NON PHACO SUTURE LESS CATARACT EXTRACTION THROUGH TEMPORAL APPROACH

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Background: Non Phaco suture less cataract extraction through temporal approach retains most of the advantages of phacoemulsification but can be delivered at lower cost with better visual out come. **Methods:** Extra capsular cataract extraction followed by posterior chamber intraocular lens implantation was performed, on 300 eyes of 250 patients. The technique involved was posterior limbal corneal tunnel incision through temporal approach, followed by implantation of PMMA posterior chamber intraocular lens. Visual acuity at the time of discharge, third post operative week and sixth week was recorded. Surgically induced astigmatism was reported. **Results:** The uncorrected visual acuity at discharge was 6/18 or better in 63.2% eyes. The best corrected visual acuity was 6/9 and better in 96.0% subjects at six weeks. Poor visual outcome (<6/60) occurred in 0.5% eyes. 0.4% subjects had posterior capsule rent followed by vitreous show. There was no increase in against the rule astigmatism, as the corneal incision was given through temporal approach. **Conclusion:** Suture less manual extra capsular cataract surgery through temporal approach ensures rapid visual recovery with minimum astigmatism against rule.

Keywords: Astigmatism, Cataract, extraction, corneal tunnel incision, temporal approach, Phaco

INTRODUCTION

Age related cataract is currently the major cause of reversible blindness in developing countries.[1] Phacoemulsification technique ensures rapid visual recovery, and better uncorrected visual acuity than sutured manual cataract extraction.[2]

Because of high expenses of Phaco emulsification system, its practise is limited in many poor countries. The conventional cataract surgery has disadvantages like large incision, multiple sutures, and post operative induced against rule astigmatism. Therefore the newer technique non Phaco manual cataract and Intraocular Lens (IOL) surgery through temporal approach has been brought in to focus.

Kamaljeet Singh introduced scleral tunnel incision to provide better wound healing and minimum surgically induced astigmatism.[3] The technique of small incision suture less cataract extraction was modified, and various names given, such as manual Phaco for suture less manual ECCE, Mini-Nuc technique, manual small incision cataract surgery (SICS)[4], a fishhook extraction technique through small incision[5]. John Sandford-Smith, in 2000 described another technique for removing nucleus by hydro extraction with the help of an irrigating vectis.[6] In most of the third world countries, these manual techniques of nuclear extraction through small incision have become popular and are frequently practised.[7]

In manual extra capsular cataract surgery, the presenting visual acuity is some times decreased even at the level of 6/60. Many of these poor outcomes are mainly due to post operative induced astigmatism, which remains a major problem.[8] In case of with the rule astigmatism, in a normal healthy eye, the stiff upper tarsal plate causes pressure on the cornea (Plus cylinder at 90 degrees). With increasing age, this pressure gradually decreases, resulting in a change towards against-the-rule astigmatism (Plus cylinder at 180 degrees).[9]

In order to minimize senile against the rule astigmatism, we used temporal posterior limbal corneal tunnel incision for cataract and IOL surgery. The technique thus applied is evaluated and reported in this prospective study.

PATIENTS AND METHODS

This prospective observational hospital based study was conducted between January 2005 and July 2006, at the tertiary eye care centre. The technique applied was manual extra capsular cataract extraction (ECCE) through temporal approach followed by posterior chamber rigid intraocular lens (IOL) implantation.

Patients with significant cataract (Figure-1), between 45 to 60 years of age, presenting for the first time controlled for diabetes and hypertension, and without any cardiovascular disease were registered.

The subjects with traumatic cataract, pseudo exfoliation, uveitis, pre-existing glaucoma, macular degeneration, diabetic or hypertensive retinopathy, corneal dystrophies and more than five dioptres of ametropia (on biometry calculation) were excluded from the study.

All of the subjects were examined at out patient department by senior medical staff. After getting informed consent of patients, the pre-operative ocular examination was performed.

The visual acuity was checked with Snellen's chart and E-chart for illiterates. Slit lamp biomicroscopy, applanation tonometry and posterior segment examination with 90 D or 78 D condensing lenses if possible was performed. Astigmatism was

measured using autorefractometer with K reading and keratometer. The cataract was classified according to its type and maturity. Intraocular lens power was calculated according to contact A-scan biometry with SRK-II formula.

All necessary investigations i.e. complete blood count, blood glucose, urine detailed report etc were carried out. After admission Ofloxacin 0.3% topical eye drops were instilled 2 hourly 24 Hrs before surgery. Topical tropicamide 1% and non steroidal anti-inflammatory ophthalmic drops (diclofenac sodium 1.0 mg) were used every 15 minutes one hour before surgery to maintain pupil dilatation during surgery.

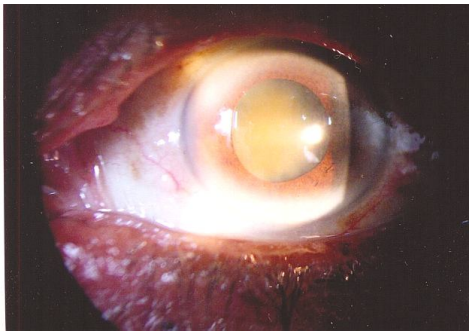

Figure-1 : A 55 Year patient left eye senile cataract. She was operated for left eye non-phaco suture less cataract extraction through temporal approach

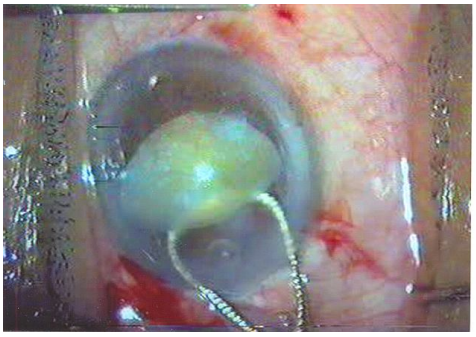

Figure-2: Nuclaus extraction by wire vectis performed through temporal 6mm incision

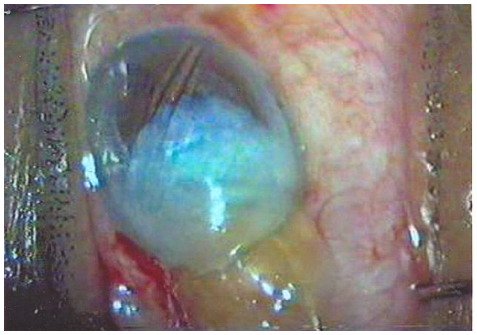

Figure-3: Nucleus being delivered through temporal 6mm incision

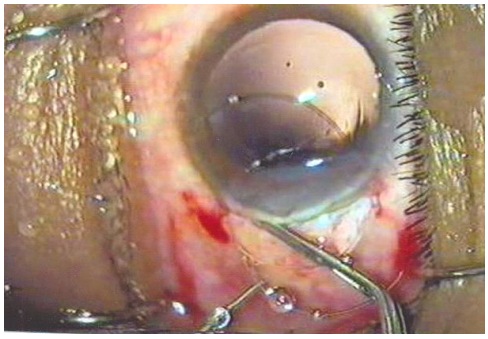

Figure-4: A 5.5 Rigid PMMA lens being implanted in posterior capsular bag

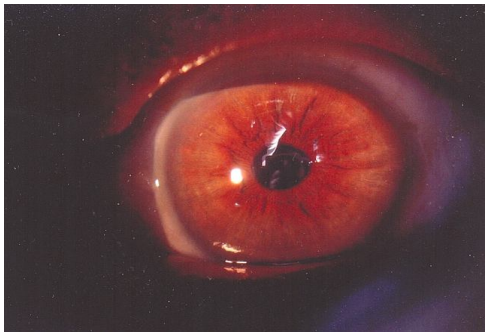

Figure-5: Peripheral Corneal stromal hydration is being performed

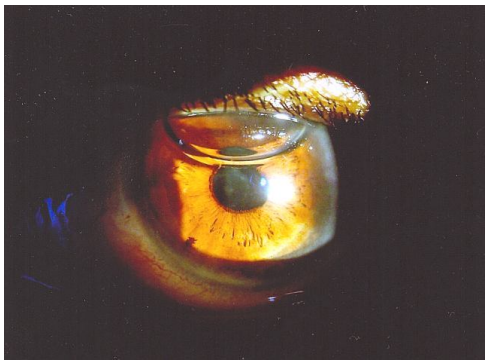

Figure-6: First Post operative day with clear cornea and air in the interior chamber

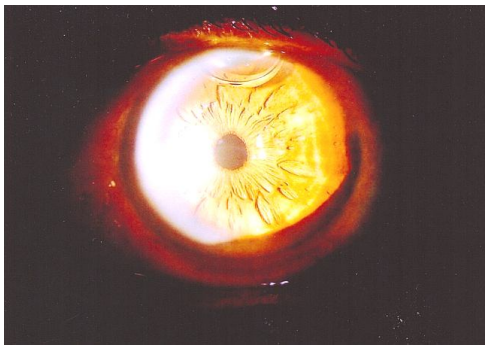

Figure-7: Third post operative day with round pupil, and visual activity 6/12 un-corrected

Patients were operated on under sub-tenon anaesthesia with 1.5 cc of 1:1 mixture of Injection Xylocaine 2% and Injection Abocaine (bupivacaine 0.5%), through button hole dissection at lateral one third of lower conjunctiva.

The superior rectus (bridle) suture was not given due to temporal approach. Peritomy was not performed. A 5–6.5 mm posterior limbal partial thickness oblique corneal incision was placed temporally/obliquely following the axis of against the rule astigmatism (in the direction of plus cylinder axis).

A three plane incision was created with a 15 degree blade and crescent blade. The vertical half corneal thickness incision was given at posterior limbus and a crescent blade was used to dissect 3 to 4 mm in to clear cornea to form a tunnel. The clear cornea tunnel was constructed by carrying forward the posterior limbal corneal dissection using a crescent blade underneath the limbus, moving forward and sliding it side by side to widen the tunnel. The anterior chamber was filled with Visco elastic solution (Hydroxy Propyl Methyl Cellulose 2%), and capsulorrhexis performed with cystotome made from 27 gauge needle passing it in anterior chamber through one edge of partial thickness corneal tunnel incision.

Entry into the anterior chamber was made with a sharp 3.2mm keratome to create a self sealing corneal valve. The internal wound was then slightly enlarged up to 6 mm than the outer one by the same 3.2mm keratome to facilitate the delivery of nucleus. For hard and large nucleus, the incision was enlarged to 7 mm. Hydro dissections and delineation was performed with ringolact solution. Hydro dissection was continued until the upper pole of the nucleus prolapsed out of capsular bag. Through the corneal incision, wire vectis was passed under the nucleus in the capsular bag, and the nucleus was delivered directly by pulling the vectis out slightly depressing the scleral side of incision with fine non-toothed forceps to avoid rubbing of corneal endothelium (Figure-2 and 3). The cortical matter was aspirated with simcoe two way irrigation and aspiration cannula.

In the presence of a Viscoelastic solution, a rigid posterior chamber 5.5 mm to 6.5 mm PMMA intraocular lens (as per the size of corneal wound) was implanted in the posterior chamber with the leading haptic facing obliquely underneath the anterior capsular rim (Figure-4). The IOL was positioned in the capsular bag with the help of a dialor. The Visco solution was removed from anterior chamber by irrigation with ringolact using simcoe cannula. Carbachol 0.25 ml was injected in anterior chamber to induce pupil constriction. Corneal stromal hydration was performed at the wound edges, and the wound left unstitched as the corneal tunnel was self sealing (Figure-5).

The patient was asked to move the eye and blink frequently to confirm stability of a self sealing corneal incision. Sub-conjunctival injection Gentamycin 20 mg mixed with Dexamethasone 4 mg was injected in the lower fornix at the site of button hole dissection. The eye was bandaged for 24 hours. Tablet Acetazolamide 250 mg twice daily was prescribed for two days, to stabilise the intraocular pressure and to ensure un apposed wound healing.

On the 1st post operative day slit lamp examination was performed and uncorrected visual acuity recorded (Figure-6, 7). The reasons for uncorrected visual acuity less than 6/18 were identified. All of the subjects were advised to complete the post operative follow up.

RESULTS

A total of two hundred and fifty patients were operated. Different age groups and gender are mentioned in Table-1.

Table-1: Patients with Gender and age (n=250)

Age (Years)	Gender	No. of Patients	%
45–50	Male	31	12.4
	Female	20	08.0
51–55	Male	42	16,8
	Female	31	12.4
56–60	Male	49	19.6
	Female	42	16.8
61–65	Male	20	08.0
	Female	15	06.0

Out of three hundred (300) eyes of 250 patients operated for extra capsular cataract extraction through temporal approach, only two hundred (200) eyes completed the post operative follow up criteria of this study. The pre-operative visual acuity along with astigmatism against rule is summarized in Table-2. Type and density of cataract is shown in Table-3.

Table-2: Patients with Preoperative Visual Acuity (n=300 eyes)

Visual Acuity (over all)	Eyes with %	Astigmatism Against Rule (over all)
6/60–6/24	200 (66.6%)	1.25–1.75 D
6/60–6/18	70 (23.3%)	0.5 D–1.25 D
6/60–FC at I meter	30 (10.0%)	1.0 D–1.5 D

FC = Finger count. D = Dioptre

Table-3: Type of Cataract (n=300 eyes)

Type	N/O Eyes	%
Nuclear	160	53.3
Cortical	120	40.0
Posterior Sub Capsular	20	6.6
Stage of Maturity		
Immature	120	40.0
Intumescent	10	3.3
Mature	140	46.6
Hyper Mature	30	10.1

On first post operative day, the over all V/A of the operated eyes is mentioned in Table-4.

Table-4: Post Operative Visual Acuity (Day One) (n=300 eyes)

Visual Acuity Un Corrected (Over All)	N/o Eyes	%
6/12–6/9	47	(15.6%)
6/18	143	(47.6%)
6/24–6/18	60	(20.0%)
6/36–6/24	40	(13.3%)
6/60–6/36	9	(3.0%)
Counting Finger	1	(0.3%)

The better post operative visual acuity was observed due to temporal corneal approach resulting to minimum astigmatism against the rule.

Two patients developed posterior capsule rent during delivery of nucleus by wire vectis. Both the patients were managed and IOL was implanted in posterior chamber. Early and late post operative complications are summarized in Table-5.

Table-5: Post Operative Complications

Complication	Eyes	Prevalence
Early Post Operative Complications (1st week): (n=300)		
Micro cystic corneal oedema	22	7.3 %
Striate Keratopathy	19	6.3 %
Ant.chamber cell reaction	5	1.6 %
Iris Prolapse	3	1.0 %
Late Post Operative Complications (3rd week follow up): (n=200)		
Shallow Ant. chamber	3	1.5 %
Striate Keratopathy	9	4.5 %
Corneal endothelial decompensation	1	0.5 %
Late Post Operative Complications (6th week follow up)		
Corneal endothelial decompensation	1	0.5 %

Six eyes (3.0%) required a second operation. In 3 eyes, prolapsed iris was repositioned, followed by anterior chamber reformation. Three patients developed shallow anterior chamber due to wound leak. In all of 6 eyes, anterior chamber was reformed and 2 corneal stitches applied at the temporal corneal incision. One eye had a visual acuity of counting finger at 1 meter distance, owing to persistent corneal endothelial dysfunction 6 weeks postoperatively.

Eleven patients out of 200 (3.66%) completing the follow up, reported with the visual acuity below 6/24, within nine months to eleven months post-operative. On examination posterior capsular opacification was observed and YAG laser posterior capsulotomy performed.

The uncorrected and best corrected post operative visual acuity and induced astigmatism thus recorded at third and 6th week is shown in Table-6. Astigmatism against the rule particularly in old patients was very well covered by our technique of temporal approach.

Table-6: Postoperative Visual Out come (n=200 eyes)

Visual Acuity	Eyes	Astig-matism	Follow up Period
6/9–6/6 (uncorrected)	100 (50.0%)	0.5 D	3rd Week
6/12–6/9 (Best corrected)	89 (44.5%)	1.0 D	3rd Week
6/24–6/18 (Best corrected)	11 (05.5%)	1.5 D	3rd Week
6/9–6/6 (Uncorrected)	88 (44.0%)	0.5 D	6th Week
6/9–6/6 (Best corrected)	100 (50.0%)	0.5 D	6th Week
6/24–6/18 (Best Corrected)	11 (5.5%)	1.0 D	6th Week
Counting Finger at 1 meter	1 (0.5%)	---	---

D=Dioptre

DISCUSSION

The main objective of today's cataract surgery is to provide better visual acuity, rapid post operative recovery and minimal surgery-related complications. The latest technology, and modified surgical methods have resulted to a dramatic change in postoperative visual rehabilitation. In spite of about 10–12 million cataract operations performed through out the world, the annual increase in blindness due to cataract is about 1 to 2 million.[10]

Despite excellent facilities and skilled surgeons, people in the developing world are deprived of the visual benefits of the IOL because of inability to afford.[11] The suture less manual extra capsular cataract extraction (ECCE) technique, the first choice alternative to Phacoemulsification, gives visual results equivalent to Phacoemulsification at lower expenses. Recent studies have shown that suture less ECCE is economical and has more benefits than conventional ECCE.[12]

In our experience, the benefits of suture less ECCE through temporal approach include better and early wound stability, less postoperative inflammation, avoidance of suture and suture-related complications, avoidance of against the rule astigmatism, and early reduction and stability of surgically induced astigmatism.

Suture less ECCE can be performed for most types of cataracts, in contrast to Phacoemulsification in which case selection is important. Phacoemulsification is not easily performed in hyper mature cataracts, because of the fibrosed capsule, weak zonules, and hard mobile nucleus. In such cases corneal endothelial burn can not be avoided. In another recent study, conducted by Muralikrishnan R and his associates[13], compared the safety of ECCE, suture less ECCE, and Phacoemulsification and reported a lower intra operative and immediate postoperative complication rate in the suture less ECCE group when compared with the rest.

In comparison with sutured manual ECCE and PC-IOL, suture less surgery provides fast visual recovery. In a randomised controlled trial study of standard ECCE and PC-IOL and intra capsular cataract

extraction and aphakic glasses conducted by Prajna and Chandrakanth, only 57.5% of the ECCE and PC-IOL eyes achieved an unaided acuity of 6/18 or better by 2 months after surgery.[14] Another study of suture less ECCE in Nepal showed that only 58.3% of eyes obtained an uncorrected vision of 6/18 or better at 8 weeks.[7] In our patients, 94.5% had an uncorrected visual acuity of 6/9 or better at third week post operative. This was also possible due to the surgical technique through temporal approach, which also helped reducing against the rule astigmatism. In this workup the post operative visual acuity of the registered patients was recorded according to the WHO definitions of good (6/18 or better), borderline (< 6/18–6/60), or poor (< 6/60) visual outcome.[15]

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