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Treatment of advanced white cataracts with manual small incision cataract surgery: a prospective study

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Abstract

Purpose: To assess the complications and visual outcome of manual small incision cataract surgery in the treatment of advanced white cataracts.

Methods: This prospective study included 50 eyes of 50 consecutive patients with advanced white cataracts who underwent manual small incision cataract surgery. Intraoperative complications and postoperative findings with visual outcomes assessed on postoperative days 1, 7, 15, 30 and 45 were used as the main measures to report the safety and efficacy of the surgery in patients with white cataracts.

Results: Of the 50 eyes studied, 27 had mature cataract, 8 had hypermature cataract and 15 had intumescent mature cataract. Intra-operatively, rhexis run off to the periphery was seen in 10 patients (20%) and none of the patients had posterior capsular rupture or zonular dialysis. Postoperatively, corneal edema was seen in 5 eyes (10%), mild postoperative uveitis in 4 eyes (8%), severe postoperative uveitis in 1 patient (2%) and postoperative IOP spike in one patient (2%). At 45 days postoperatively, 48 patients (96%) had a best corrected visual acuity of 6/9 or better and 2 patients had >6/12.

Conclusions: Manual small incision cataract surgery proves to be a safe and effective surgical option for patients with advanced white cataracts due to its low rates of intraoperative and postoperative complications and good postoperative visual outcomes.

Introduction

It has been estimated that of the 12.5 million blind population in India, 50-80% are caused by cataract.[1,2] According to the National Programme for Control of Blindness (NPCB), incidence of cataract is 0.4-0.5%; thus the number of new cases of cataract to be operated upon each year comes to 61.5 lakhs (6.15 million).[3]

In a developing country like India, with a large percentage of population residing in the rural areas, an interplay of socio-economic factors, illiteracy, lack of awareness of eye diseases, poverty and fear of surgical treatments leads to a delay in seeking treatment for cataract. This results in a delayed presentation when the cataract has reached advanced stages like intumescent, mature and hypermature cataracts (referred to as white cataract due to the white colour of the completely opaque crystalline lens). A recent study on the epidemiological correlates of cataract in a rural area has shown the incidence of mature cataract to be 57% and that of hypermature cataract to be 11.5% of the total number of cataracts screened in the tertiary centre.[4]

Majority of the patients with visually significant cataract cannot afford modern and expensive techniques of cataract surgery like Phacoemulsification. Manual Small Incision Cataract Surgery (MSICS) has been found to be a safe and effective type of cataract surgery and thus an inexpensive alternative to phacoemulsification.[5] A prospective study has found manual small incision cataract surgery to be a safe and efficacious alternative for white cataracts especially when performed using trypan blue dye.[6]

This study reports the results of a prospective study conducted in our institution to assess the outcomes of manual small incision cataract surgery (MSICS) in rural patients with white cataracts.

Materials and Methods

This prospective observational study was conducted in the Department of Ophthalmology, AIMS B.G. Nagara. We included 50 eyes of 50 consecutive patients with white cataract who underwent MSICS by a single surgeon (ASM) between November 2013-October 2015. This study was approved by the Institutional Ethical Committee and written informed consent was obtained from all the study participants.

Exclusion criteria: (i) Patients not willing to participate in the study/ adhere to the study protocol (ii) Patients with congenital cataract, traumatic cataract, active/ old uveitis and glaucoma (iii) Patients with pre-existing corneal diseases like corneal scars, corneal degenerations or preoperative corneal edema.

All patients underwent a comprehensive preoperative evaluation of the anterior and posterior segments including intraocular pressure measurements. A preoperative biometry was done to assess the power of the intraocular lens to be implanted. All patients received preoperative antibiotic prophylaxis started from one day prior to surgery (Systemic- T. Ciprofloxacin 500mg B.D for 5 days; Topically- Moxifloxacin 0.5% eye drops 1 drop every hourly). The eye to be operated was prepped with Povidone Iodine 5% on the day of the surgery and the pupil was dilated with eyedrops containing Tropicamide (0.8%) and Phenylephrine (5%). Any preoperative risk factors (e.g. poorly dilating pupil, pseudoexfoliation syndrome etc.) and grade of cataract was recorded in every patient.

MSICS with posterior chamber intraocular lens implantation was performed by following the standard surgical protocol. All the surgeries were performed under peribulbar anaesthesia. Under aseptic precautions, the eye to be operated was painted and draped and eyelids were separated by a speculum and a superior rectus bridle suture was applied. A fornix based conjunctival flap was raised and hemostasis achieved using bipolar cautery. A 6.5mm sclerocorneal tunnel was made in the superior quadrant 2mm above the superior limbus. A side port incision was made at 9 o'clock position. Through the paracentesis, an air bubble was injected to form the anterior chamber and protect the corneal endothelium, followed by 0.1ml of trypan blue 0.06% below the air bubble. After a few seconds, the dye and air bubble were removed by injecting viscoelastic agent through the paracentesis. The anterior chamber entry from the main incision was made using a 2.8mm keratome blade and enlarged on either sides.

A central circular capsulorrhexis of 6mm diameter was done using a cystitome. In cases of hypermature cataract, a small nick was made in the anterior capsule through which the liquid cortex was emptied and the CCC was completed using an Utrata capsulorrhexis forceps. If the CCC margin extended to the periphery, the capsulotomy was completed using an Utrata capsulorrhexis forceps from the opposite direction. This was followed by a gentle hydrodissection.

The nucleus was prolapsed into the anterior chamber and delivered out using a wire vectis. After a complete cortical clean-up, a single-piece Poly Methyl Methacrylate intraocular lens was implanted into the capsular bag. During each of the intraocular steps adequate viscoelastic substance (2% HPMC) was used to protect the corneal endothelium and maintain the anterior chamber. At the end of the surgery, anterior chamber was formed with balanced salt solution/air and stromal hydration was performed by injecting fluid to the side of the paracentesis. The integrity of the self-sealing scleral incision was ensured and the cut conjunctival flap was apposed using a forceps fitted to bipolar diathermy and a subconjunctival injection of Gentamicin with Dexamethasone was given in the inferior quadrant and the eye covered with a sterile eye pad.

The duration of the surgery, any intraoperative difficulties and complications were noted down.

On the first postoperative day, visual acuity and slitlamp evaluation of the anterior segment and fundus examination was done in all patients and any complications were recorded and appropriately treated. All patients received a standard regimen of topical antibiotics-steroid containing eyedrops used every hourly for the first 7 days and then every 2nd hourly for the next 7 days and then gradually tapered over the next 4 weeks.

The patients were reviewed on day 1, 7, 15, 30 and 45 and during each visit the best corrected visual acuity was recorded and a slit lamp evaluation, IOP assessment and fundus examination was done.

Results

A total of 50 eyes of 50 patients were included in the study and the following observations were made.

Preoperative factors: The demographic characteristics of the study population is as depicted in Table 1.

Table 1: **Demographic characteristics of the study population**

Characteristics	No. of patients	Percentage (%)
Age distribution of patients (in years)		
30-39	2	4
40-49	2	4
50-59	9	18
60-69	26	52
70-79	11	22
Gender distribution of patients		
Males	28	56
Females	22	44
Laterality of the operated eye		
Right	26	52
Left	24	48
Status of the lens in the other eye		
Pseudophakia	20	40
Immature cataract	27	54
Mature/hypermature cataract	3	6
Best corrected visual acuity		
Hand movements	10	20
Perception of light	40	80
Type of white cataract		
Mature cataract	27	54
Hypermature cataract	8	16
Intumescent mature cataract	15	30

Intraoperative complications: All the surgeries were performed by a single surgeon. Difficulties during capsulorhexis was encountered in 10 eyes (20%). Of these 8 eyes had intumescent mature cataract and 2 eyes had hypermature cataract. None of the eyes had posterior capsular rupture or zonular dialysis and all patients received an implantation of a rigid posterior chamber intraocular lens.

Postoperative complications: Complications encountered on first post-operative day in our patients is as shown in Table 2.

Table 2: Postoperative complications on first day postop

Post-operative complications	No. of patients	Percentage (%)
Corneal edema with <10 Descemet's folds (mild striate keratopathy)	3	6
Corneal edema with >10 descemet's folds(severe striate keratopathy)	2	4
Mild postoperative uveitis	4	8
Severe postoperative uveitis with fibrinous membrane	1	2
Postoperative IOP spike	1	2

All the patients with corneal edema recovered completely by 2 weeks postop with medical therapy. The postoperative uveitis resolved completely with intensive topical steroids and cycloplegics. The secondary open angle glaucoma seen on first postop day in one patient was due to anterior segment inflammation and resolved with topical steroids and anti-glaucoma therapy by third postoperative day. The anti-glaucoma drugs were discontinued during her third postoperative visit.

Postoperative visual outcomes: The best corrected visual acuity attained by our patients on postoperative days 1, 7, 15, 30 and 45 are as shown in Table 3.

Table 3: Postoperative best corrected visual acuity (by Snellen's chart) in our patients

BCVA	Number of eyes				
	POD 1	POD 7	POD 15	POD 30	POD 45
<6/60	2	1	-	-	-
6/60-6/24	4	5	1	-	-
6/18-6/12	21	10	10	5	2
6/9-6/6	23	34	39	45	48
Total	50	50	50	50	50

POD=Post-operative day

At 45 days postoperatively, 48 patient's(96%) had a best corrected visual acuity of 6/9 or better and 2 patients had >6/12.

Discussion

Advanced white cataracts can pose several challenges during cataract surgery. Achieving a good continuous curvilinear capsulorhexis (CCC) is an important step in MSICS. Performing a CCC in a white catatract can be difficult due to lack of red fundus reflex, poor contrast difference between the anterior capsule and the underlying cortex, a high intralenticular pressure as seen in intumescent mature cataracts and some hypermature cataracts (leading to extension of the rhexis margin to the periphery) and the presence of dense, thickened and fibrosed anterior capsule.[7] In our study, we encountered difficulty during CCC in 10 eyes (20%), 2 of whom had hypermature cataract and 8 eyes had intumescent mature cataracts. The raised intralenticular pressure led to the extenstion of the CCC towards the periphery of the lens which was retrieved in all cases by completing the CCC from the opposite direction. The rest of the surgical steps in these cases were uneventful. Use of dyes like trypan blue to stain the anterior capsule helps in CCC by providing a good visualization.[8] We too used trypan blue in all our study subjects to aid CCC.

In our series of patients, we did not encounter any other intraoperative complications like zonular dialysis and posterior capsular rupture which may be commonly expected in patients with advanced white cataracts. Thus, a careful and meticulous surgery taking appropriate precautions can prevent most of the intraoperative complications during MSICS.

On the first postoperative day, 5 eyes (10%) developed striate keratopathy (3 eyes had mild corneal edema with <10 Descemet's folds and 2 eyes had severe corneal edema with >10 Descemet's folds). This can be explained based on the fact that hard white cataracts, excessive intraoperative maneuvering during nucleus management can cause damage to the corneal endothelium leading to striate keratopathy. All the 5 eyes recovered completely by 2 weeks postoperatively with medical therapy.

The final visual outcome achieved by our patients by 45 days postoperatively was good with 48 eyes (96%) attaining a best corrected visual acuity of 6/9 or better and 2 eyes (4%) attaining 6/12. These results are consistent with the findings of other studies where phacoemulsification was done for advanced white cataracts.[7,9,10]

Conclusions

In developing countries like India, a considerable percentage of the population neglect the visual impairment caused by early cataract and seek the help of an Ophthalmologist only when the cataract has reached an advanced and mature stage and the vision is totally lost. This section of the population also cannot afford modern surgical techniques like phacoemulsification. Our study has shown that MSICS is a safe and effective alternative for patients with advanced white cataracts, due to its low rates of intraoperative complications and easily treatable postoperative complications. The good postoperative visual outcomes achieved by our patients further adds on to its benefits as a good surgical technique.

It can be used in poor patients who cannot afford phacoemulsification or in those eyes where performing phacoemulsification carries a high risk of complications with good postoperative visual outcomes.

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