



EVALUATION OF INTRAOCULAR PRESSURE FLUCTUATIONS IN NARROW ANTERIOR CHAMBER ANGLE WITH HIGH VAULT CONFIGURATION AFTER IMPLANTABLE COLLAMER LENS IMPLANTATION

Optometry

Yuvraj Singh*

Bachelor of Optometry, Sushant University, Gurugram, India*Corresponding Author

Ayush Wilson

Assistant Professor, Department of Optometry, Sushant University Gurugram, India

Shruti Jha

Consultant Optometrist, Eye 7 Hospital, New Delhi, India

ABSTRACT

Background Implantable Collamer Lens (ICL) implantation has emerged as an effective refractive surgical procedure for correction of high myopia in patients unsuitable for corneal refractive surgeries. However, postoperative anterior chamber angle narrowing and high vault configuration may influence aqueous humour dynamics and intraocular pressure (IOP), thereby increasing the risk of glaucoma-related complications. **Aim** To evaluate intraocular pressure fluctuations in narrow anterior chamber angle with high vault configuration following Implantable Collamer Lens implantation. **Methods** A prospective observational study was conducted on 50 highly myopic patients undergoing ICL implantation between August 2025 and April 2026 at Eye 7 Hospital, New Delhi. Comprehensive ophthalmic examination including visual acuity, refraction, intraocular pressure measurement, anterior chamber angle assessment, and vault evaluation was performed preoperatively and during postoperative follow-up visits on Day 1, Day 15, and Day 30. Statistical analysis was performed using Jamovi software. Friedman repeated-measures analysis and Durbin–Conover pairwise comparisons were applied for postoperative comparisons. **Results** The study included 50 highly myopic patients who underwent ICL implantation. A mild temporary increase in intraocular pressure (IOP) was seen on the first postoperative day, but the values stabilized during later follow-up visits. Statistical analysis showed no significant change in IOP after surgery. Although anterior chamber angle narrowing was observed in patients with high vault configuration, no glaucoma-related complications or clinically significant IOP elevation occurred, indicating that ICL implantation is safe regarding postoperative IOP changes. **Conclusion** ICL implantation is a safe and effective refractive surgical procedure in highly myopic patients. Despite postoperative anterior chamber angle narrowing associated with high vault configuration, no clinically significant intraocular pressure fluctuation was observed. Proper patient selection, accurate lens sizing, and postoperative monitoring are essential for maintaining long-term ocular safety.

KEYWORDS

Implantable Collamer Lens, Intraocular Pressure, Anterior Chamber Angle, Vault, High Myopia, Refractive Surgery.

INTRODUCTION

Implantable Collamer Lens (ICL) implantation has become an effective and widely accepted refractive surgical procedure for the correction of moderate to high myopia, particularly in patients who are unsuitable for corneal refractive surgeries such as LASIK due to thin cornea, dry eye, or high refractive errors. The procedure provides excellent visual outcomes, refractive stability, and preservation of corneal structure.

Despite its advantages, ICL implantation produces anatomical changes within the anterior segment of the eye. The implanted lens occupies space in the posterior chamber and may cause anterior displacement of the iris, leading to narrowing of the anterior chamber angle (ACA). Since the ACA is responsible for aqueous humour drainage, postoperative narrowing may influence intraocular pressure (IOP) and increase the risk of glaucoma-related complications.

Another important postoperative parameter is vault, which refers to the distance between the posterior surface of the ICL and the anterior surface of the crystalline lens. Excessively high vault may result in angle crowding and impaired aqueous outflow, whereas low vault may increase the risk of cataract formation.

Previous studies have reported postoperative ACA narrowing after ICL implantation; however, the relationship between high vault configuration, ACA narrowing, and IOP fluctuations remains inadequately explored. Therefore, the present study was conducted to evaluate intraocular pressure fluctuations in highly myopic patients with narrow anterior chamber angle associated with high vault configuration following ICL implantation.

Vault limite



MATERIALS AND METHODS

A prospective observational study was conducted from August 2025 to

April 2026 at Eye 7 Hospital, New Delhi, on 50 highly myopic patients undergoing Implantable Collamer Lens (ICL) implantation. Patients aged 18–40 years with stable refractive error were included, while those with glaucoma, cataract, corneal pathology, or retinal disease were excluded.

Comprehensive ophthalmic evaluation including visual acuity, refraction, intraocular pressure (IOP), anterior chamber angle (ACA), and vault assessment was performed preoperatively and postoperatively on Day 1, Day 15, and Day 30.

Data were analyzed using Jamovi software. Descriptive statistics, Friedman repeated-measures analysis, and Durbin–Conover pairwise comparison tests were applied, with $p < 0.05$ considered statistically significant.

RESULT

A total of 50 highly myopic patients underwent Implantable Collamer Lens (ICL) implantation. The mean age was 26 ± 7.29 years, with 70% males and 30% females. The mean spherical equivalent was -13.3 ± 4.32 D. Mean preoperative intraocular pressure (IOP) was 17.9 ± 3.48 mmHg, which showed a mild transient rise on Day 1 (18.6 ± 4.2 mmHg) and later stabilized on Day 15 (17.2 ± 3.9 mmHg) and Day 30 (17.5 ± 3.6 mmHg). Friedman repeated-measures analysis revealed no statistically significant postoperative IOP change ($\chi^2 = 3.41$, $p = 0.333$). Despite anterior chamber angle narrowing in high vault cases, no clinically significant IOP elevation or glaucoma-related complications were observed.

The findings indicate that high vault configuration may lead to anatomical narrowing of the anterior chamber angle without significantly affecting aqueous humour drainage or postoperative intraocular pressure stability.

DISCUSSION

The present study evaluated postoperative intraocular pressure fluctuations in highly myopic patients with narrow anterior chamber angle associated with high vault configuration following Implantable Collamer Lens implantation.

The findings demonstrated postoperative anterior chamber angle narrowing in most patients. This narrowing can be explained by the

anatomical positioning of the ICL in the posterior chamber, resulting in slight anterior displacement of the iris and reduction of iridocorneal angle width. Similar observations have been reported in previous studies evaluating postoperative anterior segment changes after ICL implantation.

Despite the observed angle narrowing, intraocular pressure remained stable throughout the follow-up period. The mild transient rise in IOP on postoperative Day 1 was clinically insignificant and gradually normalized during subsequent visits. The absence of statistically significant postoperative IOP elevation suggests that aqueous humour outflow was not substantially compromised.

The present study supports previous literature suggesting that modern ICL implantation with proper patient selection and careful postoperative monitoring is a safe and predictable refractive surgical procedure. Although anterior chamber angle narrowing is a common postoperative finding, it may not necessarily result in clinically significant intraocular pressure fluctuations.

CONCLUSION

Implantable Collamer Lens implantation is a safe, effective, and predictable surgical procedure for correction of high refractive errors. Although postoperative anterior chamber angle narrowing was observed in patients with high vault configuration, no statistically significant intraocular pressure fluctuations were detected during follow-up.

The findings suggest that high vault configuration alone may not adversely affect aqueous humour dynamics when appropriate lens sizing and patient selection are ensured. Regular postoperative monitoring of anterior segment parameters remains important to prevent long-term complications and ensure ocular safety.

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