

Original Research Article

Clinical Outcome of Manual Small Incision Cataract Surgery in Patients with Iris-Coloboma**Dr. Raghavendra R.¹, Dr. Madhuri Parande², Dr. Shubhratha S. Hegde³, Dr. Niranjana S.⁴, Dr. Harsha Shaji⁵**¹Associate Professor, Department of Ophthalmology, Mysore Medical College & Research Institute, Mysore, Karnataka, India.²Assistant Professor, Department of Ophthalmology, Mysore Medical College & Research Institute, Mysore, Karnataka, India.³Associate Professor, Department of Ophthalmology, Mysore Medical College & Research Institute, Mysore, Karnataka, India.⁴Postgraduate Student, Department of Ophthalmology, Mysore Medical College & Research Institute, Mysore, Karnataka, India.⁵Postgraduate Student, Department of Ophthalmology, Mysore Medical College & Research Institute, Mysore, Karnataka, India.**Corresponding Author**

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ABSTRACT**Background**

Coloboma (plural: *colobomata*) is derived from the Greek *koloboma*, meaning *mutilated* or *curtailed*. Iris coloboma may be typical or partial. Typical colobomas are caused by a failure of fetal fissure closure at the inferior nasal quadrant and are called as “keyhole” pupils. They may involve the iris, ciliary body, choroid, retina and optic nerve. Atypical colobomas are those found anywhere except at the inferior nasal quadrant and restricted to the iris. Colobomas are part of a continuum that includes microphthalmos and anophthalmos. The visual acuity is affected when the coloboma involves the disc and fovea, or complicated by any occurrence of retinal detachment, choroidal neovascular membrane, cataract, amblyopia due to uncorrected refractive errors. Cataract surgery in these eyes can pose many challenges due to microphthalmia and hard cataracts, resulting in increased risk of intraoperative complications.

Aim

This study was done to evaluate the clinical outcome of cataract surgery in visually significant cataract patients with co-existing iris-coloboma.

Methods

This is a tertiary hospital-based prospective interventional study of 30 patients conducted over a period of one year. Best corrected visual acuity (BCVA), grade of cataract, intraoperative challenges and postoperative complications, postoperative BCVA at 1 week and 6 weeks were recorded.

Results

Out of 30 patients, 19 were males and 11 were females. The mean age of patients at surgery was 55 years with a mean BCVA of 6/60. Grade 3-4 nuclear sclerosis noted in 15% of cases and lens subluxation noted in 2% of cases. Manual small incision cataract surgery was done in

all the cases. Primary IOL placement was successful in 66.6% of cases. Intraoperative complications noted were zonular dialysis, posterior capsular rent (PCR) and capsulorhexis extension. The mean postoperative BCVA at 1 week and 6 weeks was 6/24 and 6/18 respectively. Postoperative complications were raised intraocular pressure, corneal edema, IOL decentration and posterior capsular opacity.

Conclusion

Cataract surgery in iris-coloboma patients with visually significant cataract are challenging due to the interplay of various associated anatomical defects. Delayed surgery results in sub-optimum outcomes, thus early surgery is advisable.

Keywords: Iris Coloboma, Key Hole Pupil, Visually Significant Cataract, Manual Small Incision Cataract Surgery.

INTRODUCTION

Coloboma (plural: *colobomata*) is derived from the Greek *koloboma*, meaning *mutilated* or *curtailed*. The malformation refers to a notch, gap, hole or fissure in any of the ocular structures. The “typical” coloboma, caused by defective closure of the fetal fissure. It is located in the inferonasal quadrant and may affect any part of the globe traversed by the fissure from the iris to the optic nerve.¹ Patients with coloboma develop cataract at a much earlier age as compared to a normal population.² The presence of microcornea, non-dilating pupils, absence of zonules or lens coloboma and other structural anomalies make cataract surgery more challenging and fraught with complications in these eyes.³ Additionally, the degree of retinal choroidal coloboma and optic disc abnormality also affects the final functional outcomes.

Here in our study, we evaluated the clinical outcome of manual small incision cataract surgery in patients with iris-coloboma.

MATERIALS & METHODS

An interventional prospective study of patients presenting with Iris coloboma with cataract to K R Hospital, Mysore, Karnataka. Ethical committee approval was taken and the study adhered to the tenets of the the declaration of Helsinki. Patients who presented with iris coloboma with visually significant cataract between February 2023 and February 2024 were included in the study after informed consent. We excluded those patients with iris coloboma with cataract with central corneal opacity, microcornea <8mm, zonular dialysis more than 180 degree.

Detailed history and a thorough clinical examination which included determination of best-corrected visual acuity (BCVA), intraocular pressure (IOP) along with anterior and posterior segment examination to look for existing comorbidities were done.

Slit-lamp examination included grade of cataract, microcornea and zonular loss, phacodonesis, presence of nystagmus and strabismus were also documented. Due to the presence of dense cataract, the diagnosis of amblyopia and retinal pathologies were challenging.

The maximum horizontal corneal diameter was measured using a caliper. Based on this, the eyes were divided into three categories; grade 1- severe microcornea (<8 mm), grade 2- mild-to-moderate microcornea (8–10mm), and grade 3- normal (>10 mm). Cataracts were graded according to Lens Opacity Classification System III.⁴ The ‘Nucleus colour’ (NC) was used to define the hardness of the cataract. NC from 1 to 3 was considered ‘Soft’ cataracts, while categories 4 to 6 were included in ‘Hard’ cataracts.

The chorioretinal coloboma was graded according to Ida Mann Classification.⁵ Remaining cataract work up included IOL power calculation and routine blood investigations.

Manual small incision cataract surgery (MSICS) with or without posterior chamber intraocular lens implantation (PCIOL) under peribulbar anaesthesia was the procedure of choice. Iris hooks were used in semi dilated or poorly dilated pupils. Capsular tension ring (CTR) was used in cases with significant zonular instability. Intra-operative complications like capsulorhexis extension, phacodonesis, zonular dehiscence, posterior capsular rent, aphakia were noted.

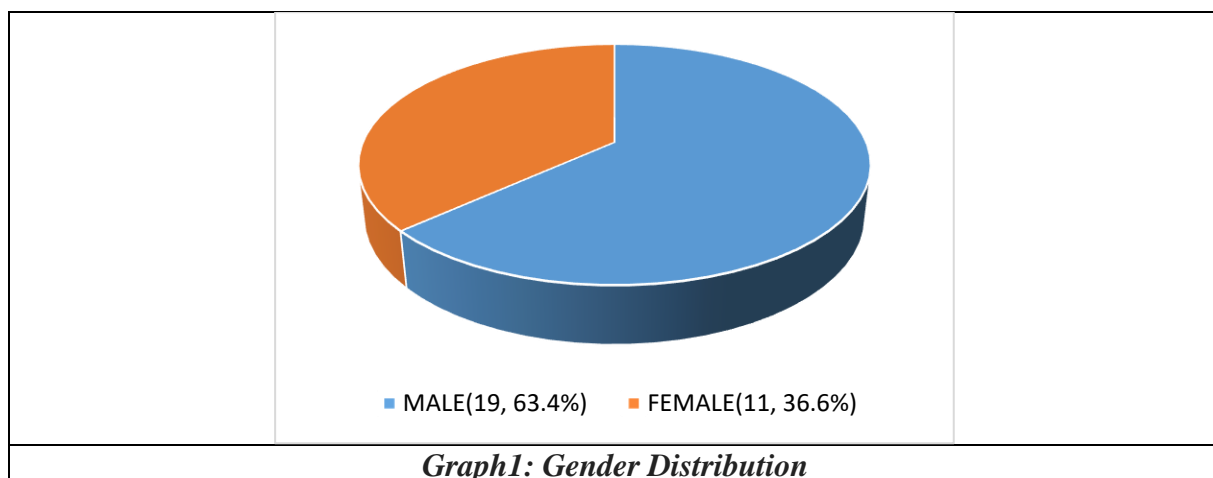
On discharge, all the patients were put on antibiotic steroid eye drops. Follow up was done at 1 week and 6 weeks following surgery. Complete ocular examination was done during each visit. Corneal edema was graded according to the Oxford Cataract Treatment and Evaluation Team (OCTET).⁶ The SUN grading system was used to measure anterior chamber inflammation.⁷ The final visual outcome was recorded using Snellen’s visual acuity chart which was converted to logMAR values for statistical analyses.

Statistical Analyses

Windows SPSS version 20 was used for all statistical analyses. A value of p value < 0.05 was considered as statistically significant. Chi square test was applied to compare associations. For continuous variables; mean, standard deviation and ranges were calculated. The mean values were compared using Student’s t test or Mann Whitney test.

RESULTS

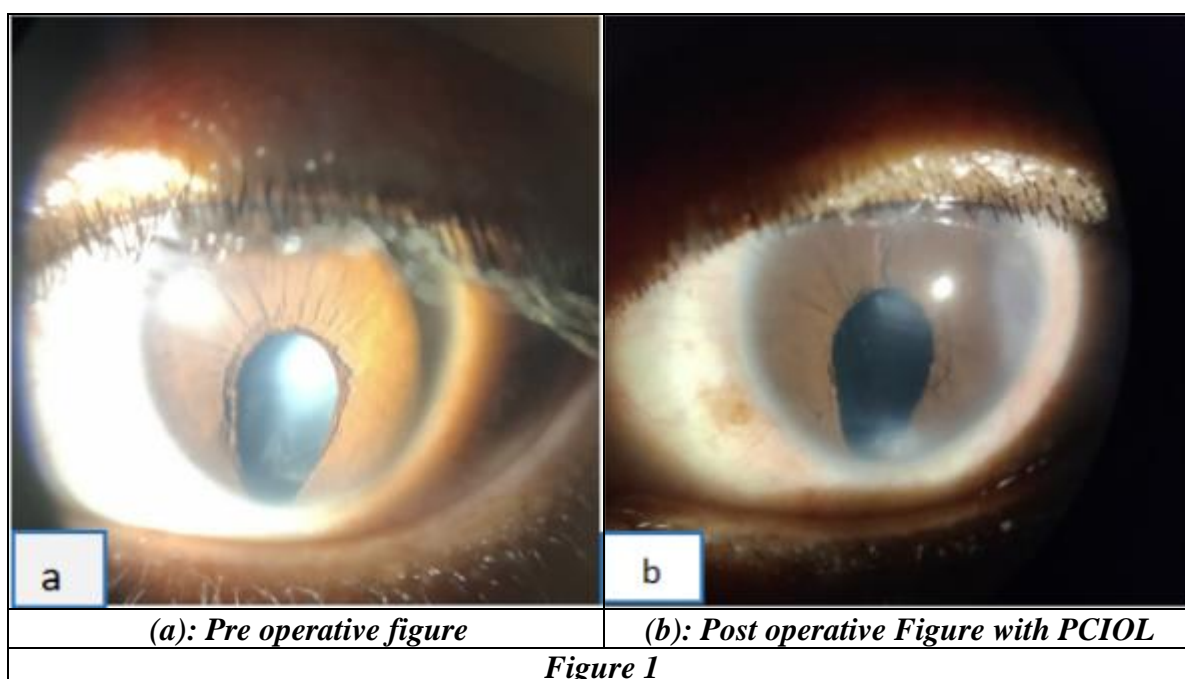
Out of 30 patients, 19 were males and 11 were females (Figure 1). The mean age of patients at surgery was 55 years with a mean BCVA of 6/60. 19 patients had unilateral Iris coloboma. 4 patients had only one functioning eye. In 15% of patients nuclear sclerosis grade 3 or 4 was noted. Lens subluxation was noted in 10% of cases and 90% of patients had Ida mann type 3 Chorioretinal coloboma. Primary IOL placement was successful in 66.6% of cases. Intraoperatively zonular dialysis was noted in 13.3%, capsulorhexis extension in 26.6% and posterior capsular rent was noted in 26.6% of patients, out of which 5 patients were rendered aphakia and planned for secondary IOL at a later date (Table 1). The mean postoperative BCVA at 1 week & 6 weeks were 6/24 and 6/18 respectively. Amblyopia was noted in 10% of patients. Postoperative complications noted were raised IOP noted in 30%, corneal edema grade 2 noted in 26.6%, IOL decentration in 30% and posterior capsular opacity noted in 16.6% of the patients (Table 2).



Finding	Number (%) (n=30)
Primary IOL Placement	20(66.6%)
Zonular dialysis	4(13.3%)

Capsulorhexis extension	8(26.6%)
Posterior capsular rent	8(26.6%)
Aphakia	10(33.3%)
Table 1: Intra Operative Findings	

Outcome	Number (%) (n=30)
Amblyopia	3(10%)
Raised IOP	9(30%)
Corneal edema	8(26.6%)
IOL decentration	9(30%)
Posterior capsular opacity	5(16.6%)
Table 2: Post Operative Outcomes	



DISCUSSION

Ocular colobomata present diagnostic and therapeutic challenges in patients of all ages. The “typical” coloboma, caused by defective closure of the fetal fissure, is located in the inferonasal quadrant. They are often associated with microphthalmia and they may be idiopathic or associated with various syndromes. Types and severity of complications vary depending on the location and size of the coloboma.¹ The prevalence of congenital coloboma is estimated to be 4.89 per 100,000 newborns.² Most studies report that visually significant cataract formation in eyes with CR coloboma is believed to occur at a relatively younger age compared to the age-related cataract.

Cataract surgery in the eyes with iris coloboma remains challenging. They are often associated with the higher risk of intraoperative and postoperative complications. Among these, eyes with grade of microcornea (corneal diameter <8 mm) with dense hard cataracts are probably the most difficult cases to operate. The limited anterior chamber space combined with hard nucleus poses great challenge to the operating surgeon.

Kohli et al³ reported the outcome of cataract surgery with different surgical techniques in eyes with coexisting coloboma and to define factors of prognostic importance. Favorable functional outcomes can be achieved with phacoemulsification in eyes with softer cataract and

corneal diameter >8 mm and with M-SICS in eyes with hard cataracts and corneal diameter of 6–8 mm. They concluded that phacoemulsification should be considered as the primary choice whenever permissible by the corneal diameter and severity of nuclear sclerosis. Poor functional outcomes were seen in eyes with smaller corneal diameter, extensive chorioretinal coloboma and intraoperative complications. However in our study, we did MSICS for all the cases.

Norland ML et al⁸ concluded that the results of their small case series affirm that clinically significant cataract develops at a younger age in eyes with congenital coloboma than in eyes with typical age-related nuclear sclerotic cataract. Monocular diplopia, a potential complication after cataract surgery in these eyes which can be managed by pupilloplasty. The improved vision in this study indicates that phacoemulsification and IOL placement are safe and beneficial in patient.

In a series of 39 eyes by Sahay et al,⁹ type 1 and 2 CR coloboma were most commonly seen with typical congenital coloboma and cataract.

Iridofundal coloboma along with macula sparing type 3 CR coloboma was the most common presenting type in our study; an observation similar to the retrospective series by Khokhar et al¹⁰. Disc and macula sparing coloboma was more common in a series of 26 eyes by Chaurasiya *et al*¹¹. Since our facility is a tertiary referral centre, it is important to consider that the estimation of the prevalence of cataract with iris coloboma and other associated defects may be an exaggerated reflection of the true population.

Khokhar S et al¹⁰ reported favorable outcomes with PE and foldable intra-ocular lens (IOL) implantation in a retrospective study of 22 eyes with coloboma and cataract. In their study, the mean corneal diameter was 11.16 mm and only 6 eyes had severe microcornea. All the 3 eyes that were left aphakic in this study had a small white to white diameter. Postoperative corneal edema was noted in 18% of cases in this series. This suggests that smaller eyes are at a greater risk of complications and endothelial damage which is similar to our study.

Similarly Chaurasia et al¹¹ reported outcomes of cataract surgery in 26 eyes with coloboma and cataract. They noted that more complications in patients undergoing M-SICS/ECCE/ICCE compared to the eyes in whom PE was performed. It is also interesting to note that 5 out of 8 eyes with hard cataract that were left aphakic had a complicated surgery with posterior capsule rent (PCR) and required anterior vitrectomy, possibly due to a harder grade of cataract. This further reflects that more complications are encountered in the management of hard cataracts in small eyes.

Mohamed et al¹² described a unique morphological type of cataract in uveal coloboma which they named 'coloboma cataract'. Coloboma cataract was not an uncommon finding (29%) in their series which presented in the form of linear lenticular opacity in the colobomatous region. Many patients in our study had dense cataracts with nuclear sclerosis due to late presentation.

In eyes with coloboma, the interplay of various associated anatomical defects collectively poses challenges for cataract extraction. Thus, delay in cataract surgery results in suboptimum outcomes.

CONCLUSION

Cataract surgery in iris-coloboma patients becomes challenging because of higher risk of complications. With appropriate clinical evaluation and timely surgery with necessary precautions helps in favourable outcome. Delayed surgery results in sub-optimum outcomes, thus early surgery is advisable.

STUDY LIMITATIONS

Though we conducted in a tertiary care hospital, anterior vitectomy was done manually. Few iris coloboma patients who were aphakic after cataract surgery were planned for SFIOL on a later date. But due to unavailability of small sized lenses, it was difficult for us to counsel the patient and for the further management.

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