Role of anterior segment optical coherence tomogram in Descemet's membrane detachment

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Descemet's membrane detachment (DD) is a rare but serious complication of intraocular surgery. In rare cases where corneal edema is severe and we may not be able to visualize DD on slit-lamp examination, anterior segment optical coherence tomogram (AS-OCT) would be helpful. We describe two patients with DD, highlighting the role of AS-OCT in early diagnosis and management of patients with DD. One of the patients had DD with rolled in edge, which could only be visualized with AS-OCT. In such a situation, AS-OCT can identify the edge of detachment and show the exact position of the rolled edge, which can allow us to plan the surgical strategy to unroll the DD.

Key words: Anterior segment optical coherence tomogram, corneal edema, Descemet's membrane detachment, intraocular surgery

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Descemet's membrane detachment (DD) is a rare but serious complication of intraocular surgery.[1] Early treatment of this condition is important as it can prevent permanent corneal opacification due to endothelial pump failure. Most cases of DD would be picked up with appropriate slit-lamp examination. However, in cases where corneal edema is severe, we may not be able to visualize DD. In these cases, anterior segment optical coherence tomogram (AS-OCT) would be helpful and, AS-OCT can also tell us the position of detached flap, which will allow the surgeon to prepare the surgical plan more appropriately.

We describe two patients with DD, highlighting the role of AS-OCT (Carl Zeiss Meditech, Dublin, CA, USA) in early diagnosis and management of patients with DD.

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Case Reports

Case 1

A 71-year-old female underwent clear corneal phacoemulsification in the left eye with implantation of non-foldable intraocular lens. Preoperative ocular examination including dilated retinal evaluation was within normal limit. No complications were reported during surgery.

In the early postoperative period, the patient had best corrected visual acuity (BCVA) of finger counting (FC) at 2 m. Slit-lamp examination showed severe corneal edema [Fig. 1] and anterior segment could not be visualized. She was treated conservatively with antibiotic and steroid drops six times and hypertonic saline four times a day. On the 8th postoperative day, her BCVA of FC was at 3 m and the corneal edema persisted. High-resolution corneal scanning with AS-OCT was performed, which revealed a big DD involving

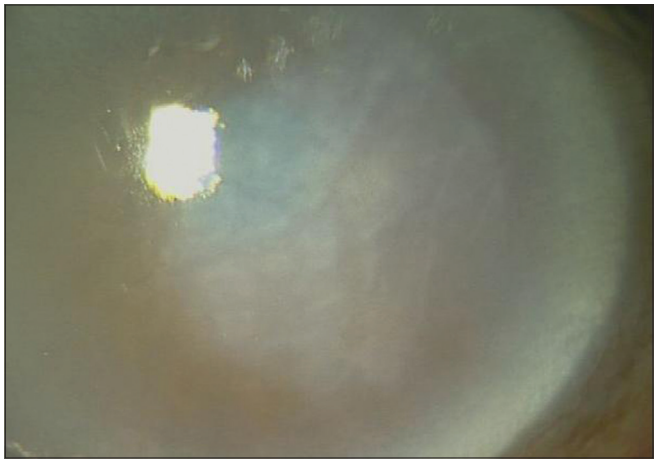

Figure 1: Slit-lamp examination image with postoperative severe corneal edema with striae keratopathy

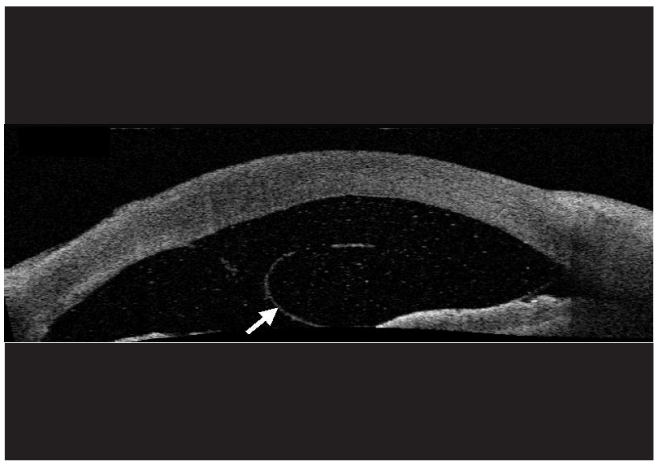

Figure 2: High-resolution cornea scanning with anterior segment optical coherence tomogram revealing big Descemet's membrane detachment involving the pupillary axis with inward rolling of Descemet's membrane (white arrow)

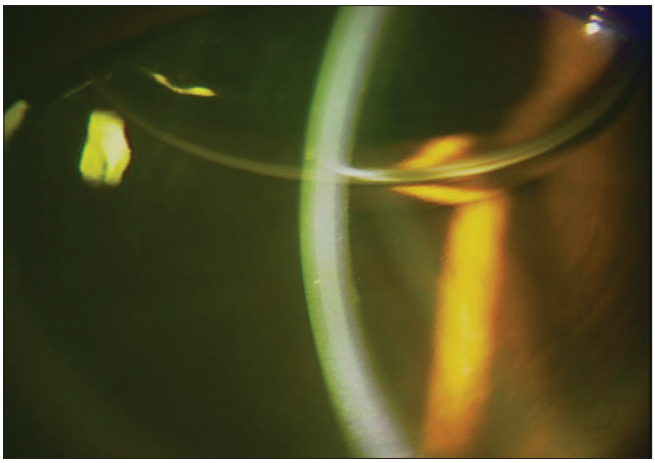

Figure 3: Slit-lamp photograph with C3F8 bubble in anterior chamber and attached Descemet's membrane with clear cornea

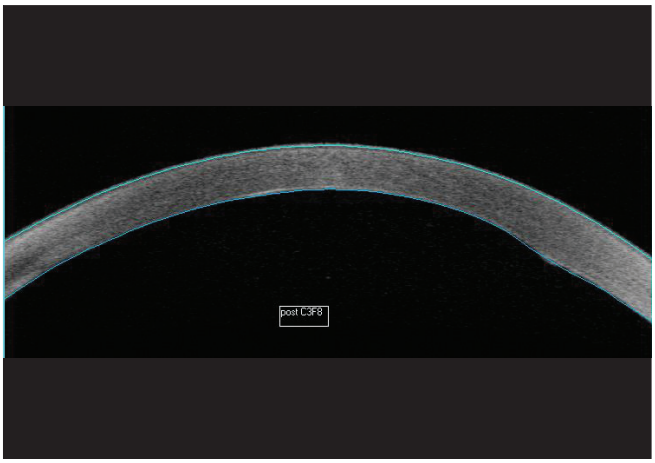

Figure 4: Post C3F8 injection attached Descemet's membrane and clear cornea on anterior segment optical coherence tomogram

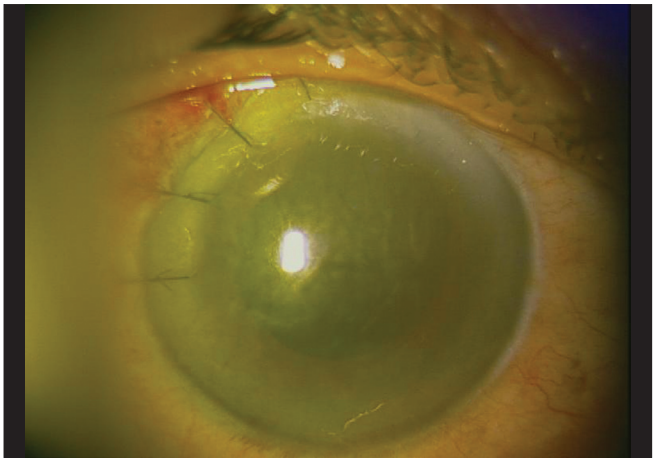

Figure 5: Slit-lamp examination image with postoperative severe corneal edema with striae keratopathy

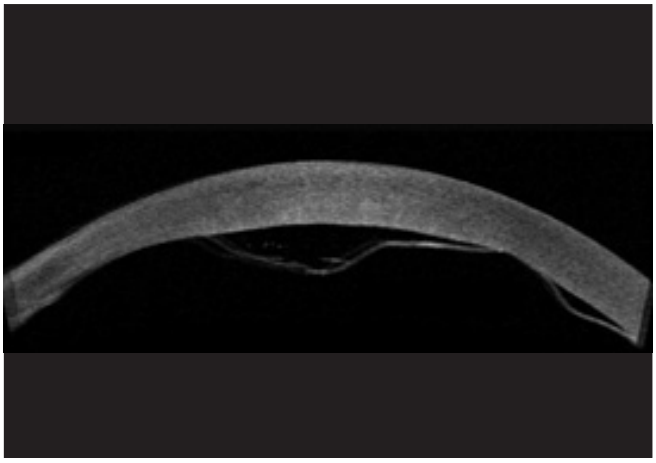

Figure 6: High-resolution cornea scanning with anterior segment optical coherence tomogram revealing central Descemet's membrane detachment

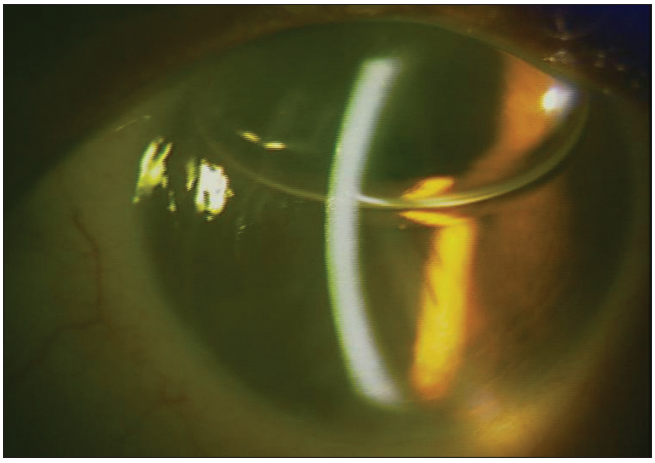

Figure 7: Post C3F8 injection slit-lamp photograph showing C3F8 bubble in anterior segment with attached Descemet's membrane and clear cornea

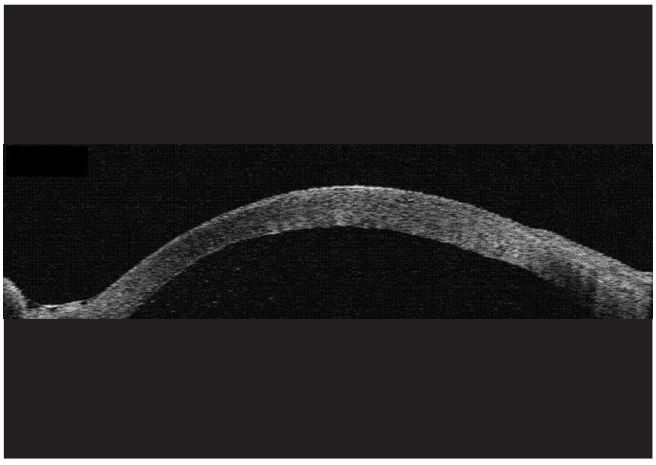

Figure 8: Post C3F8 injection attached Descemet's membrane on anterior segment optical coherence tomogram

the pupillary axis [Fig. 2]. AS-OCT image also showed the inward rolling of Descemet's membrane. On 9th postoperative day, we injected intra-cameral 0.25 ml of 14% isoexpansile perfluoropropane (C3F8) gas diluted with air through a millipore filter. The standard surgical technique was used for C3F8 injection.[2] Before C3F8 injection, the rolled edge of Descemet's membrane was repositioned using 30-gauge canula. On day 1 postoperatively, her visual acuity was 20/200, cornea was clearing and Descemet's membrane was attached. Two days after the C3F8 gas injection, cornea cleared and Descemet's membrane reattached which was confirmed by AS-OCT [Figs 3 and 4]. Intraocular pressure (IOP) remained normal (16 mm of Hg) after the procedure. At last follow-up, 3 months after the last procedure, her BCVA was 20/30 and N6 in the operated eye. Slit-lamp examination showed clear cornea and normal anterior segment findings. She was not on any ocular hypotensive medications.

Case 2

A 65-year-old female underwent a small incision cataract surgery in the right eye. Preoperative ocular examination including dilated retinal evaluation was within normal limit. The surgery went uneventfully. In the initial postoperative period, visual acuity was FC close to face. Slit-lamp examination showed severe corneal edema and anterior segment could not be visualized [Fig. 5]. On 5th postoperative day, when the corneal edema persisted and vision did not improve, we performed an AS-OCT, which showed a large DD [Fig. 6]. Next day, she was injected intra-cameral 0.25 ml of 14% isoexpansile C3F8 gas diluted with air through a millipore filter. Over the next few days, cornea cleared and Descemet's membrane reattached [Fig. 7]. Follow-up AS-OCT confirmed the same [Fig. 8]. Her BCVA was 20/30 and IOP was 24 mm of Hg for which timolet maleate 0.5% eye drops twice a day was started. At 3 months, her BCVA was 20/25 and IOP was 16 mm Hg.

Discussion

AS-OCT permits image acquisition at a rate of eight frames per second (2000 A scans per second) with a transverse resolution of 60 μm and an axial resolution of 10–20 μm.[3] Furthermore, the use of wide-field scanning optics (16 mm) and deep axial scan range (8 mm) allows AS-OCT to image a cross section of the anterior chamber in one image frame. After acquisition, the scanned images have to be processed by customized software (dewarping software), which compensates for index of refraction transition at the air–tear interface and the different group indices in air, cornea, and aqueous to correct the physical dimensions of the images. AS-OCT has been reported to be useful for various anterior segment pathologies including post LASIK (Laser-Assisted *In Situ* Keratomileusis) corneal flap evaluation, post-DSEK (Descemet's Stripping Endothelial Keratoplasty) complications, post-trabeculectomy sub-conjunctival bleb evaluation, phakic (intraocular lens) position, anterior chamber angle evaluation and evaluation of DD.[3-10]

Our cases show that in a situation after cataract surgery where the exact cause of corneal edema and haze cannot be identified due to difficult corneal evaluation, the AS-OCT can help us not only in identifying the cause but also in making surgical plan. In the first case, the Descemet's membrane was detached and the edge of the detached membrane was rolled in. In such a situation, due to severe corneal edema, we could not visualize the edge of Descemet's membrane and it could have become difficult to appose the Descemet's correctly. If the Descemet's is not apposed properly, the corneal endothelium can decompensate and can cause irreversible corneal opacification. In such a situation, AS-OCT can identify the edge of detachment and how it is rolled so that we can plan the strategy to unroll the DD.

These two cases highlight the importance of AS-OCT in identifying DD in postoperative patients with severe corneal edema where the DD cannot be visualized.

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