

Comparison of postoperative eye pain between tape and moist gauze–tape eye protection in patients undergoing general anesthesia at RSI Purwokerto

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Abstract

Background: General anesthesia reduces the blink reflex and tear production, thereby increasing the risk of postoperative eye pain and discomfort. Eye protection is essential to prevent these complications. This study aimed to compare postoperative eye pain between the use of tape and a combination of moist gauze with tape as eye protection methods in patients undergoing general anesthesia at RSI Purwokerto.

Method: This study used a quantitative, quasi-experimental design. A total of 42 patients were enrolled and equally allocated into two intervention groups: the tape group and the moist gauze–tape combination group. Postoperative eye pain was evaluated using the Numeric Rating Scale (NRS), and differences between the groups were analyzed with the Mann–Whitney U test.

Results: The findings indicated that participant characteristics were comparable between the two groups in terms of age, sex, and anesthesia duration. Most participants in both groups reported no postoperative eye pain. Statistical analysis using the Mann–Whitney U test demonstrated no significant difference in postoperative eye pain between the tape group and the moist gauze–tape combination group ($p = 0.889$).

Conclusion: A p -value of 0.889 indicates that both eye protection methods demonstrated comparable effectiveness in preventing postoperative eye pain.

Keywords: General anesthesia; Eye protection; Tape; Moist gauze; Postoperative eye pain.

INTRODUCTION

General anesthesia induces a reversible loss of consciousness, allowing surgical procedures to be performed without pain or awareness (1). During anesthesia, suppression of the blink reflex and decreased orbicularis oculi muscle tone reduce the eye's natural protective mechanisms, increasing the risk of ocular complications (2). Although advances in anesthesia have improved patient safety, perioperative eye injuries remain a preventable complication that may affect postoperative recovery (3).

Corneal abrasion is the most common ocular complication associated with general anesthesia (4). Incomplete eyelid closure (lagophthalmos) exposes the cornea to drying and mechanical trauma, resulting in irritation and postoperative eye pain (5).

Postoperative eye pain is an important indicator of patient comfort after surgery (6). Pain intensity can be measured using the

Numeric Rating Scale (NRS), a simple, valid, and reliable instrument that rates pain from 0 (no pain) to 10 (worst imaginable pain) (7). The NRS is widely used to assess acute postoperative pain in clinical practice (8).

Previous studies have shown that eye protection effectively reduces ocular complications during general anesthesia. Dsouza et al. (2023) reported that corneal injury may occur in up to 44% of unprotected eyes, whereas the incidence decreases markedly when eye protection is applied (9). Common methods include lubricating ointment, tape, and combinations of moisture-retaining materials with tape. However, each method may also cause adverse effects such as ocular irritation or allergic reactions (10)(11)(12).

Tape and the combination of moist gauze with tape are commonly used because they are inexpensive, practical, and easy to apply (13). Although moist gauze may

improve ocular surface hydration, evidence comparing postoperative eye pain between these two techniques remains limited, particularly in Indonesia (14).

At RSI Purwokerto, tape is routinely used for eye protection during general anesthesia, but data regarding postoperative eye pain associated with different protection methods are unavailable. Therefore, this study aimed to compare postoperative eye pain between tape and a combination of moist gauze with tape using the Numeric Rating Scale (NRS). The findings are expected to provide evidence for selecting an effective and comfortable eye protection method during general anesthesia.

METHOD

This study employed a quantitative approach using a quasi-experimental post-test only design. The study compared two eye protection techniques during general anesthesia: tape and a combination of moist gauze with tape. The research was conducted in the Central Surgical Intallation of RSI Purwokerto between March and May 2026 after obtaining ethical approval from the Health Research Ethics Committee of Harapan Bangsa University No.B.LPPM-UHB/22/01/2026 (15).

The study population consisted of postoperative patients undergoing elective surgery under general anesthesia at RSI Purwokerto. The required sample size was determined using G*Power version 3.1.9.7 based on an independent two-sample *t*-test. The calculation used an effect size (*d*) of 1.154 derived from a previous study conducted by Zeng et al. (2016)., a significance level (α) of 0.05, a statistical power ($1-\beta$) of 0.95, and an allocation ratio of 1:1, resulting in a minimum sample size of 42 participants (21 participants per group). Participants were recruited using consecutive sampling according to predefined inclusion and exclusion criteria. The inclusion criteria were patients aged ≥ 18 years, fully conscious after surgery (Aldrete consciousness score = 2), able to communicate effectively, and willing to participate by providing written informed consent. Patients with pre-existing

ocular disorders or neurological conditions affecting pain perception were excluded (16).

The intervention was performed after induction of general anesthesia and airway stabilization. Patients in the first group received eye protection using tape, while those in the second group received a combination of moist gauze and tape. The eye protection remained in place throughout the surgical procedure and was removed before full recovery from anesthesia according to standard perioperative practice (14)(17).

Data were collected using an observation sheet, a respondent characteristics form, and the Numeric Rating Scale (NRS). The observation sheet was used to record the eye protection technique applied, while demographic and clinical data, including age, sex, and duration of surgery, were obtained from medical records. Postoperative eye pain was assessed in the recovery room after patients regained full consciousness and were able to communicate effectively (6)(18).

The primary outcome of this study was postoperative eye pain, measured using the Numeric Rating Scale ranging from 0 to 10. The NRS is a valid and reliable instrument for assessing pain intensity and has been widely used in clinical research. Higher scores indicated greater levels of eye discomfort following surgery (7).

Data analysis was performed using statistical software. Descriptive statistics were used to summarize participant characteristics and study variables. The Shapiro–Wilk test was conducted to assess data normality. Since the pain score data were not normally distributed ($p < 0,05$), differences between the two intervention groups were analyzed using the Mann–Whitney U test with a significance level of 0,05 (19)(20).

RESULTS

A total of 42 patients undergoing surgery under general anesthesia at RSI Purwokerto were included in this study. Participants were equally divided into two intervention groups: the tape group ($n = 21$) and the moist gauze–tape group ($n = 21$).

Table 1 presents the characteristics of the study participants. In the tape group, most participants were classified as late adolescents (33,3%), whereas in the moist gauze–tape group, the largest proportions were late adolescents and late elderly participants (23,8% each). Female participants predominated in the tape group (57,1%), while male participants predominated in the moist gauze–tape group (76,2%). Most participants in both groups underwent surgery with a moderate duration, accounting for 71,4% and 85,7% of participants, respectively.

Table 1. Respondent Characteristics

Respondent Characteristics	Eye Protection	
	Tape (n=21)	Moist Gauze – Tape Combination (n=21)
Age		
Late Adolescence	7 (33,3%)	5 (23,8%)
Early Adulthood	6 (28,6%)	4 (1,0%)
Late Adulthood	1 (4,8%)	3 (14,3%)
Early Elderly	5 (23,8%)	2 (9,5%)
Late Elderly	1 (4,8%)	5 (23,8%)
Elderly	1 (4,8%)	2 (9,5%)
Sex		
Male	9 (42,9%)	16 (76,2%)
Female	12 (57,1%)	5 (23,8%)
Duration of Surgery		
Short (< 60 min)	5 (23,8%)	8 (38,1%)
Moderate (60-120 min)	15 (71,4%)	18 (85,7%)
Long (> 120 min)	1 (4,8%)	1 (4,8%)

Table 2 shows the distribution of postoperative eye pain scores in both groups. More than half of the participants in each group reported no eye pain (NRS score = 0), representing 52,4% of participants in both groups. The remaining participants reported mild pain, with NRS scores ranging from 1 to 2. No participants reported moderate or severe pain following surgery.

Table 2. Distribution of Postoperative Eye Pain Scores

Pain Level	Eye Protection	
	Tape (n=21)	Moist Gauze – Tape Combination (n=21)
No Pain		
Pain Scale 0	11 (52,4%)	11 (52,4%)
Mild Pain		
Pain Scale 1	7 (33,3%)	8 (38,1%)
Pain Scale 2	3 (14,3%)	2 (9,5%)

Table 3 presents the comparison of postoperative eye pain between the two intervention groups. The tape group had a mean rank of 21.74, whereas the moist gauze–tape group had a mean rank of 21.26. The Mann–Whitney U test revealed no statistically significant difference in postoperative eye pain between the two eye protection methods ($p = 0.889$), indicating that both techniques provided a similar level of postoperative ocular comfort in patients undergoing general anesthesia.

Table 3. Comparison of Postoperative Eye Pain Scores Between Groups Using the Mann–Whitney U Test

Group	n	Mean Rank	p-value
Tape	21	21,74	0,889
Moist Gauze–Tape	21	21,74	
Combination			

DISCUSSION

The present study demonstrated that the characteristics of participants in both groups were generally comparable in terms of age, sex, and duration of surgery. Most participants underwent procedures with a moderate operative duration, suggesting that both intervention groups had relatively similar baseline characteristics. Comparable participant characteristics are important because they reduce the potential influence of confounding variables on postoperative eye pain.

Among the participant characteristics, the duration of surgery is recognized as one of the major risk factors for perioperative

ocular complications. Longer surgical procedures prolong corneal exposure during general anesthesia, increasing tear film evaporation and the likelihood of corneal epithelial injury. Kepekci and Kepekci (2020) reported that prolonged surgery under general anesthesia significantly increases the risk of corneal abrasion because protective ocular reflexes remain absent throughout the procedure. In the present study, however, most participants underwent operations of moderate duration, with only a few undergoing prolonged procedures. This relatively homogeneous distribution may explain why the duration of surgery was unlikely to have substantially influenced the comparison between the two eye protection methods (21).

Most participants in both groups reported no postoperative eye pain, while the remaining participants experienced only mild pain. These findings suggest that both tape and the combination of moist gauze with tape were effective in maintaining ocular protection during general anesthesia.

Patients receiving eye protection with tape alone generally experienced low pain scores, indicating that eyelid closure effectively minimized direct corneal exposure. Nevertheless, a small number of participants still reported mild pain. This finding is consistent with Lee et al. (2016), who reported that eyelid taping effectively maintains eyelid closure but does not preserve corneal hydration. Consequently, tear film evaporation may still occur, resulting in mild postoperative ocular irritation. Similarly, George et al. (2017) suggested that eye protection methods without additional lubrication have limited ability to maintain ocular surface moisture during prolonged anesthesia (17)(14).

Participants receiving the combination of moist gauze with tape also predominantly reported no pain, with only a few experiencing mild pains. The addition of moist gauze may help maintain ocular surface hydration by reducing tear evaporation during anesthesia. This explanation is supported by Dsouza et al. (2023), who reported that eye protection methods incorporating moisture-retaining

materials provide better protection against ocular surface disorders than eyelid closure alone. Ahmadinejad et al. (2020) likewise demonstrated that maintaining ocular surface moisture reduces the risk of irritation and corneal epithelial injury in patients with impaired eyelid closure (9)(10).

Although the descriptive findings suggest slightly lower postoperative eye pain in the moist gauze–tape group, both eye protection techniques provided adequate ocular protection, as reflected by the predominance of participants reporting no pain after surgery.

The Mann–Whitney U test demonstrated no statistically significant difference in postoperative eye pain between the two eye protection methods ($p = 0.889$). This finding indicates that both tape and the combination of moist gauze with tape provided comparable effectiveness in preventing postoperative ocular pain following general anesthesia.

From a theoretical perspective, the addition of moist gauze is expected to better preserve ocular surface hydration and reduce irritation. However, this theoretical advantage was not reflected in the statistical analysis. One possible explanation is that most participants experienced only mild or no postoperative eye pain, resulting in minimal variability between groups. Consequently, the difference in pain scores was insufficient to demonstrate statistical significance (13)(22).

The present findings are consistent with the systematic review by Liyew et al. (2024), which concluded that although various eye protection techniques differ in their mechanisms of action, no single method has consistently demonstrated superior clinical effectiveness across different surgical settings. Likewise, Kaye et al. (2019) emphasized that postoperative ocular complications are multifactorial and are influenced not only by the eye protection technique but also by surgical duration, patient characteristics, anesthetic management, and intraoperative eye exposure (11)(5).

Another possible explanation is the relatively short duration of ocular exposure in

this study. Most participants underwent operations of moderate duration, thereby limiting corneal dehydration regardless of the protection method used. Under these circumstances, both techniques were sufficient to prevent clinically significant postoperative eye discomfort.

The findings of this study have important clinical implications. Because no significant difference was observed, tape may continue to be used as a simple, inexpensive, and readily available eye protection method during general anesthesia. The combination of moist gauze with tape may be considered an alternative in situations where additional ocular surface hydration is desired, particularly in patients expected to undergo prolonged surgical procedures or those at higher risk of developing ocular surface dryness. Future studies involving larger sample sizes, longer operative durations, and objective clinical outcomes, such as fluorescein staining for corneal abrasion, are recommended to further evaluate the comparative effectiveness of these eye protection methods (10)(17).

CONCLUSIONS

Based on the study results, the characteristics of participants in both groups were relatively comparable in terms of age, sex, and duration of anesthesia, with most participants undergoing surgeries of moderate duration. Postoperative eye pain among patients who underwent general anesthesia and received either tape or a combination of moist gauze and tape as eye protection was generally classified as mild pain. Although the moist gauze–tape combination showed descriptively lower pain levels, no statistically significant difference was found between the two eye protection methods. Therefore, both methods demonstrated comparable effectiveness in preventing postoperative eye pain.

LIMITATIONS

This study has several limitations. The sample size was relatively small because not all patients undergoing general anesthesia received intraoperative eye protection. In

addition, factors that may influence postoperative eye pain, such as pre-existing ocular conditions, surgical variations, and individual responses to anesthesia, could not be fully controlled. Postoperative eye pain was assessed using the Numeric Rating Scale (NRS), which is subjective and may vary among individuals. Furthermore, anesthesia duration was categorized as short, moderate, or long without recording the exact duration, limiting further analysis of its association with postoperative eye pain.

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