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Research Article

Post-operative outcomes of first 100 cases of Phacoemulsification done by beginner Surgeon

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Abstract
Purpose: *To study post-operative outcomes of first 100 case of Phacoemulsification done by beginner Surgeon.*
Materials and Methods: *This was retrospective, interventional study done after obtaining written informed consent from patients. Any patient having immature cataract (Grade 1, 2 and 3 nuclear sclerosis) and operated by same surgeon for phacoemulsification were included in study. Patient with brown and mature cataracts and any ocular co-morbidity were excluded. A detailed history and examination of visual acuity and best corrected visual acuity (BCVA) for distance and near, anterior segment with slit lamp biomicroscope and posterior segment with direct/indirect ophthalmoscopy was done and cataract was graded. Phacoemulsification was done by stop and chop technique in all cases. Patient was examined on 1st post-operative day, 1 week post-operatively and 1.5 months post-surgery for BCVA, corneal edema, iridocyclitis, intraocular pressure (IOP) and endothelial cell count (ECC). Visual recovery, duration of full recovery, resolution of corneal edema and iridocyclitis, rise in IOP, count of endothelial cells after surgery were analyzed.*
Results: *All patients got BCVA ≥ 6/9 at final follow-up, no patient had residual corneal edema or iridocyclitis after 2 weeks. 1 patient developed IOP rise due to steroid response which was controlled medically. There was 12.2 % loss of ECC at final-follow up visit.*
Conclusion: *Stop and chop method of phacoemulsification is safe in beginner's hands with no significant difference in long term visual outcomes, however recovery takes long time compared to experienced surgeon.*
Keywords: *Phacoemulsification, Beginner, Endothelial cells count.*

Introduction

The commonest cause of preventable blindness and low vision is cataract.[1,2] Till now, no effective non-surgical treatment for cataract is available. Surgeries for the treatment of cataract are the commonest surgical procedure in ophthalmology.[3] Phacoemulsification (phaco) with insertion of intraocular lens (IOL) has become the procedure of choice for dealing with cataract.[4] Phaco permits removal of cataractous lens through a smaller incision and quicker visual recovery. But like every surgery, phaco has its own learning curve.

There are chances of some complications or initial slower recovery when surgery is done by beginners who are relatively inexperienced compared to other experienced surgeons.

Materials and Methods

This was a retrospective, interventional study done from a period of November 2018 to march 2019 after obtaining written informed consent from all the patients. We analyzed post- operative outcomes in first 100 cases operated by phacoemulsification by beginner surgeon. Any patient having immature cataract (up to Grade 3 nuclear sclerosis) and operated by same senior resident were included in the study. Patients with brown and mature cataracts, pediatric patients and those other ocular co-morbidities, endothelial count < 1500 cells/mm2 were excluded from the study. A detailed history, examination of visual acuity and best corrected visual acuity (BCVA) for distance and near, anterior segment examination with slit lamp biomicroscope and posterior segment examination with direct/indirect ophthalmoscope was done. Cataract was graded. Intraocular pressure (IOP) measurement was done by Non contact tonometer and sac syringing was performed. Pre-operative endothelial cell count (ECC) was done by non-contact specular microscope. Keratometry was done by automated keratometer and axial length was done by contact A-Scan ultrasound and IOL power was calculated. Urine sugar testing, Random blood sugar (RBS), Blood pressure (BP) measurement, Human Immunodeficiency Virus (HIV), Hepatitis B Surface Antigen (HBsAg) testing was done in all cases. In diabetics, post prandial blood sugar (PP2BS) and fasting blood sugar (FBS) were also measured. Pre-operatively, pupils were dilated with tropicamide (0.8%) + phenylephrine (5%) eye drops instilled 3 times at the interval of 10 minutes. After all aseptic precautions, surgery was started. Peribulbar anesthesia (4 ml 2% lignocaine + 4 ml 0.5% bupivacaine mixed with 15 IU/ml of hyaluronidase) was given and Eye massage was done for 5 minutes. After that, painting with 10% povidone iodine was done and draping was done. Wire speculum was applied. 2 side ports were made at 10 and 2 o' clock with 15 degree knife. 2% Hydroxypropylmethyl cellulose (HPMC) (viscoelastic) was injected into anterior chamber (AC). Continuous curvilinear capsulorrhexis (CCC) was done using 26 G needle bent as a cystitome. A Biplanar clear corneal main entry was made AC using 2.8 mm keratome. Viscoelastic was injected and hydro-dissection was done followed by hydrodelineation. Nucleus was rotated freely into capsular bag and then phacoemulsification was done by 'Stop and Chop technique. Phaco tip was kept at iris plane in all cases. In the bag phaco was done in all cases. Cortical clean up was done with bimanual irrigation-aspiration canula. Hydrophilic acrylic foldable IOL was inserted with injector system under viscoelastic cover. Viscoelastic wash was done and all 3 ports were hydrated. 3 cases required suturing of main port at 12 o' clock. Subconjunctival antibiotic-steroid injection (Amikacin 50 mg + Dexamethasone 2 mg) was given, povidone iodine wash was done and speculum was removed and eye was patched. Duration of surgery ranged from 25-50 minutes. Postoperatively, antibiotic steroid eye drops (Moxifloxacin 0.5% + Dexamethasone 0.1%) were given 6 times/day for 1 week followed by 4 times/day for 1 month followed by 2 and 1 times/day for 15days . Patients were examined on 1st post-operative day, 1 week post-operatively and 1.5 months post-surgery for BCVA, status of corneal edema, iridocyclitis, intraocular pressure (IOP) and endothelial cell count (ECC). Visual recovery, duration of time for full recovery, resolution of corneal edema and iridocyclitis, rise in IOP, count of endothelial cells after surgery were analyzed.

Results

Out of 100 patients, 60 were males and 40 were females. Right eye was operated in 56 and left eye was operated in 44 patients. Age group of patients included was from 46 to 85 years with mean age

being 64 ± 8.54 years. According to grading of cataract, 24 patients were having nuclear sclerosis grade 1, 36 patients were having nuclear sclerosis grade 2 and 40 patients were having nuclear sclerosis grade 3 cataract. Mean pre-operative best corrected visual acuity (BCVA) in logMAR (logarithm of mean acuity of resolution) was 0.84 ± 0.33. Mean endothelial cell count (ECC) pre-operatively was 2345.48 ± 240.27 cells/mm2. All patients got BCVA ≥ 6/9 at final follow-up visit 1.5 months post-operatively. Mean pre-operative BCVA in logMAR was 0.82 ± 0.33. Mean post-operative uncorrected visual acuity (UCVA) in logMAR was 0.16 ± 0.15 and mean post-operative BCVA in logMAR was 0.05 ± 0.08. Compared to pre-operative BCVA, mean improvement in post-operative UCVA is 4 lines of Snellen's visual acuity chart and mean improvement in post-operative BCVA is 5 lines of Snellen's visual acuity chart. Mean post-operative visual acuity in logMAR and improvement in visual acuity as per the grade of nuclear cataract is shown in Table 1. No patient had residual corneal edema or iridocyclitis after 2 weeks. One patient developed IOP rise due to steroid response which was controlled medically. Post-operatively mean ECC is 2107.90 ± 210.19 cells/mm2. There was 12.2% ± 0.37% loss of endothelial cell count at final-follow up visit. Reduction in ECC as per nuclear grade is shown in Table 2.

Table 1: Mean pre and post-operative visual acuity

	Nuclear sclerosis grade 1 (n=24)	Nuclear sclerosis grade 2 (n=36)	Nuclear sclerosis grade 3 (n=40)
Mean pre-operative BCVA (logMAR)	0.38 ± 0.32	0.8 ± 0.32	1.13 ± 0.32
Mean post-operative UCVA (logMAR)	0.11 ± 0.14	0.26 ± 0.14	0.14 ± 0.14
Mean post-operative BCVA (logMAR)	0.03 ± 0.08	0.04 ± 0.09	0.07 ± 0.08

Table 2: Mean pre and post-operative endothelial cell count (ECC)

	Nuclear sclerosis grade 1 (n=24)	Nuclear sclerosis grade 2 (n=36)	Nuclear sclerosis grade 3 (n=40)
Mean pre-operative ECC (cells/mm2)	2276.5 ± 247.93	2451.60 ± 259.09	2407.03 ± 254.94
Mean post-operative ECC (cells/mm2)	2011.83 ± 208.35	2146.77 ± 212.91	2104.70 ± 209.66
Percent of endothelial cell loss	11.6	12.3	12.6

Discussion

Several studies have studied outcomes of phacoemulsification but most of them studied outcomes of phacoemulsification done by experienced surgeons. Very few studies have studied outcomes of phacoemulsification done by a beginner and relatively inexperienced surgeon. There are chances of some complications or initial slower recovery when surgery is done by a beginner who is relatively inexperienced compared to other experienced surgeons. Age group in this study was from 46 to 85 years mean being 64 years which is comparable to the study done by Paul O' Brien et al. in which mean age was 71 years.[5] We included cataracts up to grade 3 nuclear sclerosis in our study because grade 4 hard brown cataracts are known to have poor post-operative outcome by phacoemulsification in hands of inexperienced surgeons. Mean pre-operative BCVA and ECC in all 3 nuclear grades were comparable. BCVA was lesser in cataracts of higher nuclear grade because of density of cataract. However, there was no difference in post-operative UCVA or BCVA at final 1.5 months post-operative visit. Visual recovery was comparatively delayed in cataracts of higher density nuclear grade because of post-operative iritis which was more found in grade 3 nuclear cataract. All patients got BCVA ≥ 6/9 at final follow-up visit 1.5 months postoperatively which is comparable to the study done by Hyung Bin Hwang et al.[6] Endothelium of cornea plays important role in the corneal transparency. Endothelium is arranged in single layer and is non-healing. Endothelium may be damaged during ocular surgeries. Apart from mechanical

damage endothelium may be damage by the temperature of fluid inside the anterior chamber.[7] During phacoemulsification temperature in the anterior chamber may be increased by various reasons which produce potentially dangerous heat which damages endothelium. Important factors include, vibaration of the phaco tip and ultrasound power used.[8] In one study the oxidative tissue damage of the corneal endothelium during phaco was found to be correlated with the ultrasonic energy applied.[9] Mode of phaco applied during surgery is important, effect of continuous vs pulse and burst mode was studied and it was noted that serious corneal edema occurred more frequently in continuous group than that in the pulse and burst groups.[10] Whether supervised or unsupervised the complications of phaco procedure were more by the beginner than by experienced phaco surgeon. Corneal endothelial cell damage can induce corneal decompensation after phacoemulsification, especially in high-risk groups. Thus, endothelial cell loss is an important prognostic factor of the outcome of phacoemulsification surgery. Our study found 12.2% loss of endothelial cells count at 1.5 months follow up which is comparable with study done by Reuschel et al. who reported ECC loss of 4.5–7.9% 3 months after phacoemulsification and Park et al. demonstrated ECC loss of 5.2–9.1% two months after phacoemulsification.[11,12]
However, long term results of visual acuity and ECC were comparable with surgery done by experienced surgeons.

Conclusion

Stop and chop method of phacoemulsification is safe in beginner's hands with no significant difference in long term visual outcomes, however recovery takes long time compared to experienced surgeon.

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