CASE REPORT

Scleral fixation of a posterior chamber intraocular lens combined with penetrating keratoplasty in an aphakic patient with microcornea and microphthalmia

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SUMMARY

A 66-year-old man with microcornea and microphthalmia required a corneal transplant for bullous keratopathy. The patient suffered from congenital cataracts and was left aphakic at the time of the original surgery because of the special challenge of operating on his eye. To improve his vision, we elected to place an intraocular lens (IOL) into his eye as an 'open sky' procedure during corneal transplant. However, the implantation was difficult because of the small size of this eye. The surgeon used a novel approach to fixing the IOL to the sclera in which he penetrated the IOL and sutured the IOL through this hole. Following the procedure, the patient reported improvement in his vision and great satisfaction. This case report describes a manoeuvre of fixating an IOL to the sclera by piercing the IOL optic.

or insufficient surgical experience for scleral fixation.¹ Iris-fixated intraocular lenses (IOLs), anterior chamber (angle supported) IOLs and scleral-fixated IOLs offer enhanced vision in patients who are aphakic after cataract surgery.^{2 3} These procedures are significantly more difficult in patients of microphthalmia and small eye axial length and/or diameter.⁴ However, implantation of a lens can improve visual acuity and subjective quality of vision. We present a surgical technique of scleral fixation of IOL applied in an aphakic patient with microphthalmia that may be used to improve vision in similar patients.

CASE PRESENTATION

We present a case of a 66-year-old man with microphthalmia and microcornea. The axial length of his eye measured 17.14 mm and white-to-white distance measured 10.6 mm. He had congenital cataracts and lens removal without IOL implantation (aphakic). He had a corneal transplant because of bullous keratopathy, which did not result in

BACKGROUND

Aphakia after a cataract surgery could be attributed to many reasons, including lack of capsular support

Figure 1 Images showing intraoperative steps. (A) Half thickness scleral flaps were constructed at the 2 o'clock and 8 o'clock positions. (B) The intraocular lens (IOL) was pierced with the tip of a needle. (C) The corneal button was removed. (D) Placement of sutures at approximately 2 mm from the limbus. (E) Insertion of IOL. (F) A 6.5 mm donor button placed with interrupted 10-0 nylon sutures.

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significant improvement of his visual acuity. His ocular history included retinal detachment, corneal transplant, bullous keratopathy, aphakia of the eye and glaucoma. He had undergone retina repair, two penetrating keratoplasties (PKPs) and trabeculectomy. His left eye was prosthetic.

He was not satisfied by his aphakic vision in the right eye. Prior to surgery, his visual acuity in his right eye was counting fingers at 2 feet. Because his right eye was his only seeing eye, it was important to restore or preserve as much vision as possible.

When a corneal transplant was performed for bullous keratopathy, an IOL was also planned to be implanted to improve his vision. He had an insufficient capsular bag to support an in-the-bag IOLs implantation. Further, the small size of his eye prohibited sulcus fixation of an IOL. Thus, through a modified technique, along with his corneal transplant, an IOL was inserted and fixated on his sclera (the technique is documented below and a video file is also available). Ultrasonography performed prior to surgery determined that there was no damage to the posterior segment of the eye. The visual pathway was intact as revealed by MRI.

TREATMENT

The patient's eye was carefully measured and a monofocal, acrylic single-piece IOL with anterior asymmetric optic (SA60AT, Alcon, Fort Worth, Texas, USA) was chosen. The lens has an optic diameter of 6.0 mm, a haptic-haptic diameter of 13 mm and a +40.0 dioptre power. It was decided to perform a 6.5 mm transplant into a 6.0 trephination and a 6.5 donor punch was used to punch a central donor corneal button. Next, the cornea was marked with a radial keratotomy marker to find a measure exactly 180° apart. Peritomy was performed at the 2 o'clock and 8 o'clock positions. Next, a half thickness scleral flap was constructed at the 2 o'clock and 8 o'clock positions (figure 1A) and a Flieringa ring was sewn over the eye. A 6.0 central trephination was then taken with a hand trephine and the corneal button removed with corneal sutures (figure 1C and video 1).

Subsequently, the IOL was pierced at the edges of the haptic with a 9-0 prolene suture. The IOL was pierced with the tip of the needle (figure 1B). The suture was then brought through the edge of the optic until the prolene portion was through the hole made by the needle. These were brought in through the open

Video 1 Patient's corneal transplant and intraocular lens (IOL) implantation. The patient's cornea was removed via 'open sky'. Then, the IOL was inserted and sutured to the sclera. Note that the suture pierces the optic of the IOL. A cornea graft was then implanted and the wound sealed.

sky and brought out adjacent to the marker to an 8 o'clock position approximately 2 mm from the limbus (figure 1D). With this accomplished, the sutures were tied and the IOLs was inserted and found to be in good position (figure 1E). Viscoelastic was used to protect the anterior chamber and a 6.5 donor button placed over the eye and sewn in position with interrupted 10-0 nylon sutures (figure 1F). At the conclusion of the case, the IOLs was in the visual axis and appeared to be sitting well.

OUTCOME AND FOLLOW-UP

One day postoperatively, the patient was able to perceive motion at 3 feet. Two months postoperatively, he retained hand motion vision. Four months postoperatively, he was counting fingers at 4 m, an improvement over his preoperative visual

Patient's perspective

The following was dictated by the patient during his 1-month postoperative follow-up.

I have had trouble seeing since I was a child. As I grew older, it only became worse. I am always in and out of the eye doctor's office. I have only one working eye, my right. I was very scared when I was told that what little vision I had could be threatened. I was willing to try anything to keep what little vision I had (what did I have to lose?). The lens they put in my eye makes everything more clear. I am very happy with the result.

Learning points

- Scleral intraocular lens (IOLs) fixation is quite a challenging technique. In our case, limited intraocular space made the fixation of a lens using the standard technique problematic. Haptics fixation in the scleral flaps or even use of other IOLs such as Akreos AO60 (Bausch & Lomb, Rochester, USA) or similarly designed IOLs (with appropriate eyelets), which are appropriate for similar operations in normal dimension eyes, could result in intraocular folding of the IOL's optic. This can have devastating results regarding the refractive outcome and mainly with the biocompatibility of adjacent tissues such as of the iris causing significant chafing and pigment dispersion. Eventually, this unusual use of IOL piercing gave the opportunity to place the IOL's optic component in such a place that its horizontal shape could be maintained.
- The clinical result was very encouraging, since the patient had perceived significant improvement in his vision. Of course, alternative management plans could be applied, such as preorder of a customised smaller sized IOL. To the best of our knowledge, this is the first report of a modified scleral fixation technique for a microphthalmic eye, using a standard one piece IOL.
- We strongly consider that, under these specific circumstances, where anatomic conditions were extremely intricate, the proposed step to pierce the optic of the IOL introducing in this way two convenient 'additional eyelets' for suture incorporation was sufficient for the best care of the patient.

acuity. He reported subjective improvement in his vision and was very happy with the results.

DISCUSSION

Seki *et al* described a technique of introducing two suture loops for scleral fixation of an IOL by a single 'ab externo' procedure, which proved safe and effective.⁵ Al-Qahtani presented a technique that allows scleral fixation of a posterior chamber IOL (PC-IOL) in a closed anterior chamber combined with PKP.⁶ However, our report presents a unique case of scleral fixation of a PC-IOL in microphthalmia, by piercing the IOL optic. There are a few concerns in our case. Piercing of the IOL may contribute to a change in the power and axis of the lens. Lens integrity could be affected, but the elastic acrylic material appears quite resistant in such treatment. However in our case, the patient's visual acuity was already so poor that the aberrations that would have been discernable to a normal eye were not noticed. Prolene sutures maintain integrity within ocular tissue. However, the 'jagged' hole produced by the needle may lead to eventual erosion of the suture, which is also common in cases of the use of 'conventional' scleral fixation techniques. The risks were reviewed with the patient and he was willing to undergo this

treatment with the knowledge that he would require long-term follow-up to assess outcome.

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Competing interests None declared.

Patient consent Obtained.

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