INTRODUCTION

Descemet’s membrane detachment (DMD) or tears may occur as a complication of intraocular procedures; causes of this condition include cataract surgery, viscocanalostomy, trabeculectomy, iridectomy, penetrating keratoplasty and cyclodialysis. DMD may manifest with loss of vision due to corneal edema and the presence of Descemet’s membrane (DM) folds. The incidence of DMD has been reported from 2% to 6% and from 0% to 5% during extracapsular and phacoemulsification cataract surgery, respectively. However, owing to improved instrumentation and techniques, this complication occurs less frequently. Spontaneous resolution of partial DM detachment has been described. Surgical interventions to re-attach large DM detachments using methods such as injecting substances or suturing have been proposed.

Herein, we report a patient who developed severe tears, detachment and partial loss of DM during phacoemulsification surgery. The massive corneal edema completely resolved 5 weeks after two sessions of air bubble injection.

CASE REPORT

A 64-year-old woman underwent phacoemulsification surgery in her right eye. Surgery was uneventful until the irrigation/aspiration stage during which engagement of the central area of the detached DM in the aspiration port was suddenly noted. Intraocular movement of the aspiration port had created three pieces of large DM tears and aspiration of the central piece had led to loss DM in the central area. A posterior chamber intraocular lens was implanted and the procedure was terminated. Postoperatively, the patient was referred to our cornea service for management of corneal edema.

One day after phacoemulsification, in July 2012, visual acuity was counting fingers at one meter and
slit lamp examination revealed diffuse corneal stromal edema with deep corneal folds. Extensive corneal edema obscured the view of DM and anterior chamber. Due to scattering in the edematous cornea, a clear view of DM was not obtained by Scheimpflug imaging. Only in a few images, an indistinct view of DMD was noticeable. Pachymetry revealed a central corneal thickness of 1344 mm [Figure 1]. Topical dexamethasone eye drops (Maxidex, Alcon, Fort Worth, TX, USA) were administered every 1 h for a total of 4 days. After 2 days of treatment, the corneal edema decreased [Figure 2] and after 4 days, DM was visible and multiple tears with and without DMD were seen. Scheimpflug images showed partial reattachment of DM in some parts of the cornea [Figure 3].

On the following day, air was instilled into the anterior chamber of the same eye through a corneolimbal paracentesis track. Air injection was repeated the day after, due to insufficient attachment. Visual acuity and central corneal thickness gradually improved to 20/32 and 642 mm, respectively, over the course of 5 weeks. Despite partial loss of DM, corneal edema largely disappeared 5 weeks after air bubble injection [Figure 4].

**DISCUSSION**

Descemet’s membrane detachment was first described by Samuels in 1928. Surgical trauma is the predisposing factor in DMD and this complication has been reported after iridectomy, extracapsular cataract extraction, phacoemulsification, viscoanalogostomy, trabeculectomy, iridectomy, penetrating keratoplasty and cycloidalysis. Inadvertent insertion of instruments between the corneal stroma and Descemet’s membrane, improper incisions (excessively anterior or shelved incisions), too tight or too long corneal tunnels, use of dull knives, engagement of Descemet’s membrane during intraocular lens implantation or misuse of the irrigation/aspiration devices are among predisposing factors for DMD.

In the present case, DM tears occurred during the irrigation/aspiration stage. The surgeon reported

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**Figure 1.** (a) Schiempflug image of the eye 1 day after cataract surgery complicated by Descemet’s membrane (DM) detachment. Note the corneal thickening and hyper-reflectivity with an indistinct view of DM in the anterior chamber (arrowhead). (b) Pachymetric map: Massive thickening of the whole cornea with minimal thickness of 1342 mm.

**Figure 2.** (a) Slit lamp photograph of the same eye as in Figure 1, 2 days after cataract surgery. Note the corneal wrinkling and Descemet’s membrane tear (arrowhead). (b) Pachymetric map: Corneal thickening with a minimal value of 950 mm.

**Figure 3.** Appearance of the same eye 4 days after cataract surgery. Slit lamp photographs: (a) Partial reattachment of Descemet’s membrane (DM, red arrow), (b) DM Detachment (arrowhead), and loss of DM (asterisk). Scheimpflug image (c) of the same eye, note the detached DM flaps (arrow) and partial reattachment (red arrow).

**Figure 4.** Appearance of the same eye 5 weeks after air bubble injection: (a) Slit lamp photograph reveals a clear cornea except for some haziness in the corneal apex. (b) Scheimpflug image shows a fully attached Descemet’s membrane; (c) pachymetric map: The thinnest point is 544 mm and mild thickening (642 mm) is present in the corneal apex.
multiple forceful entries of the phaco probe through a tight main incision. He inserted the aspiration port through the main incision resulting in engagement of the central part of the detached Descemet’s membrane resulting in large DM tears and loss of DM from the corneal apex. The procedure was terminated without intracameral air fill. The day after surgery, massive corneal edema was present through which no details of DM were visible. It appears that the tight main phaco incision and forceful movements of the probe had led to initial DMD and when the aspiration port was inserted through the main incision, the detachment was enlarged. Finally, the secondary insertion of the port engaged the DM and resulted in tears and loss of DM. Frequent topical corticosteroid eye drops were initiated and continued until the DM became visible. Two sessions of air injection were performed after 5 days when some spontaneous DM reattachment had occurred and the edema had decreased.

Ultrasound biomicroscopy, optical coherence tomography and Scheimpflug imaging provide quantitative information and qualitative imaging of the cornea and anterior chamber. In the current case, slit lamp biomicroscopy and Scheimpflug imaging were used to diagnose and monitor DMD and its posttreatment course. Minor DMDs usually reattach spontaneously but large ones require surgical repair. Recommended management of DMD includes simple observation, manual repositioning, intracameral injection of air or gas, and direct suturing of DM.[3,7,9,10] Ti et al showed that air bubble tamponade is effective for significant DMDs, however a promising outcome may require two procedures and even after DM reattachment, recovery of corneal clarity may take up to 3 months.[11] In the present case, we also performed air tamponade procedure twice and corneal clarity was achieved in 5 weeks.

Mackool and Holtz classified DMDs into planar and nonplanar types, stating that nonplanar detachments are unlikely to spontaneously reattach and should be repaired early on.[8] Our case was particularly complex, as the DMD was complicated by three linear tears which failed to meet because of an intervening small apical area in which DM was lost. Despite the loss of DM in the central cornea, the edema largely resolved in this area and only mild central thickening was observed on the pachymetric map. Common thinking is that reattached endothelial cells proliferate and migrate into the defect. Corneal endothelial cell migration to the damaged cornea has also been evident in animal and in vitro studies.[13,14]

In summary, in the case reported herein, complex DM tears were successfully reattached using air bubble tamponade which was done after frequent corticosteroid application and waiting for a few days. This approach was helpful in considerably reducing corneal edema and visualization of DM details before applying the air bubble treatment despite partial loss of central DM. Insertion of the aspiration port through the main incision may have been the trigger of DMD. Scheimpflug imaging is beneficial for diagnosis and monitoring of DM tears and detachments.

REFERENCES

1. Scheie HG. Stripping of descemet’s membrane in cataract extraction. Trans Am Ophthalmol Soc 1964;62:140-152.
2. Makley TA Jr, Keates RH. Detachment of descemet’s membrane with insertion of an intraocular lens. Ophthalmic Surg 1980;11:492-494.
3. Unlü K, Aksünger A. Descemet membrane detachment after viscosocanostomy. Am J Ophthalmol 2000;130:833-834.
4. Wigginton SA, Jungschafter DA, Lee DA. Postoperative Descemet membrane detachment with maintenance of corneal clarity after trabeculectomy. J Glaucoma 2000;9:200-202.
5. Samuels B. Detachment of Descemet’s Membrane. Trans Am Ophthalmol Soc 1928;26:427-437.
6. Lang GK, Green WR, Maumenee AE. Clinicopathologic studies of keratoplasty eyes obtained post mortem. Am J Ophthalmol 1986;101:28-40.
7. Anderson CJ. Gonioscopy in no-stitch cataract incisions. J Cataract Refract Surg 1993;19:620-621.
8. Mackool RJ, Holtz SJ. Descemet membrane detachment. Arch Ophthalmol 1977;95:459-463.
9. Greenhut J, Sargent R, Pilkerton R. Descemetopexy. A report of two cases. Ann Ophthalmol 1971;3:1244-1246.
10. Ellis DR, Cohen KL. Sulfur hexafluoride gas in the repair of Descemet’s membrane detachment. Cornea 1995;14:436-437.
11. Zeiter HJ, Zeiter JT. Descemet’s membrane separation during five hundred forty-four intraocular lens implantations 1975-1982. J Am Intraocul Implant Soc 1983;9:36-39.
12. TiSE, Chee SP, Tan DT, Yang YN, Shuang SL. Descemet membrane detachment after phacoemulsification surgery: Risk factors and success of air bubble tamponade. Cornea 2013;32:454-459.
13. Nakahori Y, Katakami C, Yamamoto M. Corneal endothelial cell proliferation and migration after penetrating keratoplasty in rabbits. Jpn J Ophthalmol 1996;40:271-278.
14. Olsen EG, Davanger M. The healing of human corneal endothelium. An in vitro study. Acta Ophthalmol (Copenb) 1984;62:885-892.

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