Original Article

Comparison of Peribulbar and Topical Anesthesia in Phacoemulsification Cataract Surgery in Terms of Pain

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ABSTRACT

Purpose: To compare effectiveness of Peribulbar and topical anesthesia in phacoemulsification in terms of severity of pain.

Study Design: Quasi experimental study.

Place and Duration of Study: This cross-sectional study was conducted at Eye Department, Liaquat National Hospital, Karachi, from August 2017 to January 2020.

Methods: This study included 1154 patients of 40-75 years of age who underwent phacoemulsification. Complete ocular examination was performed. Patients were allocated into two groups by convenient sampling. Cataract surgery was performed under Peribulbar anesthesia in 577 patients and other 577 patients were operated using topical anesthesia. Pain was assessed by Visual Analogue Scale Score. Frequency and percentage and mean ± standard deviation was computed for qualitative and quantitative variables respectively using SPSS version 21. Chi square test was used for stratification of gender, duration of symptom and age, p≤0.05 was considered significant.

Results: Average age of the patients was 57.43±6.70 years. There were 576(49.9%) males and 578(50.1%) females. There were 34 (5.9%) patients in Peribulbar group and 382 (66.2%) patients in topical group who had no pain (p=0.0005). Frequency of mild, moderate and sever pain was less in patients given topical anesthesia. The rate of pain was significantly higher in older and female patients with shorter duration of symptoms (p 0.0005).

Conclusion: Phacoemulsification can be accomplished efficiently and effectively using topical anesthesia. Compared to retro bulbar and Peribulbar anesthesia, it offers several advantages and a high degree of pain satisfaction for the patient.

Key Words: Cataract surgery, Peribulbar, Topical anesthesia, pain.

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INTRODUCTION

Cataract surgery is generally performed under local (regional) anesthesia, unless medically contraindicated. An effective anesthesia approach involves selecting the appropriate anesthetic agent and combining it with a suitable clinical strategy to ensure patient comfort both during and after the procedure.[1,2] Peribulbar anesthesia (PA) was the most commonly used method for cataract surgery in the last decade.[3] Shorter acting anesthetics are now used during cataract surgeries because of advancements in the field, such as the use of smaller, self-sealing incisions that have shortened operating times.[4] Peribulbar anesthesia, which involves injecting anesthetic behind the globe of the eye, is associated with consequences such as globe perforation, optic nerve damage, retrobulbar hemorrhage, and ocular muscle injury. Fichman introduced topical anesthesia for cataract surgery in

1992.[5] It does minimize the possibility of injection problems, but it does not reduce pain sensitivity of the iris, zonules, and ciliary body. There have also been reports of epithelial and endothelial toxicity with various topical medications like drops, intracameral drugs or gels.[6]

The two main approaches in the cataract surgery are peribulbar and topical anesthesia. It is a matter of dispute whether topical anesthetic technique is safer and more successful than the peribulbar technique for cataract surgery. In a recent research, 336 participants got topical anesthetics drops while 366 participants received peribulbar anesthesia.[7] The peribulbar injection group had a greater mean pain score than the other group ($p < 0.001$). The group receiving peribulbar injections had a greater mean pain score compared to the other groups ($p<0.001$ for all genders).[7]

As cataract surgery is one of the most commonly performed surgeries worldwide, and minimizing pain is essential for patient satisfaction and comfort. Comparing two widely used anesthesia methods (peribulbar and topical) will help to identify which provides better pain management during surgery. Secondly, different anesthesia techniques have varying risk profiles and recovery times. Evaluating which method is safer, quicker, and more efficient can guide clinicians in choosing the best approach for different patient populations. There, the purpose of this study was to compare the peribulbar and topical anesthesia in phacoemulsification cataract surgery to evaluate severity of pain.

METHODS

This quasi-experimental study was conducted at Eye Department, Liaquat National Hospital, Karachi by taking proportion of pain during topical administration as 16.7%, proportion of pain during peribulbar administration as 11.6%, power of test (1-β) as 80%, the calculated sample size was 1154 patients. WHO software for sample size calculation was used taking 95% confidence interval.[8]This sample was further divided into 577 patients in each group. Both males and females undergoing cataract surgery in the age range of 40-75 year were included. Patients outside this age limit or those suffering from glaucoma, herpes or trigeminal neuralgia, confirmed on the basis of clinical history, (these diseases affect the ocular sensitivity and are therefore confounding variables) were excluded from the study. The study was conducted after ethical approval from Ethical Review Committee of Liaquat National Hospital, Institute for Postgraduate Medical Studies and Health Sciences. An informed written consent was taken before conducting study from each participant. Patients were allocated to either peribulbar or topical anesthesia group by convenient sampling. Immediately after operation they were asked to fill a questionnaire regarding pain scale. Pain was assessed on the basis of Visual Analogue Scale (VAS) Score. 0- Score indicate No pain, 10 – score indicate Worst pain and greater than 3 was considered as pain. Confounders and bias were controlled by strictly following the inclusion and exclusion criteria. Frequency and percentage and mean± standard deviation was computed for qualitative and quantitative variables respectively using SPSS version 21. Chi square test was used for stratification of gender, duration of symptom and age, $p \leq 0.05$ was considered significant.

RESULTS

A total of 1154 patients undergoing cataract surgery were divided into two groups. Cataract surgery with peribulbar anesthesia was performed in 577 patients and other 577 patients were operated under topical anesthesia. Table 1 show that mean age of the patients was 57.43±6.70 years and mean duration of cataract symptoms was 5.01±3.18 months. The age distribution of the patients shows that most of the patients were in the age range of 51 to 60 years (Figure 1). There were 272 (47.14%) males and305 (52.86%) females in peribulbar group while 304 (52. 69%) males and 273 (47.31%) females in tropical group respectively.

Table 1: *Mean Age and Duration of Cataract Symptoms.*

Variables	Peribulbar Mean ±SD	Topical Mean ±SD
Age (Years)	57.30 ±7.541	57.56 ±5.749
Duration of Symptoms (Months)	4.52 ±2.515	5.50 ±3.679

In Figure 2, the severity of pain is depicted, revealing that the frequency of no pain was more commonly observed in patients who received topical anesthesia (34 cases, 5.89%) compared to those who received peribulbar anesthesia. Additionally, patients given topical anesthesia experienced lower frequencies of mild, moderate, and severe pain.

There were 34 (5.9%) patients in peribulbar group and 382 (66.2%) patients in topical group who had no

pain so the rate of pain was significantly high in peribulbar anesthesia as compared to topical anesthesia group with p=0.0005. (Chi square test was applied with p<0.05 considered significant).

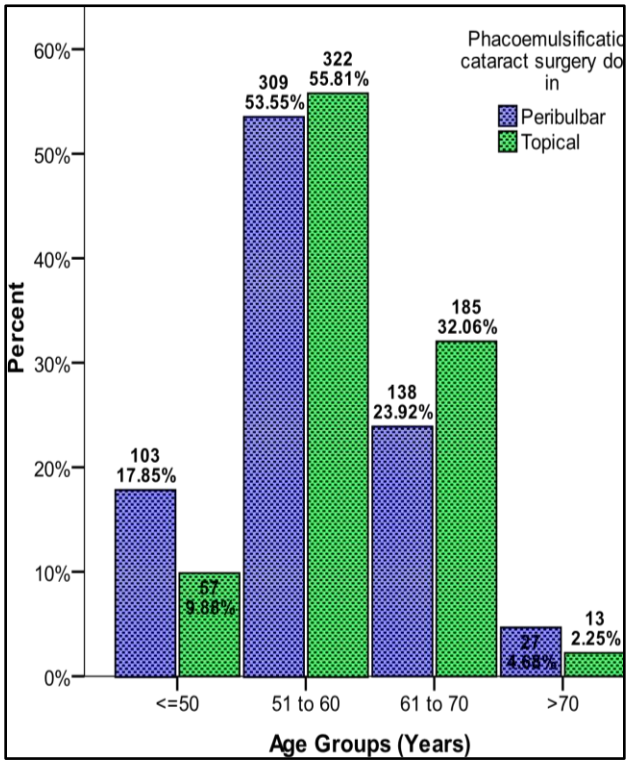

Figure 1: Distribution of age.

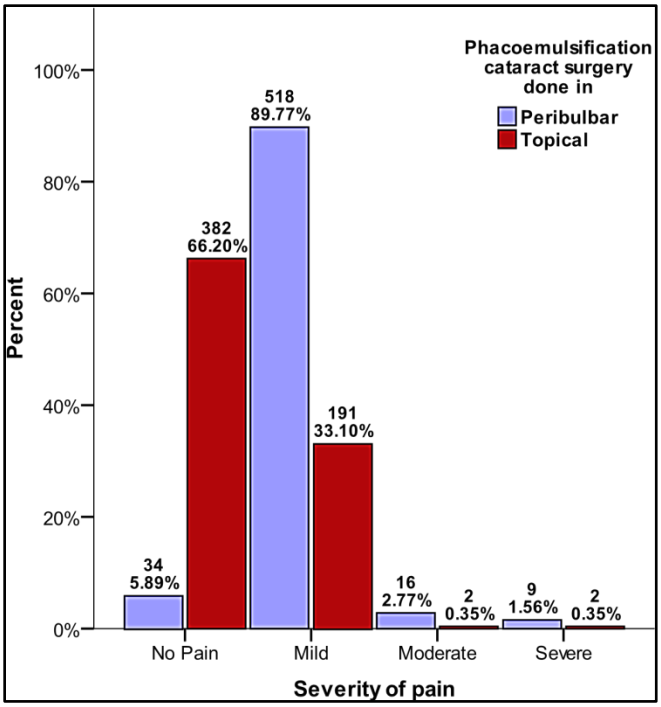

Figure 2: Grading of Pain.

Stratification was done to observe the effect of age, gender and duration of symptoms on the rate of pain and it was noted that rate of pain was significantly high in peribulbar anesthesia in all age groups however; this rate of pain was more as the age of patient increased. Similarly, frequency of pain was

Table 2: *Association of Demographic features with Pain.*

Variables	Pain	Peribulbar (n=577)	Topical (n=577)	p-value
Age Groups				
≤ 50 Years	No Yes	9(8.7%) 94(91.3%)	18(31.6%) 39(68.4%)	0.0005
51 to 60 Years	No Yes	16(5.2%) 293(94.8%)	228(70.8%) 94(29.2%)	0.0005
61 to 70 Years	No Yes	9(6.5%) 129(93.5%)	123(66.5%) 62(33.5%)	0.0005
>70 Years	No Yes	0(0%) 27(100%)	13(100%) 0(0%)	0.0005
Gender				
Male	No Yes	22(8.1%) 250(91.9%)	220(72.4%) 84(27.6.%)	0.0005
Female	No Yes	12(3.9%) 293(96.1%)	162(59.3%) 111(40.7%)	0.0005
Duration of Symptoms				
≤ 5 months	No Yes	28(7.9%) 328(92.1%)	175(57.8%) 128(42.2%)	0.0005
>5 months	No Yes	6(2.7%) 215(97.3%)	207(75.5%) 67(24.5%)	0.0005

significantly higher in both male and females given peribulbar anesthesia. Moreover, significantly higher frequency of pain was observed in peribulbar group with duration of symptoms ≤ 5 months (p 0.0005) as shown in Table 2.

DISCUSSION

One of the most prevalent surgical procedures in medicine today is cataract surgery.[9] Minimally invasive methods for regular cataract surgery have been developed in tandem with its growing frequency. Similarly, an extra option for standard cataract surgery may be topical anesthesia utilizing anesthetics eye drops.[10,11]Patient satisfaction, however, is a crucial element and quality indicator in healthcare because it indicates the extent to which a patient's expectations have been met.

In the present study we observed that most of the patients were 51 to 70 years of age, the average age of the patients was 57.43±6.70 years. Age is considered an important risk factor for development of cataract.[12]

Gender distribution in our study reveals that there were more females than males in the study sample. According to a systematic review on 22 Indian studies on the prevalence of cataracts and gender, gender disparities were seen in cataract blindness, surgical coverage for cataracts, and blindness itself.[13] For men, the pooled prevalence of blindness was 4.17%, while for women, it was 5.68%. The chances of blindness and cataract blindness were 35% and 69% higher, respectively, for women.

In the present research the rate of pain was significantly high in peribulbar anesthesia as compared to topical anesthesia groups. We observed that in peribulbar anesthesia group 94.1% patients experienced pain while 33.8% patients in topical group had pain. Our study confirms the results of previous study by Agarwal, found topical anesthesia as a technique of choice in small incision cataract surgery.[14]

Regarding pain felt in the second eye of surgery, it was noted that pain perception was more in second eye surgery as compared to the first eye under topical anesthesia.[15] Our results are contrary to the findings of Lindely, who found that patients experience more pain with topical anesthesia as compared to peribulbar anesthesia.[16] However, a recent study compared both anesthetic techniques in terms of post-operative visual outcome and showed that the anterior chamber depth was more after peribulbar anesthesia as compared to topical anesthesia while refractive outcome was better with the use of topical anesthesia.[17] According to Roman et al, topical anesthesia had different course of study and increased surgical difficulties.[18] These variations in the results might be the result of various clinical environments and physicians' patient counseling.

The association of pain in peribulbar anesthesia versus topical anesthesia with respect to gender, age and duration of symptoms shows that pain was significantly associated with older age in peribulbar anesthetic group. Females experienced more pain than male and patients with lesser duration of symptoms perceived more pain (p;0.0005). These results are consistent with previous findings, which indicate that female patients are more likely to report experiencing pain.[19] Similarly, patients in the age range of 61 to 70 years experienced more pain. These findings agreed with the recent report by Khan et al, which showed that pain was perceived more in patients that were in the sixth and seventh decades of their life.[20] The findings of the present study revealed that as the duration of symptoms increases, the reported rate of pain decreases. This may be attributed to patients' growing acceptance of their illness, as confirmed by a previous study by Kowalczuk et al.[21] The study showed perception of pain was significantly associated with the acceptance of illness.

Limitations of this study are a quasi-experimental study design which lacks randomization introducing bias and limiting the generalizability of the results. It was a single center study with limited duration of follow up. Pain was assessed using the Visual Analogue Scale Score, which is subjective and may vary based on individual pain tolerance and perception. The study focused primarily on pain and did not extensively evaluate other potential adverse effects or complications associated with the anesthesia types.

CONCLUSION

Topical anesthesia is safe and effective for phacoemulsification. It has numerous advantages over retrobulbar and peribulbar anesthesia, as well as a high degree of patient satisfaction in terms of pain. As the trend towards less intrusive cataract surgery grows, the study findings suggested that topical anesthetic

technique might replace other techniques of anesthesia in all cases.

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Patient's Consent: Researchers followed the guidelines set forth in the Declaration of Helsinki.

Conflict of Interest: Authors declared no conflict of interest.

Ethical Approval: The study was approved by the Institutional review board/Ethical review board **(App/0372-2017-LNH-ERC)**.

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Authors Designation and Contribution

Fatima Ahmed; Consultant Ophthalmologist: *Concepts, Design, Data acquisition, data analysis, Statistical analysis, Manuscript preparation, Manuscript review.*

Abdul Hameed Siddiqui; Professor: *Concepts, Design, Literature search, Data acquisition, Manuscript preparation, Manuscript editing, Manuscript review.*

Imran Ghayoor; Professor: *Data acquisition, Manuscript editing, Manuscript review.*