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# An Evaluation of Topical and Local Anesthesia in Phacoemulsification

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## Introduction

The technique of phacoemulsification was developed, to enable ophthalmologists to extract cataracts through the smallest possible incision using an ultrasound or laser probe, to break the lens without damaging the lens capsule. Today it has become the preferred technique for cataract removal. No sutures are required as the incision is self-healing. This reduces the risk of astigmatism and foreign body sensation following surgery, while eliminating fluctuations in intra-ocular pressure intraop, thereby reducing the risk of hemorrhage.<sup>1</sup>

Several local anesthetic techniques are used in phacoemulsification. These include retrobulbar, peribulbar<sup>2</sup>, subconjunctival, and Sub-Tenon's techniques.<sup>3,4</sup> The traditional local anesthetic techniques have potentially serious side effects. <sup>5-7</sup> Topical anesthesia provides a safer alternative as it avoids the risk of injections and reduces the need for intravenous medications.<sup>8</sup> It is clinically effective though it has increased technical difficulty.<sup>9</sup> Conditions that prohibit patients from undergoing phacoemulsification procedures with topical anesthesia include, Alzheimer's disease, extreme anxiety, and communication problems (e.g. language barriers and hearing deficits) along with inability to tolerate eye drops (as demonstrated by excessive eye blinking and squeezing).

There is patient preference of phacoemulsification procedures with topical anesthesia, with very high patient satisfaction as sutures and eye patches are not required, and the improvement in vision is immediate.<sup>10,11</sup> Phacoemulsification procedures with topical anesthesia are cost effective for surgery departments, with shorter hospital stay and fewer chargeable items.<sup>10</sup>

Studies show that topical anesthesia provides good surgical conditions for the ophthalmologist and a comfortable operating environment for the patient. The operation is tolerated well by patients, and even though there is greater awareness of ocular discomfort it does not alter patient satisfaction with the surgical experience.<sup>12,13</sup> This awareness does not become clinically significant when viewed against the reduced incidence of anesthetic related complications.<sup>14</sup> The absence of post-operative ptosis or diplopia and rapid return of visual function with a mean acuity of 6/15 by four hours, suggests that early patient discharge is relatively safe.<sup>15</sup> Topically applied proparacaine 0.5%, effectively penetrates the eye, providing good analgesia for the phacoemulsification.<sup>16</sup>

No studies comparing the use of topical and local anesthesia in phacoemulsification have been conducted in the South Asian region including Pakistan. Our aim was an attempt to

gather baseline demographics and statistics of local and topical phacoemulsification procedures in our population ,and to see whether we had similar results to those studies done globally.

## **Methods**

A retrospective study of medical records was carried out at The Aga Khan University Hospital. The subjects were men and women between the ages of 45 and 85 years, of various socioeconomic backgrounds, who underwent elective cataract surgery by phacoemulsification technique, under the care of one surgeon over a period of one year, from March 1999 to March 2000. Different grades and types of cataracts were reviewed. The outcome was graded in terms of: subjective experience of the patients, ease of doing the procedure and surgical outcome. The procedure aimed was sutureless, clear cornea phaco with foldable IOL under topical anesthesia only (no intracameral lignocaine).

Basic screening for the suitability of topical anesthesia was assessed in the clinic while doing applanation tonometry, or A-Scans; 'squeezers' were not offered during the procedure. Informed consent was taken on the day of the surgery.

Pre-op dilatation was done with Tropicamide 1%, Phenylephrine 5-10% and NSAID drops. Patients were instructed on the operating table to look at the microscope light and not to move the eye. Microscope light was initially adjusted to a lower intensity and then gradually increased. Two to three drops of proparacaine 0.5% were put on the cornea and conjunctival sac followed by a clear cornea section. HPMC (Hydro propyl methyle cellulo) was the viscoelastic used in all cases. A paracentesis section was made perpendicular to the left of the corneal section. Continuous curvilinear capsulorhexis was performed followed by hydrodissection with the 'Divide and Conquer' Phaco-Chop technique. Irrigation and aspiration was performed to remove the residual cortex followed by HPMC injection to inflate the capsular bag. Section was enlarged slightly and a foldable IOL was put in the bag. Automated irrigation and aspiration was done to remove the viscoelastic. Stromal hydration was done to seal the wound. An eye shield was applied over the treated eye for 1-2 hours. 2 Hourly steroid and antibiotics drops were started on the first day. Patient was discharged following surgery and seen the next day.

## **Results**

A total of 186 patients underwent small incision, phacoemulsification cataract surgery, of which 124 received topical anesthesia and 62 received local anesthesia (LA). There were an equal number of male and female patients. The mean age range was 56-65 years with standard deviation of 9.46.

Seventy four percent of the patients had at least one pre-existing co-morbid condition, with 22.6% having more than one co-morbid in those under going local anesthesia (LA) and 39.5% in those who had topical (TA). The commonest comorbid was hypertension (58.1% in LA and 37.9% in TA), followed by diabetes mellitus (33.9% in LA and 31.6% in TA). (Table 1). In both study populations (TA and LA) approximately 25% had no comorbid.

The type of cataracts operated upon included nuclear sclerosis type (86.7%) followed by posterior sub-capsular type (47.3%) and cortical type (6.9 %) (Table 2). Seventy eight patients had more than one type of cataract and for 4 patients the information was not given. Thirty eight patients (30.7%) undergoing TA versus 5 (8.1%) patients undergoing LA had a concomitant pathology of the preoperative eye. Glaucoma and pterygium (3.2% each) were more common in LA as compared to TA where age related macular degeneration (ARMD) (3.2%) and diabetic retinopathy (2.4%) were more prevalent in the TA group (Table 3).

Out of the 186 procedures carried out, it was seen that with topical anesthesia, the duration of surgery (11.46 minutes) was shorter as compared to that with local anesthesia (15.3 minutes).

The planned procedure was not completed in 1.7% of cases of topical anesthesia and 8.7% of cases of local anesthesia due to some per-operative complication (Table 4). Subconjunctival injection and eye padding were required only for procedures done under LA while sutures were required more for LA patients. Uncorrected visual acuity assessed in the first post op week between 20/20-20/40 was 43.3% for TA as compared to 23.4% under LA and 20/50 or worse was 56.7% for TA and 76.7% for L.A.

Corrected visual acuity in the first postoperative week between 20/20 - 20/40 was 66.23% for TA and 40% for LA cases. It was 33.76% for TA and 60% for LA cases 20/50 or worse.

Uncorrected visual acuity after the first postoperative month between 20/20 - 20/40 was 48.57% for TA and 42.42% for LA and 51.42% for TA and 57.57% for LA for visual acuity 20/50 or worse.

Corrected visual acuity in the first postoperative month was 82.52% and 62.71% in TA and LA respectively for 20/20 - 20/40 and 17.47% and 37.28% respectively for 20/50 or worse.

Another important variable that was assessed in the first postoperative week and month was IOP (intra-ocular pressure). The acceptable IOP of 1-21 mm of water was found in 81.7% of TA cases and 82.8% of LA cases and 95.2% of TA and 93.5% of LA in the first postoperative week and month respectively.

## **Discussion**

Topical anesthesia and traditional anesthesia are both accepted methods for patients undergoing cataract surgery via the phacoemulsification technique. Topical anesthesia is a safer alternative to local anesthesia, as it avoids the risk of injury and decreases the need for intravenous medications.

Our study results show that improvement in uncorrected visual acuity in the first post-operative week was faster, when topical anesthesia was used. The results for improvement in corrected visual acuity during the first post-operative week showed

significant difference. A large number of patients had an uncorrected visual acuity of 20/40 or better and a desired refractive error within 0.75 diopters of ametropia. These results are consistent with the findings of comparable studies by other authors.

Uncorrected and corrected visual acuity one month post-operatively, showed similar results. Another outcome variable studied was intraocular pressure. The majority of patients in both groups were found to have intraocular pressures within the acceptable range of 1-21cmH<sub>2</sub>O, both one week and one month post-operatively, with no significant difference between the groups. No comparable study has so far been published which takes into account intraocular pressure as a variable.

The mean duration of surgery when topical anesthesia was used, was found to be two-thirds of that when local anesthesia was used. Again no comparable study has been done which incorporates duration of surgery as a variable.

Interpretation of these results should take into account, the limitations of the study being based upon the use of pre-existing data, which inevitably means that some information is incomplete. If our study had utilized a prospective cohort, we would have been able to incorporate other variables, such as patient comfort and pain experienced by the patient during and after the surgery. Studies by other authors have assessed these variables using the visual pain analog scale to assess pain.

## **Conclusion**

Our study showed that the uncorrected visual acuity improves faster and the duration of surgery is shorter when topical anesthesia is used. The study also provides baseline statistical and demographic information about phacoemulsification surgery carried out under topical and local anesthesia in the local population. We hope that our work can provide a platform for further analytical studies in this area.

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