

*Original Article*

DESCEMET'S MEMBRANE DETACHMENT: AN OVERLOOKED CAUSE OF  
POST CATARACT SURGERY PERSISTENT CORNEAL EDEMA

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Received: 3/11/2023

Accepted: 5/4/2024

Doi: 10.21608/ejco.2024.361185

**Abstract**

**Background:** To report varying presentations of Descemet membrane detachment (DMD). **Methods:** Ten cases were referred for management of persistent corneal edema (7 eyes - group 1) and corneal scarring (3 eyes - group 2). All cases in group 1 had corneal edema and central DMD at presentation by slit lamp bio microscopy. One eye in group 2 presented 3 months after cataract surgery with visible DMD despite significant corneal scarring. Two eyes had dense corneal scarring with no visible DMD 1 year after cataract surgery. Group 1 underwent air descemetopexy and group 2 underwent penetrating keratoplasty (PK). Four cases had Fuchs endothelial corneal dystrophy (FECD) in the other eye. **Results:** All eyes in group 1 had successful reattachment of DM after air descemetopexy with recurrence of DMD in one case which presented 2 months after cataract surgery. This case was successfully treated with another air injection. All eyes in group 1 had resolution of the corneal edema with clear corneas postoperatively. In group 2, DMD was discovered intraoperatively in one eye during PK and another eye postoperatively. All corneal grafts in group 2 were clear until the submission of this manuscript (1-2 years postoperatively) with no complications. **Conclusion:** DMD is a frequently overlooked cause of post cataract surgery corneal edema. Early management of DMD with air descemetopexy within 2 months postoperatively can achieve excellent results.

**Keywords:** *DMD, Cataract, Corneal edema, Air injection.*

**1. Introduction**

Small, peripheral descemet membrane detachments (DMD) occur frequently after cataract surgery [1]. These DMDs usually develop at the main cataract incision or side port and are usually visually insignificant and heal spontaneously without any intervention. On the other hand, large and central DMDs despite being

relatively infrequent (0.5% after cataract surgery), are usually serious, frequently not diagnosed, and if left untreated, lead to significant visual sequelae [2]. Air reattachment of DMD (descemetopexy) has been first described by Sparks [3]. This relatively simple procedure can restore corneal clarity and prevent irreversible

corneal scarring. There are many reasons for DMD during cataract surgery with clear corneal incision phacoemulsification. It can occur at different steps. The most common during phacoemulsification or irrigation/aspiration. It can also occur to a lesser extent during hydrodissection, IOL implantation or capsulorhexis [4]. Descemet membrane detachments can be classified according to extension, morphology, or etiology [5-9]. According to extension into mild, moderate and severe regarding detachment size and location. In peripheral DMD, it is mild if less than 25% of the cornea is involved and moderate in 25%-50% involvement. It's severe in central involvement or if the size is more than 50% of the cornea [9]. With the help of anterior segment optical coherence tomography (AS-OCT), DMD can be classified according to morphology into Rhegmatogenous DD (RDD), Tractional DD (TDD), Bullous DD (BDD) and Complex DD (CDD) [5]. This report describes different presentations and outcomes of DMD after cataract surgery with management with descemetopexy and penetrating keratoplasty (PK). The first reported classification was based on pathology and described 3 types of DMD: active (pushed back), passive (pulled back and torn away), and a third type due to

## 2. Methods

Retrospective case series study of ten cases, which were referred to the Department of Ophthalmology, Assiut Univ. School of Medicine between 2017 and 2020 for management of persistent corneal edema (7 eyes - group 1) and corneal scarring (3 eyes - group 2). All cases in group 1 presented within one month after cataract surgery, except one case (2 months postoperatively). All cases were classified as severe DMD. All cases in group 1 had clinically visible large and central DMD at presentation which was confirmed by Triton-DRI system (Topcon, Co, Tokyo, Japan) anterior segment optical

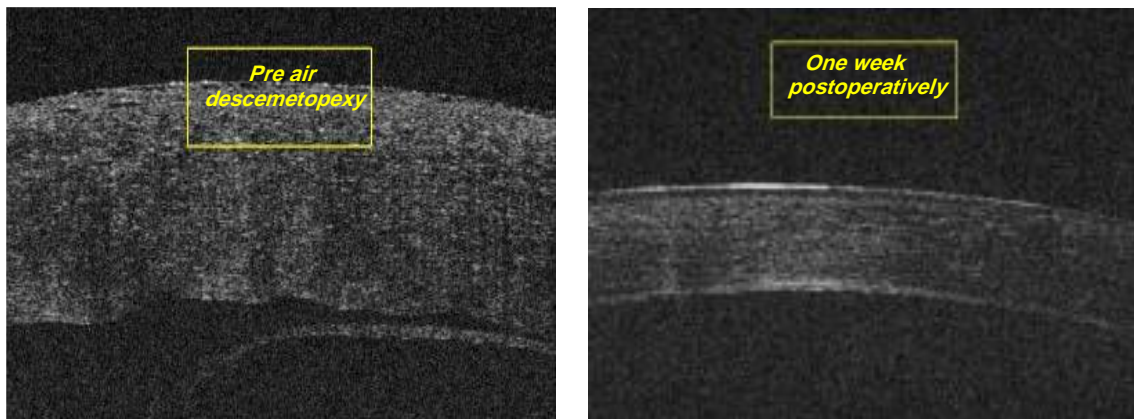
difference in elasticity of DM and the anterior parenchyma. Another classification of DMD is based on location and scope, the detachment can be divided into 3 types simple, symmetrical and complete DM detachment. Simple detachment, confined to the area of surgical incision (detachment range < 1/4 corneal area). symmetrical DMD, referring to detachment (1/4 corneal area < detached area < 1/2 corneal area) that appeared symmetrically on the surgical incision and the opposite site. Complete DMD (> 1/2 of the corneal area). DMD can be classified as partial thickness detachment and full thickness detachment, in partial thickness detachment only a portion of DM separates from the cornea. it is further classified based on the extent of detachment, such as focal (small localized detachment), sectoral (detachment involving a particular sector of the cornea), or multifocal (multiple detached areas). Full thickness detachment involves a complete separation of DM from corneal stroma, it can be classified based on the extent and location of the detachment. Examples include localized full thickness detachment or global full thickness detachment or global full thickness detachment (involving the entire cornea)

coherence tomography (AS-OCT). One eye in group 2 presented 3 months after cataract surgery with visible DMD despite significant corneal scarring. The other two eyes had very dense corneal scarring with no visible DMD and were referred to us one year after cataract surgery for PK. All eyes in group 1 underwent air descemetopexy immediately after diagnosis. All eyes in group 2 underwent PK. Three cases in group 1 and one case in group 2 had Fuchs dystrophy with visible corneal 5-6 mm central confluent guttae in the other eye.

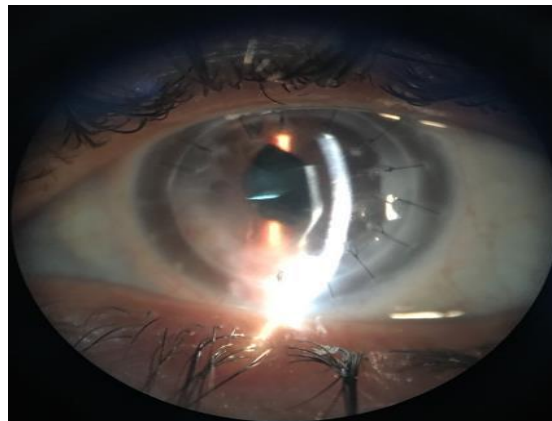
### 3. Results

Group 1. All eyes in group 1 had successful reattachment of Descemet membrane after air descemetopexy, fig. (1). One eye in this group which presented 2 months after cataract surgery had recurrence of DMD after successful descemetopexy. This case was successfully treated with another air injection. All eyes in group 1 had clear corneas with resolution of their corneal edema after air descemetopexy. Group 2. One eye in group 2 with dense corneal scarring was

found to have DMD intraoperatively during PK. The other eye with the dense corneal scarring underwent PK and the detached recipient Descemet membrane was discovered in the postoperative period, fig. (2) and was successfully removed 6 months postoperatively. All corneal grafts in group 2 are clear until the submission of this manuscript (1-2 years postoperatively) with no complications.



**Figure 1:** Anterior segment optical coherence tomography; **a.** Descemet membrane detachment (arrow), **b.** one week post air descemetopexy showing attached Descemet membrane (arrow)



**Figure 2:** Postoperative slit lamp photo of an eye with penetrating keratoplasty showing retained host Descemet membrane (DM) (arrow). This retained DM was detached during cataract surgery and was not discovered until after penetrating keratoplasty.

### 4. Discussion

The incidence of DMD after cataract surgery has been described to be approx. 42% [10,11]. These DMDs are usually small and peripheral and located at the main wound or side port. These peripheral DMDs infrequently extend into

the central cornea particularly during stromal hydration of the incisions. Another cause of DMD is that the disposable and reusable tools are not sharp which needs inappropriate force to penetrate the corneal inner tissue easily

leading to separation of DM from the stromal layer. In addition, if the depth of the field of microscope is too small, the detached DM may be mistakenly identified as anterior lens capsule leading to a wide range of DMD. There have been several reported classifications of DMD in the literature [5-9]. The most common classification by Jain et al [9] classified DMD into 3 categories: mild if it involved less than 25% of the cornea and was peripheral, moderate if it involved 25-50% cornea and was peripheral, and severe if it involved more than 50% of the cornea or involved the central cornea. In our study, all the cases in group 1 and one case in group 2 where we were able to see the Descemet membrane had severe DMD according to the Jain classification. The other two cases in group 2 also had severe DMD that was diagnosed intraoperatively in one case and post-operatively in another case. Endothelial diseases such as Fuchs dystrophy can lead to easier detachment of the Descemet membrane as well as extension of peripheral DMDs [12]. Four cases in our study had Fuchs dystrophy noted in the other eye which also became evident in the DMD eye after

reattachment. DMD is frequently overlooked as a cause of post cataract surgery corneal edema. In our study, the diagnosis of DMD was missed by the referring physicians because they suspected the cause of the persistent edema to be endothelial dysfunction or direct endothelial damage from the cataract surgery. Although DMD can be detected in some cases with slit lamp examination, anterior segment optical coherence tomography (AS-OCT) is a useful tool for uncertain cases [13]. Early diagnosis and correction of DMD with air descemetopexy achieved excellent results [14]. The ideal timing for successful air descemetopexy in our study was less than 2 months post cataract surgery. It has been recently suggested that modifying the conventional narrow corneal incision to a trapezoid incision to decrease the friction of surgical instruments and prevent DMD [15]. If undiscovered, DMD can lead to significant corneal scarring within 3 months necessitating a PK for visual improvement. Ophthalmologists should always look for DMD in cases with persistent corneal edema after cataract surgery and when in doubt, they should exclude DMD with AS OCT.

## 5. Conclusion

*DMD is a frequently overlooked cause of post cataract surgery corneal edema. Early management of DMD with air descemetopexy within 2 months postoperatively can achieve excellent results.*

## References

1. Samarawickrama, C., Beltz, J. & Chan E. Descemet's membrane detachments post cataract surgery: A management paradigm. *Int J Ophthalmol.* 2016; 9: 1839-1842.
2. Khng, C., Voon, L. & Yeo, K. Causes and management of Descemet's membrane detachment associated with cataract surgery-not always a benign problem. *Ann Acad Med Singap.* 2001; 30: 532-535.
3. Sparks, G. Descemetopexy: Surgical reattachment of stripped Descemet's membrane. *Arch Ophthalmol.* 1967; 78: 31-34.
4. Dai, Y., Liu, Z., Wang, W., et al. Real-time imaging of incision-related Descemet membrane detachment during cataract surgery. *JAMA Ophthalmol.* 2021; 139 (2): 150-155.
5. Jacob, S., Agarwal, A., Chaudhry, P., et al. A new clinico-tomographic clas-

- sification and management algorithm for Descemet's membrane detachment. *Cont Lens Anterior Eye*. 2015; 38: 327-333.
6. Samuels, B. Detachment of Descemet's membrane. *Trans Am Ophthalmol Soc*. 1928; 26: 427- 437.
  7. Mackool, R. & Holtz, S. Descemet membrane detachment. *Arch Ophthalmol*. 1977; 95: 459-463.
  8. Assia, E. Levkovich-Verbin H, Blumenthal M. Management of Descemet's membrane detachment. *J. Cataract Refract Surg*. 1995; 21: 714-717.
  9. Jain, R., Murthy, S., Basu, S., et al. Anatomic and visual outcomes of descemetopexy in postcataract surgery Descemet's membrane detachment. *Ophthalmology*. 2013; 120: 1366-1372.
  10. Monroe, W. Gonioscopy after cataract extraction. *South Med J*. 1971; 64: 1122-1124.
  11. Anderson, C. Gonioscopy in no-stitch cataract incisions. *J. Cataract Refract Surg*. 1993; 19: 620-621.
  12. Fang, J., Amesur, K. & Baratz K. Preexisting endothelial abnormalities in bilateral postoperative Descemet membrane detachment. *Arch Ophthalmol*. 2003; 121: 903-904.
  13. Berger, T., Seitz, B., Flockerzi, E., et al. Surgical management of complicated Descemet's membrane detachment in corneas without prior endothelial keratoplasty *Graefes Arch Clin Exp Ophthalmol*. 2024; 262: 879-889
  14. Trindade, L., Attanasio de Rezende, R., Bisol, T., et al. Late Descemet membrane detachment after uneventful cataract surgery. *Am J Ophthalmol Case Rep*. 2022; 29:101783.
  15. Dai, Y., Liu, Z., Wang, W., et al. Incidence of incision-related Descemet membrane detachment using phacoemulsification with trapezoid vs conventional 2.2-mm clear corneal incision: A randomized clinical trial. *JAMA Ophthalmol*. 2021; 139 (11): 1228-1234.