

Study of Visual Outcome in Patients with Hypermature Cataract after Small Incision Cataract Surgery

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Abstract

Purpose: To evaluate the visual outcome in patients with hypermature cataracts after small incision cataract surgery. **Materials and Methods:** This study was conducted in the Department of Ophthalmology, Navodaya Medical Hospital, Raichur, from december 2017 to may 2018. In this study, evaluation of hundreded patients with senile hypermature cataract after pre-operative assessment and investigations underwent small incision cataract surgery. Their surgical and post-operative complications were recorded. Their visual outcome was studied at post-operative day 1, 1 week and 6th week. Best corrected visual acuity was obtained at 6 weeks. **Results:** Total of hundreded patients with 42 male and 58 female had small incision cataract surgery. 8 of the eyes had surgery complicated by posterior capsule rupture, vitreous loss, zonular dialysis. On first post-operative day most common complication noted was striate keratitis (39%). Best corrected visual acuity at 6 weeks was 6/18 in 58 (58%) patients. **Conclusion:** The intra-operative and post-operative complications rate is higher in hypermature cataracts. These complications can be reduced by early removal of cataract before it reaches the stage of hypermaturity. Small incision cataract surgery of hypermature cataract has good results after thorough pre-operative assessment and if performed with expertise.

Keywords: Capsulorrhexis; Hypermature cataract; Manual small incision cataract surgery

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Introduction

In India, there are 12.5 million blind and it is estimated that 50% to 80%^{1,2} of them are blind due to cataract. In addition to the backlog, an additional 3.8 million become blind each year due to cataract.³ Most patients had advanced stages of cataract hypermature lenses. Majority of these patients are socio-economically backward and cannot afford procedures such as phacoemulsification.

Conventionally, in the last millenium Extra Capsular Cataract Extraction with Posterior Chamber Intra-ocular Lens Implantation (ECCE-PCIOL) was considered an effective means of restoring visual function and improving vision related quality of life in developing countries.

However, it has its own problems related to wound suturing with its associated complications and late visual rehabilitation.⁴ Recent reports indicate that both Manual Small Incision Cataract Surgery (MSICS) and ECCE-PCIOL are safe and effective for treatment of cataract surgery, however, MSICS gives better uncorrected vision.⁵

In this context, MSICS is gaining popularity in developing countries as an inexpensive alternative to phacoemulsification.⁶ Inspite of the fact that MSICS can be a cost-effective procedure, more research on the outcomes of MSICS is warranted.⁷ This study reports the results of a prospective

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observational study done to assess the safety and efficacy of MSICS in white cataracts.

Materials and Methods

This study included 100 eyes of 100 consecutive patients with white cataracts who had routine MSICS operated at Navodaya Medical Hospital and Research Centre, Raichur, from *december 2017–may 2018*.

Exclusion criteria were patients with traumatic cataract, complicated cataract, lens induced glaucoma, insufficient follow up cases. Institutional ethics committee clearance was obtained before the start of the study. All patients underwent detailed pre-operative ocular examination, including clinical history and systemic examination, measurement of visual acuity, Intra-ocular Pressure (IOP) by goldmann applanation tonometry.

Detailed slit lamp biomicroscopy under maximum mydriasis was performed.

A-scan and keratometry for IOL power calculation.

B-scan for posterior segment evaluation.

All observations and demographic data were carefully recorded using a protocol sheet.

Prophylactic antibiotics drops moxifloxacin 0.5% eye drops started one day before surgery. Patients were dilated with tropicamide and phenylephrine 0.5% eye drop and non-steroidal anti-inflammatory drops flurbiprofen sodium 0.03% was used 3 times every 15 minutes to maintain the dilatation.

Surgical Technique

All patients underwent small incision cataract surgery by experienced surgeon.

After peri-bulbar block with 5 ml of with 2% lignocaine with adrenaline (1: 20,000) with 150 units/ml of hyaluronidase. Povidine-iodine 5% was instilled into the conjunctival sac. For MSICS a fornix base conjunctival flap was made, scleral incision was made with bard parker knife with 15 no. blade temporally or supero-temporally and sclerocorneal tunnel was constructed with crescent. The anterior chamber was deepened using a viscoelastic and a CCC of 5–6 mm was initiated and completed using a bent 26-gauge needle mounted on a viscoelastic syringe.

In cases of hypermature cataract, a small trap door or nick was made in the anterior capsule through which the liquid cortex was emptied

and the CCC was completed using a cystitome. If the CCC margin extended to the periphery, the capsulotomy was converted to canopener type. Hydroprocedures were done with a 24-gauge hydrodissection cannula.

The nucleus was made to rotate freely by hydroprocedures. A Sinskey hook was used to hook out one pole of the nucleus outside the capsular bag and the rest of the nucleus was wheeled out into the anterior chamber. After a good cover of viscoelastic, the prolapsed nucleus was extracted from the eye using an wirevectis technique. Rigid, single piece, biconvex, polymethyl meth acrylate posterior chamber intra-ocular lens (IOLs) with optic diameter of 5.25 mm was implanted in bag. The integrity of the self-sealing scleral incision was ensured and the cut conjunctival flap was apposed using a forceps.

Intra-operative and post-operative complications

Post-operatively, patients were put on topical antibiotics and steroids tapered over 4–6 weeks depending upon the post-operative inflammation. Patients were followed on the post-operative day 1, day 7 and day 14 and at weekly intervals for 6 weeks to evaluate intra-ocular pressure spikes, presence of intra-ocular inflammation, decentration/tilt of intra-ocular lens and corneal edema. Post-operative uncorrected visual acuity was recorded every week and best corrected visual acuity was recorded at 6th week.

Results

Of the 100 eyes operated, 55 had surgery in the right eye and 45 had surgery in the left eye. There were 42 males and 58 females in the study. The pre-operative vision for all patients were either FCF (finger counting close to face) or HM (hand movements) or PL (perception of light), (Table 1).

The age range was 50–80 years with a mean age group of 62.78 years.

Surgery was done on 22 morgagnian and 78 sclerotic type of hypermature cataract. 15 eyes had posterior synechia resulting in poor pupillary dilatation.

Capsulorrhexis tear was converted to canopener type of capsulotomy in 10 cases (10%). All the ten cases had thick fibrotic anterior capsule so capsulorrhexis was difficult. In the rest of the 90 eyes, CCC was completed successfully.

Ninety two percent of these patients had

uneventful surgery while 8 (8%) of them developed some complications intra-operatively. 15 eyes had poor pupillary dilatation, 3 eyes had posterior capsular rupture with vitreous loss and 5 eyes had zonular dialysis and were rendered aphakic.

Table 1: Pre-op visual acuity

Visual acuity	Number of patients' n' (%)
Hand movements	41 (41%)
PL+ PR Accurate	53 (53%)
PL+ PR Inaccurate	06 (6%)
Total	100 (100%)

PL- Perception of Light; PR- Projection of Rays.

All patients underwent cataract surgery using SICS technique. Surgical complications are listed in (Table 2). 15 (15%) cases required sphincterotomy to facilitate capsulorrhexis and nucleus delivery. Zonular dialysis seen in 5 (5%) cases, posterior capsular tear with vitreous loss seen in 3 (3%) due to difficulty in surgical maneuvers, iris trauma occurred in 16 cases (16%).

Patients were followed on the post-operative *day 1, day 7, day 14* and at weekly intervals for *6 weeks* to evaluate intra-ocular pressure spikes, intra-ocular inflammation, decentration/tilt of intra-ocular lens and corneal edema. Post-operative hazy cornea (corneal edema) was seen in 39 (39%) cases. Anterior chamber reaction in 16 (16%) cases, irregular pupil seen in 15 (15%) cases (Table 3).

The IOP was measured both pre-operatively and post-operatively. We did not find any pressure spikes in any patient. Final visual acuity was recorded after *6 weeks* of surgery (Table 4). At the end of *6 weeks*, 8 (8%) patients showed persistent corneal edema probably due to corneal decompensation. However, pre- or post-operative specular microscopy and pachymetry were not included in this study.

Table 2: Intra-op complications

Complications	Number of patients
Poorly dilating pupil	15
Difficulty in capsulorrhexis	10
Zonular dialysis	05
Posterior capsular rent with vitreous loss	03
Nucleus drop	00

Table3: Post-op complications

Complications	Number of patients' n' (%)
Corneal edema	39 (39%)
AC reaction	16 (16%)
Irregular pupil	15 (15%)

Ninety-two eyes had PCIOL in the bag and 8 eyes were rendered aphakic due to zonular dialysis and posterior capsular rent with vitreous loss. 58 (58%) cases had visual acuity between 6/6-18, 19 (19%) cases had visual acuity between 6/24-6/36, 15 (15%) cases had visual acuity of 6/60 and 8 (8%) cases had visual acuity of less than 6/60.

Table 4: Final visual acuity

Visual acuity	Number of patients' n' (%)
6/6-6/18	58 (58%)
6/24-6/36	19 (19%)
6/60	15 (15%)
< 6/60	08 (8%)
Total	100 (100%)

Discussion

Cataract is the leading cause of blindness globally and prevalence of blindness among people aged *50 years* is 8.5%.^{8,9} The annual incidence of cataract blindness is about *3.8 million*.

Hypermature cataracts constitute a significant volume of cataract surgical load in developing countries like India.¹⁰ The most prevalent cause of blindness and low vision being an un-operated cataract.¹¹

Currently, satisfactory results have been published with respect to phacoemulsification in white cataracts. In a developing nation like India, where cataract backlog is still a socio-economic problem, procedures like phacoemulsification remain an expensive modality of management, and majority of the population find it difficult to afford it.

MSICS promises to be a viable cost-effective alternative in this regard.^{11,12} Certain eyes are at a higher risk of complication during cataract surgery. Operations on such 'high-risk' eyes are also more likely to yield a poor visual outcome (defined as best corrected vision less than 6/60 after surgery).

Learning to recognise when eyes are at greater risk, and acting accordingly, will help you to avoid complications. Even so, before the operation takes place, it is good practice to explain to such patients that a poor outcome is a possibility. This makes these patients' expectations more realistic and improves post-operative compliance and follow-up.

All those cataracts in which the CCC was converted to can-opener type were morgagnian in nature. The incomplete CCC encountered was

possibly due to increased intra-lenticular pressure. The challenge of performing CCC in white cataracts is well documented.¹³

This is because of lack of red reflex, poor contrast between the anterior capsule and the underlying cortex, high intra-lenticular pressure in morgagnian cataracts, leaking of lens matter from the anterior capsule puncture sites and the presence of capsular fibrosis.

Various methods have been described to tackle such situations effectively. Use of trypan blue is found to be safe and effective in performing a CCC.¹⁴ In MSICS, it also helps in making the difficult step of nucleus prolapse through an intact capsulorrhexis safe and effortless, because the dye stained capsular rim is distinctly visible all throughout the surgery.

As a result, any compromise to the capsular bag during prolapse of nucleus can be detected easily and relaxing incisions can be made at any point of the process thereby saving the intra-capsular removal of nucleus.

In our study, out of 100 patients 39 cases had phacodonesis pre-operatively, 15 cases had posterior synechiae and 10 cases had thick fibrotic anterior capsule. In the present study, most frequent problem encountered was intra-operative poorly dilating pupil which was managed with sphincterotomy and viscomydriasis. Sphincterotomy had the disadvantage of causing post-operative distorted pupil, which may even lead to the pupillary capture.

Intra-operative complications encountered were Zonular dialysis in 05 (5%) cases, posterior capsular tear with vitreous loss in 03 (3%) cases due to difficulty in surgical maneuvers, iris trauma occurred in 16 (16%) cases. Post-operative hazy cornea (corneal edema) was seen in 39 (39%) cases. Anterior chamber reaction in 16 (16%) cases, irregular pupil seen in 15 (15%) cases. After 6 weeks 58 (58%) cases had visual acuity between 6/6–6/18, 19 (19%) cases had visual acuity between 6/24–6/36, 15 (15%) cases had visual acuity of 6/60 and 8 (8%) cases had visual acuity of less than 6/60. We did not encounter complications like decentered IOL, retained cortical matter, nucleus drop, postop hyphema as seen in other studies.

Similar results were obtained in a study conducted by erumshahid *et al.* were out of 50 cases corneal edema was noted in 30 cases (60%), anterior chamber reaction was noted in 4 cases (8%) and irregular pupil was noted in 3 cases (6%).¹⁵ Final

BCVA was > 6/18 in 58% cases in our study which is less compared to results of erumshahid, *et al.* in which BCVA was > 6/18 in 76% cases.

In a study, conducted by Alex A Ilechie on 1288 eyes with hypermature cataract who underwent cataract surgery Intra-operative complications encountered during surgery were; irido dialysis in 6 (0.5%) cases, posterior capsular tear with vitreous loss was seen in 6 cases (0.5%). Post-operative complications were corneal edema in 44 (3.4%) cases, anterior chamber reaction in 3 (0.5%) cases.¹⁶

Final BCVA was > 6/18 in 58% cases in our study which is more when compared to results of alex A, *et al.* in which BCVA was > 6/18 in 41.2% cases. The above two studies also encountered complications like hyphema, high IOP, dislocated IOL, retained lens matter, cystoid macular edema and early posterior capsular opacification which was not seen in our study.

Conclusion

We conclude from our study that chances of complications are higher in advanced cataracts and is a challenging scenario to operate upon, hence a thorough pre-operative assessment and case based management plan is required. Cataract patients should be advised to seek medical advise early to improve post-operative visual outcome.

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