

# Descemet Membrane Detachment (DMD) After Cataract Surgery: Outcomes of Air Descemetopexy

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## Abstract

**Background:** The aim is to analyze the anatomical & functional outcomes with intracameral injection of air (100%) in eyes with Descemet's membrane (DM) detachment after cataract surgery. **Material and Methods:** This is retrospective non-comparative interventional case study included 43 eyes of 43 patients who underwent descemetopexy at a multi-speciality tertiary health care hospital & research centre from March 2025 to March 2026. The procedure consisted of descemet's membrane reattachment by injecting filtered air (100%) intracamerally. Institutional review board approval was obtained prior to conducting the study. Outcome measures were reattachment of DM, improvement in visual acuity, resolution of corneal edema, causes for failure of DM reattachment and complications. **Results:** 43 eyes of 43 patients were analyzed. Distribution of DMD was between Phaco – 21 and small incision cataract surgery – 22 cases. All cases had a planar type of DMD. Air descemetopexy resulted in anatomical reattachment of DM in 91.3%, resolution of edema in 73.9% (37 of 43, 2 had resolving edema and 4 had persistent edema who underwent DSAEK). The post-operative vision 20/25 is seen in 10 patients, vision 20/30 seen in maximum number of patients i.e. 20 patients, vision 20/40 seen in 7 patients, vision 20/200 seen in 2 patients, while 3 patients have vision CF 3 Meters & 1 patients have vision CF 2 Meters post operatively & underwent DSAEK. Eyes with failure of DM reattachment & persistent edema at 1 month had an interim period of >4weeks. **Conclusion:** We conclude that descemetopexy with air offers a safe option with good anatomical & function outcome in early post cataract surgery period as in such cases, descemet membrane is devoid of structural alterations.

**Keywords:** Air descemetopexy, descemet, membrane detachment.

Received: 02 July 2026

Revised: 20 July 2026

Accepted: 05 August 2026

Published: 11 August 2026

## 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 cataract 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>

Descemet's membrane detachment (DMD) is a rare, but potentially serious complication of cataract surgery. Acute loss of vision from severe corneal edema can be the first sign and may also be the cause of delayed diagnosis.<sup>[1]</sup> Apart from cataract surgery, a DMD may also occur during cyclodialysis, surgical iridectomy, trabeculectomy, holmium LASER sclerostomy, penetrating or lamellar keratoplasty, and viscocanalostomy.<sup>[5-8]</sup> Prompt recognition along with the management gives dramatic improvement of corneal edema and enhances the visual outcome.

There have been studies which have dealt with the outcomes of air descemetopexy post-cataract surgery.<sup>[9-13]</sup>

The surgical intervention to reattachment detached Descemet membrane has been shown to hasten the process of visual recovery.<sup>[14]</sup> Successful reattachment of Descemet membrane

has been observed with the intracameral use of air, sulfur hexafluoride (SF<sub>6</sub>), and perfluoro propane (C<sub>3</sub>F<sub>8</sub>).<sup>[4]</sup> In current study, we describe our experience with post-cataract surgery descemetopexy using intracameral air injection.

## MATERIALS AND METHODS

Retrospective non comparative interventional study including 43 eyes having Descemet's membrane detachment following phacoemulsification & SICS at a multi-speciality tertiary health care hospital & research centre were posted for air descemetopexy between March 2025 to March 2026. Ethics approval was obtained. The characteristic features of the Descemet membrane detachment documented on slit-lamp examination were the area of corneal edema, extent of

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**DOI:**

10.21276/acta.2026.v13.i2.927

**How to cite this article:** Khan N, Jain S. Descemet Membrane Detachment (DMD) After Cataract Surgery: Outcomes of Air Descemetopexy. Acta Med Int. 2026;13(2):1625-1627.

separation from the posterior stromal layer, and other associated features, such as folds or wrinkling in Descemet membrane. Outcome measures at 1 month included reattachment of DM, improvement in vision, resolution of corneal edema, causes for failure and complications were noted. Further analysis was performed to correlate the results with interim period (interval up to air descemetopexy) and characteristics of DMD.

**Surgical Technique:** Descemetopexy was performed using intracameral air (100%) injection under local or topical anesthesia. The air was injected at the limbal site where the cornea was relatively compact and Descemet membrane appeared apposed, at least in close relation to the posterior stroma. A 26-gauge needle was introduced with the bevel down to reach beneath the plane of the detached Descemet membrane, and slow injection of air was attempted to tamponade Descemet membrane. The needle was then gently withdrawn and the site of entry sealed with a surgical sponge for 1 minute to prevent the air from escaping. In all eyes, complete air fill of the anterior chamber was targeted and a supine position was maintained for 15 to 20 minutes. One drop of tropicamide and phenylephrine was instilled in most cases to prevent pupillary block in the immediate postoperative period.

## RESULTS

This study comprised 43 patients. The mean age of the patients was  $56.74 \pm 7.86$  years (range 40-70 years). There were 25 males (58.1%) & 18 females (41.9%). The DMD was seen in 49% patients with post phacoemulsification & 51% patients with post SICS. The site of DMD was more in side port i.e. 53.5% than in anterior chamber maintainer i.e. 46.5%. The area involved in DMD is 40-50% in 13 patients 60-70% in 23 patients & 80-90% in 5 patients.

5 Patients did not receive a drop of tropicamide and phenylephrine to prevent pupillary block in the immediate postoperative period. Successful reattachment of Descemet membrane and resolution of corneal edema occurred in all except 4 patients. In these patients, the Descemet membrane had fixed folds led to persistence of the central detachment. Endothelial keratoplasty was planned in these cases. 1 Patient had elevated IOP due to appositional angle closure resulting from air migration behind the iris. This patient had anterior chamber decompression and synechialysis, after which the IOP and anterior chamber normalized. This resolved after pupil dilation. In all patients, the Descemet membrane detachment involved the central visual axis.

After successful reattachment of Descemet membrane, the stromal edema decreased rapidly in the 1-week postoperative period and continued to decrease progressively over the subsequent 4- to 6-week follow-up visits in all eyes. The post-operative vision 20/25 is seen in 10 patients, vision 20/30 seen in maximum number of patients i.e. 20 patients, vision 20/40 seen in 7 patients, vision 20/200 seen in 2 patients, while 3 patients have vision CF 3 Meters & 1 patient have vision CF 2 Meter post operatively & underwent DSAEK. Eyes with failure of DM reattachment & persistent edema at 1 month had an interim

period of >4 weeks. At 4 to 6 weeks in some eyes, faint Descemet membrane folds were observed in the mid-peripheral location. No corneal haze or scar was noted. The co-morbidity factors affected vision in 2 eyes with successfully attached Descemet membrane due to posterior capsular plaque in 1 patient and cystoid macular edema in 1 patient.

## DISCUSSION

The management of Descemet detachment depends on various factors, such as the location and area of the detachment, the degree of antero-posterior separation from the posterior stroma, and the duration of watchful observation. Although spontaneous reattachment has been reported,<sup>[15]</sup> the factors that favor this are not clearly known. In addition, visual rehabilitation may be delayed in these cases. Therefore, in patients with involvement of the visual axis, surgical intervention to promote attachment may be the preferred approach.

Furthermore, early attachment leads to better visual reliability because prolonged Descemet membrane detachment can result in corneal opacification, fibrosis, and wrinkling of Descemet membrane, thereby affecting visual recovery.<sup>[16]</sup> Surgical repair aims to re-approximate Descemet membrane against the stroma using a tamponading agent until it adheres well so that it does not re-detach after removal of the tamponade. Tamponading agents successfully used for this purpose include 100% air, 20% SF6, and 14% C3F8.

We prefer to use 100% air over other long-standing gases (SF6 or C3F8) for many reasons. Air is absorbed in the shortest time (1 to 3 days). It has a lower risk for endothelial toxicity than the gases.<sup>[12]</sup> Furthermore, the need for a long-standing tamponade is also questionable. It is well known that the attachment of a posterior lamellar disc in Descemet-stripping automated endothelial keratoplasty (DSAEK) is successfully achieved by maintaining a complete air fill and good air tamponade for a few minutes.

Several mechanisms,<sup>[15-18]</sup> of surgically induced DMD have been proposed. The most common cause is a localized detachment occurring during instrumentation in cataract surgery higher incidence being observed in clear corneal procedures. It is also seen following uncomplicated clear corneal phacoemulsification. It may occur following inadvertent intra-corneal injection of fluids like viscoelastic and is also possible with other fluids like balanced salt solution, adrenaline and antibiotics. Samuels et al,<sup>[19]</sup> mention that shallow chamber as a risk factor and stated that complicated or repeated operations were at particular risk. The inadvertent insertion of instruments between the corneal stroma and Descemet's membrane was first suggested by Scheie,<sup>[20]</sup> as a risk factor. Anterior (clear corneal) incisions, shelved incisions and the use of blunt blades,<sup>[18]</sup> have been implicated as risk factors. It has also been reported that DMDs results from freezing Descemet's membrane with the cryoprobe,<sup>[19]</sup> or from heat-induced contraction of Descemet's membrane during holmium laser sclerostomy. Engaging Descemet's membrane during intraocular lens implantation [20] or with the irrigation/aspiration device (when mistaken as an anterior capsular remnant) can also lead to extensive DMDs. The

inadvertent injection of viscoelastic by inserting the cannula between Descemet's membrane and the corneal stroma may be the most common cause of DMD with current surgical techniques.<sup>[15,21-23]</sup> Small and localized DMDs are insignificant and resolve spontaneously with medical management. Some types of DMD, such as those with large flaps or scrolls, are less likely to spontaneously reattach, although even these can reattach spontaneously on occasion.<sup>[24]</sup>

In this study the site of DMD is 46.5% from anterior chamber maintainer & 53.5% from side-port i.e. instrumentation during cataract surgery. So, chances of DMD are seen more in cases with repeated improper instrumentation & can be prevented by cautiously use of instruments.

## CONCLUSION

Air descemetopexy is a safe, effective, and minimally invasive treatment for Descemet membrane detachment following cataract surgery, achieving a high anatomical reattachment rate (91.3%) with significant resolution of corneal edema and favorable visual recovery in most patients. Early intervention, particularly within four weeks of detachment, was associated with better anatomical and functional outcomes, whereas delayed treatment increased the likelihood of persistent edema and the need for endothelial keratoplasty (DSAEK). These findings support intracameral air as a cost-effective first-line tamponading agent for the management of post-cataract DMD, emphasizing the importance of prompt diagnosis and timely surgical intervention to optimize visual prognosis.

## Financial support and sponsorship

Nil.

## Conflicts of interest

There are no conflicts of interest.

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