VOLUME-6 | ISSUE-1 | JANUARY-2017 • ISSN No 2277 - 8179 | IF : 3.508 | IC Value : 78.46

Manual small incision cataract surgery in eyes with mature and hypermature cataracts.

Ophthalmology

KEYWORDS: manual small incision cataract surgery , hypermature , mature , cataract, capsulorrhexis,

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ABSTRACT

Purpose: To assess the safety and efficacy of Manual Small Incision Cataract Surgery (MSICS) in cases of mature and hypermature cataracts . **Materials and Methods:** Prospective observational study on 100 eyes of patients with mature and hypermature cataract who had undergone MSICS .The nucleus was prolapsed into anterior chamber by using a sinskey hook and extracted out of the eye using irrigating vectis. Intraoperative and postoperative findings as well as postoperative visual outcomes were used as main measures to report the safety and efficacy of the surgery. **Results:** Of the 100 eyes, 64 had mature and 36 had hypermature cataract. Intraoperatively Continuous Curvilinear Capsulorrhexis(ccc) was incomplete in 3 eyes (3%) and had to be converted to canopener capsulotomy. None of the eyes had posterior capsular rupture or zonular dialysis and no eyes were converted to conventional Extra Capsular Cataract Extraction (ECCE). Postoperatively, 2 eyes (2%) developed corneal oedema with >10 Descemets folds and 1 eyes (1%) had corneal oedema with < 10 Descemets folds. Mild iritis was seen in 4 eyes (4%) and moderate iritis with fibrin membrane was seen in 2 eyes (2%). 97 patients (97%) had a best-corrected visual acuity of 6/9 or better on the 40th post-operative day. **Conclusion:** In developing countries like India where phacoemulsification may not be affordable to a majority of those requiring cataract surgery, MSICS proves to be a safe and efficacious alternative for mature and hypermature cataracts .

Introduction

Manual small incision cataract surgery (MSICS) has become popular in India in the last decade. Cataract is the leading cause of avoidable blindness in India,[1] and cataract surgery forms the major workload of most ophthalmic units in the country. An estimated 4 million people become blind because of cataract every year,[2] which is added to a backlog of 10 million operable cataracts in India, whereas only 5 million cataract surgeries are performed annually in the country.[3] Thus, a technique of cataract surgery that is not only safe and effective but also economical and easy for the majority of ophthalmologists to master is the need of the hour.

Majority of these patients are socioeconomically backward and cannot afford procedures such as phacoemulsification. Conventionally, in the last millenium Extra Capsular Cataract Extraction with Posterior Chamber Intraocular 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] This study reports the results of a prospective observational study done to assess the safety and efficacy of MSICS in white cataracts .

Patients and Methods

This study included 100 eyes of patients with white cataracts who had routine MSICS operated at Rajshree Medical Research Institute,Bareilly(U.P) between January to June 2016. The patients were operated at subsidised cost. Informed consent was taken from the patients. Ethical clearance was taken from the institutional ethics review board. Preoperative examination like detailed slit lamp examination, applanation tonometry, keratometry, A scan biometry and all routine pre-operative examinations were done one day prior to surgery. White cataracts were classified as mature or hypermature based on the appearance of the anterior capsule and nature of lens matter pre-operatively. A cataract with totally opaque lens matter and normal anterior chamber depth was considered mature. Hypermature cataracts had milky cortex or fibrous anterior capsule or both. The inclusion criteria included white cataracts with healthy endothelium (examined under high magnification using slit lamp) and without coexisting ocular pathology. Patient with small non-dilating pupil (< 5mm), pseudoexfoliation (examined by slit lamp) and diabetes were excluded from the study.

Surgical technique

After an adequate mydriasis with tropicamide 0.8% and phenylephrine 5%, a peribulbar block was administered. All surgeries were performed by a single surgeon . A superior rectus bridal suture was fixed. A fornix based conjunctival flap was created superiorly and haemostasis achieved with bipolar diathermy. A partial thickness 6 – 6.5mm frown shaped external scleral incision was made 2 mm behind the limbus. Scleral tunnel was constructed using a crescent knife and extended up to 1.0 mm into clear cornea. Additional paracentesis was made at 10'o clock position using a paracentesis knife . Through the paracentesis, first an air bubble was injected to reform the anterior chamber and protect the endothelium, then 0.1 ml of 0.06% trypan blue was injected below the air bubble using a 26 g needle. After a few seconds the air bubble was removed by injecting viscoelastic through the paracentesis to attain a uniform staining of the anterior capsule. A 3.2mm keratome was used to access the anterior chamber and the internal corneal incision was extended for about 0.5mm more than the external scleral incision. The anterior chamber was deepened using a viscoelastic and a continuous curvilinear capsulorrhexis(CCC) of 5 – 6 mm was initiated and completed using a bent 26-gauge needle mounted on a viscoelastic syringe. In most of the cases of mature cataract, CCC was completed with a cystitome. 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 an utrata capsulorrhexis forceps. 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 irrigating vectis employing the principles of mechanical and hydrostatic pressure by pressing the posterior lip to open the valve for the exit of the nucleus. The cortex was washed using a simcoe cannula and a 6 mm optic PMMA PCIOL was implanted in the capsular bag inflated by viscoelastics. The viscoelastic material was replaced by a balanced salt solution 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. Types of cataract, intraoperative findings or postoperative complications were recorded both in the case records as well as in a standard proforma. Postoperatively, patients were examined on the 1st and 40th post-operative days. A high follow-up rate on Day 40 was achieved with a strong post-operative counselling

process in the hospital. On the 40th postoperative day, the complete ophthalmic examination included slit lamp examination, fundus examination and refraction.

Results

Intraoperative

Of the 100 patients operated there were 45 males and 55 females in the study(Table 2). The pre-operative vision for all patients were either HM (hand movements) or PL (perception of light). Surgery was done on 64 mature (64%) and 36 hypermature (36%) cataracts (Table 3). Capsulorhexis tear was converted to can-opener type of capsulotomy in 3 cases (3%). None of the eyes had posterior capsular rupture or zonular dialysis and no eyes were converted to conventional ECCE.

Postoperative

On the first postoperative day corneal oedema with Descemet's folds >10 developed in 2 eyes (2%), corneal oedema with Descemets folds <10 developed in 1 eyes (1%). Mild iritis was seen in 4 eyes (4%) and moderate iritis with fibrin membrane was seen in 2 eyes (2%) and all the eyes had PCIOL in the bag. An overall postoperative complication rate of 9% comprising those of varying degrees is reported (Table 4). All these complications were resolved before the patients were discharged. Patients without postoperative complications were discharged on the second postoperative day, and those with moderate iritis were discharged on the third postoperative day. On the 40th postoperative day, 97 patients (97%) had a Best Corrected Visual Acuity (BCVA) of 6/9 or better (Table 5). Considering Un Corrected Visual Acuity(UCVA) on Day 40, 96 patients (96%) presented themselves 6/9 or better against the 83 patients (83%) on Day 1.On Day 40, only one patient had BCVA of 6/24 due to Age Related Macular Degeneration(ARMD).

TABLE 1

Age groups(years)	Number of cases
<40	3
41-60	55
>60	42

TABLE 2

Sex	Number of cases
Male	45
Female	55

TABLE 3

Type of cataract	Number of cases
Mature	64
Hypermature	36

TABLE 4

Postoperative complications	Number of cases
Corneal edema(descemets fold>10)	2
Corneal edema(descemets fold<10)	1
Mild iritis(<50 cells)	4
Moderate iritis(>50 cells)	2
Total	9

TABLE 5

	UCVA(Day 1)	BCVA(Day 1)	UCVA(Day40)	BCVA(Day40)
6/6 – 6/9	83	90	96	97
6/12 – 6/18	15	9	3	2
6/24 – 6/60	1	1	1	1
<6/60	1			

In a developing nation like India, where cataract backlog is still a socioeconomic 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.[7,8,9]

Jacob et al reports a failure of CCC with adjunct use of trypan blue in 3.85% of eyes with white cataract.[10] This compares favourably with our results in three cases (3%). All those cataracts in which the CCC was converted to can-opener type were intumescent in nature. The incomplete CCC encountered was possibly due to increased intralenticular pressure. The challenge of performing CCC in white cataracts is well documented.[11] This is because of lack of red reflex, poor contrast between the anterior capsule and the underlying cortex, high intralenticular pressure in intumescent cataracts, leaking of lens matter from the anterior capsule puncture sites and the occasional presence of capsular fibrosis.

Postoperative corneal edema and potential corneal decompensation are common in poorly performed MSICS. The trial in Pune had nine (4.5%) cases of postoperative corneal edema on the first day in the phaco arm and four (2%) cases in the MSICS arm.[12] A series of white cataracts had 65 eyes with corneal edema of >10 descemets folds and 7% with corneal edema of <10 descemets folds.[13] In the Nepal study, both groups had an average increase in the central corneal thickness on the first day, but the MSICS group had less corneal edema (P = 0.0039).[14] The edema had decreased to 29 and 4 cases in the phacoemulsification and MSICS group, respectively, on the fifth day, and by the third month, it had returned to baseline in both groups. Most studies of MSICS report a transient corneal edema, which clears off by the first week,[12,15,16,17,18,19] but a series from Ghana had a single case (0.5%) of bullous keratopathy.[19] A clinical audit of more than 8000 cataract surgeries done in Pune had found 12 cases of corneal decompensation, all of which were due to MSICS.[20] However they were performed by surgeons in the learning phase of MSICS. In our study corneal edema with descemets fold greater than 10 were present in 2% of cases and with descemet fold less than 10 was present in 1% of cases. MSICS should be done with caution in very old patients, those with very hard cataracts, and those with not so clear corneas.[4,18,20] The MSICS involves touching the iris at some point of time. This may lead to higher incidence of postoperative iritis and cystoid macular edema.[9,13] Nevertheless, the studies so far have not shown any diff erence or increase in these complications.[12,21,22] The series from south India had mild iritis in 6% and moderate iritis in 3% in the first postoperative week.[13] In our study mild iritis was reported in 4(4%) cases, moderate iritis in 2(2%) cases. Final visual outcome on the 40th postoperative day was satisfactory, with 97% of patients having BCVA of 6/9 or better. It compares favourably with other studies on white cataracts.[10,11]

Conclusion: In developing countries like India where phacoemulsification may not be affordable to a majority of those requiring cataract surgery, MSICS proves to be a safe and efficacious alternative for white cataracts. MICS is a faster and less expensive technique for addressing the large and growing backlog of blinding cataracts in developing world.

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VOLUME-6 | ISSUE-1 | JANUARY-2017 • ISSN No 2277 - 8179 | IF : 3.508 | IC Value : 78.46

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