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A COMPARATIVE STUDY OF EARLY POST OPERATIVE CORNEAL COMPLICATIONS OF MANUAL SMALL INCISION CATARACT SURGERY BY FOUR TECHNIQUES OF NUCLEUS EXPRESSION

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ABSTRACT: AIM: To study the early post-operative corneal complications arising from the 4 techniques of nucleus expression. To study the resultant post-operative visual acuity from the 4 techniques of nucleus expression. **MATERIALS AND METHODS:** 100 patients with senile cataract were selected from those attending ophthalmology OPD, M. S. Ramaiah Medical College and those attending camps. They were divided by simple random sampling into 4 groups of 25 patients each. The 1st group underwent standard small incision cataract surgery by phacosandwich technique. The 2nd group by vectis with counter pressure, 3rd group by phacofracture and the last group by irrigating vectis technique. The resultant corneal complications and visual acuity were studied on post-operative day 1 and day 7 **RESULTS:** Chi square test was used for comparison of corneal complications and ANOVA test was applied for comparison of visual acuity by the 4 different techniques. The commonly encountered corneal complications were striate keratopathy and corneal edema. On the first post-operative day, corneal complications were seen in 36% of cases each in phaco sandwich and vectis with counter pressure groups, 40% in the irrigating vectis group and 56% in the phaco fracture groups. Although not statistically significant, the phaco fracture group was associated with more corneal complications. By day 7, only 4% each in the phaco sandwich group and irrigating vectis group had faint SK. None of the patients in the vectis with counter pressure group had any corneal complications. In the phaco fracture group, 16% had faint SK and 4% had pigments on the endothelium. The post-operative visual acuity was studied on day 1 and 7. On day 1, Visual acuity of 6/12 or better was seen in 24% of the patients each in the phacosandwich and irrigating vectis groups, 20% in the vectis with counter pressure group and 16% in the phacofracture group. Visual acuity of 6/60 or less was seen in 8% in the phacosandwich group, 4% in the vectis with counter pressure group, 28% in the phaco fracture group and 4% in the irrigating vectis group. The phacofracture group had a higher incidence of poor vision on day 1. By the 7 day, visual acuity of 6/12 or better was seen in 76% in the phacosandwich group, 88% in the vectis with counter pressure group, 84% in the irrigating vectis group and only 44% in the phacofracture group. **CONCLUSION:** In the management of senile immature cataracts with nuclear sclerosis grade 2 or less, phacosandwich, vectis with counterpressure and irrigating vectis are equally effective. Phacofracture technique was associated with higher rate of corneal complications in the early post-operative period. Vectis with counterpressure gave the best results causing the least corneal complications. Hence vectis with counterpressure is a safe and effective technique in the management of soft cataracts. Phacosandwich and irrigating vectis techniques also gave comparable results with few corneal complications and fast visual recovery.

KEYWORDS: Phacosandwich; Vectis with counterpressure; Phacofracture; Irrigating Vectis.

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INTRODUCTION: Cataract opacification of the lens is one of the commonest causes of loss of useful vision with an estimated 17 million people affected worldwide. Increasing age is an important risk factor. No method to halt the formation of a cataractous lens has been shown to be effective.¹ Cataract has been documented to be the most significant cause of bilateral blindness both in India as well as on a global scale. In India cataract has been reported to be responsible for 50-80% of the bilaterally blind.²

It was estimated that in 2001, there were 7.75 million individuals whose blindness could be attributed to cataract and this would increase to 8.25 million by 2020.³

From around 1.2 million cataract surgeries per year in the 1980s, the cataract surgical output increased to 3.9 million per year by 2003. Recent data from the World Health Organization shows that there is a 25% decrease in blindness prevalence in India.

Although phacoemulsification is considered the gold standard in cataract surgery, MSICS has emerged as first choice alternative as it retains most of the advantages of phacoemulsification and can be delivered at a lower cost even in high volume cataract surgery programmes. It is the best way of removing the large back log of cataract surgery in developing countries.⁴

The main goals of modern cataract surgery are:

1. Early visual rehabilitation by giving near normal vision.
2. Minimal induced post-operative astigmatism.
3. Rapid patient mobilization.
4. Cost effectiveness in developing countries like India.

To meet these objectives, cataract surgery should be performed using a small incision. The smaller the incision, the smaller the residual post-operative astigmatism.⁵ The size of the incision in turn depends on the mode of nucleus delivery and type of intraocular lens.

After the nucleus has been prolapsed into the anterior chamber, various techniques may be used to deliver it out of the eye. This is a crucial step. The nucleus is in close proximity to the cornea and should be expressed out without damaging the cornea.

During MSICS, different techniques used to remove the nucleus are:

1. Hydroexpression alone (using an anterior chamber maintainer).
2. Extraction alone (using a fish hook needle).
3. Phacosandwich technique (using a lens loop and a Sinskey hook).
4. Vectis with counterpressure.
5. Nucleus division and subsequent removal by various methods.

The present study was undertaken to compare four techniques of nucleus delivery in MSICS^{6,7} in terms of the visual outcome as well as the early post-operative corneal complications and thereby to determine the technique best suited for a given patient.

MATERIALS AND METHODS: A comparative study of early post-operative corneal complications of manual small incision cataract surgery by 4 techniques of nucleus expression, a prospective randomized comparative study was conducted at the Department of Ophthalmology, M.S. Ramaiah Medical College between 1st September 2014 and 30th April 2015.

Source of Data-100 patients with visually significant senile cataract attending the Ophthalmology OPD at M. S. Ramaiah Medical College and those attending eye camps were chosen based on the inclusion and exclusion criteria.

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The following statistical methods were used in the study: Proportions were compared using Chi-square test of significance 2. Analysis of Variance (Anova).

Inclusion Criteria:

1. Senile cortical cataract.
2. Nuclear cataract Grade I and Grade II.
3. Posterior subcapsular cataract.
4. Senile cataract with metabolic diseases like Diabetes mellitus and Hypertension are also included in the study.

Exclusion Criteria:

1. Nuclear Sclerosis Grade III and Grade IV.
2. Mature Cataract and Hyper mature cataract.
3. Subluxated or dislocated lens.
4. Presenile, complicated and traumatic cataracts.
5. Pseudoexfoliation syndrome.
6. Corneal opacities due to degenerations/dystrophies/infective or inflammatory disorders.
7. Glaucoma.
8. Miotic pupil.

Sampling Size and Methods: This study included 100 patients who had visually significant senile cataracts of cortical, nuclear or posterior subcapsular types. They were divided into four groups of 25 each based on simple random sampling. First 25 cases underwent nucleus extraction by Phacosandwich method, the second 25 by vectis with counterpressure, the third 25 by Phacofracture technique and the final 25 by Irrigating Vectis technique.

Patient Evaluation: Detailed ocular and systemic history. • General Physical examination. • Best Corrected Visual acuity. • Detailed ocular examination with special attention to the adnexa, status of cornea, the type of cataract and the grade of nucleus. • Direct ophthalmoscopy and indirect ophthalmoscopy to assess the fundus and the presence and severity of retinopathy in cases with DM and HTN. • Intraocular pressure by applanation tonometry. • Lacrimal Syringing. • Keratometry. • A scan for calculation of IOL power using SRK formula. • Fasting Blood Sugar to assess Diabetic status. • All patients received systemic and topical antibiotics 1 day prior to surgery. The topical antibiotics were instilled every 2 hours until the time of surgery. • Eye lashes were trimmed on the previous day.

Technique of Surgery: Preoperatively, the pupils were dilated with combination of Tropicamide (0.8%) and Phenylephrine (5%) eye drops, instilled every 15 minutes until the pupils were dilated. • 1 drop of Ketorolac eye drops (0.5%) was instilled 3 times every 20 minute to prevent pupillary constriction during the surgery. • All the patients were operated under peribulbar anesthesia using a mixture of 5 ml bupivacaine 0.5% and 5 ml lignocaine 2% with 1:2,00,000 adrenaline and 75 units of hyaluronidase. • Eyelids, eyebrows and the entire half of the face were painted with Povidone Iodine (5%) and a sterile drape was applied. • The incision area was exposed by putting a superior rectus bridle suture. • A fornix based conjunctival flap was dissected. • Bipolar cautery was used to stop active bleeding and obliterate large surface vessels. • Using callipers, a 6 mm long incision was

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marked in the superior sclera area at a distance of 2 mm from the limbus. • A straight 6 mm superior scleral incision was made using a 11 No. surgical blade. • A partial thickness sclerocorneal tunnel was dissected from the incision to 1 mm into the clear cornea, using an angled crescent knife. • AC was entered with a 3.2 mm keratome and reformed with air. • Anterior capsule was stained with Trypan blue which was injected under the air bubble. • Excess dye and air was washed off and the AC was formed with viscoelastic material. • CCC was done using a 26 G bent tipped needle. Size of the opening was ensured to be adequate for nucleus prolapse. • The internal opening was extended with a 5.2 mm angled Keratome. • AC was reformed using Viscoelastic. Using a 26 G hydrodissecting canula hydrodissection was performed. • Nucleus was prolapsed into the AC using the lens dialer. • Nucleus was well coated with viscoelastic, both above and below. • One of the 4 methods was applied to extract the nucleus out.

In Phacosandwich technique⁸:

- A wire vectis was introduced under the nucleus and Sinskey hook above it.
- The sandwiched nucleus was then extracted out.

In the vectis with counterpressure technique:

- Vectis is applied between nucleus and iris.
- Excess of viscoelastic injected above and below the nucleus.
- Counterpressure applied by pulling superior rectus bridle suture.
- Nucleus delivered by good depression of lower lip of sclera by vectis.

In the Phacofracture technique⁹:

- The vectis was introduced beneath the nucleus.
- A Sinskey hook or lens dialler was introduced above the nucleus.
- Using the vectis as a support the nucleus was bisected.
- Each part was later sandwiched out.

In the Irrigating vectis technique¹⁰:

- Patency of vectis is confirmed.
- It is insinuated under the nucleus.
- It is withdrawn slowly without irrigating until the superior pole engages in the wound.
- The irrigating fluid is injected slowly and the nucleus is delivered by pulling the irrigating vectis out slowly while depressing the sclera lip.

The remaining cortical matter was removed by continuous irrigation and aspiration. • AC was reformed with viscoelastic and capsular bag distended with it. • Posterior chamber Intraocular Lens was implanted into capsular bag and dialled into position. • Minimal AC wash was given to aspirate the viscoelastic and lens matter if present. • Tunnel integrity was assessed. • Subconjunctival Gentamycin and Dexamethasone was given. • Eye was patched with Chloramphenicol eye ointment.

POST OPERATIVE MANAGEMENT: All patients were given topical steroid antibiotic drops post operatively in tapering dose for 6 weeks. Eye dressing was removed after 24 hours and eye shade

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was given. Visual acuity was recorded in 1st post op day. Detailed slit lamp examination with special attention to cornea was done. Patients were discharged after giving detailed instructions regarding Post-operative care. All patients were followed up at the end of the 1st week post operatively. Visual acuity and detailed slit lamp evaluation was performed. At this visit, keratometry was performed to detect any significant astigmatism and fundus examination was also performed.

RESULTS: This is a comparative study in which 100 patients underwent manual small incision cataract surgery. These cases were divided into four groups of 25 patients each. The first group of patients underwent SICS by Phacosandwich technique, the second group by vectis with counter pressure technique, the third group by Phacofracture technique and the final group by Irrigating vectis technique. The resultant visual acuity and the post-operative corneal complications were studied on the 1st and the 7th post-operative days. These were compared and analysed at the end.

Statistical Methods Applied: Data was analysed using SPSS (Statistical Package for Social Science Ver. 10.0.5) package.

The following method was used:

1. Proportions were compared using Chi-square test of significance.
2. Analysis of Variance (Anova).

Mean Age Distribution: The mean age was 62.24 years for Phacosandwich group, 62.96 years for vectis with counter pressure group, 65.00 years for Phacofracture group and 63.88 years for Irrigating Vectis group. The minimum age was 50 years in the Phacosandwich, vectis with counterpressure and Phacofracture groups and it was 53 years in the Irrigating Vectis group. The maximum age was 85 years in the Phacosandwich and Phacofracture groups and it was 75 years in vectis with counterpressure and Irrigating Vectis groups.

There was no significant difference in age between the four groups ($P = 0.596$).

Sex Distribution: 49% of the total patients were male and 51 % were female. Hence females accounted for a marginally higher no of patients. In the Phacosandwich and Phacofracture groups, females were more than the males whereas in vectis with counter pressure and Irrigating Vectis groups, males were more than the females. However, there was no statistical difference in the sex distribution between the groups ($P = 0.688$).

Laterality: The right eye was operated in 57% of patients whereas the left eye was operated in 43% of the patients. There was no statistical difference in the laterality between the four groups ($P = 0.989$).

Comorbidity: Most of the patients (73%) did not have any associated systemic diseases. 18% of the total patients had associated with Diabetes Mellitus alone, 5% had Hypertension alone and 4% had both Diabetes and Hypertension.

In the Phacosandwich group, 20% had DM, 12% had HTN and 4% had both. In the vectis with counterpressure group, 24% had DM, 4% had HTN and 4% had both. In the Phacofracture group, 16% had DM and 8% had both DM and HTN. In the Irrigating Vectis group, 12% had DM and 4% had

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HTN. However the occurrence of associated DM and HTN among the groups was not statistically significant ($P = 0.563$).

Type of Cataract: Majority of the patients (39%) had Posterior Subcapsular Cataract (PSC) with Nuclear sclerosis (NS), 22 % had Cortical Cataracts (CC) with PSC and NS, 17% had CC with NS, 12% had PSC, 6% had CC with PSC, 3% had NS and 1% had CC only.

In each of the groups, PSC with NS was the maximum accounting for 40% in Phacosandwich group, 44% in vectis with counterpressure group, 32% in Phacofracture group and 40% in the Irrigating Vectis group. The distribution of the type of cataract in each group was not statistically significant ($P = 0.752$).

Preoperative Grading of Nuclear Sclerosis: Majority of the patients had Nuclear Sclerosis Grade 2 (55%). 26% had NS grade 1 and 19% did not have nuclear sclerosis.

NS grade 2 was present in 64% of Phacosandwich group, 52% of vectis with counterpressure group, 44% of Phacofracture group and 60% of Irrigating Vectis group. NS grade 1 was seen in 24% in Phacosandwich group, 32% of vectis with counterpressure group, 28% of Phacofracture group and 26% of Irrigating Vectis group. There was no statistical significance in the distribution of nuclear sclerosis among the groups. ($P = 0.7193$)

Post-operative Astigmatism: Following surgery, the vertical and horizontal corneal curvatures were measured on the 7th day to find out any significant astigmatism responsible for diminution of vision.

96% of patients had astigmatism of less than 1.50D cyl and only 4% had astigmatism of over 1.50D cyl. Astigmatism of over 1.50D cyl was seen in only 4% of patients in Phacosandwich group and Irrigating Vectis groups and 8% of patients in Irrigating Vectis group. None of the patients in the Phacofracture group had astigmatism of over 1.50D cyl.

Post-operative Corneal Complications on Day 1: Majority of the patients did not have any corneal complications (58%) on Day 1 following surgery. 23% had Striate keratopathy. 11% had SKs with corneal edema. 5% had corneal edema alone. 1% each had Pigments on endothelium, SK with edema with Pigments on endothelium and SK with edema with DM detachment.

In the phacosandwich group 16% had SK, 12% had SK with corneal edema and 8% had corneal edema alone. 64% in this group had no complications on Day 1.

In the vectis with counterpressure group, 28% had SK and 8% had corneal edema. 64% had no complications.

In the phacofracture group, 24% had SK, 24% had SK with corneal edema and 4% each had SK with edema with pigments on endothelium and SK with edema with Descemet's detachment. Only 44% in this group had no complications on Day 1.

In the irrigating vectis group, 24% had SK, 8% had SK with corneal edema and 4% each had corneal edema and pigments on the endothelium. 60% had no complications.

Between the 4 groups, 36%, 36%, 56% and 40% respectively in the phacosandwich, vectis with counterpressure, phacofracture and irrigating vectis groups had corneal complications on the first post-operative day.

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The least corneal complications on day 1 were seen in phacosandwich and vectis with counterpressure groups. Complications were maximum in the phacofracture group. Although the phacofracture group was associated with more complication, the difference in the occurrence of corneal complications between the four groups was not statistically significant.(Fig. 1)

Fig. 1

Post-operative Corneal Complications on Day 7: By the 7th day, most of the corneal complications had subsided in all the groups. Few SKs were seen in 6% of all the patients and pigments on the endothelium in 2%. The corneal edema had subsided in all the cases.

In the phaco sandwich group, only 4% had SK and 96% had no corneal complications on day 7.

In the vectis with counterpressure group, none of the patients had any corneal complications on day 7.

In the phacofracture group, 16% had SKs and 4% had pigments on the endothelium. Only 80% had no complications on day 7.

In the irrigating vectis group, 4% each had SKs and pigments on the endothelium. 92% had no complications.

On Post-operative day 7 also, the phacofracture group was associated with more corneal complications than the other 3 groups. However there was no statistical significance in the occurrence of corneal complications among the different groups. (Fig. 2)

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Fig. 2

Post-operative Visual Acuity on Day 1: 68% of the total patients had a visual acuity between 6/18 - 6/36. 21% had a visual acuity between 6/6 - 6/12. Only 11% had a visual acuity of 6/60 or less.

In the phacosandwich group, 17 patients (68%) had a visual acuity between 6/18-6/36. 6 patients (24%) had visual acuity between 6/6-6/12. Only 2 patients (8%) had a visual acuity of 6/60 or less. In the vectis with counterpressure group, 19 patients (76%) had a vision between 6/18-6/36. 5 patients (20%) had visual acuity between 6/6-6/12. Only 1 patient (4%) had a vision of 6/60 or less. In the phacofracture group, 14 patients (56%) had visual acuity between 6/18-6/36. 4 patients (16%) had vision between 6/6-6/12. 7 patients (28%) had a visual acuity of 6/60 or less. In the irrigating vectis group, 18 patients (72%) had a visual acuity between 6/12-6/36. 6 patients (24%) had a visual acuity between 6/6-6/12. Only 1 patient (4%) had a visual acuity of 6/60 or less.

The visual acuity outcome among different groups was not statistically significant.(Fig.3)

Fig. 3

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Post-operative Visual Acuity on Day 7: The visual acuity had improved in most of the patients by day 7. 76% of the patients had a visual acuity of 6/6-6/12. 23% of the patients had a visual acuity of 6/18-6/36. Only 1% had a visual acuity of 6/60 or less.

In the phacosandwich group, by the 7th day, 19 patients (76%) had a visual acuity of 6/6-6/12 and 6 patients (24%) had a visual acuity of 6/18-6/36. None of the patients had a visual acuity of 6/60 or less.

In the vectis with counterpressure group, 22 patients (88%) had a visual acuity of 6/6-6/12. 3 patients (12%) had a vision of 6/18 - 6/36. None of the patients had visual acuity of 6/60 or less.

In the phacofracture group, 14 patients (56%) had a visual acuity of 6/6-6/12. 11 patients (44%) had a visual acuity between 6/18-6/36. None of the patients had a visual acuity of 6/60 or less.

In the irrigating vectis group, 21 patients (84%) had a visual acuity between 6/6-6/12. 3 patients (12%) had a visual acuity between 6/18-6/36. 1 patient (4%) had a visual acuity of 6/60 or less. There was however no statistical difference in the visual acuity outcomes between the 4 groups on day 7.(Fig. 4)

Fig. 4

DISCUSSION: This is a comparative study in which 100 patients were chosen to undergo manual small incision cataract surgery. They were divided into four groups of 25 patients each. The first group underwent SICS with nucleus expression by phacosandwich technique, second group by vectis with counterpressure technique, the third group by phacofracture the second technique and the final group by irrigating vectis technique. The post-operative visual acuity and corneal complications were studied on the 1st and the 7th post-operative days.

Patients chosen were in the age group of 50 years to 85 years. The mean age was 62.24 years, 62.96 years, 65.0 years and 63.88 years respectively in the phacosandwich group, vectis with counterpressure group, phacofracture group and irrigating vectis group. 51% of the total patients were females and 49% were males. In 57% of the cases, the right eye was operated and in 43%, the

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left eye was operated. 18% of the patients had associated DM, 5% had HTN alone and 4% had both DM and HTN.

39% of the total patients had PSC with NS. 22% had CC with PSC with NS, 17% had CC with NS, 12% had PSC, 6% had CC with PSC, 3% had only PSC and 1% had CC.

Preoperatively, the nuclear sclerosis was graded¹¹ 55% of patients had a nuclear sclerosis of grade 2, 26% had nuclear grade 1 and 19% did not have nuclear sclerosis. In all the four groups, majority of the patients had nuclear sclerosis grade 2.

Post operatively, keratometry was performed on day 7 in all patients to detect astigmatism over 1.50 which could result in diminished vision. Only 4 patients (4%) had astigmatism of over 1.50D cyl. Astigmatism of -2.25D cyl (at 90°) was the highest and it was seen in 1 patient (4%) in the irrigating vectis group. The remaining patients in this group had astigmatism below 1.50D cyl. 1 patient (4%) in the phacosandwich group and 2 patients (8%) in the vectis with counterpressure group had astigmatism over 1.50D cyl. None of the patients in the phacofracture group had astigmatism of over 1.50D cyl. The fundus was also evaluated on day 7 to rule out posterior segment complications for decreased visual acuity. Of the 100 patients chosen, 27 had associated systemic disease. We have seen that 18 (18%) patients chosen had associated DM, 5 (5%) had HTN alone and 4 (4%) had both DM and HTN. Of these patients, none had any evidence of hypertensive retinopathy. A total of 11 patients (11%) had Non Proliferative Diabetic Retinopathy; 4 (16%) in the phacosandwich group, 3 (12%) in the vectis with counterpressure group, 2 (8%) in the phacofracture group and 2 (8%) in the irrigating vectis group. These changes varied from mild to moderate and were not significant enough to cause diminution of vision. 1 patient of had associated Diabetic maculopathy which caused severe diminution of vision. This patient was in the irrigating vectis group accounting for 4% in this group. The resultant visual acuity was 6/60 following surgery and the poor vision in this case was attributed to maculopathy as there were no other complications.

The corneal complications were studied on day 1 and day 7. The corneal complications encountered were striate keratopathy (SKs), Corneal edema, Descemet's detachment and pigments on the endothelium. SK and SK with corneal edema were the most frequently encountered complications. SK was seen in 16% of patients in the phacosandwich group, 28% in the vectis with counter pressure group, 6% in the phacofracture group and 24% in the irrigating vectis group.

SK with corneal edema was seen in 12% in the phacosandwich group, 24% in the phacofracture group and 8% in the irrigating vectis group. It was not seen in the vectis with counter pressure group.

Corneal edema alone was seen in 8% each in the phacosandwich and vectis with counter pressure groups and none of the patients in the phacofracture group. Pigments on the endothelium were seen in 1 patient (4%) in the phacofracture group. SK with corneal edema with pigments on the endothelium was seen in 1 patient (4%) in the phacofracture group. SK with corneal edema with Descemet's detachment was seen in 1 patient (4%) in the phacofracture group.

There were no post-operative corneal complications seen in 64% each in phacosandwich and vectis with counter pressure groups, 60% in the irrigating vectis group and 44% in the phacofracture groups.

Although there was no statistical significance in the occurrence of corneal Complications between the 4 groups, it was more frequently encountered in the phacofracture group. The corneal complications in the other 3 groups were comparable.

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In 1 patient (4%) of the phacosandwich group who had SK with corneal edema, there was accidental fracture of the nucleus during delivery followed by AC collapse. This patient had soft cataract, with nuclear sclerosis grade 1. Hence phacosandwich should be done carefully in patients with very soft cataracts because if excess pressure is applied between the 2 instruments during delivery, it may break the nucleus in the AC causing complications.

In the present study, phacofracture was done by using a wire vectis below the nucleus and a Sinskey hook or lens dialler above the nucleus. Using the vectis as a support, downward pressure was applied using the Sinskey hook and in the process, the nucleus was bisected. Each portion was then sandwiched out. During the process of bisecting, the pressure applied resulted in escape of the viscoelastic substance and shallowing of the AC. All the patients in the phacofracture group who had poor visual outcome on the first post-operative day had AC collapse and some had endothelial touch during the step of fracturing the nucleus. This may have resulted either due to inadequate use of viscoelastic substance or due to excessive pressure applied during the step. Thus the corneal complications on the first post-operative day were slightly higher in this group.

The use of a viscocannula instead of the Sinskey hook along with the wire vectis may help overcome this complication. When using a viscocannula to fracture the nucleus, the AC can be constantly irrigated with viscoelastic substance. So even when visco escapes while applying downward pressure, it can be constantly replenished, thus maintaining the AC and preventing AC collapse and endothelial touch. The use of a bisector or trisector may also prevent the corneal complications.

By the 7th post-operative day, most of the corneal complications had subsided. 92% had no complications. 6% had SK and 2% had pigments on the endothelium that persisted. These patients had been started on sodium chloride 5% eye drops or 6% eye ointment.

Only 4% in the phacosandwich group and the irrigating vectis group had faint SK. 4% in the irrigating vectis group had pigments on the endothelium. 96% in phacosandwich group, 92% in the irrigating vectis group and 100% in the vectis with counter pressure group had no corneal complications by day 7. In the phacofracture group, 16% had SK and 4% had pigments on the endothelium. The remaining 80% had no corneal complications. However the rate of corneal complications on day 7 had come down drastically even in the phacofracture group.

Although the phacofracture group had a higher rate of complications even on day 7, there was no statistically significant difference between the 4 groups

We studied the post-operative visual acuity on day 1 and day 7. The visual outcome was divided into 3 groups. Visual acuity of 6/6 to 6/12 was labeled as having good visual improvement, 6/18-6/36 as moderate visual improvement and 6/60 or less as having poor vision.

On Post-operative day 1, 68 patients (68%) had moderate visual improvement, 21 Patients (21%) had good visual improvement and 11 patients (11%) had poor vision.

Good visual improvement was seen in 24% of the patients in the phacosandwich, 20% in the vectis with counter pressure group, 16% in the phacofracture group and 24% in the irrigating vectis group.

Moderate visual improvement was seen in 68% of the patients in the phacosandwich group, 76% in the vectis with counter pressure group, 56% in the phacofracture group and 72% in the irrigating vectis group.

Poor vision was seen in 8% in the phacosandwich group, 4% in the vectis with counter pressure group, 28% in the phacofracture group and 4% in the irrigating vectis group.

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We found that on the 1st day maximum no of patients with good visual improvement was seen in the phacosandwich and the irrigating vectis group.

Poor vision was seen more often in the Phacofracture group-28% as compared to phacosandwich (8%), vectis with counter pressure (4%) and irrigating vectis (4%) techniques.

Visual acuity of 6/60 or less on the first post-operative day in most of these cases could be attributed to the corneal complications. Poor vision in 1 patient in the irrigating vectis group was however due to diabetic maculopathy.

By the 7th post-operative day, visual acuity had improved in most of the patients. 76% had good visual improvement, 23% had moderate visual improvement and only 1% had Poor vision.

Good visual improvement was seen in 76% in the phacosandwich group, 88% in the vectis with counter pressure group, 84% in the irrigating vectis group and only 44% in the phacofracture group. Moderate visual improvement was seen in the remaining patients-24% in the phacosandwich group, 12% in the vectis with counter pressure group, 44% in the phacofracture group and 12% in the irrigating vectis group.

None of the patients had poor visual acuity on day 7 in the phacosandwich, vectis with counter pressure and the phacofracture groups. 1 patient in the irrigating vectis group had poor vision and this could be attributed to diabetic maculopathy.

Vectis with counter pressure technique had good results with respect to all parameters, but the important considerations in this technique is to make external incision of 5.5 mm with large inner wound lip and to use lot of viscoelastic and advantage being no manipulation needed once nucleus in anterior chamber except gentle depression of lower scleral wound lip during delivery of nucleus.

CONCLUSION:

- In the management of senile immature cataracts with nuclear sclerosis grade 2 or less, phacosandwich, vectis with counter pressure and irrigating vectis are equally effective.
- Phacofracture technique was associated with slightly higher rate of corneal complications and resultant poor vision in the early post-operative period. This was primarily due to collapse of the anterior chamber while fracturing the nucleus. This can be overcome by using a viscocannula instead of a Sinskey hook along with the wire vectis so as to maintain the AC by continuously injecting viscoelastic material during the step of fracturing the nucleus in the AC. Using a bisector or trisector may also decrease the corneal complications in phacofracture technique.
- When the four techniques were compared, vectis with counter pressure gave the best results causing the least corneal complications. Hence vectis with counter pressure is a safe and effective technique in the management of soft cataracts.
- Phacosandwich and irrigating vectis techniques also gave comparable results with few corneal complications and fast visual recovery.
- Phacosandwich technique should be used cautiously in very soft cataracts as any extra pressure between the 2 instruments during delivery may result in accidental fracture of the nucleus.

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