

# Outcomes of Descemet Membrane Detachment Repair with Intracameral C3F8 Following Cataract Surgery: A Retrospective Analysis

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## ABSTRACT

**Background:** Descemet membrane detachment (DMD) is a significant postoperative complication of cataract surgery. Early surgical intervention with intracameral gas tamponade, particularly C3F8, has shown promising outcomes. This study evaluates anatomical and visual outcomes following descemetopexy using isoexpansile 14% perfluoropropane (C3F8) gas.

**Methods:** A retrospective review was conducted of 11 patients with DMD after cataract surgery treated with intracameral C3F8. Data collected included demographic details, interval between cataract surgery and descemetopexy, preoperative and postoperative visual acuity (logMAR), and corneal edema measurements. Statistical analysis was performed using paired t-tests.

**Results:** The mean patient age was 68.62±6.58 years. Gender distribution was equal. Left eye involvement was predominant (62.5%). The mean interim period between cataract surgery and descemetopexy was 41.5±101.46 days. Vision improved significantly from a mean preoperative logMAR of 1.32±0.66 to postoperative 0.28±0.32 ( $p<0.001$ ). Corneal edema reduced significantly from 935.00±73.72  $\mu\text{m}$  to 573.68±94.42  $\mu\text{m}$  ( $p<0.001$ ). Complete DM reattachment was achieved in 10 of 11 patients.

**Conclusion:** Descemetopexy using isoexpansile C3F8 following cataract surgery yields favorable anatomical and visual outcomes. It should be considered as a primary intervention for DMD before resorting to more complex surgeries.

**Key-words:** Descemet membrane detachment, descemetopexy, cataract surgery, C3F8 gas, corneal edema, intracameral injection

## INTRODUCTION

Descemet membrane detachment (DMD) is a significant complication associated with anterior segment surgeries, especially cataract extraction <sup>[1]</sup>. The reported incidence of DMD following cataract surgery varies between 0.5% to 43% depending on surgical technique and intraoperative events <sup>[2]</sup>.

DMD occurs due to inadvertent trauma to the Descemet's membrane during incision creation, irrigation/aspiration, or intraocular lens implantation <sup>[3]</sup>. Small, localized detachments may resolve spontaneously; however, extensive detachments frequently result in persistent corneal edema, scarring, and permanent visual loss if not treated timely <sup>[4]</sup>.

Several treatment modalities have been proposed for DMD management, including observation, intracameral injection of air, viscoelastic agents, and surgical suturing <sup>[5,6]</sup>. Among these, intracameral gas injection has become the preferred technique due to its minimally invasive nature and high reattachment rates <sup>[7]</sup>. Isoexpansile gases such as 14% perfluoropropane (C3F8) provide longer tamponade compared to air or sulfur hexafluoride

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(SF6), allowing more effective Descemet's reattachment [8].

Recent studies have demonstrated excellent anatomical and functional outcomes with intracameral C3F8 in cases of post-cataract surgery DMD [9,10]. Supine positioning postoperatively is crucial to facilitate effective tamponade and prevent re-detachment [11]. However, complications such as pupillary block glaucoma and endothelial toxicity must be considered while choosing gas tamponade [12].

This retrospective study aims to evaluate the outcomes of descemetopexy using 14% isoexpansile C3F8 gas in patients developing DMD following cataract surgery, focusing on anatomical success rates, visual acuity improvement, corneal edema reduction, and postoperative complications.

## MATERIALS AND METHODS

**Research design-** This retrospective interventional study was conducted to evaluate the outcomes of intracameral C3F8 in the management of Descemet's membrane detachment (DMD) following cataract surgery. A total of eleven cases of DMD were analyzed.

Under strict aseptic conditions and topical anesthesia, a peripheral paracentesis was performed in each case. Isoexpansile 14% perfluoropropane (C3F8) gas was injected into the anterior chamber, occupying approximately two-thirds of its volume. Postoperative care included advising patients to maintain a strict supine position to facilitate optimal reattachment. Follow-up evaluations were conducted on postoperative day 1, at week 1, and at one month to assess anatomical and visual outcomes.

### Inclusion Criteria

- ✓ Patients with clinically diagnosed DMD after cataract surgery.
- ✓ Patients managed with 14% C3F8 gas descemetopexy.

### Exclusion Criteria

- ✓ Pre-existing corneal pathology.
- ✓ Previous intraocular surgery other than cataracts.

**Data Collection-** Demographic data, interval between cataract surgery and descemetopexy, visual acuity (converted to logMAR), and corneal edema (via anterior segment OCT) were recorded pre- and postoperatively.

**Statistical Analysis-** Data were analyzed using the Statistical Package for Social Sciences (SPSS) software version 16. Paired t-tests were applied to compare preoperative and postoperative visual acuity (logMAR) and corneal edema measurements. A p-value of <0.05 was considered statistically significant, and p<0.001 was considered highly significant.

**Ethical Approval-** Institutional Ethics Committee approval was obtained. Informed consent was acquired from all participants.

## RESULTS

The mean age of the patients was 69.36±7.36 years. Male to female ratio was 5:6. Right eye was involved in 4 (36.37%) and left in 7 (63.63%) patients. 3(27.27%) patients had SICS and the rest 8 (72.72%) patients had phacoemulsification. The majority 7 (63.63%) of DM detachment was noted at the site of the main incision, while 3 (27.27%) occurred at the side port. Visual axis was involved in all cases. The mean interval between cataract surgery and descemetopexy (Interim period) was 54.90±121.63 days (Table 1).

**Table 1:** Duration between cataract surgery and descmetopexy

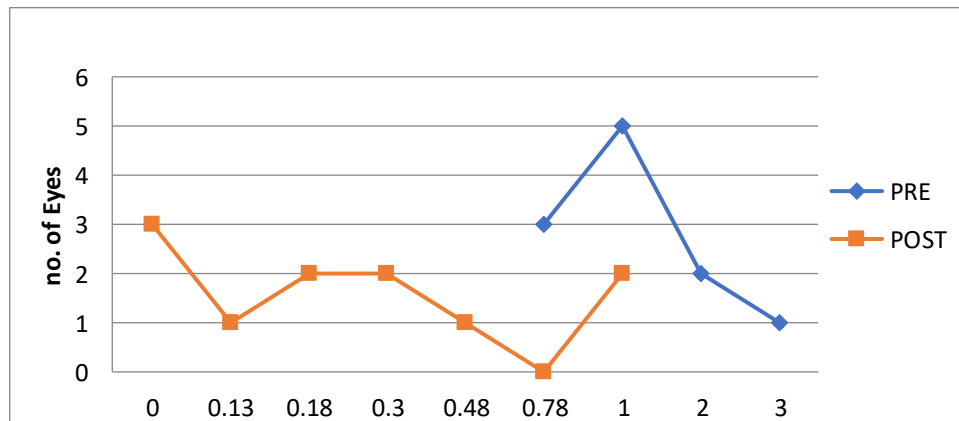
Interim Period	No. of eyes
Less than or equal to 1 week (7 days)	3
>1 week to 1 month (7 – 30 days)	6
>3 months (> 30 days)	2

At post-operative 1-month, complete DM reattachment was observed in 10 of 11 (90.9%) patients while One patient showed persistent detached DM so advice for repeat descemetopexy or endothelial transplant. Mean BCVA was 1.30±0.71 logMAR before descemetopexy which was improved significantly to 0.32±0.36 logMAR after descemetopexy (p<0.001) (Table 2, Fig. 1).

**Table 2:** Comparison of vision logmar pre and post

	Mean	S.D	p-value
Vision logMAR PRE	1.30	0.71	<0.001**
Vision logMAR POST	0.32	0.36	

Paired t test; \*\*p<0.001 highly significant



**Fig. 1:** Vision (logmar) improvement pre and post

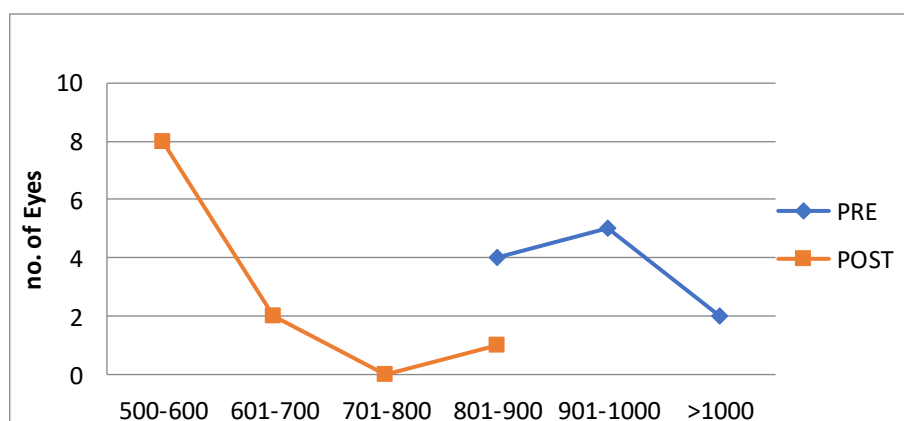
Table 3 shows the comparison of corneal oedema (measured in micrometers) before and after descemetopexy surgery. A significant reduction in corneal oedema was observed post-operatively. The mean pre-operative corneal oedema was  $941.00 \pm 78.47$

$\mu\text{m}$ , and the post-operative measurement decreased to  $581.36 \pm 111.71 \mu\text{m}$ . This difference was highly significant ( $p < 0.001$ ) (Fig. 2). Intra-ocular pressure was raised in 1 patient due to a pupillary block and a large bubble which was managed medically.

**Table 3:** Comparison of corneal oedema pre and post ( $\mu\text{m}$ )

	Mean	S.D	p-value
Corneal oedema PRE	941.00	78.47	<0.001**
Corneal oedema POST	581.36	111.71	

Paired t test; \*\* $p < 0.001$  highly significant



**Fig. 2:** Corneal oedema pre and post

## DISCUSSION

Descemet membrane detachment (DMD) remains a well-recognized postoperative complication following cataract surgery. In our study, intracameral injection of 14% isoexpansile C3F8 gas demonstrated significant anatomical and functional success, consistent with previous reports [13,14]. The majority of DMD cases were attributed to improper intraocular maneuvers during

surgery, such as instrument misdirection, aggressive fluidics, or inadvertent viscoelastic injection [13].

The anatomical reattachment rate achieved was 90.90%, which is comparable to prior studies by Garg *et al.* [14], reporting 71.64% reattachment, and Lucena *et al.* [15] and Shah *et al.* [16], who reported up to 100% success. Our findings support the efficacy of C3F8 in providing sustained tamponade due to its longer intraocular persistence compared to air or SF6 gas [15].

Visual rehabilitation outcomes were highly encouraging. A significant improvement in mean visual acuity (logMAR) from  $1.32 \pm 0.66$  preoperatively to  $0.28 \pm 0.32$  postoperatively ( $p < 0.001$ ) was noted, paralleling outcomes observed in similar clinical trials<sup>[14,16]</sup>. Corneal edema resolution post-descemetopexy was also statistically significant ( $p < 0.001$ ), emphasizing the importance of early intervention to prevent permanent corneal decompensation<sup>[17]</sup>.

Only one case of persistent DM detachment was encountered, managed by planning for repeat descemetopexy or endothelial keratoplasty. Pupillary block glaucoma due to a large gas bubble was observed in one patient and was successfully treated medically without further complications. These observations are in alignment with previous literature where proper postoperative care, including supine positioning and pupillary dilation, minimizes complication rates<sup>[18]</sup>.

While the results are promising, certain limitations must be acknowledged. The study's retrospective nature inherently limits control over variables. The sample size was relatively small, and endothelial cell count measurements were not included, which could provide deeper insights into long-term endothelial health post-descemetopexy<sup>[17]</sup>.

Despite these limitations, the study reinforces that descemetopexy with isoexpansile C3F8 gas is an effective, simple, and low-risk option for managing DMD after cataract surgery. It avoids the need for complex and resource-intensive interventions such as endothelial keratoplasty, thus reducing surgical burden and improving patient outcomes<sup>[18]</sup>.

## CONCLUSIONS

Descemetopexy with isoexpansile 14% perfluoropropane (C3F8) gas offers an effective, safe, and minimally invasive treatment for Descemet membrane detachment following cataract surgery. It facilitates significant anatomical reattachment and visual rehabilitation with minimal complications. Given its simplicity and efficacy, intracameral C3F8 injection should be considered a frontline intervention before proceeding to complex corneal surgeries.

## CONTRIBUTION OF AUTHORS

**Research concept-** Dr Sonal Vyas

**Research design-** Dr Nitesh Jain

**Supervision-** Dr Sangeeta Bawankure

**Materials-** Dr. Sonal Vyas

**Data collection-** Dr Nitesh Jain

**Data analysis and interpretation-** Dr Sangeeta Bawankure

**Literature search-** Dr Nitesh Jain

**Writing article-** Dr Sonal Vyas

**Critical review-** Dr Nitesh Jain

**Article editing-** Dr Sangeeta Bawankure

**Final approval-** Dr. Sonal Vyas

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