CATARACT SESSION - IV

Chairman : Dr. Arun Kabra, Co-Chairman: Dr. T.P. Lahane
Convenor: Dr. Kumar J. Doctor, Co-Convenor: Dr. Reyaz Hassan, Moderator: Dr. Arvind Kumar Jaiswal

AUTHOR'S PROFILE:
Dr. HARIPRIYA ARAVIND: M.B.B.S. ('97), Sri Ramachandra Medical College, MGR Medical University; M.S. (2001), Aravind Eye Hospital , MGR Medical university. Presently, Chief, Cataract and IOL Services, Aravind Eye Hospital, Madurai.
Contact: 9442643561, *E-mail*: haripriya@aravind.org.

Iris Sutured Posterior Chamber IOLs: Indications, Technique, Complications and Outcome

Dr. Haripriya Aravind, Dr. Anand Dev, Dr. Aravind Srinivasan
(Presenting Author: Dr. Haripriya Aravind)

Implantation of intraocular lens has become the standard of care after cataract surgery. Ideally lens is placed in the capsular bag which affords stable fixation at a position closer to the nodal point of the eye; however there will always be instances where this will not be possible. Trauma, surgical complication and congenital zonular weakness are some such examples. In this article, we review the technique employed to allow IOL implantation in the presence of inadequate capsular or zonular support and to secure a displaced IOL using fixation suture. The purpose was to evaluate indications, technique, surgical and postoperative complications and visual outcome of iris sutured posterior chamber intraocular lenses.

Materials and Methods

17 eyes of 17 patients with iris sutured PC IOLs were prospectively reviewed. Evaluation included patient demographics, preoperative vision, indication, surgical technique and visual outcome. The preoperative evaluation included age of the patient at the time of treatment, unaided and best corrected visual acuity, Slitlamp examination (cornea, A/C reaction, iris/ pupillary margin, presence or absence of capsule, presence or absence of zonular weakness, presence or absence of vitreous), intra ocular pressure, fundus evaluation, IOL power calculation, USG/ UBM when ever indicated. Iris suturing was done either in phakic or aphakic eyes or eyes with decentered IOL. Either one or both haptics were sutured to the iris depending on the amount and site of capsular and zonular stability. 9-0 prolene sutured on long straight needle was used. The needle was bent slightly at the centre prior to using it. Postoperatively patients were examined on one day, one month and three months postop.

Results

Indications were ectopia lentis (2), decentered IOL(5), traumatic subluxation (1), aphakia without capsular support (3), pseudo-exfoliation with cataract (2), hypermature cataract (3) and intraoperative PC rupture (1). 13 eyes needed fixation of both haptics, while 4 needed one. All but one had good centration. Fibrinous uveitis and CME were present in 2 eyes each. 13 had visual acuity of >6/9.

Discussion

Study included 17 eyes of 17 patients who underwent iris fixation IOL either as a primary procedure or as secondary procedure for various indications as mentioned before. The mean age group was 25 to 60 years. Iris fixation of IOL may be more technically demanding than implanting an ACIOL or transscleral fixation in eyes with compromised capsular support or zonular weakness. Advantages include possible reduced risk of corneal endothelial damage when compared to ACIOL and decreased possibilities of late suture breakage and suture related endophthalmitis when compared to scleral fixated IOL. This technique of iris fixation of PCIOL may diminish the possibility of dislocation of PCIOL and decentration. In the current study decentration occurred in one case with zonular dialysis, where only one haptic was sutured. Here, secondary suturing of the second haptic provided good centration. The patient had BCVA of 6/12. The most common postoperative complication in our study was mild to moderate iritis in most patients which resolved with treatment. Only two patients developed severe iritis with fibrinous membrane which resolved with treatment. Many patients had mild transient corneal edema on first post operative day with clear cornea on first postoperative visit. The prerequisite for iris fixation of PCIOL is the need for intact iris diaphragm. It is technically more demanding but provides good outcome in cases where there is inadequate capsule and/or zonular support.

Shallow Anterior Chamber Depth as A Risk Factor For Complication During Cataract Surgery In Eyes With Pseudoexfoliation

Dr. Amjad Salman, Dr. Pragya Parmar, Dr. Vineetha Rachel Philip, Dr. P. A. Thomas, Dr. C. A. Nelson Jesudasan
(Presenting Author: Dr. Amjad Salman)

The aim was to determine whether a shallow anterior chamber is a risk factor for complications during cataract surgery on eyes with pseudoexfoliation.

Materials and Methods

This was a prospective randomized clinical trial conducted at the Institute of Ophthalmology, Joseph Eye Hospital, Tiruchirapalli, India, between January and December 2004. The institutional review board approved the study and informed consent was obtained from all patients. All eyes with pseudoexfoliation undergoing phacoemul-sification by a single, experienced surgeon were included in the study. Exclusion criteria were presence of obvious subluxation or dislocation of the lens, associated open or closed angle glaucoma and prior intraocular surgery. All patients underwent a comprehensive dilated ophthalmological examination. Preoperative biometry was performed using a noncontact technique with a gain of 60 dB and with the patient in a supine position. At least 10 readings from each eye were taken. The mean axial length, anterior chamber depth and lens thickness for the eye was noted. Phacoemulsification was done using a 3.2 mm superior scleral tunnel incision with the divide and conquer technique and a foldable posterior chamber intraocular lens was inserted into the capsular bag. Mechanical stretching or sphincterotomies were used to dilate pupils. The occurrence of an intraoperative complication (defined as zonular dialysis and or vitreous loss) was recorded. Eyes without pseudoexfoliation undergoing Phaco by the same surgeon during this period were included in the

control group. The number of control eyes was chosen preoperatively to match the number of study eyes in each day's operating list. These eyes underwent biometry as described earlier and underwent PE using the surgical technique described. Intraoperative complications were again documented and managed as mentioned for the study eyes. Mean axial length, anterior chamber depth and lens thickness in eyes with and without intraoperative complications in the study and control groups were compared. The students 't' test was used for statistical analysis. The relative risk for intraoperative complications when the anterior chamber depth was < 2.5 mm was calculated for pseudoexfoliation eyes.

Results

115 eyes of 115 patients with pseudoexfoliation syndrome were included in the study group. Similarly, 115 eyes of 115 patients without pseudoexfoliation were included as controls. Preoperative demographic and biometric data in both groups are shown in Table 1. Mean age and the number of males were significantly higher in the pseudoexfoliation group than the control group. Although the overall axial length in both groups was similar, the anterior chamber was significantly shallower (P=0.000) and the lens was significantly thicker (P= 0.009) in eyes with pseudoexfoliation when compared to eyes without pseudoexfoliation. Nine eyes (7.8%) in the study group and 4 eyes (3.5%) in the control group had intraoperative complications. This difference was not statistically significant (P = 0.16, $\div^2$ test). Table 2 compares preoperative biometric data in eyes with and without intraoperative complications in the study and control groups. Eyes with pseudoexfoliation that suffered an intraoperative complication tended to have a significantly shallower anterior chamber than eyes that had no complications (P=0.013). No such relationship was evident with the axial length or lens thickness. Eyes in the control group showed no significant difference in biometric data between eyes with and without intraoperative complications. Table 3 compares the relative risk for intraoperative complications in pseudo-exfoliation eyes with an anterior chamber depth of < 2.5 mm.

Discussion

Fragile zonules are one of the main factors that predispose eyes with pseudoexfoliation to zonular dialysis and vitreous loss during cataract surgery. However, zonular weakness may not necessarily occur in all eyes with pseudoexfoliation. Electron microscopic studies have found a normal and intact zonular complex with an easily removable coating of pseudoexfoliation material in some eyes Other studies have found impaired anchorage of the zonular fibres in the defective basement membranes of the ciliary body and lens. Zonular weakness has been show to lead to forward movement of the lens with shallowing of the anterior chamber in conditions such as trauma. In eyes with pseudoexfoliation where the zonules are fragile, a similar anterior movement of the lens with shallowing of the anterior chamber may occur. We found anterior chamber depth to be significantly shallower in eyes with pseudoexfoliation when compared to eyes in the control group. In our study, this could be partly related to the fact that the patients with pseudoexfoliation were older and could thus have had an age-related increase in lens thickness. Other studies have, however, found a shallower anterior chamber in eyes with pseudoexfoliation compared to age and gender matched eyes without pseudoexfoliation despite an overall similarly in axial length. This could indicate a tendency for forward shifting of the lens -iris diaphragm in eyes with pseudoexfoliation due to comparatively weaker zonules. We believe that in eyes with pseudo-exfoliation, shallowing of the anterior chamber depth is indicative of increasing zonular fragility. Thus, pseudoexfoliation eyes with a shallow

Table-1: Preoperative biometry and demographic data in the study and control groups

Characteristic	Pseudoexfoliation groupn = 115	Control Group n = 115	Statistical significance
Mean age ± SD	66.35 ± 7.6	58,48 ± 8.8	p = 0.000
Sex distribution (male: female)	73:42	59 : 56	p = 0.006
Biometric data			
Mean axial length (mm) ± SD	22.21 ± 2.0	22.34 ± 2.1	p = 0.63
Mean anterior chamber depth (mm) ± SD	2.52 ± 0.42	3.01 ± 0.50	p = 0.000
Mean lens thickness (mm) ± SD	4.51 ± 1.0	4.21 ± 0.60	p = 0.009

Table-2: Biometric data in eyes with and without intraoperative complications†

Biometric data	PXF eyes without intraoperative complications n = 105	PXF eyes with intraoperative complications n = 9	Statistical significance	Control eyes without intraoperative complications n = 111	Control eyes intraoperative complications n = 4	Statistical significance
Mean axial length (mm) ±SD	22.20 ± 2.9	22.38 ± 0.91	p = 0.595	22.32 ± 2.93	22.95 ± 0.53	p = 0.073
Mean anterior chamber depth (mm) ± SD	2.56 ± 0.41	2.21 ± 0.40	p = 0.013	3.0 ± 0.51	3.3 ± 0.6	p = 0.060
Mean lens thickness (mm) ± SD	4.5 ± 1.1	4.58 ± 0.38	p = 0.60	4.22 ± 0.58	4.4 ± 0.4	p = 0.218

Table-3: Relative risk of intraoperative complications in eyes with pseudoexfoliation with an anterior chamber depth < 2.5 mm

	Number (%) of eyes with intraoperative complications with AC depth <2.5 mm	Number (%) of eyes with intraoperative complications with AC depth >2.5 mm	Relative risk (95% confidence interval) of intraoperative complications when AC depth <2.5 mm
Pseudoexfoliation eyes	7 (15.9%)	2 (2.8%)	6.52 (4.3 – 11.0)

anterior chamber are at increased risk of complications. Despite the limited number of complications in our series, we were able to clearly show that the anterior chamber depth tended to be significantly shallower in pseudoexfoliation eyes with intraoperative complications than in eyes without complication. One large study of eyes with pseudoexfoliation undergoing phacoemulsification also found that eyes with zonular dialysis or vitreous loss had a shallower anterior chamber than those with uncomplicated surgery. Presence of a shallow anterior chamber alone in the absence of zonular fragility does not seem to affect the rate of intraoperative complications as was seen in the control group. Several studies document that PE is safe in eyes with pseudoexfoliation. The relative risk for intraoperative complications was higher for eyes undergoing PE when the anterior chamber was < 2.5 mm in depth. It is possible that the zonular stress caused by maneouvers such as sculpting and cracking of nucleus, while easily borne by healthy zonules, causes breakage of the fragile zonules that occur in pseudoexfoliation eyes with a shallow anterior chamber. In conclusion, intraoperative complications such as zonular dialysis and / or vitreous loss are significantly more likely to occur in eyes with pseudoexfoliation with a shallow anterior chamber.

AUTHOR'S PROFILE:
Dr. SHIBU VARKEY: M.B.B.S. ('93), Government Medical College, Kottayam, Kerala; M.S. (2000), Dr. MGR Medical University, Chennai, Tamil Nadu. DNB (2001), FRCS (2003). Registrar, Institute of Ophthalmology, Tiruchirapalli, 2002-05, Gold Medal for M.S. Presently, Director (Academics and Research) Vasan eyecare Group, Tiruchirapalli.
Contact: 9443141424, *E-mail:* varkeyshibu@yahoo.com

A New Technique for Iridodialysis Repair in Manual SICS

Dr. Shibu Varkey, Dr. Shaju Asokan M., Dr. Roche Arockiaraj S.,
Dr. R. Srinivasan, Dr. A. M. Arun
(Presenting Author: Dr. Shibu Varkey)

The aim was to describe the technique and results of modified procedure to repair iridodialysis in manual small incision cataract surgery.

Materials and Methods

10 eyes of 10 patients who suffered iridodialysis during manual small incision cataract surgery were repaired by this method and the results were followed up over a period of 6 months. All patients underwent small incision cataract surgery through a 6 mm scleral tunnel, by sandwich technique. 6 were male patients and 4 were female patients. 5 of the patients had a grade 4 nuclear cataract, 4 were mature cortical cataracts and 1 was senile immature cataract. 4 patients had pseudoexfoliation at the pupillary margin with poor mydriasis, 5 patients had broad arcus senilis, and 1 patient had a paracentral leucomatous corneal opacity. 8 patients were operated on by trainee surgeons and 2 by consultant surgeons. 3 patients had iridodialysis of 180 degrees, while the other 7 patients had iridodialysis of 2 clock hours. In 7 patients the irdodialysis occurred between 4'0 clock and 7'0 clock positions. In all the cases the iridodialysis occured during the delivery of the nucleus from the anterior chamber using vectis and lens hook by sandwich technique. All the cases had hyphema associated with the iridodialysis. Immediately on recognizing the iridodialysis the procedure was aborted. The chamber was filled with viscoelastic and air and time was allowed for the bleeding to arrest. After achieving hemostasis the chamber was washed by gentle irrigation and aspiration to clear all the clots and iris pigments along with the viscoelastic. Fresh high density viscoelastic was used to form the chamber and after the extent of damage was assessed the nucleus delivery was completed in cases where it had not been done. Cortical cleanup was done and a posterior chamber IOL was placed in the bag. Keeping the chamber well formed a bridle suture was taken through the inferior rectus muscle. Conjuctiva was opened at the points were repair was intended, making limbal based flaps. After mild cautery a 2.8 mm keratome was used to make a tunnel entry into anterior chamber starting 1 mm posterior to the limbus. A Mcphersons forceps was used to grasp the torn edge of the iris and bring it into the tunnel. A 10-0 prolene suture was passed through the torn edge, the iris tissue is pushed back into the anterior chamber and the suture is tied to the floor of the tunnel the knot being inside the tunnel. The scleral tunnel was closed separately using 10-0 nylon suture and the conjuctiva was closed either with suture or with electrocautery. Viscoelastic and debris were washed out the chamber formed and pupil constricted using intracameral pilocarpine.

Results

10 eyes of 10 patients were repaired using the modified technique. The only preoperative complication encountered in the repair procedure was bleeding from the incision site in two patients. Immediate postoperative complications included hyphema in 1 case (10%), raised IOP requiring postoperative anti-glaucoma medication in 3 cases (30%) and

anterior chamber reaction of grade 3 cells and flare in 3 eyes (30%). All cases had round and centered pupils with stable implants at 6 months follow up. At 6 months follow up 3 patients (30%) had UCVA of 6/9 and above 6 patients (60%) had UCVA of 6/18 and 1 patient (10%) had UCVA of 6/36. All patients (100%) had BCVA of 6/12 and above. Astigmatism of 2.5D was seen in 3 patients (30%) all other patients (70%) had astigmatism below 1.5 D. None of the patients needed any anti-glaucoma medication at 6 months follow up. Regarding patient comfort and quality of vision, 2 patients (20%) had glare at night when looking at bright lights; all the other patients were extremely comfortable and satisfied with the quality of vision. None of the patients complained of symptoms like monocular diplopia. There were no cases of vitreous hemorrhage or of retinal or choroidal detachments.

Discussion

Iridodialysis has been recognized as a definite clinical entity and its repair has been described as way back as 1933 by Ben Wit Key et al in the Trans American Ophthalmological society 1933 vol 31. Iridodialysis can occur due to blunt or penetrating trauma, and also as a surgical complication. With the advent of manual small incision cataract surgery the incidence of this complication has increased mainly in those employing the sandwich technique. The complication occurs as a result of the pupillary margin getting trapped between the nucleus and the vectis. It is mostly the inferior pupillary margin which gets trapped and more so in cases with poor mydriasis. The classical repair of iridodialysis is by iridencleisis for small dialyses and direct suturing of large dialyses. The basic idea however is to anchor the iris to the sclera using sutures and then destroying the exposed iris using diathermy after a week or so. Various surgeons have provided their own modifications of the procedure, like Key's technique, Callahan's technique, Safar's technique etc, all with minor modifications of the basic principle though. In our study the main modification was the use of a scleral tunnel, thus keeping the iris tissue intraocular without any incarceration into the sclera. This technique helps in preventing externalisation of intraocular tissue, which in turn prevents hosts of other complications like wick syndrome and intraocular epitheliasation. The risk of sympathetic ophthalmitis is also considerably reduced with our technique. In our study the preoperative and postoperative complications were minimal and responded well to treatment. However no other similar studies were available for comparing our complications and our outcome. Iridodialysis mainly of the inferior iris has been associated with sandwich technique of manual small incision cataract surgery. It can be avoided by ensuring very good mydriasis and confirming the absence of pupil entrapment before attempting nucleus delivery from anterior chamber. Our modified technique is easy to perform and provides good functional and cosmetic results, with negligible complications over long term followup.

Why do Phacoemulsification? Manual Small Incision Cataract Surgery is Almost as Effective but more Economical

Dr. Parikshit Gogate, Prof. (Col.) Madan Deshpande, Dr. Praveen K. Nirmalan, Dr. Rahul D. Deshpande
(Presenting Author: Prof. (Col.) Madan Deshpande)

A large backlog of cataract blindness exists in the developing world and cataract is still the most common cause of avoidable blindness[1]. An estimated 4 million people develop blinding cataract[2] every year in India. Researchers estimate that cataract annually causes a loss of US$ 4.4 billion to India in terms of loss of workdays of the patients and their caretakers, the cumulative loss for the entire lifespan of the patient being US$ 22.2 billion[3].

On the other hand the cost of tackling cataract blindness is US$ 0.15 billion[3]. A randomized trial in the United Kingdom (UK)[4] found phaco to be more effective and economical than conventional extracapsular cataract surgery (ECCE).

A study done in India found SICS to be more effective[5] than ECCE , and more economical[6]. The SICS is done without the phaco machine. All the three techniques need a posterior chamber intraocular lens (PCIOL) for better visual rehabilitation. This study compares the average cost of phaco and SICS cataract surgery in a hospital based setting.

Materials and Methods

A single masked randomized control trial was used to compare the safety and efficacy of manual small incision cataract surgery (SICS) with phacoemulcification (phaco)[7]. In both the techniques a posterior chamber intraocular lens was implanted (PCIOL). The details of ethical considerations, sample size calculations, surgical techniques, randomization, masking preoperative and postoperative visual acuity results and complications are discussed elsewhere[7]. In the current manuscript we focus on the cost of these procedures. The average cost was calculated by standard methods[8]; the building, equipment and instruments cost was calculated as depriciation and added to the human resource cost, hospital mantainance cost and consumable cost. Average cost per procedure was calculated by the total cost divided with the number of procedures performed. Both the techniques had a common expenditure for fixed facility hospital building, equipment, hospital and office maintenance and personnel medical, paramedic and administrative. The cost of fixed facility was calculated from the annual audit report of the hospital. The preoperative and postoperative protocol were exactly the same for both the techniques. The total time that a surgeon took for surgery was recorded using a stopwatch in minutes and seconds. The time was calculated from the time the patient was draped for surgery to the time the drapes were taken off. The average personnel cost for each procedure was calculated using the time required to perform it. In a high quality high volume surgical setting, each trained experienced ophthalmologist performs numerous cataract surgeries in quick succession. This allows optimum use of human resource and consumables, as they are used for more than one surgery and saves time and money. Upto a dozen or more surgeries may be performed on a single operative microscope with trolley. Each operation trolley (with the scrub nurse) was allocated a fixed number of consumables. Any more needed or those not used during the surgery list were noted along with the numbers of surgeries performed. Some items were used for multiple surgeries (ointment, dilating eye drops, viscoelastic, blades- and sutures after sterilization). The consumable cost was calculated by finding out the number of surgeries one unit of the material was used for (x), and then dividing the cost of that unit by the number of surgeries used for (x) to calculated the average cost of that material for one surgery.

Results

The fixed facility cost included hospital maintenance, office maintenance, medical, paramedic and administrative staff salary and the depreciation on the hospital building, furniture, equipment and other instruments.

Hospital maintenance included expenditure on electricity, water, cleaning, vehicle fuel, generator fuel, laboratory, garden, painting, canteen, uniforms, etc. The office maintainence included cost of printing stationary, postage, photocopying, telephone, etc. The depreciation was calculated on amount spent for hospital building, vehicle, furniture, equipment (including phaco machine) and instrumentations. The total cost for the fixed facility was divided by 17,000, the total number of cataract surgeries perfomed in that year. The average cost per procedure for the fixed facility was Rs. 755.2 ($16.07). The average time for small incision surgery for 8 min. 35 sec. while for phaco it was 15 min. 30 seconds. The cost for the consumables was Rs 1206.8 ($25.68) for phaco and Rs. 220.3 ($4.69) for small

incision. The Indian made hydrophilic acrylic foldable lens cost Rs. 1100 ($23.40) while the Indian made polymethy methacrylate (PMMA) rigid lens cost Rs. 120 ($2.55). The cost of phaco machine was added as depriciation of the phaco cost (Rs. 280 000 annually), its annual maintenance contract (Rs. 70 000) and the replenishment of tips and other accessories (Rs. 29 890). This was used for 1400 phaco surgeries. The additional cost per procedure for the use of phaco machine was Rs. 271.4($5.77). The average cost per procedure for phaco was Rs. 2233.5 ($47.52) and for small incision it was Rs. 975.65 ($20.75). If the consumables were to be used only once, then the cost of consumables for both the procedures would be higher, Rs 2490 ($53.0) for phaco and Rs.1330 ($28.3) for small incision and the final average cost would be Rs. 3516.6 ($74.8) for phaco and Rs. 2085.2 ($44.4) for small incision.

Discussion

The randomised trial in Pune, India[7] showed small incision to be almost as effective as phaco and equally safe. The difference in uncorrected visual acuity at six weeks was small (81.1% of phaco > = 6/18 without spectacle correction as compared to 71.1% in small incision). But cost of small incision is substantially lower ($20.13 versus $45.57 for phaco). Phaco needed more costly consumables (the foldable intraocular lens) and the cost for purchase and maintainance of the machine. Reuse of consumables also accounted for the lower cost in small incision. This was possible in a high quality high volume setting only. If the consumables were to be used only once, then the cost of consumables for both the procedures would be higher, Rs 2490 ($53.0) for phaco and Rs.1330 ($28.3) for small incision, and the final average cost would be Rs. 3516.6 ($ 74.8) for phaco and Rs. 2085.2 ($44.4) for small incision. The major difference in the cost is due to the price difference of the intraocular lens used. The Indian made hydrophilic acrylic lens cost Rs.1100 ($23.4). A sharp edge silicone lens would cost around Rs.3500 ($74.5) while the hydrophobic acrylic foldable lens (Alcon acrysof) would cost more than Rs.4800 ($102.1). An Indian made square edge poly-methyl methacrylate (PMMA) lens would cost around Rs. 400 ($8.5). All these lenses would reduce the incidence of posterior capsular opacification, but would substantially add to the cost of the procedure. The difference in astigmatism between the two techniques is due to the size of the incision. If PMMA lens is used in phaco then the cost will be closer to SICS, but the difference in astigmatism would also disappear. So even if the intra-ocular lens cost is the main price differential between phacoemulcification with foldable lens and manual small incision cataract surgery, the lesser size of incision is the rationale for doing phaco and the reason for it's better uncorrected visual acuity results. If PMMA lens is used in phaco, the cost would be closer to manual SICS, but so would be the degree of astigmatism. The cost for small incision at $ 20.75 was marginally more than the cost in the same institute in a similar study in 2003[6]. The cost of phaco is much less than the cost calculated during a randomized trial in the UK[4] in 2001, but that was in a developed country setting while this study was done in a third world setting. The cost findings compare with findings of Singh et.al in Indian setting[17]. A single case of phaco (1/200) in the randomised trial[7] had dropped nucleus and the patient was managed by referral to a vitreoretinal clinic and subsequent intervention. The patient had final visual acuity as 6/24. The cost of managing this complication was Rs. 14,445 ($ 307.3). This worked out to be Rs.72.2 ($1.5) per surgery on an average. The incidence of retained cortex and iritis was the same for both techniques. As the follow-up results were for six weeks, there was no posterior capsular opacification which would need laser capsulotomy. The small difference in uncorrected visual acuity may make the use of spectacle correction optional for phaco, as many phaco patients would not need spectacles and others would have smaller cylindrical errors. The average time for small incision surgery was 8 min 35 sec while for phaco it was 15 min 30 seconds. So in a busy facility, a surgeon would be capable of handling higher volumes with SICS. So the personnel costs for phaco would be higher.

Phaco needs longer training and is performed by more experienced (and better paid) surgeons in the hospital. Also surgeons find it easier to switch from conventional extracapsular surgery to SICS rather than phaco. The learning curves for phaco are also steeper. The personnel cost in phaco is likely to be much higher than small incision due to increased surgeon time and higher salaties and would increase the cost difference in both techniques. The cost and the availability of the phaco machine, it's maintainance, replenishment of accessories and need for trained phaco surgeons would make SICS the technique of choice wherever any one of these factors are not available.

References

1. Thylefors B, Negrel AD, Pararajasegram R, et al. Global data on blindness. *Bull World Health Organisation* 1996;74:319-41.
2. Minasian DC, Mehera V. 3.8 million blinded by cataract each year: projections of the first epidemiological study of incidence of cataract blindness in India. *Br J Ophthalmology* 1990;74: 341-43.
3. Shamanna BR, Dandona L, Rao GN et al., Economic burden of blindness in India. *Ind J Ophthalmology* 1998;46:169-72.
4. Minassian DC, Rosen P, Dart JKG, Reidy A, Desai P, Sidhu M., Extracapsular cataract extraction compared with small incision surgery by phacoemulcification: a randomised trial. *Br J Ophthalmology* 2001;85:822-29.
5. Gogate PM, Wormald RP, Deshpande M, Deshpande R, Kulkarni SR., Extracapsular cataract surgery compared with manual small incision cataract surgery in community eye care setting in Western India: a randomized controlled trial. *Br J Ophthalmology* 2003;87:673-79.
6. Gogate PM, Wormald RP, Deshpande M. Is manual small incision cataract surgery affordable in the developing countries? A cost comparison with extracapsular cataract extraction. *Br J Ophthalmology* 2003;87:841-44.
7. Gogate PM, Kulkarni SR, Krishnaiah S, Deshpande RD, Joshi SA, Palimkar A, Deshpande M. Safety and efficacy of phacoemulcification compared with manual small incision cataract surgery by a randomized controlled clinical trial: six weeks results. *Ophthalmology* 2005;112:869-74.
8. Drummond MF, Jefferson TO. Guidelines for authors and peer reviewers of economic submission to the BMJ. *BMJ* 1996;313:275-83.

AUTHOR'S PROFILE:
Dr. (LT. COL.) SHANTANU MUKHERJI: M.B.B.S. ('93), Armed Forces Medical College, Pune; M.S., AFMC, Pune University. Presently, Graded Specialist (Ophthal) Military Hospital, Shillong-793001, Meghalaya.
Contact: 09436313045, *E-mail:* eyeshanty@yahoo.co.uk

Temporal SICS: Practical Advantages and Great Results at Low Cost – Our Experience

Dr. (Lt. Col.) Shantanu Mukherji, Dr. (Col.) Arpettu Prabhakara Kamath, Dr. (Col.) J.K.S. Parihar, Dr. (Lt. Col.) Sandepan Bandyopadhyay
(Presenting Author: Dr. (Lt. Col.) Shantanu Mukherji)

Manual SICS has emerged as a popular technique in the last decade and in India it has been possible to deliver quality surgery to the masses for costs as less as 15$, inclusive of the IOL.[1] The ultimate goal of modern cataract surgery is to achieve minimal postop astigmatism. The temporal approach to cataract surgery has many anatomical and practical advantages.

The aim was to evaluate the advantages of temporal SICS and to compare the visual outcome with superior approach SICS.

Materials and Methods

This study included 882 eyes having cataract of varied maturity – the nuclear sclerosis

(NS) ranging from grade I to hypermature cataracts. All of these cases underwent Manual Small Incision Cataract Surgery (MSICS). The aetiopathology of the cataracts were as follows: senile cataract (868), complicated cataract (12) and traumatic (02). Excluded from the study were lenticular subluxation, poorly dilating pupil, corneal pathologies and decompensation, doubtful zonular integrity due to pseudoexfoliation, advanced glaucoma and patients requiring additional filtering surgery, severe retinal pathology and single viable eye patients. Preoperative and 1 month post-operative keratometry was performed on all patients and the inclusion criteria was keratometric astigmatism of either 'with the rule' (WTR-vertical steepening) or 'against the rule' (ATR-horizontal steepening) of at least 0·5D. 612 eyes (70.18%) had ATR astigmatism while 270 (30.61%) had WTR astigmatism. Eyes with the mean age of the patients was 58.8 years, the youngest being 26 years and the oldest 76 years. There were 378 female (42.85%) and 504 male (57.14%) patients (total 882 cases).

Patients were screened and underwent work up before surgery as follows which included preop evaluation consisted of Uncorrected Visual Acuity (UCVA), ocular examination, tonometry, keratometry and A-scan. Routine investigations required for surgery under local anaesthesia were carried out. At the hospital, patients were screened on the first day and then taken up for surgery on the subsequent day. Complications were categorized into Intraoperative and Postoperative and graded according to system devised by the Oxford Cataract Treatment and Evaluation Team (OCTET)[2]. Preop, intraop and postop clinical data were recorded on a formatted case sheet for all patients. All the patients were treated free of cost. This included cost of all medications as well as surgery. An expense incurred per patient was calculated by dividing the funds received by the number of surgeries done. Lastly, the operating surgeons were asked to comment on the two types of surgical procedures (Temporal Vs Superior approach) with respect to operative practicality and future preferences.

Table-1: Distribution table for ATR (Temporal) and WTR (Superior) groups:

Total n=882 (100%)	ATR n=612 (70.18%)	WTR n= 270 (30.61%)
Males n=504 (57.14%)	384	120
Females n=378 (42.85%)	228	150

Results

A total of 882 eyes were operated for cataract by manual suture less small incision surgery. 612 eyes were operated by temporal approach and 270 eyes by superior approach. The criteria for selecting the site of incision was pre-operative keratometry evaluation namely, 'ATR' astigmatism for temporal incision and 'WTR' incision for superior incision. For calculation purpose, keratometry was undertaken one month postop along with refraction. Amplitude of pre and postop astigmatism was calculated from the difference in the K values of steeper and flatter meridian. A vector equal to the magnitude of astigmatism (in dioptre) towards the steeper meridian was considered. For the temporal SICS group, out of a total of 612 eyes operated- 555 eyes were analysed (54 cases were lost to follow up; 03 cases were aphakes due to intraop complication). Likewise, for the superior SICS group, 250 out of a total of 270 eyes

Visual Acuity	UCVA		BCVA	
	Temporal n=555	Superior n=250	Temporal	Superior
6/6 – 6/18	492 (88.64%)	189 (75.6%)	548 (98.73%)	245
6/24-6/60	51 (9.18%)	54 (21.6%)	05	04
< 6/60	12 (2.16%)	07 (2.8%)	02	01

were analysed (19 lost to follow up and 01 aphakia). Preoperative and postoperative astigmatism data was analysed by converting the power and axis into Cartesian coordinates (x and y values) using Holladay's system.[3] Surgical induced refractive change at the anterior surface of the cornea was calculated for individual data from the Cartesian coordinates. The mean amplitude of preoperative astigmatism was about 0.6D for the 'WTR' group and 0.75D for the 'ATR' group. Amplitude of postop astigmatism was 1.30D ± 0.9 for 'WTR' (superior SICS) and 0.6D ± 0.47 for the 'ATR' group (temporal SICS). The amplitude of surgical induced refractive change was higher in the superior SICS gp. (1.22D ± 0.8) than in the temporal gp. (0.5D ± 0.42). Mean induced horizontal steepening for the superior SICS gp was 1.1D whereas vertical steepening for the temporal gp. was 0.52D. Visual acuity was categorised by the WHO guidelines as – good: 6/6- 6/18; moderate: 6/24-6/60; poor: < 6/60. Visual outcome of the two groups were similar except for the fact that the superior incision group had a higher distribution of UCVA in the moderate category (6/24-6/60) but improved by refractive correction. Distribution of intraoperative and post-operative complications were comparable and there was no significant difference between the two groups.

Complications	Temporal SICS	Superior SICS
Intraoperative PCR without vitreous loss PCR with vitreous loss zonular dialysis	12(1.96%)	05(1.85%)
Postoperative Transient corneal edema, Iritis, hyphema, optic capture, hypopyon	79(12.9%)	33(12.2%)

The operating surgeons gave a subjective evaluation and enumerated merits of temporal over superior incision which included deep seated eyes, narrow palpebral fissure, bridle suture, manipulation of the globe, drainage of intraocular fluids, incision of choice, induced astigmatism, theoretical advantage and insult to corneal endothelium.

Discussion

Technology and techniques have brought about advancements in ophthalmology over the past decades. Very few fields of medicine have seen as much development as in the field of cataract surgery lately. Despite all that modern technology has done, our greatest challenge today is the backlog of cataract blindness especially in developing countries[4,5] Manual SICS is an alternative surgery to phacoemulsification, especially useful during high volume surgical setting. The cost of surgery too, both overhead and recurring, turns out to be cheaper than phacosurgery. In our setting, the average cost of surgery by SICS was Rs 622/- (US $ 14 approx.), which included cost of PMMA IOL, eyedrops and other consumables. Whereas the cost of phacoemulsification surgery at our centre costs upwards from Rs 1500/-, depending upon the type of foldable IOL used. However, the induced astigmatism is higher than phacoemulsification due to the larger incision, but marginally so, and definitely not as high as induced by conventional extracapsular cataract surgery. In our study, MSICS done with a temporal and superior tunnel incision have been compared. The UCVA outcome was better in the temporal SICS group. This was achieved because of lesser surgical induced astigmatism. This compares favourably with a study by Gokhale NS & Sawhney S[6]. The complication rate was similar in both the groups and is similar to other SICS studies [7,8,9,10]. In conclusion, temporal approach MSICS has manifold advantages over superior SICS, with excellent visual outcome; It is the ideal surgery for camp and peripheral settings. Temporal SICS is an efficient and yet cheap procedure to tackle cataracts with minimal complications and is clearly the best way to use the scarcest and most precious asset of the eye care system- the cataract surgeon.[1]

References

1. Chang DF. Tackling the greatest challenge in cataract surgery. *Br. J. Ophthalmol* 2005; 89:1073-7.
2. Oxford Cataract Treatment and Evaluation Team. Use of grading system in evaluation of complications in a randomised controlled trial. *Br J Ophthalmol* 1986; 70:411-14.
3. Holladay JT, Dudeja DR, Koch DD. Evaluating and reporting astigmatism for individual and aggregate Data. *J Cataract Refract Surg* 1998;24:57-65.
4. World Health Organisation. Global initiative for the elimination of avoidable blindness, WHO fact sheet No.213, Geneva: WHO, Feb 2000.
5. Dandona R, Dandona L. Socioeconomic status and blindness. *Br J Ophthalmol* 2001;85:1484-88.
6. Gokhale NS, Sawhney S. Reduction in astigmatism in manual small incision cataract surgery through change of incision site. *Indian J Ophthalmol* 2005;53:201-3.
7. Venkatesh R, Muralikrishnan R et al. Outcomes of high volume cataract surgeries in a developing country. *Br J Ophthalmol* 2005;89:1079-83.
8. Natchiar G, Dabralkar T. Manual small incision suture less cataract surgery- an alternative technique to instrumental phacoemulsification. *Operative Techniques Cataract Refract Surg* 2000;3:161-70.
9. Gogate PM, Deshpande M, Wormald RP, et al. Extracapsular cataract surgery compared with manual small incision cataract surgery in community eye care setting in western India: a randomised controlled trial. *Br J Ophthalmol* 2003;87:667-72.
10. Balent LC, Narendran K, Patel S, et al. High volume sutureless intraocular lens surgery in a rural eye camp in India. *Ophthalmic Surg Lasers* 2001;32:446-55.

AUTHOR'S PROFILE:
Dr. RAJA DATTA: M.B.B.S. ('89), S.C.B. Medical College, Utkal University; M.S. ('94), M.P. Shah Medical College, Saurashtra University. Presently in Private Practice.
Address: B2, Maharani Mansion, 36, C. H. Area (Old), Jamshedpur-831001,
Contact: 09334614234. *E-mail:* drrajadatta@gmail.com

Efficacy of Newer Power Modalities Compared to Conventional Power Modalities

Dr. Raja Datta

The aim was to compare the efficacy of "torsional phacoenergy" with "the simultaneous use of neosonics with burst mode" and "continuous linear energy with pulse mode" in different grades of cataract .

Materials and Methods

In a prospective study three groups of 20 patients each, in the age group of 60 – 70 yrs., were formed, each group having equal number of patients with each grade of cataract from grade III-V. Individuals with ocular deformities and ocular diseases other than cataract were excluded. Stop and chop method was used for all the cases, to remove bias. In group I continuous linear energy was used for trenching, the phaco energy being set at 70%, vacuum at 25 mm of Hg. and asp. flow rate at 25cc / min. For fragment removal phaco energy was 60%, with pulse at 10 / sec., vacuum at 200 mm Hg. and asp. flow rate 32cc / min. In group II - burst mode with neosonics were used simultaneously for trenching and fragmentation. For trenching 70% energy, vacuum at 60 mm Hg., asp. flow rate at 38cc / min. , burst width of 25 ms, and neosonix with 80% amplitude were used. 60% energy, vacuum at 260 mm Hg., asp. flow rate of 38cc / min., burst width of 25 ms, and neosonix at 80% amplitude were used. In group III torsional phacoenergy was used for trenching as well as fragment removal. For trenching 70% amplitude in continuous mode, 60mm Hg of vacuum and 40cc / min. of asp. flow rate were used. For fragment removal 100% amplitude in continuous mode, 350mm Hg of

vacuum and 40cc / min of asp. flow rate were used. In all the groups the width of the trench, the speed of fragment removal and the followability of the fragments , the phaco time and the total surgical time were observed. Examination of the cornea with the slit lamp was done on the seventh post operative day for all cases , for corneal edema and Descemet's folds, and compared in the three groups.

Results

The mean age of the patients was 66 yrs. (SD 2.96). The trench in Group III was the widest. Trench in Group II were wider than Group I but slightly narrower than Group III . The speed of fragment removal and the followability of the nuclear fragments were best observed in Group III followed by Group II and Group I, respectively. The comparision of Phaco time in the various groups for the different grades of cataract are shown in Table-1. Corneal edema and Descemet's folds were grossly reduced in Group III patients when compared to Group II and Group I patients, especially for Grade V cataracts.

Table-1

Cataract	Phaco Time		
	Group I	Group II	Group III
Grade III	1.3 min ± 0.205	0.3 min ± 0.121	0.1 min ± 0.042
Grade IV	2.7 min ± 1.050	0.7 min ± 0.319	0.2 min ± 0.032
Grade V	5.2 min ± 1.331	1.6 min ± 0.405	0.7 min ± 0.229

The comparision of Total Surgical Time in the various groups for the different grades of cataract are shown in Table-2.

Table-2

Cataract	Phaco Time		
	Group I	Group II	Group III
Grade III	18.20 min ± 2.279	14.05 min ± 1.276	13.35 min ± 1.248
Grade IV	24.05 min ± 2.163	17.30 min ± 2.336	15.45 min ± 2.306
Grade V	30.30 min ± 2.532	20.30 min ± 2.269	17.05 min ± 2.345

Discussion

Significant reduction is marked in the phaco time especially for Grade IV and V cataracts when Group III was compared to Group II . A similar reduction in phaco time is also observed when Group II is compared to Group I. Significant reduction is marked in the total surgical time especially for Grade IV and V cataracts in Group III when compared to Group II and in Group II when compared to Group I. The followability of the nuclear fragments and the speed of fragment removal are better in Group II and III. These are possible because of Neosonics and burst mode in Group II patients and Torsional phacoenergy mode in group III patients. Neosonix is oscillation of the phaco tip (appreciated in angulated tips such as Kelman tip) for 2 degrees on either side at 100 Hz. Therefore, it enhances the followability, covers a larger area during fragment removal and assists in breaking the fragments with its mechanical energy. The oscillations also constantly reorients the nuclear segments at the tip, thus reducing the need for a second instrument. Burst mode allows maximization of fluidics by delivering the precise number of energy bursts appropriate for a given cataract. Torsional phaco is more efficient during sculpting because it is cutting with each side- to- side motion, not just the forward stroke. Moreover, the frequency, which is 32kHz,in this case, is effectively doubled, as each side-to-side stroke counts twice while it removes the lens material. So, we arrive at an equivalent of 64,000 cuts per second, thereby increasing the cutting strokes. Torsional stroke is side-to-side, so it shears the lens material and doesn't make it move away from the tip, therefore, there is a marked reduction in repulsion at the tip. The energy used is markedly reduced as there is very little wastage and chances of wound burn is reduced due to less production of heat from the wasted ultrasonic energy. Nucleus extraction is more effective with minimal use of ultrasound energy, using the newer power modalities. This minimises tissue damage, phaco time and the total surgical time significantly and is most beneficial in hard cataracts.

References

1. Jorge L. Allo MD, PhD – *Fluidics and Cataract Surgery* Ocular Surgery News – August 2004.
2. Noel Alpins, MD – *Fluidics and Cataract Surgery* Ocular Surgery News – August 2004.
3. I. Howard Fine, MD – *Fluidics in Phacosurgery* JSCRS – 2004;Vol. 30.
4. Richard L. Lindstorm MD – *Less Power Needed* JSCRS – 2004;Vol. 30.
5. Khiun F. Tija – *Improving Cataract Surgery Performances* - July 1, 2004.
6. Richard J. Mackool, MD – *Understanding the Physics of Torsional Phacoemulsification - Eye World* March 2006.

AUTHOR'S PROFILE:
Dr. LOKESH T.: M.B.B.S. ('99), Mysore Medical College; M.S. (2005), KIMS, Hubli. Fellowship in General Ophthalmology, Rotary Eye Hospital, Bangalore. Trained In Basic Course of Ophthalmic Diagnostics, LVPEI, Hyderabad. Completed Part-A FRCS**.** Presently, Working as Consultant at Rotary Eye Hospital, Bangalore.
Address: 208, 4th Stage, 4th Block, Basaveshwarnagar, Bangalore-560079. *Contact:* 9886100705, *E-mail:* drloki1@indiatimes.com

Panaromic View of Various Surgical Techniques in Posterior Polar Cataract

Dr. Lokesh T, Dr. P. Mohan, Dr. S.R. Mamatha
(Presenting Author: Dr. S.R. Mamatha)

The aim was to know the visual outcome using various surgical techniques in posterior polar cataracts.

Material and methods

120 cases of PPC who were included in the study were divided into 4 groups of 30 cases each. Group A patients underwent SICS with modified hydro procedures, Group B patients underwent phaco with conventional hydro procedures, Group C patients underwent phaco with modified hydro procedures and Group D patients underwent supra capsular phaco.

Results

The mean age was between 35 and 65 yrs. We did not notice any sex predominance in our study. Among the intra operative difficulties, completing the rhexis was the most common difficulty encountered and was seen in younger patients because of the elasticity of capsule. PC rent was seen in 5 cases of Group A and B, 3 cases of group C and D. however all cases had a PCIOL implantation. Visual acuity of 6/12-6/6 was seen in >80% of the cases in all groups.

Discussion

Posterior polar cataract commonly called, as PPC is a special type of congenital cataract that always affects the vision. It is present in visual axis in majority of the cases and is a well-circumscribed dense white lesion with a typical **o**nion whorl appearance. Cataract surgery in PPC is challenging because of several reasons, to mention a few are the younger age of manifestation, vision being affected from the beginning and most importantly the presence of congenital posterior capsular dehiscence (CPCD). Major fear during surgery is the risk of nucleus drop. Hence the aim of the operating surgeon is to prevent or delay the capsular rupture and placement of an IOL. Various types of surgeries have been described in PPC and several modifications have been done to enhance the visual outcome of surgery including SICS and phaco. Although defect in PC does not exist in all cases, it is better to be prepared for it rather than to dive for the lens when it is sinking. Surgery in PPC is challenging because of its association with CPCD. Modification in hydro procedures is mandatory. Even though there is a marginal difference between various techniques, modified hydro procedure with phaco is a better technique, as it is a much-controlled procedure.

AUTHOR'S PROFILE:
Dr. JOLLY ROHATGI: Working as a Professor of Ophthalmology at University College of Medical Sciences and associated with Guru Teg Bahadur Hospital, Delhi. Doing mainly anterior segment work with special interest in Glaucoma, Cataract, Lacrimal diseases and ocular manifestations of dematological disorders.
Address: 310, SFS, DDA Flats, Hauz Khas, New Delhi-110016; *Contact:* (011)26513522; *E-mai:* jollyrohatgi@gmail.com

Comparative Evaluation of 5mm And 7mm Inverted Vs Superior Scleral Incision Techniques in Manual Small Incision Cataract Surgery – A: Prospective Randomized Study

Dr. Jolly Rohatgi, Dr. V.P. Gupta, Dr. Dipsera Sangma
(Presenting Author: Dr. Jolly Rohatgi)

Modifications of the small incision manual ECCE technique have been described in the literature with an attempt to make it an easier and safer technique.[1,2,3,4] Although small incision surgeries are thought to induce less astigmatism and result in earlier and more stable refraction, differences in induced astigmatism have been found with different wound architecture and closure method.[5] Each technique claims to have some advantage over the other. Hence the present study was conducted using 5mm and 7mm inverted V superior scleral incisions and the outcomes measured included the ease of surgery, intra and postoperative complications, surgically induced astigmatism, and visual and patient rehabilitations.

Materials and Methods

A prospective randomized study was conducted on 30 patients each undergoing cataract surgery using 5mm and 7mm inverted V sutureless superior scleral incision (Manual SICS), under peribulbar anaesthesia. After making fomix based conjunctival flap, inverted V incisions were made. The apex of inverted V was 1.5 mm from the superior limbus while the ends of the two limbs of the inverted V were 4 mm from the superior limbus and the distance between the two ends of the limbs was 5mm and 7mm respectively, in the two groups. A sterile disposable metal cresent blade was used to create a tunnel first through the sclera starting at the inverted V incision, and then through the limbus, and finally into the clear cornea for another 1mm from 10-2 o'clock. Through a self sealing side port entry anterior capsulotomy was done by continuous curvilinear capsulorrhexis or canopener technique. A 3mm metal keratotome was used to enter the eye through the tunnel incision and the clear cornea into the anterior chamber, the internal wound was enlarged to 8-10 mm length approximately. Hydrodissection and hydrodelineation were performed. The prolapsed nucleus was engaged in the scleral tunnel, and was delivered out by irrigating vectis or hydropressure or assisted nuclear fragmentation (in 5mm group). The epinuclear shell and the lens cortex were removed and IOL was inserted in the capsular bag and dialed. Self sealing wound was left sutureless after checking for any wound leakage. None of the cases in these groups required suturing. Outcomes measured included the ease of surgery, intra and postoperative complications, surgically induced astigmatism, and visual and patient rehabilitations. Patients were followed up for minimum period of 3 months. Pre and post operative Quality of Life and Patient Rehabilitation were graded and analysed using questionnaires (consisting of 20 questions) modified from the other studies[6-7-8] to suit the environment and lifestyle of our patients. The findings were subjected to statistical analysis.

Results

Most of the patients in our study were between 55 to 65 years of age, the mean age being 56.80 and 63.40 in the 5mm and 7mm groups

Table-1: Distribution of visual acuity grades in different study groups

	5 mm incision unaided vision			5 mm incision pin hole vision			7 mm incision unaided vision			7 mm incision pin hole vision		
	≥6/18	6/24-6/60	<6/60	≥6/18	6/24-6/60	<6/60	≥6/18	6/24-6/60	<6/60	≥6/18	6/24-6/60	<6/60
Pre op	0	9	21	0	10	20	0	7	23	0	12	18
Day1	1	23	6	9	16	5	1	19	10	12	13	5
Day 7	11	18	1	21	8	1	9	19	2	18	10	2
Week 2	13	17	0	26	4	0	15	13	2	25	3	2
Week 3	23	7	0	28	2	0	19	9	2	26	2	2
Month 2	26	4	0	28	2	0	21	7	2	26	2	2
Month 3	26	4	0	28	2	0	25	3	2	26	2	2

respectively. Maximum number of patients were females (61.67). Preoperatively, the type of cataract, nuclear grading and visual acuity and corneal astigmatism were comparable in the two groups. In our study, we were able to perform the surgery comfortably even in cases with mature and hypermature cataract and also with hard nucleus especially in the 7mm incision group. Overall, 5mm group had more intra operative problems, and most of these were related to the size of the external incision. The commonest complication encountered during the surgery was difficulty in nucleus delivery. (50 in 5mm group and 16 in 7mm group) .Maximum number of transient edema post operatively was found in 5mm group (50) which was probably due to introduction of instruments into AC to fragment the nucleus (23.3 in 7mm group). Preoperatively, maximum number of patients had unaided visual acuity of <6/60 in both groups. Post-operatively visual acuity was comparable in both groups. At day 1, 12.5 patients had unaided vision of <6/18, by 3rd week this increased to 65 and by 3rd month to 78.8. (Table 1). Preoperatively and postoperatively, with the rule astigmatism was more common than against the rule astigmatism in both groups. There was a statistically significant increase in mean astigmatism from preop to day 1 in both the groups (p value= 0.000). After a week, astigmatism steadily decreased in both groups, reaching close to borderline after 2 weeks.

There were statistically significant differences (p value 0.000) in grading of quality of life and patient rehabilitation when compared pre and post operatively in both groups. However, comparison between groups shows comparable result in quality of vision and patient rehabilitation post operatively.

Table-2: Pre and postop surgically induced astigmatism at different time intervals

	5mm incision group	7mm incision group
	Mean ±SD	Mean ±SD
Preop	0.775± 0.52	0.946±0.52
Day 1	0.98±0.57	1.24±0.607
Day 7	0.93±0.56	1.25±0.593
Week 2	0.93±0.508	1.03±0.515
Week3	0.85±0.501	0.857±0.501
Month 2	0.75±0.506	0.732±0.456
Month3	0.79±0.521	0.678±0.434

Discussion

Although smaller incisions are thought to reduce induced astigmatism, resulting in earlier, more stable refraction, important differences have been found with different wound architecture and closure method.[5'9'10] Many authors [11] consider the external incision to be the most important step in cataract surgery since this gives the ultimate result of surgery. Therefore, for achieving least astigmatism, they preferred to make the smallest possible incision in which the nucleus can be delivered easily, and renamed as far from the limbus as possible [12, 13] Palm [14] first described another incision in the shape of 'V' called 'chevron incision' in 1991. Bartov et al[1] 'developed a technique for extracapsular

cataract extraction in which nucleus was removed through 5mm chevron incision. He reported that although the base ofV incision was 4mm from the hmbus, its tip was only 1.5mm from the limbus, thereby making it easier to create the tunnel Another advantage described was that, a straight side of the V incision when pressed sideways by a nucleus exiting the eye or an IOL inserted into the eye assumed an oval shayeand allowed a larger nucleus or IOL to pass through than the 5mm base of the incision.[1] Burgansky et al[15] enlarged the incision to 6-7mm in order to minimize the intraocular manipulation especially in the eyes with large and hard nucleus. In terms of surgically induced astigmatism, they found statistically significant surgically induced astigmatism only in 7mm incision with eyes having mature cataracts. In our study, in terms of surgically induced astigmatism, we found no significant difference between the two small incision groups. However, the intra operative and post operative complications were much higher in 5mm inverted V group than in 7 mm group 1 he commonest intra operative complication encountered was difficulty in nucleus delivery which was found in 50% of cases in 5mm group as compares to only 16% in 7mm group. The difficulty in nucleus delivery was found to be inversely related to the size of the incision. Maximum post operative comeal edema was also found in 5mm group, which was also attributed to the small size of the external incision. Preoperative quality of life score was much lower than post operative scores in both the groups Postoperatively, the inter group quality of vision and patient rehabilitation however was comparable. In conclusion, there was increase incidence in the complications like nucleus delivery, IOL implantation and post operative corneal edema in 5mm incision group in comparisonto 7mm group, and was statistically significant. Surgeon factor was in more comfortable zone 7mm incision, it also had less post operative complication and at the same time having the same visual results as 5mm incision group.

References

1. Bartov E, Isakov I, Rock T. Nucleus fragmentation in a sclera pocket for small incision cataract extraction. *J Cataract Refract Surg* 1998;24:160-5.
2. Guzek P.J, Ching A. Small incision manual extra capsular cataract surgery in Ghana. *J Cataract Regract Surg* 2003;29:57-64.
3. Kimura H, Kuruda S Mizoguchi N, Teranchi H, Matsumara M, Nagata M. Extracapsular cataract extraction with a sutureless incision for dense cataract. *J Cataract Refract Surg* 1999; 25:1275-9.
4. Blumenthal M, Moisseiev J. Anterior chamber maintainer for extracapsular cataract extraction and intraocular lens implantation. *J Cataract Refract Surg* 1999;13:204-6.
5. Singer J A. Frown incision for minimizing induced astigmatism after small incision cataract surgery with rigid optic. IOL implantation. *J Cataract Refract Surg* 1991;17:677-88.
6. Zhao J Sui R, JjaL,et al. Visual acuity and quality of life outcomes patients with cataract in Shunyi Counly China. *Am JOphthalmol* 1998;126:515-23.
7. PokharelIGP, Selvaraj S, Ellwein LB. Visual functioning and quality of life outcomes among cataract operated and unopcrated blind populations in Nepal. *Br J Ophthalmol* 1998; 82:606-10.
8. Chan CWN, Wong JCC, Chan KSK et al. Evaluation of quality of life in patients with cataract in Hong Kona I. *Cataract Refract Surg* 2003;29:1753-60.
9. Steinert RF, Brint SF, White SM et al. Astigmatism after small incision cataract surgery. A prospective randomized multicentcr comparison of 4 to 6.6 mm incisions. *Ophthalmology* 1991;98:417-24.
10. Shepherd JR. Induced astigmatism in small incision cataract surgery *J Cataract Refract Surg* 1989;15:85-8.
11. IlliffCE, Khodadoust A. Control of astigmatism in cataract surgery. *Am J ophthalmol* 1968;65:378.
12. Girard LJ. Reducing surgically induced astigmatism by using scleral tunnel. *Am J Ophthalmol* 1984;97:450-6.
13. Girard LJ. Origin of scleral tunnel incision (letter) *J Cataract Refract Surg* 1995;21:6-7.
14. Pallm SL. Chevron sutureless closure, a preliminary report. *J Cataract Refract Surg* 1991;17:706-9.
15. Burgansky Z, Isakov 1, Avizemer H, Bartov E. Minimal astigmatism after sutureless planned extracapsular cataract extraction. *J Cataract Refract Surg* 2000;28:499-503.

AUTHOR'S PROFILE:
Dr. SANJIV KUMAR GUPTA: M.B.B.S. ('96) and M.S. (2001) from King George Medical University, Lucknow. Presently, Assistant Professor, Department Of Ophthalmology, King George Medical University, Lucknow.
Contact: 09839019241; *E-mail:* sanjiv204@hotpop.com

Manual Small Incision Cataract Surgery under Topical Anesthesia: How and Why?

Dr. Sanjiv Kumar Gupta, Dr. Dipak Kumar, Dr. Swati Agarwal
(Presenting Author: Dr. Sanjiv Kumar Gupta)

Cataract is the main and biggest cause of curable blindness in India and worldwide. It has been estimate that there is a backlog created as 3.8 million people develop blinding cataract every year in India[1] as against 2.7 million cataract surgeries done every year.[2] Cataract extraction is one of the most cost effective of all surgical interventions[3,4] in terms of quality of life restored. The treatment option for cataract is only surgical removal of the opaque lens and insertion of an artificial lens. The state of the art technique is phacoemulsification with insertion of a foldable IOL through a self sealing incision. However the cost considerations and the steep learning curve associated with the phacoemulsification procedure is not the answer for high volume surgery needed in the developing countries. However the MSICS is the surgery of choice in such circumstances[5].

Those of us who are already using this technique will agree with us that the only disadvantage of the surgery when compared to Phaco procedure is the choice of anesthesia and the length of incision. The MSICS has been conventionally performed under peribulbar, Retrobulbar anesthesia. Now there are some reports of the procedure being performed under Subtenon and Subconjunctival anesthesia too[6]. However the difference between topical and these techniques remains palpable to the surgeon and the patients. We here describe a topical anesthesia approach for performing manual small incision cataract surgery. We have performed a pain evaluation survey on patients undergoing this procedure. This technique has not been described in literature yet.

Materials and Methods

The patients with significant cataract causing impairment of visual functions not correctable by glasses or with unacceptable glare, polyopia or reduced quality of vision attributable to cataract can under go this procedure. Only contraindication is a patient who cannot follow or understand verbal commands. Sensitivity to lignocaine is also an absolute contraindication to topical anaesthesia. Cataract was classified according to the morphology and the nuclear density was graded according to the slit lamp examination and standard photographs. Patients were told to hold the hand of an OT assistant and to squeeze the hand when they felt some pain. Lignocaine 2% or 4% drops were instilled in the conjunctival sac 5 minutes before the surgery. The lids and periocular area was painted with povidone iodine twice and the patient draped. Once fully draped the eye speculum was inserted and then the 2% lignocaine viscous is generously poured on the exposed ocular surface. The patients usually report a stinging sensation but if instructed and advised to look towards the operating microscope light will bring the eye back in straight gaze. After a wait of about 1 minute the surgery was started. The patients feel less pain than the peribulbar anaesthesia as evident by the patient's cooperation. The reason is that the conjunctival surface is adequately anesthetized. Once the sclera has been exposed and the blood vessels have been

cauterized then the corneoscleral tunnel was designed. The entry into the anterior chamber was followed by intracameral injection of diluted 2% lignocaine solution. This can be commercially available preservative free or regular 2% lignocaine injection. Four times dilution is safe for the corneal endothelium and provides adequate anaesthesia to uveal tissue for pain free surgery. This step is crucial to gain confidence in the beginning later on when the surgical expertise is enough to do surgery without touching the iris then this step can be omitted. In our pain evaluation survey we gave intracameral lignocaine to all the patients. Viscoelastic gel was injected in the anterior chamber and capsulorrhexis was done. Hydrodissection to separate the cortex from the capsule and to prolapse the nucleus out of the capsular bag was done after making sure that the capsulorrhexis was large enough with respect to the nucleus size, otherwise a relaxing incision with a cysitome was made. With nucleus in the anterior chamber the chamber was inflated with Viscoelastic gel and the nucleus was engaged with a fish hook. In case of very soft nucleus irrigating vectis was used. The nucleus was brought out of the tunnel with support from a forceps holding the anterior lip of the tunnel to prevent the upward rotation of the globe. The cortex was washed and then again with the chamber filled with Viscoelastic gel IOL implanted in the bag. The gel is washed out and the tunnel inspected for integrity by looking for any leakage. We included 96 cases that underwent cataract surgery with the mentioned technique. A pain survey questionnaire having visual analog scale for pain evaluation or Wong scale for simplified version of pain evaluation was given to the patients depending upon their ability to comprehend. The surgeon also evaluated his result in terms of time, surgical ease or difficulty, complications with regards to the topical anesthesia.

Results

There were 96 patients enrolled in the study according to the inclusion and exclusion criteria. 46 (47.9%) patients were male. Age ranged from 38 years to 78 years. Mean age 64.2 years. 50 patients were male out of the 96 patients. Type of cataract according to morphology was nuclear in 36 patients (37.5%), nuclear and subcapsular in 42 patients (43.7%) and subcapsular in rest. Nuclear density ranged from grade I to grade V and corelated with age. 41 were the right eye and 55 left eye. The pain experience during the surgical procedure was recorded as patient's response by squeezing the hand of the OT assistant during the surgery. This revealed that only 4 patients had pain during the surgical procedure. This was felt during the stretching of the wound during the nucleus delivery and the same patients also had pain during the irrigation aspiration procedure and when the viscoelastic was being injected before capsulorrhexis. This was attributable to the low effect of anesthetic drug due to them being habitual tobacco users in form of "khaini" a kind of chewable tobacco used in north India. The visual analog scale used to mark the assessment of scale or the Wong scale used for the patients who could not understand the analog scale showed that only 5 patients out of the whole series experienced pain which could be termed significant and rated more than 2 on the visual analog scale on a scale of 10. The surgeon's evaluation of the technique in terms of time, surgical ease and complications was extremely favorable. Only one patient had a small zonular dehiscence and that does not relate to the anesthesia technique but because of small rhexis during the insertion of the IOL. The time was saved as the waiting time for peribulbar injection and achieving hypotony by occupressure is al together avoided. This made the surgical time shorter by about 7 minutes. The technique is especially useful in cases of glaucoma as these patients have a risk of loosing vision if to long occupressure is given. There was no increased difficulty was observed by the surgeon during the surgery due to the change in the anesthesia technique. Rather the author feels that the experience was an eye opener as he feels that the surgery is easier with a more comfortable patient who is absolutely pain free in contrast to peribulbar anesthesia where at times there is inadequate anesthesia and the patient has pain.

Discussion

The MSICS is the surgery for the masses and appropriate technique for a country like us. The surgery is cheap, fast, safe, and easy to learn, needs fewer resources and provides results equitable to Phaco. The addition of topical anesthesia to the merits of the MSICS would make the surgery exactly at par with Phaco or may be better than Phaco if we consider the resources, price and speed. The technique describe is strictly topical as done during phacoemulsification and the author after completing the series of nearly 100 patients under topical anesthesia has shown that the technique is safe and acceptable for the patients and needs no extra endeavor on the part of the surgeon apart from being a good MSICS surgeon. The surgeon is sure that once anybody switches to the mentioned technique will wonder why the idea did not occur to him as the concept is so straight forward and obvious. This cuts down the price of the surgery, excludes the complications of peribulbar injections, and makes the surgery absolutely painless. The author has shown that a slight modification of the MSICS can allow the surgery to be performed under topical anesthesia, thus making the surgery painless, safe, fast, and devoid of the complications of putting a needle in the orbit.

References

1. Minasian DC, Mehera V. 3.8 Million blinded by cataract each year. Projections of the first epidemiological study of incidence of cataract blindness in India. *Br J Ophthalmol* 1990;74:341-3.
2. Jose R. National programme for the control of blindness. *Indian J Comm Health* 1997;3:5–9.
3. Marseille E. Cost-effectiveness of cataract surgery in a public health eye care program in Nepal. *World Health Organ Bull OMS* 1996;74:319-24.
4. Porter R. Global initiative the economic case. *Commun Eye Health* 1998;27:44-5.
5. D F Chang. Tackling the greatest challenge in cataract surgery. *British Journal of Ophthalmology* 2005;89:1073-77.
6. Parkar T, Gogate P, Deshpande M, Adenwala A, Maske A, Verappa K. Comparison of subtenon anaesthesia with peribulbar anaesthesia for manual small incision cataract surgery. *Indian J Ophthalmol* 2005;53:255-9.