

# Successful treatment of late onset post-phacoemulsification Descemet's membrane detachment

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## Abstract

**Purpose:** To present a case with the late-onset post-phacoemulsification Descemet's membrane detachment that has been treated successfully.

**Methods:** Case report.

**Results:** A 68-year-old female patient presented with the complaint of decreased vision in her pseudophakic left eye after a 4-week silent post-phacoemulsification period. In the biomicroscopy, corneal oedema was seen to be prominent on the nasal incision side. Anterior segment optical coherence tomography objectively revealed the presence of Descemet's membrane detachment. Treatment of descemetopexy was applied by injecting 0.3-mL perfluoropropane gas into the anterior chamber. No complication associated with descemetopexy was noticed during recovery. Total Descemet's membrane detachment reattachment was achieved and perfluoropropane gas resorption from the anterior chamber was completed by the end of 1-month post-injection. The cornea was transparent and best corrected visual acuity increased to 20/20.

**Discussion:** DMD is a rare complication following phacoemulsification and this patient had not any preoperative, intraoperative, or postoperative risk factors for DMD. It generally occurs in early-postoperative period and late-onset DMDs have been reported less frequently. The success rates with intracameral gas injections in similar cases have been reported to be 90% - 95%.

**Conclusion:** To the best of our knowledge, this is one of the latest onset post-phacoemulsification Descemet's membrane detachment cases in literature that has been treated successfully. The results of this case showed that descemetopexy is a safe and effective treatment method for late-onset post-phacoemulsification DMD.

**Keywords:** descemetopexy, Descemet's membrane detachment, phacoemulsification

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## Introduction

Descemet's membrane detachment (DMD) as a discontinuity or tear of the Descemet's membrane (DM) is one of the most serious complications of modern phacoemulsification surgery, leading to irreversible corneal decompensation. The incidence of clinically significant DMD associated with cataract surgery has been reported as 0.05 % to 0.5 %.<sup>1</sup> In these cases, DMD is mostly seen during surgery or in the early post-operative period associated with surgical technique, surgical equipment or genetic factors<sup>1–4</sup>

A rare case is presented here of spontaneous late-onset post-phacoemulsification DMD after a

silent period with no known risk factors. To the best of our knowledge, this case represents one of the latest onset DMD cases in literature that was successfully treated with the injection of a single dose of long-lasting intracameral gas tamponade.

## Case report

A 68-year-old female, Caucasian patient underwent uneventful phacoemulsification on her left eye due to Grade 3 nuclear cataract (The Oxford Clinical Cataract Classification and Grading System) using the Constellation Vision System (Alcon; Fort Worth, TX, USA) 6 weeks after successful cataract surgery on the right eye by the

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same highly experienced surgeon (A.K.A.). The main triplanar incision (12 o'clock) was made with a 2.8-mm surgical blade, and 0.9-mm side port incisions (2 o'clock and 10 o'clock) were made with microvitrectomy blade. Low phacoemulsification parameters were used. Excellent intraocular lens centralization was achieved with minimal surgical manipulation. The wound sites were closed with stromal hydration.

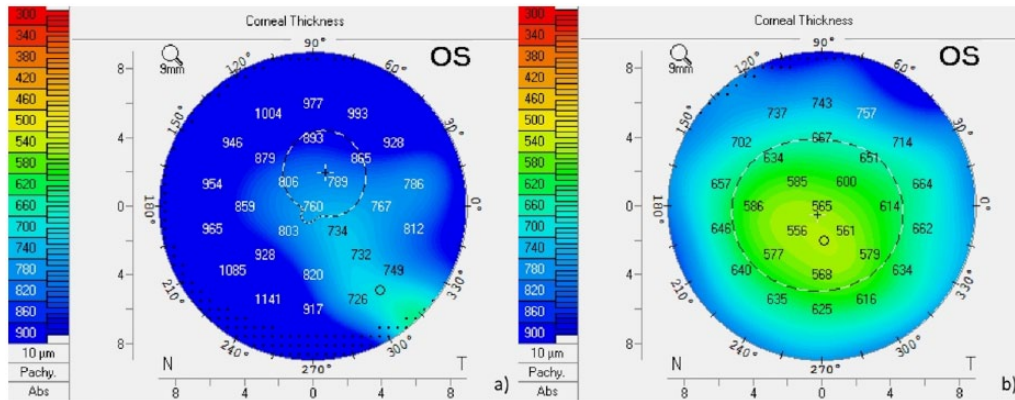
Postoperative topical medications included moxifloxacin 0.5% (Vigamox®, Alcon; Fort Worth, TX, USA) 4 times a day for 1 week and dexamethasone (Maxidex®, Novartis Pharmaceuticals UK Ltd.) 5 times a day for 1 month. Standard postoperative medical, social, and personal care protocols were provided. Following the cataract surgery, the 1st, 3rd, 7th, 14th, and 21st day examinations were completely normal; the cornea was transparent and best corrected visual acuity (BCVA) was 20/20 at all examinations. In postoperative week 4, the patient presented with the complaint of decreased vision in the left eye that had been ongoing for 1 day. BCVA was decreased to 20/200 in the left eye, while it was 20/20 in the previously operated right eye. Extensive corneal edema was observed to be more prominent on the nasal periphery with the involvement of the visual axis, the intraocular lens reflex was normal, and no other pathology was observed in the slit lamp and ultrasound examinations. According to the patient's declaration and medical documents, there was no systemic co-morbidity, ocular history or any pre-existing condition, or postoperative risk factors before DMD development. The same topical steroid (dexamethasone) and a hypertonic ophthalmic solution (5% NaCl) was administered 5 times a day. After 1 month of medical treatment, it was seen in the weekly examinations that the corneal edema had not regressed in either the central or nasal periphery, and BCVA was still 20/200.

Corneal thickness at the apex was measured on Pentacam HR (Oculus Optikgerate GmbH, Wetzlar, Germany) and increased central corneal thickness (789  $\mu\text{m}$ ) was seen. Anterior segment optical coherence tomography (AS-OCT) was applied (Visante; Carl Zeiss Meditec, Dublin, CA, USA) for more detailed evaluation. On the AS-OCT examination, the presence of DMD from the nasal and central cornea without rupture or rolled scroll was objectively revealed. To provide reattachment of DMD, air was injected into the anterior chamber through the temporal incision (3 o'clock) while both aqueous humor and

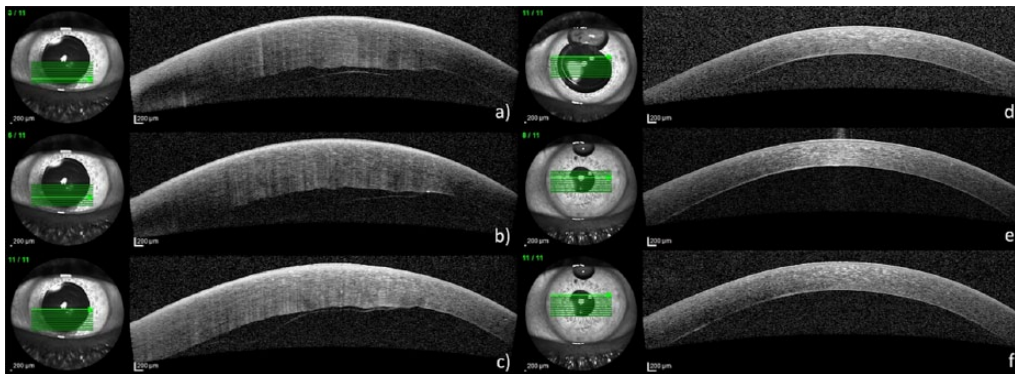
the pre-DM fluid was drained out through the venting incision (9 o'clock) at the highest location of the detached DM by gently depressing the posterior lip of the paracentesis. Then the anterior chamber was filled with 0.3 mL (14%) perfluoropropane (C3F8). The paracentesis wound was not sutured. Normal intraocular pressure was maintained immediately after the C3F8 injection. All procedures were performed under topical anesthesia in the operating room. No complication associated with descemetopexy was observed. Postoperatively, the patient was told to maintain the supine position for the first 24 h. Topical antibiotics and topical corticosteroids were administered. One day after the procedure, the edema was observed to have lessened on the central cornea, which had regained much of its clarity. The patient was then recommended to lean into a left lateral position to apply further pressure on the lateral DMD and to achieve absorption of the gas in the anterior chamber. One week after the descemetopexy, the DMD was completely reattached and 1 month later, the C3F8 gas was completely resolved from the anterior chamber, the cornea was transparent and BCVA had again increased to 20/20. A significant decrease on central corneal thickness from 789 to 565  $\mu\text{m}$  was observed. The corneal topography and AS-OCT images are presented in this article (Figures 1 and 2). A written informed consent was obtained also for publication of these medical data and images. During the 12-month follow-up period, no re-detachment was observed and repeated injections of air or gas were not required.

### Discussion

DMD is a rare complication following phacoemulsification. Generally, it occurs during surgery or is noticed in the early post-operative period.<sup>5</sup> Complicated or repeated operations are important preoperative risk factors for DMD. Improper surgical manipulations including anteriorly placed, shelved, or small incisions, suboptimal quality of the surgical instruments (especially use of blunt microkeratomers), or engagement of the DM during irrigation/aspiration, and antibiotic, saline, or viscoelastic material injection into the space between the deep stroma and DM are primary reasons for intraoperative DMD.<sup>1-6</sup> Ti and colleagues<sup>7</sup> described several risk factors for post-operative DMD including older age, grade 4 or 5 nuclear sclerotic cataract, pre-existing endothelial disease, and corneal oedema on the first post-operative day. On the other hand, genetically related weak or abnormal adhesions between the



**Figure 1.** Corneal topography images: (a) before descemetopexy and (b) after descemetopexy.



**Figure 2.** Anterior segment optical coherence tomography images. (a-c) Descemet's membrane detachments at different sections, (d) post-descemetopexy first week, (e, f) post-descemetopexy second week.

stroma and DM also underlie anatomic predispositions for the development of intraoperative or postoperative DMD.<sup>4</sup> This case was not a reoperation and the patient had no prominent preoperative risk factors for DMD such as shallow anterior chamber, angle closure, pseudoexfoliation syndrome, corneal scar, or glaucoma to consider as a complicated cataract surgery. Triplanar main incision and side port incisions were made with a disposable high-quality surgical blade, and the surgery were finalized using low phacoemulsification parameters and with minimal surgical manipulation. Any intraoperative improper surgical manipulation was not seen when watching video record of the surgery. The patient cannot be considered as too old for cataract surgery and her cornea was transparent since postoperative first day. In this regard, this patient had no preoperative, intraoperative, or postoperative risk factors for DMD. However, despite the fact that the patient has passed an uncomplicated surgery for her fellow eye, genetically related risk factors

cannot be fully excluded because the presence of these factors was not investigated, and these factors may be predisposing for DMD in this case if they are present.

Odayappan and colleagues<sup>8</sup> reported a median time interval of 4 days from cataract surgery to intervention. Late-onset DMDs after uneventful phacoemulsification have been reported less frequently.<sup>9,10</sup> Bhatia and Gupta<sup>9</sup> reported DMD on postoperative day 17 and Gatzoufas and colleagues<sup>10</sup> in the third postoperative week. In this regard, the current case is one of the latest onset post-phacoemulsification DMD cases in literature as it developed at 4 weeks after a silent postoperative period. Nonetheless, there are also very extreme late onset DMD cases that occurred as late as 19 months in literature.<sup>11</sup>

Due to the unknown course of DMD, there is no established gold standard for the timing and nature of treatment. The management depends

on various factors such as the location and area of the detachment, and the degree of anteroposterior separation from the posterior stroma.<sup>12</sup> Mackool and Holtz<sup>13</sup> classified DMD into two groups as planar (separation of < 1 mm between DM and stroma) and non-planar (separation of > 1 mm between DM and stroma). Spontaneous DM re-attachment can occur in rare cases. Medical treatment including topical corticosteroid, non-steroidal anti-inflammatory drugs and hyperosmotics can be efficient in the reattachment of DMD, mostly in eyes with planar DMD and a clear central cornea.<sup>12,14</sup> Early treatment is essential to prevent wrinkling, fibrosis, and shrinkage of the detached DM. Reluctance of necessary intervention can lead to irreversible corneal decompensation. To achieve visual rehabilitation when medical treatment is inadequate, additional invasive procedures should be performed such as descemetopexy with air or expandable gases such as sulfur hexafluoride (SF6) or C3F8, tamponading with viscoelastic agents, intracameral manual reattachment with or without suturing and finally penetrating or DM stripping endothelial keratoplasty and more recently, DMEK.<sup>15–17</sup> Kumar and colleagues<sup>18</sup> described the HELP algorithm for decision-making in the planning of effective treatment by evaluating DMD in terms of height, extent, length and pupil. AS-OCT is a very effective method for examination of the nature of the cornea and evaluation of the status of DMD as early as possible in cases of postoperative corneal edema. According to the patient's clinic and AS-OCT findings, the current case could be classified as planar type and better clinical outcomes could be predicted with non-invasive treatment. After non-invasive treatment, unresponsive 1-month, surgical intervention was considered according to the HELP algorithms because the height of the DMD was >300 mm, the extent reached zone 1 and length was > 2 mm. Long-lasting intracameral C3F8 gas was administered as initial treatment nearly 2 months after the operation and no recurrence was observed. The success rates with intracameral gas injections in similar cases have been reported to be 90–95%.<sup>19,20</sup> Tamponading agents of 100% air, sulfur hexafluoride (15–20% SF6), and perfluoropropane (12–14% C3F8) have been reported.<sup>12,13,21</sup> Due to a longer resorption period, SF6 and C3F8 have been selected for cases where reattachment attempt(s) with air have failed or in cases with prolonged detachment. Garg and colleagues<sup>21</sup> reported that a prolonged interval between cataract surgery and descemetopexy

decreases the anatomic and functional outcomes. Bhatia and Gupta<sup>9</sup> reported an unsuccessful descemetopexy with SF6. According to other experiences reported in literature, C3F8 gas was selected for the current case with long-standing DMD as it has a longer resorption period than SF6.

To the best of our knowledge, this case is one of the latest onset DMD cases that has been treated successfully with a single dose of C3F8 as a long-lasting gas.

In conclusion, descemetopexy with long-lasting gas tamponade is a safe and effective treatment method for late onset DMD after phacoemulsification.

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