

Topical Anaesthesia for Cataract Surgery

Ahmed Jabbar Kadhim

Anesthesia and intensive care specialist, Imam Al _Sadiq teaching hospital, Babylon, Iraq

Sabah Khudher Asfoor

Anesthesia and intensive care specialist, Al-Hussein teaching hospital, Samawah, Al-Muthanna, Iraq

Talal Abdulrazaq Shaker Shnayien

Anesthesia and intensive care specialist, AlDiwaniyah teaching hospital, Aldiwanyia health directorate, Iraq

ABSTRACT

The purpose of this study is to determine if topical anesthetic with 0.5% propacaine hydrochloride is effective in reducing pain during phacoemulsification surgery. At each of the three points of the procedure, the patients' levels of discomfort were verbalized using a 5-point scale. For each patient's age, gender, cataract type, and surgical stage, we compared overall pain levels with pain scores from each surgical stage. The white mature cataract (WMC) and corticonuclear plus posterior subcapsular cataract (CN + PSC) groups had substantially higher mean overall pain levels and mean stage 2 pain scores compared to the PSC-only (PSC) group ($P < 0.05$). In summary. Even with topical anesthetic, phacoemulsification could cause some discomfort. Cataract type and surgical stage determine the level of discomfort.

KEYWORDS: Topical, Anesthesia, cataract

INTRODUCTION

Because it offers enough patient comfort with a reduced frequency of problems compared to other forms of anesthetic, topical anesthesia is used for routine cataract surgery.[2 ,1]

Eye drops, eye drops injected with intracameral lidocaine, and gel are the three most prevalent forms of topical anesthetic [3, 4]. A second intracameral lidocaine injection may be necessary if the topical anaesthetic from eye drops does not give enough analgesia, yet this noninvasive technique is still worth considering.[5]

Patients undergoing phacoemulsification were the subjects of this research, which sought to establish the effectiveness of topical anesthetic with 0.5% propacaine hydrochloride in managing pain and ensuring intraoperative comfort.

MATERIALS AND METHODS

Sixty eyes from sixty patients who visited the Erzurum Regional Training and Research Hospital from 2021 to 2023 were part of this prospective research. No glaucoma, traumatic cataract, or extreme myopia operations or diseases were documented in these individuals' medical histories.

According to Table 1, the pain grading method was developed using the Keele verbal pain chart [6]. Prior to surgery, all patients were given information on the pain scoring system and instructed to utilize it to communicate their degree of discomfort during the procedure.

TABLE 1: Pain intensity scoring system.

Intensity	Description	Score
None		0
Mild	Momentary mild sensations of burning or piercing	1
Moderate	Intermittent moderate sensations of burning, piercing, or fullness/tightness in the eye lasting a few seconds	
Severe	Continuous sensations of piercing or swelling/stretching in the eye severe enough to require additional intervention	
Unbearable	Continuous sensations of piercing or swelling/stretching of the eye severe enough to make the patient want to stop the procedure	

Cataract type, age, gender, and laterality were the criteria used to classify patients. There was a comparison of the overall pain score and pain scores at each step of the surgery among groups. Three age groups were distinguished: those between 35 and 50, 51 and 65, and 66 and 80. White mature cataract (WMC), posterior subcapsular cataract (PSC), and corti-conuclear plus posterior subcapsular cataract (CN + PSC) were the three types of cataracts to be considered.

Cataract types PSC and CN + PSC were determined using the American Optometric Association's cataract grading scheme [7]. Each group's patients had cataracts that were graded 2 or 3 by the American Optometric Association (AOA). Inclusion in the WMC group was contingent upon meeting the following criteria: preoperative or intraoperative inability to differentiate between epinucleus and nucleus; and lens overall opacity and whiteness. Preoperatively or during surgery, no individuals in this group were found to have a severely emulsified epinuclear component, hypermature cataract, or morgagnian cataract. During preoperative exams, these individuals also showed no signs of abnormal pupil movements or lens-to-iris contact.

Everyone went through the same three-step process with only one surgeon, and no one was sedated before the operation (Table 2). While doctors watched the operation via live video, patients self-reported their degrees of intraoperative discomfort and the relevant surgical stages. At any given step of the surgical procedure, the maximum pain score was used if multiple scores were provided by the patient. When all three phases of surgery are added together, the overall pain score is the result.

Avoiding manipulation of the conjunctiva was a priority throughout the surgery.

The incision was sutured shut and the patient was transferred to the inpatient clinic without delay after the procedure. The following questionnaire was used to interview patients at the clinic. They were given the task of evaluating the effectiveness of their process and were then asked to justify their choices.

TABLE 2: Surgical stages.

Stage 1	Injecting viscoelastic, applying topical anesthetic (0.5% propacaine), making a side port incision, injecting air or dye, incisions for both the clear corneal tunnel and preincision, and capsulorhexis are all part of the procedure.
Stage 2	Using the divide-and-conquer technique for phacoemulsification, hydrodissection, and coaxial irrigation/aspiration to rinse the cornea
Stage 3	Procedures include stromal hydration, irrigation/aspiration for viscoelastic clearance, in-the-bag implantation of a hydrophilic acrylic intraocular lens (IOL), and filling the lens with the drug.

Results

While 54 patients (or 90%) were given simply topical anesthetic drops during surgery, 6 patients (10%) reported very painful surgery and were given extra intracameral lidocaine injections (Table 3). A total of four patients—two with WMCs, one with PSC, and three with CN + PSCs—received lidocaine injections. We evaluated the pain ratings of these individuals separately, excluding them from the within-group data. Within 10 seconds of receiving an intracameral lidocaine injection, all patients reported a full remission of their pain, and none of them reported any further discomfort throughout the procedure.

TABLE 3: Cataract type, surgical stage, and pain scores in patients requiring supplemental lidocaine injection.

Cataract type	Surgical stage	Pain score	Number of patients
PSC		4	1
CN + PSC	All Stage 2, during nucleus fragmentation and rotation	3-4	3
WMC		3	2

Figure 4. The association between the kind of cataract and the average total and stage-specific pain scores.

Cataract type	Ranks	N
PSC		18
Total pain score	WMC	17
CN + PSC		19

Total		54
PSC		18
Stage 1	WMC	17
CN + PSC		19
Total		54
PSC		18
Stage 2	WMC	17
CN + PSC		19
Total		54
PSC		18
Stage 3	WMC	17
CN + PSC		19
Total		54

N: number.

DISCUSSIONS:

Scientific investigations on clear corneal phacoemulsification surgery are many [8–11]. Topical anesthetic has a number of benefits over peribulbar or retrobulbar anesthesia, including faster vision recovery and the absence of injection-related problems.[14–12]

We tested the effectiveness of topical 0.5% propacaine hydrochloride anesthetic in ensuring patient comfort during phacoemulsification by examining the impacts of cataract type, age, gender, and laterality in this prospective randomized trial.

As stated in the study by Soliman et al., topical 0.4% benoxinate caused severe to excruciating pain in 73.3% of patients and topical 0.5% bupivacaine in 10% of patients undergoing phacoemulsification surgery; hence, subtenon lidocaine injection was added in these cases [4]. Seven patients (14.2%) required an intracameral lidocaine injection due to severe to excruciating pain in our research. In each instance, the second stage of the operation was when the patient experienced the most excruciating agony.

The data analysis of 56 patients who were given topical anesthetic drops alone showed that the groups who received both WMC and CN + PSC had substantially higher mean overall pain ratings and mean stage 2 pain scores compared to the PSC group ($U < 0.05$). The great density of the cataracts necessitated mechanical impacts of nucleus rotation or intracapsular manipulation on the surrounding tissue, particularly the corpus ciliare area, which was believed to be the source of the referred discomfort.

Researchers Malecaze et al. looked at the effectiveness of intracameral mepivacaine during phacoemulsification, in addition to topical anesthetic. According to their findings, 84% of patients saw a reduction of at least one level of pain on the Keele verbal score within 10 seconds of the intracameral injection. Of these patients, 90.4% reported less discomfort throughout the rest of the treatment, but 9.6% needed further intracameral mepivacaine injections because their pain levels were too high [15]. Patients in our research reported no further discomfort during the surgery after receiving intracameral lidocaine injection, which completely relieved their agony within 10 seconds.

Kaluzny et al. investigated the analgesic effectiveness of oral acetaminophen in conjunction with topical anesthetic drops containing 0.5% tetracaine during phacoemulsification. The average verbal pain score for 80 patients in the oral placebo group was 1.11 ± 0.73 , according to their findings [16]. Our research found that 56 individuals who were given just topical anesthetic had an average pain level of 3.05 ± 1.24 on a scale from 0 to 5. Our study's overall pain score was calculated by adding the highest reported score from each of the three phases for each patient. This is why there is a huge discrepancy. Following the methodology used in the study by Kaluzny et al., the average pain score in our research drops to 1.01 ± 0.41 when the patient's greatest pain score for the whole process is included.

The results of the survey indicated that fifteen patients deemed the operation a success due to the enhancement of their vision that occurred after the removal of the cataract. Keep in mind that the WMC group included all of these patients. Patients' impression of the microscope lamp's brightness is greatly affected by phacofragmentation of the cataract following surgery, as WMC filters more light than other forms of cataracts. The patients may have mistakenly believed their operation had been successful because of this shift. Note also that all five patients who needed extra lidocaine injections thought the treatment was a failure since they were in so much agony throughout the operation.

In conclusion, even when using topical anesthetic eye drops, phacoemulsification is still not unpleasant. Pain levels range from low to moderate for most people, but may be excruciating for those with extensive cataracts. According to our findings, patients are more likely to think the treatment was a failure if they are in excruciating pain throughout it, and more likely to feel it was a success if they see obvious benefits while the process is still ongoing. Patients should be aware before surgery that their level of discomfort or visual acuity does not always indicate how well the operation is going to go.

REFERENCES:

1. D. A. Lebuissou, P. Lim, J. C. Mary, and M. C. Jolivet, "Anesthésie topique pour l'opération de la cataracte de l'adulte," *Journal Français D'Ophthalmologie*, vol. 19, no. 3, pp. 181–189, 1996.
2. H. Ru'schen, D. Celaschi, C. Bunce, and C. Carr, "Randomised controlled trial of sub-Tenon's block versus topical anaesthesia for cataract surgery: a comparison of patient satisfaction," *The British Journal of Ophthalmology*, vol. 89, no. 3, pp. 291–293, 2005.
3. A. Bardocci, G. Lofoco, S. Perdicaro, F. Ciucci, and L. Manna, "Lidocaine 2% gel versus lidocaine 4% unpreserved drops for topical anesthesia in cataract surgery: a randomized controlled trial," *Ophthalmology*, vol. 110, no. 1, pp. 144–149, 2003.
4. M. M. Soliman, T. A. Macky, and M. K. Samir, "Comparative clinical trial of topical anesthetic agents in cataract surgery: lidocaine 2% gel, bupivacaine 0.5% drops, and benoxinate 0.4% drops," *Journal of Cataract and Refractive Surgery*, vol. 30, no. 8, pp. 1716–1720, 2004.
5. A. S. Crandall, N. A. Zabriskie, B. C. K. Patel et al., "A comparison of patient comfort during cataract surgery with topical anesthesia versus topical anesthesia and intracameral lidocaine," *Ophthalmology*, vol. 106, no. 1, pp. 60–66, 1999.
6. K. D. Keele, "The pain chart," *The Lancet*, vol. 252, no. 6514, pp. 6–8, 1948.
7. American Optometry Consensus Panel, *Care of the Adult Patient with Cataract*, American Optometry Association, St. Louis, Mo, USA, 1996.
8. H. Maclean, T. Burton, and A. Murray, "Patient comfort during cataract surgery with modified topical and peribulbar anesthesia," *Journal of Cataract and Refractive Surgery*, vol. 23, no. 2, pp.

277–283, 1997.

9. P. S. Koch, “Efficacy of lidocaine 2% jelly as a topical agent in cataract surgery,” *Journal of Cataract and Refractive Surgery*, vol. 25, no. 5, pp. 632–634, 1999.
10. I. S. Barequet, E. S. Soriano, W. R. Green, and T. P. O'Brien, “Provision of anesthesia with single application of lidocaine 2% gel,” *Journal of Cataract and Refractive Surgery*, vol. 25, no. 5, pp. 626–631, 1999.
11. R. Aksu, C. Bicer, A. Özkırı, et al., “Comparison of 0.5% levobupivacaine and 0.5% bupivacaine for retrobulbar anesthesia in cataract surgery,” *Turkiye Klinikleri Journal of Medical Sciences*, vol. 31, no. 4, pp. 867–872, 2011.
12. C. M. Morgan, H. Schatz, A. K. Vine et al., “Ocular complications associated with retrobulbar injections,” *Ophthalmology*, vol. 95, no. 5, pp. 660–665, 1988.
13. J. S. Duker, J. B. Belmont, W. E. Benson et al., “Inadvertent globe perforation during retrobulbar and peribulbar anesthesia: patient characteristics, surgical management, and visual outcome,” *Ophthalmology*, vol. 98, no. 4, pp. 519–526, 1991.

-
14. K. L. Sullivan, G. C. Brown, A. R. Forman, R. C. Sergott, and J. C. Flanagan, “Retrolbulbar anesthesia and retinal vascular obstruction,” *Ophthalmology*, vol. 90, no. 4, pp. 373–377, 1983.
- [1] F. A. Malecaze, S. F. Deneuve, B. J. Julia et al., “Pain relief with intracameral mepivacaine during phacoemulsification,” *The British Journal of Ophthalmology*, vol. 84, no. 2, pp. 171–174, 2000.
- [2] B. J. Kaluzny, K. Kazmierczak, A. Laudenska, I. Eliks, and J. J. Kaluzny, “Oral acetaminophen (paracetamol) for additional analgesia in phacoemulsification cataract surgery performed using topical anesthesia. Randomized double-masked placebo-controlled trial,” *Journal of Cataract and Refractive Surgery*, vol. 36, no. 3, pp. 402–406, 2010.