which does not vary with ambient lighting conditions, thereby limiting the visual acuity in scotopic conditions. This is an important consideration which should be borne in mind and emphasised to the patient preoperatively before going ahead with a definitive procedure for small-aperture implants.

These patients will need a pen torch to enhance their vision when walking in a movie theatre and if they are going to the rest room in the middle of the night.

The patient preferred to get his implant removed despite improvement in visual acuity postsurgery due to extremely poor vision in dim light.

It may be wise to counsel the patient preoperatively about the quality of vision in dim illumination. Preoperatively pinhole contact lens trial can be employed to simulate the postoperative visual quality at different illuminations by varying room lighting (figure 2).

In conclusion meticulous counselling preoperatively and trial of pinhole contact lens are vital to set forth right expectations postoperatively.

Learning points

- ▶ This case highlights the importance of meticulous counselling preoperatively to any patient undergoing small-aperture implants, namely XtraFocus Pinhole intraocular lens and IC-8 implantation.
- ▶ It may be wise to counsel the patient preoperatively about the possible compromised vision in dim illumination.
- ▶ A trial of pinhole contact lens can be employed to simulate the postoperative visual quality at different illuminations by varying room lighting, and this helps to set forth the right expectations postoperatively.

Acknowledgements The authors acknowledge the contributions of Steven Hay for the clinical photographs.

Contributors PA: prime surgeon and analysis of data. NM: analysis and interpretation of data, along with the design of the manuscript. SEN: concept of the manuscript and its layout. PS: modifications in the text, language and take home message.

Funding The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests None declared.

Patient consent for publication Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

REFERENCES

- 1 Narang P, Agarwal A. Single-pass four-throw technique for pupiloplasty. *Eur J Ophthalmol* 2017;27:506–8.
- 2 Mayer C, Tandogan T, Hoffmann AE, et al. Artificial iris implantation in various iris defects and lens conditions. *J Cataract Refract Surg* 2017;43:724–31.
- 3 Applegate RA, Donnelly WJ, Marsack JD, et al. Three-dimensional relationship between high-order root-mean-square wavefront error, pupil diameter, and aging. *J Opt Soc Am A Opt Image Sci Vis* 2007;24:578–87.

- 4 Trindade CC, Trindade BC, Trindade FC, *et al.* New pinhole sulcus implant for the correction of irregular corneal astigmatism. *J Cataract Refract Surg* 2017;43:1297–306.
- 5 Agarwal P, Navon SE. Xtra focus pinhole IOL (Morchers GMBH) a novel approach to tackle irregular astigmatism and large pupillary defects with a single step surgery. *BMJ Case Rep* 2019;12:e228902.

Copyright 2019 BMJ Publishing Group. All rights reserved. For permission to reuse any of this content visit <https://www.bmj.com/company/products-services/rights-and-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

Customer Service

If you have any further queries about your subscription, please contact our customer services team on +44 (0) 207111 1105 or via email at support@bmj.com.

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