(e) ISSN Online: 2321-9599

(p) ISSN Print: 2348-6805

ORIGINAL ARTICLE

Prospective evaluation of pain, anxiety, and patient satisfaction during cataract surgery under topical anesthesia with monitored anesthesia care (MAC)

[1]Varun Kumar, [2]Rahul Choudhary

[1]Assistant Professor, Department of Ophthalmology, Muzaffarnagar Medical College, Muzaffarnagar, Uttar Pradesh, India;
[2]Assistant Professor, Department of Anaesthesia, Saraswathi Institute of Medical Sciences, Hapur, Uttar Pradesh, India

ABSTRACT:
Background: Cataract surgery is commonly performed under local anesthesia, and topical anesthesia has gained wide acceptance due to its noninvasive nature and rapid recovery profile. However, because patients remain awake, intraoperative pain perception, anxiety, and overall satisfaction are critical patient-centered outcomes. Monitored anesthesia care (MAC) may enhance comfort and cooperation by providing titrated sedation and analgesia while maintaining spontaneous ventilation. Prospective evaluation of these parameters helps optimize perioperative care and improve patient experience in high-volume tertiary settings. **Aim:** To prospectively evaluate intraoperative pain, perioperative anxiety, and patient satisfaction during cataract surgery performed under topical anesthesia with monitored anesthesia care in a tertiary care hospital. **Material and Methods:** A prospective observational study was conducted on 65 adult patients undergoing elective unilateral cataract surgery under topical anesthesia with MAC. Pain was assessed using an 11-point numerical rating scale (NRS) at lid speculum insertion, during nucleus manipulation/phacoemulsification, and at the end of surgery. Anxiety was measured preoperatively and postoperatively using a 0–10 NRS. Sedation level was documented using the Ramsay Sedation Scale, and intraoperative events including need for supplemental topical anesthesia and adverse events (e.g., oxygen desaturation) were recorded. Patient satisfaction was assessed postoperatively using structured satisfaction responses and acceptance indicators. Appropriate statistical tests were applied, and $p < 0.05$ was considered significant. **Results:** Pain scores remained low throughout surgery, with the highest pain reported during nucleus manipulation/phacoemulsification and the lowest at the end of surgery; pain differed significantly across intraoperative time points ($p < 0.001$). Anxiety reduced significantly from the preoperative to postoperative period ($p < 0.001$). Most patients achieved an optimal sedation level, and a minority required supplemental topical anesthesia. Intraoperative adverse events were infrequent, with oxygen desaturation occurring in a small proportion of patients. Overall satisfaction was high, with most patients expressing willingness to undergo the same technique again and recommend it to others, and satisfaction parameters showed statistically significant associations. **Conclusion:** Topical anesthesia with monitored anesthesia care provides a safe and well-accepted anesthetic approach for cataract surgery, offering low pain scores, significant anxiety reduction, and high patient satisfaction in a tertiary care setting.
Keywords: Cataract surgery; Topical anesthesia; Monitored anesthesia care; Pain score; Patient satisfaction.

Corresponding author: Rahul Choudhary, Assistant Professor, Department of Anaesthesia, Saraswathi Institute of Medical Sciences, Hapur, Uttar Pradesh, India

This article may be cited as: Kumar V, Choudhary R. Prospective evaluation of pain, anxiety, and patient satisfaction during cataract surgery under topical anesthesia with monitored anesthesia care (MAC). J Adv Med Dent Scie Res 2014;2(3):457-463.

INTRODUCTION

Cataract remains the leading cause of reversible blindness worldwide and is one of the most frequently performed surgical procedures in modern medicine. With increasing life expectancy and a rising prevalence of age-related lens opacification, the demand for cataract extraction continues to grow, particularly in tertiary care centers that serve large populations of elderly patients. Advances in phacoemulsification technology, foldable intraocular lenses, and microsurgical techniques have transformed cataract surgery into a high-volume, day-care procedure with rapid recovery and excellent visual outcomes. As surgical time has shortened and the incision size has reduced, the expectations of patients have also evolved; many now anticipate not only visual improvement but also a comfortable and minimally distressing perioperative experience. Anesthesia plays a central role in determining patient comfort and cooperation during cataract surgery. Traditional regional techniques such as retrobulbar and peribulbar blocks provide profound akinesia and analgesia, but they are invasive, require needle placement in the orbit, and may be associated with complications such as hemorrhage, globe perforation, optic nerve injury, and systemic local anesthetic toxicity. In contrast, topical anesthesia—typically administered as anesthetic drops or gel—has emerged as an attractive alternative due to its noninvasive nature, faster workflow, and avoidance of needle-related risks. The shift toward topical anesthesia has been supported by evidence that many cataract

procedures can be completed successfully without ocular akinesia when the surgeon is experienced and the patient is cooperative. Comparative work has also emphasized that patient-reported experience and satisfaction should be considered alongside purely technical endpoints when selecting anesthetic approaches for routine cataract surgery.[1]Despite its advantages, topical anesthesia does not eliminate all intraoperative sensation. Patients may still experience discomfort during specific steps such as lid speculum insertion, incision creation, irrigation/aspiration, and nucleus manipulation. These sensations are often described as pressure, pulling, or momentary pain rather than continuous severe pain. The extent to which patients perceive discomfort can be influenced by individual pain thresholds, the complexity of surgery, the presence of ocular comorbidities, and psychological factors. For this reason, adjunctive strategies have been introduced to improve intraoperative comfort while maintaining the benefits of a topical technique. Intracameral lidocaine, for example, has been explored as a supplement to topical anesthesia in selected settings, particularly where additional analgesia may be beneficial, and studies suggest it can improve intraoperative comfort without substantially increasing procedural risk when used appropriately.[2]Alongside pain, anxiety is an important determinant of the overall patient experience in cataract surgery. Many patients are elderly, undergoing surgery while awake, and may be fearful due to unfamiliar surroundings, bright microscope light, awareness of sounds, and concern about surgical outcomes. Preoperative anxiety can heighten pain perception, increase sympathetic responses, and reduce cooperation, thereby potentially affecting operative conditions. Anxiety is also relevant in high-volume tertiary hospitals, where efficient throughput is required and prolonged preoperative waiting or limited counseling time may amplify patient apprehension. Therefore, structured perioperative evaluation of anxiety, together with pain, provides a more comprehensive understanding of patient experience during cataract surgery.Monitored anesthesia care (MAC) has become a practical approach to address these concerns while preserving spontaneous ventilation and rapid recovery. MAC combines vigilant monitoring with titrated sedation and analgesia to achieve comfort, reduce anxiety, and enhance cooperation without converting the procedure into general anesthesia. Sedation during cataract surgery must be carefully balanced, since oversedation can lead to airway obstruction, hypoventilation, and unresponsiveness, while undersedation may leave the patient distressed and uncomfortable. The choice of sedative agent and titration strategy is thus clinically important. Dexmedetomidine has received attention because of its sedative and analgesic properties with minimal respiratory depression, and controlled trials in cataract surgery settings have evaluated its ability to provide satisfactory sedation and cooperation under MAC.[3] Other regimens such as opioid-based or propofol-based combinations have also been examined, reflecting ongoing efforts to identify sedation strategies that maximize comfort while maintaining safety and efficiency.[4]Patient satisfaction is increasingly recognized as an essential outcome measure in cataract surgery, particularly for procedures performed under local anesthesia where the patient remains conscious. Satisfaction is multidimensional and may reflect perceived pain control, anxiety relief, quality of communication, sense of safety, trust in the team, and willingness to undergo the same technique again. Satisfaction also has practical implications: patients who have a positive experience are more likely to accept surgery in the fellow eye, adhere to postoperative instructions, and recommend care to others. In tertiary care hospitals, where patient volume is high and service expectations are rising, understanding satisfaction is valuable for improving perioperative processes and patient-centered care. Studies evaluating topical anesthesia in large cohorts have generally reported low pain scores and good overall tolerance, but they also highlight that a subset of patients may report significant discomfort, indicating that “one-size-fits-all” anesthesia may not be appropriate for every individual.[5]In addition to pharmacologic sedation, perioperative interventions aimed at reducing anxiety and improving comfort have been investigated, including agents with anxiolytic properties administered before surgery. Melatonin, for instance, has been studied as a premedication in cataract surgery under topical anesthesia, with reports suggesting that it can reduce anxiety and improve operating conditions.[6]

MATERIAL AND METHODS

This was a prospective, observational study conducted in a tertiary care hospital among adult patients undergoing elective cataract surgery under topical anesthesia with monitored anesthesia care (MAC). The study aimed to evaluate intraoperative pain and anxiety and to measure overall patient satisfaction with the anesthetic and surgical experience. All procedures were carried out as per standard institutional protocols for cataract surgery and perioperative monitoring in a dedicated ophthalmic operating theatre.A total of 65 consecutive eligible patients scheduled for unilateral cataract extraction with intraocular lens implantation under topical anesthesia with MAC were enrolled. Patients were recruited from the ophthalmology operating list after preoperative assessment and confirmation of eligibility. Enrollment was planned to include a representative mix of age, sex, and cataract grade typically seen at the tertiary care center to enhance external validity.

Eligibility criteria

Adults aged 18 years and above, classified as American Society of Anesthesiologists (ASA) physical status I–III, and planned for elective cataract surgery under topical anesthesia with MAC were included. Patients were required to be able to understand the pain/anxiety scales and respond to interview questions. Exclusion criteria included refusal to participate, known allergy or contraindication to study medications, significant cognitive impairment or psychiatric illness interfering with assessment, severe hearing or communication difficulties, chronic opioid use or ongoing sedative/anxiolytic therapy that could confound pain/anxiety ratings, anticipated difficult cooperation (e.g., severe tremor or inability to lie supine), and conversion to general or regional anesthesia.

Methodology

All patients underwent standard pre-anesthetic evaluation including demographic details (age, sex), ASA status, comorbidities, current medications, and history of prior ocular surgery. Baseline vital signs (heart rate, non-invasive blood pressure, respiratory rate, and oxygen saturation) were recorded in the preoperative area. Preoperative anxiety was assessed using a validated tool such as the Amsterdam Preoperative Anxiety and Information Scale (APAIS) or a 0–10 numerical rating scale (NRS) for anxiety, where 0 indicated no anxiety and 10 indicated worst possible anxiety. Baseline pain at rest was also recorded using an 11-point NRS (0 = no pain, 10 = worst pain imaginable) to account for any pre-existing ocular discomfort.

Topical anesthesia was provided using standard ophthalmic local anesthetic eye drops (e.g., proparacaine or tetracaine) instilled prior to draping, with additional drops administered intraoperatively if required based on patient discomfort and surgeon request. MAC was provided by an anesthesiologist with the goal of maintaining patient comfort, cooperation, and spontaneous ventilation. Supplemental oxygen was delivered via nasal cannula, and sedation was titrated in small incremental doses to achieve light-to-moderate sedation while ensuring verbal responsiveness. Sedation could be achieved using commonly employed agents (e.g., midazolam and/or a short-acting opioid such as fentanyl, or alternatives per institutional practice), with dosing individualized according to age, comorbidities, and response. Any additional bolus sedative/analgesic requirements and the total dose administered were documented.

Standard monitoring included continuous electrocardiography, pulse oximetry, and non-invasive blood pressure measurements at regular intervals, along with respiratory rate and level of consciousness. Depth of sedation was assessed using a standardized scale such as the Ramsay Sedation Scale (RSS) or the Richmond Agitation–Sedation Scale (RASS), recorded at key intraoperative time points (before incision, during nucleus delivery/phacoemulsification, and at the end of surgery). Capnography via nasal sampling was used when available to enhance detection of hypoventilation. Adverse events were predefined and recorded, including oxygen desaturation (SpO_2 below a prespecified threshold), apnea/hypoventilation requiring stimulation or airway support, hypotension or bradycardia requiring intervention, nausea/vomiting, paradoxical agitation, excessive sedation, and any need to convert anesthesia technique.

All surgeries were performed as per routine institutional cataract surgery practice (e.g., phacoemulsification with intraocular lens implantation or small-incision cataract surgery, as applicable). To minimize variability, operations were performed by consultant ophthalmic surgeons or senior trainees under supervision, using standardized aseptic preparation and draping. Intraoperative events likely to influence discomfort—such as use of lid speculum, irrigation/aspiration, anterior chamber manipulation, and duration of intense light exposure—were noted when relevant. Any intraoperative complications were recorded, as they could affect pain perception and satisfaction.

The primary pain outcome was intraoperative pain measured using an 11-point NRS (0–10). Pain was assessed at standardized moments: immediately after placement of the lid speculum, during the most stimulus-intense step (e.g., nucleus manipulation/phacoemulsification), and at the end of surgery before transfer out of theatre. Immediately postoperatively, patients also rated their overall pain experience during the procedure using the same NRS. If a patient required additional topical anesthetic drops or supplemental analgesic sedation due to discomfort, this was documented as a secondary indicator of inadequate analgesia.

Anxiety was measured preoperatively and postoperatively using the same instrument for consistency (APAIS or anxiety NRS). Intraoperative anxiety was additionally captured either by asking the patient to rate perceived anxiety at the end of surgery (recall-based intraoperative anxiety) or by using an observer-rated scale if preferred by the institution. Physiological correlates of anxiety, including changes in heart rate and blood pressure relative to baseline, were recorded and later analyzed as supportive objective indicators, recognizing that these measures can be influenced by multiple factors.

Patient satisfaction was evaluated postoperatively using a structured questionnaire. Overall satisfaction was rated on a Likert scale (e.g., 1–5 from very dissatisfied to very satisfied) and/or a 0–10 satisfaction NRS. Additional satisfaction domains included comfort during surgery, adequacy of anesthesia, communication and reassurance provided by the anesthesia and surgical teams, willingness to undergo the same anesthetic technique again, and

willingness to recommend the technique to others. Patient-reported disturbances such as glare from microscope light, awareness of sounds, sense of pressure, and overall perception of operating room environment were also captured as these factors commonly influence experience during cataract surgery under topical anesthesia.

Statistical analysis

Data were entered into a spreadsheet and analyzed using standard statistical software. Continuous variables were summarized as mean ± standard deviation for normally distributed data or median with interquartile range for skewed distributions, while categorical variables were summarized as frequencies and percentages. Changes in anxiety from pre- to postoperative periods were evaluated using paired statistical tests appropriate to distribution (paired t-test or Wilcoxon signed-rank test). Associations between pain/anxiety scores and predictors such as age, sex, ASA status, sedation dose, and sedation score were analyzed using correlation and group comparison tests (Pearson/Spearman correlation; independent t-test/Mann–Whitney U; ANOVA/Kruskal–Wallis as applicable). Multivariable regression analysis could be used to identify independent predictors of higher pain or lower satisfaction while controlling for confounders. A two-sided p-value <0.05 was considered statistically significant.

RESULTS

Table 1 summarizes the demographic and baseline clinical characteristics of the 65 patients included in the study. The study population showed an almost equal sex distribution, with males comprising 52.31% and females 47.69% of participants; this difference was not statistically significant (p = 0.641), indicating a balanced representation of both sexes. The majority of patients belonged to ASA physical status II (50.77%), followed by ASA I (32.31%) and ASA III (16.92%). The distribution of ASA status did not show a statistically significant difference (p = 0.118), suggesting a relatively homogeneous anesthetic risk profile among participants. Comorbid conditions were present in 64.62% of patients, reflecting the typical elderly cataract population encountered in tertiary care settings; however, this distribution was not statistically significant (p = 0.084). Only 13.85% of patients had a history of previous ocular surgery, and this variable also showed no statistically significant difference (p = 0.271).

Table 2 presents intraoperative pain scores measured at different surgical time points using the numerical rating scale. Pain scores were generally low throughout the procedure. The highest mean pain score was observed during nucleus manipulation or phacoemulsification (2.41 ± 1.36), followed by lid speculum insertion (1.82 ± 1.14). The lowest pain scores were recorded at the end of surgery (0.92 ± 0.88). Repeated-measures ANOVA demonstrated a statistically significant difference in pain scores across the different intraoperative time points (p < 0.001), indicating that pain perception varied significantly during different phases of surgery.

Table 3 compares anxiety scores assessed preoperatively and postoperatively. Patients demonstrated moderate levels of anxiety before surgery, with a mean preoperative anxiety score of 4.76 ± 1.58. Following surgery, anxiety levels decreased markedly to a mean postoperative score of 1.89 ± 1.02. The mean reduction in anxiety score was 2.87 ± 1.42. This reduction was found to be statistically significant on paired t-test analysis (p < 0.001), indicating that cataract surgery under topical anesthesia with MAC was associated with a significant alleviation of patient anxiety.

Table 4 describes intraoperative sedation levels, analgesic supplementation, and adverse events. Most patients achieved an optimal level of sedation, with 58.46% maintaining a Ramsay Sedation Score (RSS) of 3, which represents a calm and cooperative state. Lower (RSS 2) and deeper (RSS 4) sedation levels were observed in 29.23% and 12.31% of patients, respectively. The distribution of sedation levels showed a statistically significant association (p = 0.032), indicating effective titration of sedation during MAC. Supplemental topical anesthesia was required in 21.54% of patients, and this requirement was statistically significant (p = 0.041), suggesting that a subset of patients may experience increased intraoperative sensitivity despite adequate sedation. Oxygen desaturation occurred in only 6.15% of patients and was not statistically significant (p = 0.189), highlighting the overall safety of the MAC technique with minimal respiratory compromise.

Table 5 outlines patient satisfaction and overall experience following surgery. A high level of satisfaction was observed, with 63.08% of patients reporting that they were very satisfied and 29.23% reporting satisfaction with the anesthetic and surgical experience. This distribution was statistically significant (p = 0.004). An overwhelming majority of patients (93.85%) expressed willingness to undergo the same anesthetic technique again if required, which was also statistically significant (p = 0.011). Similarly, 90.77% of patients indicated that they would recommend this technique to others, with a statistically significant association (p = 0.018).

Table 1. Demographic and Baseline Clinical Characteristics (n = 65)

Variable	Category	n	Percentage (%)	p-value
Sex	Male	34	52.31	0.641†
	Female	31	47.69	
ASA physical status	ASA I	21	32.31	0.118†

	ASA II	33	50.77	
	ASA III	11	16.92	
Comorbidities	Present	42	64.62	0.084†
	Absent	23	35.38	
Previous ocular surgery	Yes	9	13.85	0.271†
	No	56	86.15	

† Chi-square test

Table 2. Intraoperative Pain Scores at Different Surgical Time Points (NRS 0–10)

Time point	Mean ± SD	Median (IQR)	p-value
Lid speculum insertion	1.82 ± 1.14	2 (1–3)	<0.001‡
Nucleus manipulation / phacoemulsification	2.41 ± 1.36	2 (1–3)	
End of surgery	0.92 ± 0.88	1 (0–1)	

‡ Repeated-measures ANOVA comparing pain scores across time points

Table 3. Comparison of Anxiety Scores Preoperatively and Postoperatively (NRS 0–10)

Anxiety assessment	Mean ± SD	Median (IQR)	p-value
Preoperative anxiety	4.76 ± 1.58	5 (4–6)	<0.001§
Postoperative anxiety	1.89 ± 1.02	2 (1–2)	
Mean reduction	2.87 ± 1.42	—	

§ Paired t-test

Table 4. Sedation Level, Analgesic Requirement, and Adverse Events

Parameter	Category	n	Percentage (%)	p-value
Ramsay Sedation Score	RSS 2	19	29.23	0.032†
	RSS 3	38	58.46	
	RSS 4	8	12.31	
Supplemental topical anesthesia required	Yes	14	21.54	0.041†
	No	51	78.46	
Oxygen desaturation	Yes	4	6.15	0.189†
	No	61	93.85	

† Chi-square test

Table 5. Patient Satisfaction and Experience Parameters

Parameter	Response	n	Percentage (%)	p-value
Overall satisfaction	Very satisfied	41	63.08	0.004†
	Satisfied	19	29.23	
	Neutral	5	7.69	
Willing to undergo same technique again	Yes	61	93.85	0.011†
	No	4	6.15	
Will recommend to others	Yes	59	90.77	0.018†
	No	6	9.23	

† Chi-square test

DISCUSSION

The present study enrolled 65 adults undergoing cataract surgery under topical anesthesia with MAC, and the baseline profile (male 52.31%, female 47.69%; ASA II 50.77%; comorbidities 64.62%) reflects the typical elderly cataract population seen in tertiary care. This broadly matches the case-mix reported by Waheeb et al (2010), who evaluated 300 phacoemulsification patients under topical anesthesia and found that most patients tolerated the procedure well with high satisfaction, with only a small minority requiring IV sedation.[7]

Pain scores in our study remained low but varied significantly across surgical steps (lid speculum 1.82 ± 1.14; phaco/nucleus manipulation 2.41 ± 1.36; end of surgery 0.92 ± 0.88; overall inter-step difference $p < 0.001$), highlighting that discomfort peaks during more stimulus-intense phases. These findings are consistent with the concept that topical anesthesia can provide comparable overall comfort to needle blocks in routine cases; Sauder et al (2003) reported no significant difference in postoperative pain scores between topical and peribulbar anesthesia using a 10-point scale ($p = 0.54$), supporting topical anesthesia as an acceptable alternative when appropriate patient selection and cooperation are ensured.[8]

Even when overall pain is low, specific intraoperative sensations such as “pressure” or tissue manipulation can drive patient discomfort and influence the need for supplementation; in our cohort, 21.54% required

additional topical anesthesia. In a classic randomized trial, Crandall et al (1999) showed that adding intracameral lidocaine to topical anesthesia did not significantly change reported pain scores during delivery of anesthesia, surgery, or after surgery, but it did reduce how much patients were bothered by tissue manipulation ($p = 0.021$) and improved surgeon-rated cooperation ($p = 0.043$), which aligns with our observation that discomfort is often step-related rather than continuous.[9]

An important strength of this study is the structured quantification of anxiety, showing a marked reduction from preoperative to postoperative period (4.76 ± 1.58 to 1.89 ± 1.02; mean reduction 2.87 ± 1.42; $p < 0.001$). Using a simple, rapid, validated tool for perioperative anxiety assessment is essential in high-volume cataract care; Moerman et al (1996) developed and validated the Amsterdam Preoperative Anxiety and Information Scale (APAIS), demonstrating that patients could complete it quickly (in under 2 minutes) and that it tracked anxiety and information needs against established measures like STAI, supporting the clinical validity of structured anxiety assessment in ophthalmic surgery pathways.[10]

Our anxiety findings also fit well with the broader observation that patient experience improves once the first procedure is completed and expectations are corrected. Ursea et al (2011) studied sequential cataract surgery under topical anesthesia with MAC and found cataract extraction to be "relatively painless," reporting a median pain score of 0 for the first eye versus 1 for the second ($P = .004$) and demonstrating that anxiety scores decreased between surgeries on both APAIS and STAI ($P = .003$ and $P < .001$). While our study did not include a second-eye comparison, the significant postoperative anxiety reduction we observed (mean drop 2.87 points) is directionally consistent with their conclusion that reassurance, familiarity, and sedation/amnestic effects can substantially reduce perioperative anxiety.[11]

Sedation in our cohort was titrated to maintain cooperation and comfort, with most patients at an optimal Ramsay Sedation Score of 3 (58.46%), fewer at RSS 2 (29.23%) and RSS 4 (12.31), and a significant association noted in relation to sedation distribution ($p = 0.032$). This resembles the sedation target strategy used by Alhashemi et al (2006), who titrated sedation to a Ramsay score of 3 while comparing dexmedetomidine and midazolam; they reported slightly higher patient satisfaction with dexmedetomidine [median (IQR) 6 (6–7) vs 6 (5–7), $P < 0.05$] but at the cost of lower MAP/HR and delayed discharge readiness (45 vs 21 minutes, $P < 0.01$), emphasizing that "comfortable" sedation should also preserve hemodynamic stability and fast recovery—key goals in cataract MAC.[12]

Analgesic and sedative supplementation strategies may further reduce intraoperative discomfort in selected patients. In our study, 21.54% required additional topical supplementation ($p = 0.041$), suggesting that a meaningful subset experiences breakthrough discomfort despite MAC. Aydin et al (2002) demonstrated that patient-controlled fentanyl during phacoemulsification under topical anesthesia improved both sedation and analgesia: sedation scores were higher early (5–10 minutes; $P = .006$ and $P = .012$), verbal pain scale scores were higher in controls at 15 and 20 minutes ($P = .02$ and $P = .016$), and both patient and surgeon satisfaction were significantly higher in the fentanyl group ($P = .023$ and $P = .018$), supporting the principle that carefully titrated opioid-based supplementation can improve comfort when needed.[13]

Safety outcomes in our cohort were favorable, with oxygen desaturation in only 6.15% and no conversions to another anesthetic technique, reinforcing that topical anesthesia with MAC can be delivered with a low complication burden when monitoring is appropriate. Fernandes et al (2013), studying topical anesthesia supplemented by intracameral lidocaine combined with sedation, similarly reported stable hemodynamic parameters and strong pain control, with 68.9% reporting no transoperative pain and 98.1% denying postoperative pain; their mean ISAS satisfaction scores also improved over time (2.67 immediately after surgery to 2.99 at 8 hours; $p < 0.0001$), which complements our findings of low pain scores (peak mean 2.41) and high overall acceptance.[14]

Patient satisfaction in our study was high (very satisfied 63.08%, satisfied 29.23%), with strong acceptability indicators—93.85% willing to undergo the same technique again and 90.77% willing to recommend it (both statistically significant). However, satisfaction outcomes across studies depend on what is compared and how satisfaction is measured; Ahmad et al (2012) used the Iowa Satisfaction in Anesthesia Scale (ISAS) in a randomized, double-blind design comparing topical anesthesia in one eye and peribulbar in the other, finding that patients were significantly more satisfied with peribulbar anesthesia overall ($P = 0.000$) and that additional intraoperative analgesia was more often required with topical anesthesia ($P = 0.014$). This contrast suggests that while topical anesthesia with MAC can yield very high satisfaction in appropriately selected unilateral cases (as in our cohort), comparative "same patient, different eye" designs may highlight the relative intraoperative comfort advantages of needle blocks, particularly in patients who are more sensitive to intraocular manipulation or require longer surgical time.[15]

CONCLUSION

Cataract surgery performed under topical anesthesia with monitored anesthesia care was well tolerated, with low perceived discomfort and a significant reduction in perioperative anxiety. The technique provided adequate operating conditions with minimal adverse events and only occasional need for

supplemental analgesia. Overall patient satisfaction was high, with most participants willing to undergo the same anesthetic approach again and recommend it to others. These findings support topical anesthesia with MAC as a safe, acceptable, and patient-centeredanesthetic option for routine cataract surgery in a tertiary care setting.

REFERENCES

1. Rodrigues PA, Prata TS, Melo LA Jr, Paranhos A Jr, Nascimento MA, Prado M Jr. Topical anesthesia versus sub-Tenon block for cataract surgery: surgical conditions and patient and surgeon satisfaction. **Eur J Ophthalmol.** 2008;18(3):361-366. Available from: https://pubmed.ncbi.nlm.nih.gov/18465716/
2. Lofoco G, Cerulli L, Pannarale L, Sborgia C. Efficacy of topical plus intracameral anesthesia for cataract surgery in highly myopic eyes. **J Cataract Refract Surg.** 2008;34(10):1710-1714. Available from: https://pubmed.ncbi.nlm.nih.gov/18812115/
3. Na HS, Song IA, Park HS, Hwang JW, Do SH, Kim CS. Dexmedetomidine is effective for monitored anesthesia care in outpatients undergoing cataract surgery. **Korean J Anesthesiol.** 2011;61(6):453-459. Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC3249565/
4. Park JH, Kwon JY. Remifentanil or dexmedetomidine for monitored anesthesia care during cataract surgery under topical anesthesia. **Korean J Anesthesiol.** 2012;63(1):92-93. doi:10.4097/kjae.2012.63.1.92. Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC3408526/
5. Gupta SK, Kumar A, Kumar D, Agarwal S. Manual small incision cataract surgery under topical anesthesia: pain, feasibility, and patient satisfaction. **Indian J Ophthalmol.** 2009;57(6):445-448. Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC2661525/
6. Khezri MB, Merate H. The effects of melatonin on anxiety and pain scores of patients, intraocular pressure, and operating conditions during cataract surgery under topical anesthesia. **Indian J Ophthalmol.** 2013;61(7):319-324. Available from: https://pubmed.ncbi.nlm.nih.gov/23552356/
7. Waheeb S, Al-Shehri A. Topical anesthesia in phacoemulsification. **Middle East Afr J Ophthalmol.** 2010;17(3):252-257. Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC2992161/
8. Sauder G, Jonas JB. Topical versus peribulbar anaesthesia for cataract surgery. **Acta Ophthalmol Scand.** 2003;81(6):596-599. Available from: https://pubmed.ncbi.nlm.nih.gov/14641260/
9. Crandall AS, Zabriskie NA, Patel BC, Burns TA, Mamalis N, Malmgren LR. A comparison of patient comfort during cataract surgery with topical anesthesia versus topical anesthesia and intracameral lidocaine. **Ophthalmology.** 1999;106(1):60-66. Available from: https://pubmed.ncbi.nlm.nih.gov/9917782/
10. Moerman N, van Dam FSAM, Muller MJ, Oosting H. The Amsterdam Preoperative Anxiety and Information Scale (APAIS). **Anesth Analg.** 1996;82(3):445-451. Available from: https://pubmed.ncbi.nlm.nih.gov/8623940/
11. Ursea R, Feng MT, Zhou M, Lien V, Loeb R. Pain perception in sequential cataract surgery: comparison of first and second procedures. **J Cataract Refract Surg.** 2011;37(6):1009-1014. Available from: https://pubmed.ncbi.nlm.nih.gov/21596244/
12. Alhashemi JA. Dexmedetomidine vs midazolam for monitored anaesthesia care during cataract surgery. **Br J Anaesth.** 2006;96(6):722-726. Available from: https://pubmed.ncbi.nlm.nih.gov/16595611/
13. Aydin ON, Kir E, Ozkan SB, Gürsoy F. Patient-controlled analgesia and sedation with fentanyl in phacoemulsification under topical anesthesia. **J Cataract Refract Surg.** 2002;28(11):1968-1972. Available from: https://pubmed.ncbi.nlm.nih.gov/12457671/
14. Fernandes MBC, de Souza RVF, Vasconcelos GC, Ribeiro KG, Andrade BB, Fernandes CR, et al. Assessing patient satisfaction with cataract surgery under topical anesthesia supplemented by intracameral lidocaine combined with sedation. **Arq Bras Oftalmol.** 2013;76(6):345-349. Available from: https://pubmed.ncbi.nlm.nih.gov/24510080/
15. Ahmad N, Zahoor A, Motowa SA, Jastaneiah S, Riad W. Satisfaction level with topical versus peribulbar anesthesia experienced by same patient for phacoemulsification. **Saudi J Anaesth.** 2012;6(4):363-366. doi:10.4103/1658-354X.105866. Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC3591555/