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Recurrence of Descemet's Membrane Detachment Treated with Repeat Descemetopexy

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INITIAL PRESENTATION

Chief Complaint

78-year-old male underwent left eye (OS) cataract extraction with intraocular lens (IOL) placement complicated by a tear in Descemet's membrane.

History of Present Illness

The patient experienced progressive loss of vision and was found to have a 3+ nuclear sclerotic cataract OS. He underwent a pre-operative evaluation the day prior to surgery.

Pre-Op Visual Acuity

- OD: with correction (cc) 20/40
- OS: cc 20/80

Past Ocular History

- No history of ocular surgeries
- Hyperopia, both eyes (OU)
- Presbyopia OU
- Dermatochalasis OU

Past Medical History

- Diabetes, Type II
- Hypertension
- Hyperlipidemia
- Arthritis

Medications/allergies

- Noncontributory

CLINICAL COURSE

The patient underwent phacoemulsification OS with IOL placement. He had poor dilation, so a Malyugin ring was used. Capsulorrhexis and nucleofractis were completed without complication. Near the end of the case, it was noticed that a small tear in Descemet's membrane (DM) had occurred near the temporal clear cornea incision, because of this finding, an air bubble was placed.

At the patient's one week post-operative appointment, a small, focal Descemet's membrane detachment (DMD) was diagnosed. At this point, it was decided that a DMD repair, or "Descemetopexy," was necessary in order to reattach the patient's DM to the corneal stroma. The patient returned to the operating room to have this procedure performed. A single paracentesis was made on the opposite side of the DMD, at around 10 o'clock. Air was instilled into the anterior chamber and the patient was positioned right side down, so that the air would apply pressure onto the area of detachment.

The patient followed up one week after Descemetopexy. He reported improvement in vision immediately after the air bubble was placed but stated his vision became worse on the third day after the procedure. Exam at this time revealed the following

Visual Acuity

- OS: without correction (sc) 20/100, pinhole 20/80

Intraocular Pressure (IOP) by Tono-pen

- OS: 8 mmHg

Slit lamp exam

OS

- **Lids/lashes:** Normal
- **Conjunctiva:** 1+ injection
- **Cornea:** 3+ Descemet's folds extending 5mm from phaco wound. Focal detachment from phaco wound in visual axis. Wound secure.
- **Anterior chamber:** Deep, Trace cell
- **Iris:** Marginal atrophy, TIDs at 4 & 8
- **Lens:** PCIOL

The patient was found to have a recurrence of DMD and was scheduled to have a re-bubble procedure (repeat Descemetopexy) two days later. This again involved air instilled into the anterior chamber, and the patient was positioned supine for two hours in the PACU and was instructed on strict positioning at home.

He returned to clinic three days following repeat Descemetopexy. Exam was as follows

Visual Acuity

- OS: sc 20/70, ph 20/60

Intraocular Pressure (IOP) by Tono-pen

- OS: 8 mmHg

Slit lamp exam

OS

- **Lids/lashes:** Normal
- **Conjunctiva:** 1+ injection
- **Cornea:** Attached Descemet's membrane with few folds
- **Anterior chamber:** 30% air-filled
- **Iris:** Dilated, TID at 9:00 and 7:00 with PI at 7:00
- **Lens:** PCIOL

The patient's DM had reattached following repeat air bubble placement. He was told to position face up as much as possible for the next three days, since the air bubble was still present. At his four-week follow-up, the patient was seeing 20/30 without glasses from his surgical eye. On slit-lamp exam, DM showed trace folds, but had remained attached.

DIAGNOSIS

Descemet's Membrane Detachment (DMD), a separation of corneal Descemet's membrane from the posterior corneal stroma.

DISCUSSION

Epidemiology

DMD can occur during cataract extraction, but may also occur during other ophthalmological procedures that involve the cornea. In one study, clinically insignificant small curls or tags in Descemet's membrane were found via gonioscopy in 47% of patients [1]. The incidence of DMD is reported as 2.6% for extracapsular cataract extraction and 0.5% for phacoemulsification [2]. More recent studies showed the incidence to be 0.044% [3], 0.52% [4], and 0.81% [5] after phacoemulsification surgery.

Pathophysiology

Descemet's membrane is in the posterior cornea, between the endothelial layer and the stroma. A DMD occurs when there is a break in Descemet's membrane, creating an area of separation between DM and the stroma of the cornea. A single area of separation can be inadvertently expanded with further manipulation during surgery by instrumentation or fluid. It is likely that many large DMDs start small and extend during surgery. The majority of DMDs that occur during phacoemulsification are the result of tears at incision sites, often due to dull instruments [6]. Inserting instruments or fluid through corneal incisions can then extend a break in Descemet's membrane. Additionally, DMD may be caused by unintentional insertion of an instrument or fluid between stroma and Descemet's membrane.

Classification

Multiple classification systems for DMDs have been proposed. Mackool and Holtz suggested classification based on the extent of separation from the stroma so that DMDs <1 mm from the stroma are called planar, whereas those >1 mm from the stroma are considered non-planar [7]. Jain *et al.* classified DMDs based on extension of

the detachment, and categorized each tear as mild, moderate, or severe, based on location and corneal involvement [5]. Recently, Kumar *et al.* proposed classification based on height, extent, length, and pupil-involvement of the detachment [4].

Signs/Symptoms

DMD presents with decreased visual acuity and localized or diffuse corneal edema or haziness that persists for over two weeks.

Imaging

A detachment in Descemet's membrane can be seen intraoperatively under the operating microscope. Postoperatively, DMD can be detected on slit-lamp exam, with gonioscopy, ultrasound biomicroscopy (UBM), or anterior segment optical coherence tomography (AS-OCT).

Prevention

To minimize the occurrence of DMD, it is recommended that one use a sharp blade for making an incision, avoid forceful insertion of instruments, and ensure the cannula enters the anterior chamber before injecting BSS or viscoelastic. If there is substantial resistance during wound construction, remove and inspect the blade, and preferably replace it with a new one. One may also alter the angle of insertion or enlarge the clear corneal incision or paracentesis. Additionally, prompt detection of DMD intraoperatively is crucial in preventing progression of the detachment.

Management

If DMD occurs and is detected intraoperatively, one can prevent further detachment by using high magnification to carefully insert instruments and enlarge and lubricate the incision. Pressure can be placed on the posterior lip to avoid the anterior lip. Air or gas should be placed at the conclusion of the case when a medium to large (>1 mm) detachment has been identified.

If DMD is discovered postoperatively, there are two options for management: observation or surgery. Observation may be successful via spontaneous reattachment in DMDs less than 1mm with non-scrolled edges. Spontaneous reattachment, however, may be unpredictable. If DMD does not spontaneously resolve, it can result in stromal fibrosis and opacification. One study suggested that planar DMDs more often showed spontaneous reattachment and a better prognosis with conservative treatment, whereas spontaneous reattachment of nonplanar DMDs was less common and therefore required surgery [7]. Later, spontaneous reattachment in nonplanar, non-scrolled DMDs was reported, suggesting that a non-scrolled detachment would reattach even if the separation between the Descemet's membrane and stroma was greater than 1 mm [8]. Furthermore, the timing of reattachment is uncertain. A case series showed spontaneous reattachment in 53% of non-scrolled DMDs between the 3rd and 20th week post-detachment, with an average time to resolution of 9.8 weeks [9].

Surgery is able to provide a quicker visual recovery and can avoid permanent corneal damage. There are multiple surgical options. Descemetopexy, or anterior chamber injection with air or gas, is accepted as today's standard of care, but other options are mechanical tamponade with viscoelastic, suture fixation, or endothelial keratoplasty. Descemetopexy has been shown to provide better post-procedure visual acuity in patients with DMD when compared to visual acuity pre-procedure, demonstrating the benefit of the intervention [9]. These patients are typically told to remain face up for one hour after surgery and then told to remain face up as much as possible over the next 24 hours. Descemetopexy with air versus perfluoropropane (C₃F₈) or sulphur

hexafluoride (SF_6) gas remains an area of deliberation. In one study, either air or C_3F_8 insertion provided a 95% overall reattachment rate in DMDs, with no difference in those that required endothelial keratoplasty; however, 0% in the air group versus 11.66% in the C_3F_8 group experienced pupillary block [5]. Notably, air was also found to have statistically significant better final visual outcomes than C_3F_8 . The study also found that final visual acuity was adversely affected by a high pre-operative cataract severity score, prior corneal scarring, and prolonged duration between cataract surgery and Descemetopexy. Thus, when deciding between air or gas for Descemetopexy, air is a reliable and feasible option for anterior chamber bubble injection.

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Management of recurrent DMD is similar to that of the primary detachment. Multiple studies have shown success in repeat Descemetopexy procedures after recurrence in detachment. As referenced earlier, Descemetopexy using air was shown to be equal to, if not better, when compared to C_3F_8 . In this same aforementioned study, 15% of patients had recurrence of DMD and underwent successful repeat of Descemetopexy [5]. For this group of patients, some were given a repeat injection of air or C_3F_8 for the second Descemetopexy, and some were provided with the alternate injection material; however, the outcomes between air and C_3F_8 were similar in visual acuity and pupillary block.

An alternate study demonstrated the success of repeat Descemetopexy for post-cataract extraction recurrent DMDs. Successful reattachment of Descemet's membrane was achieved in 12 of 13 patients, with the one failure involving a "taut" DMD, with stretched out areas between attachment sites on the cornea, as well as the use of C_3F_8 on both Descemetopexy procedures [10].

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CONCLUSION

Descemetopexy is an effective method of intervention for DMD and is most successful when done within a few days after DMD diagnosis. If the DMD is small, it may be observed, but if an intervention is warranted, Descemetopexy can lead to the successful recovery of visual acuity. Furthermore, using air in a Descemetopexy is a reasonable, effective, and economic choice for bubble injection, with a high chance of successful reattachment, and similar or better anatomic and functional outcomes than gas.

If recurrence of DMD is encountered, one should not be deterred from performing a repeat Descemetopexy. It is a highly successful procedure the second time, in both reattachment rates and visual outcomes, particularly if air is used. Overall, our case report and other studies have shown that early intervention with air bubble placement is recommended for recurrent DMDs following cataract surgery.

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