

TO STUDY CATARACT SURGERY OUTCOMES IN PATIENTS WITH COEXISTING TYPICAL OCULAR COLOBOMA

Ophthalmology

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ABSTRACT

Purpose: To report the outcome of cataract surgery in eyes with coexisting typical coloboma and to identify preoperative, intraoperative and postoperative prognostic factors in these cases. **Methods:** Ten patients aged between 25 to 75 years with typical iris colobomas and cataract were included in this prospective, interventional, hospital-based study at a tertiary care center. Small incision cataract surgery was performed in all patients. **Results:** Preoperative visual acuity ranged from 6/18 to hand movements and the grades of cataract varied from NS 2 to NS4. Microphthalmos and microcornea was noted in 8 patients. 8 had coloboma with retino-choroidal involvement. Phacodonesis, iridodonesis, zonular weakness/absence and microcornea posed as intraoperative complications. Due to absence of zonules inferiorly in one patient, ACIOL implantation was done. The higher risk of intraoperative complications and retino-choroidal involvement led to poor postoperative outcome. **Conclusion:** Cataract surgery in patients with typical iris colobomas is challenging due to the presence of microcornea, microphthalmos, and associated surgical complications.

KEYWORDS

Cataract, Iris Coloboma

INTRODUCTION

The word *coloboma* is Greek—*koloboma*, which means mutilated or curtailed, and refers to a congenital malformation in which ocular structures are incompletely formed due to failure of the embryonic optic fissure to fuse⁽¹⁾. Ocular coloboma occurs in 1-2 per 10,000 live births⁽²⁾. Closure defects can involve iris, ciliary body, lens, retina, choroid, optic nerve and eyelid.

Patients with coloboma develop cataract at a much earlier age as compared to normal population⁽³⁾. Lens coloboma does not necessarily indicate an actual loss of lens matter, rather the zonules are usually absent resulting in flattening or notching of the equator of the lens. Absent or weak zonules will result in instability of posterior capsular bag for easy nuclear removal and IOL placement in cataract surgery⁽⁴⁾. The presence of microcornea, non-dilating pupils and other structural anomalies make cataract surgery very challenging. The presence of retino-choroidal and optic disc colobomas, early onset of glaucoma, will further affect the final visual outcome post cataract surgery.

As ocular colobomas are rare, there are not many studies that have reported the cataract surgical outcomes in these patients. Careful understanding of structural variations of tissues in each case and surgical modifications needed to avoid complications of nuclear drops and IOL instabilities is essential to have successful outcome with cataract surgery. Irrespective of the technique used, functional outcomes have been inconsistent. Preoperative factors such as grade of cataract, type of coloboma, presence of microcornea, nystagmus, strabismus, zonular loss, phacodonesis etc., intraoperative factors like type of surgery used, nuclear management, nuclear drops, vitreous prolapse through coloboma, small pupil management, rhexis extension, post-operative factors like corneal edema, intraocular pressure, dislocation of intraocular lens etc., are all important factors to be understood while handling cataract in eyes with coexisting coloboma for good outcomes.

This study attempts to understand the preoperative, intraoperative and postoperative assessments of different cases of iris coloboma that might help to lay down guidelines for successful management of cataract in such cases in future.

METHODS

After obtaining Institutional ethical committee approval, this study was conducted among patients attending the Ophthalmology outpatient department at a tertiary care hospital fulfilling inclusion and exclusion criteria from December 2020 to November 2023.

Seven patients aged between 25 and 75 years with iris colobomas and cataract were selected for the purpose of the study.

Inclusion Criteria:

All patients with cataract and co-existing typical iris coloboma were planned for small incision cataract surgery.

Exclusion Criteria:

Patients with other pre-existing ocular illnesses not associated with coloboma such as:-

- Macular degeneration
- Diabetic retinopathy
- Other ocular pathology that could affect the visual outcome postoperatively
- Patients who have had previous intraocular surgeries or not willing to give consent were excluded.

Pre operative assessment was done using Snellen chart, Slit lamp, 78 or 90D lens, Indirect ophthalmoscope, A- Scan, Keratometry, and Goldmann applanation tonometer

Cataract graded based on Lens Opacity classification system 3.

- Biometry (SRK-T), tonometry and lacrimal syringing was done along with pre-operative blood investigations in cases planned for surgery.
- Surgical plan was guided by severity of microcornea, hardness of cataract and zonular instability.
- The surgery was done after obtaining patient's consent.
- Intra-operative events such as complications if any, modifications in surgical steps etc., were noted in each case.

RESULTS

Among the 10 patients (n=10 eyes) included in the study 7 were males and 3 were females. Preoperative visual acuity ranged from 6/18 to hand movements.

The grades of cataract in these patients ranged from NS2- NS4.

The cornea was measured in all 10 patients' eyes. Microphthalmos and microcornea were seen in 8 of these patients. Corneal measurements in these 8 patients were between 7 and 10mm. Congenital nystagmus was seen in 2 patients.

Intraocular pressures in the eyes ranged from 12 to 20mm of Hg which were well within the normal limits.

All 10 patients had typical iris coloboma (7 bilateral & 3 unilateral), 8 had coloboma with retino-choroidal involvement. They were further classified based on Ida Mann classification.

According to the classification, 2 patients had grade II, 3 had grade III, 2 had grade IV and 1 had grade V.

Small incision cataract surgery (SICS) was done in all 10 patients under guarded visual prognosis. Phacodonesis, iridodonesis, zonular weakness/absence and microcornea posed as intraoperative complications. Due to absence of zonules inferiorly in one patient ACIOL (Anterior chamber intraocular lens) implantation was done.

Postoperative visual acuity in 8 patients was $\leq 6/60$. 2 patients had postoperative visual acuity of HM+ and CF/CF. Corneal edema was present in 6 patients.

Preoperative Findings:

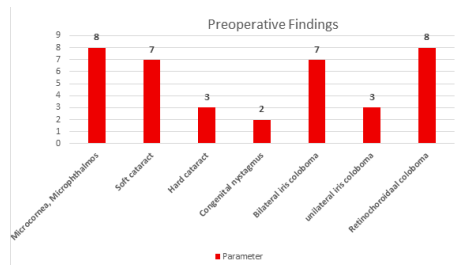


Fig 1: Preoperative findings

Intraoperative findings:

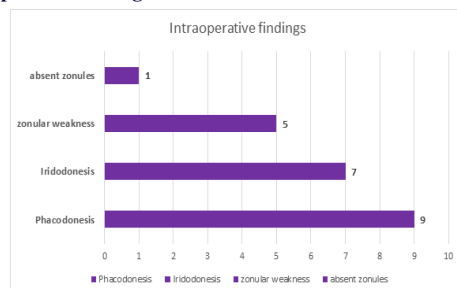


Fig 2: Intraoperative complications

Postoperative Findings:

PARAMETER	NUMBER
Visual Acuity < 6/60	2
Visual Acuity > 6/60	8
Corneal edema	6

DISCUSSION

The present study highlights the significant anatomical and surgical challenges encountered during cataract extraction in eyes with typical iris coloboma and associated structural anomalies. Our study demonstrated a high prevalence of microcornea, microphthalmos, and retinochoroidal colobomas—all of which are well-documented features arising from failure of closure of the embryonic fissure. These developmental abnormalities directly influence preoperative assessment, intraoperative difficulty, and postoperative visual recovery. Pagon et al and Onwochei BC et al observed similar findings.^(1,3)

A major preoperative finding in this study was the presence of microcornea and/or microphthalmos in most of the eyes. It was also noted that colobomatous eyes commonly exhibit smaller globe dimensions, shallow anterior chambers, and zonular weakness, complicating biometry and surgical planning. This observation aligns with reports by Onwochei et al. and Bhari et al.^(3,4)

Intraoperatively, phacodonesis and zonular weakness were encountered in the majority of patients—findings that are anticipated in colobomatous eyes due to segmental zonular deficiency, particularly inferonasally⁽⁴⁾. Prior studies have reported comparable rates of zonular compromise, requiring modifications such as capsular tension rings, careful hydrodissection, slow-motion phacoemulsification, or conversion to manual small-incision cataract surgery (SICS)^(5,6,7). In our study, SICS was employed in all cases, likely reflecting surgeon preference in eyes with small corneal diameter, shallow chambers, and hard nuclei. The need for an anterior chamber IOL in one patient due to complete inferior zonular loss echoes findings by Phylactou et al., who have advocated individualized IOL strategies in complex colobomatous anatomy⁽⁷⁾.

Despite successful surgical completion in all eyes, functional visual outcomes remained relatively modest. Eight patients achieved visual acuity better than 6/60 and two patients remained below 6/60 at final follow-up. Poor postoperative acuity in these eyes is multifactorial. Retinochoroidal coloboma, is a major determinant of final vision. The significant postoperative corneal edema noted in six patients may reflect endothelial vulnerability in microcornea and prolonged surgical manipulation due to zonular instability. Furthermore, associated nystagmus, amblyopia, and optic nerve involvement—common in congenital coloboma—contribute to limited visual rehabilitation⁽³⁾. Thus, even with technically successful cataract extraction, anatomical constraints substantially limit visual potential, reinforcing the importance of preoperative counselling and guarded prognosis. These findings were previously established by Bhari et al. and Sahay et al in their study.^(4,8)

Our findings are in agreement with the broader evidence that, although cataract surgery in colobomatous eyes is feasible, it demands meticulous preoperative evaluation, intraoperative modifications, and patient-specific decision-making to optimize outcomes⁽⁵⁻⁸⁾. The clustering of complications in this series—phacodonesis, zonular dialysis, microcornea, and postoperative edema—illustrates the cascading challenges inherent to these eyes. While larger studies by Kohli et al. and Sahay et al. have reported slightly better visual outcomes, their cohorts included mixed surgical techniques and more frequent use of capsular support devices^(6,8). This variability emphasizes the need for protocol-driven approaches to biometry, IOL selection, zonular management, and postoperative rehabilitation in such patients.

Limitations of the study include small sample size and lack of comparison to other surgical techniques.

CONCLUSION

Overall, this study contributes to the growing body of evidence emphasizing that cataract surgery in eyes with typical iris coloboma remains a high-risk intervention with unpredictable visual outcomes. Future studies with larger sample sizes and comparative evaluation of surgical techniques—particularly the role of phacoemulsification with capsular support devices—may help establish clearer guidelines for optimizing safety and outcomes in this challenging subset of patients.

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