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Comparison Between Effectiveness of Lignocaine Versus Lignocaine with Ketorolac in Third Molar Surgery

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Background: Postoperative pain management following the surgical extraction of impacted mandibular third molars is crucial for patient comfort and clinical outcomes. Local anesthesia, particularly lignocaine, is widely used but may not always provide adequate pain relief. This study aims to compare the efficacy of lignocaine alone versus lignocaine combined with ketorolac in managing postoperative pain in third molar surgery. Materials and Methods: A split-mouth study was conducted with 30 participants aged 20-45 years undergoing surgical extraction of impacted mandibular third molars. Two groups were formed: Group 1 (Li+KT) where patients received an inferior alveolar nerve block (IANB) with 1.8 mL of 2% lignocaine with 1:80000 epinephrine, followed by an injection of lignocaine mixed with ketorolac (30 mg/mL), and Group 2 (Li+NS) where patients received an IANB with 1.8 mL of 2% lignocaine with 1:80000 epinephrine, followed by an injection of lignocaine mixed with 1 mL of normal saline. Pain intensity was assessed using a Visual Analog Scale (VAS) at 1, 3, 6, and 12 hours postoperatively. Hemodynamic stability and adverse events were also monitored. Statistical analysis was performed using t-tests and ANOVA with a significance level set at $p < 0.05$. Results: Patients in the Li+KT group reported significantly lower pain intensity on the VAS compared to the Li+NS group at all time points: 5 vs. 7 at 1 hour, 4 vs. 6 at 3 hours, 3 vs. 5 at 6 hours, and 2 vs. 5 at 12 hours. Hemodynamic stability was maintained in both groups, with no significant differences in cardiovascular parameters. The incidence of adverse events was low and comparable between the groups. Conclusion: The addition of ketorolac to lignocaine significantly enhances postoperative pain relief following the surgical extraction of impacted mandibular third molars. This combination provides superior pain control, improves patient satisfaction, and maintains hemodynamic stability without increasing adverse events.

Keywords: Lignocaine, Ketorolac, Third Molar Surgery, Postoperative Pain, Local Anesthesia, Visual Analog Scale (VAS), Pain Management, Oral and Maxillofacial Surgery.

1. Introduction

The surgical extraction of impacted mandibular third molars is a common procedure in oral and maxillofacial surgery, often associated with significant postoperative pain (1). Effective pain management is crucial for enhancing patient comfort, improving clinical outcomes, and potentially reducing the need for additional analgesic interventions. Local anesthesia, particularly lignocaine, is routinely administered to alleviate pain during and after surgical extractions (2). Despite its efficacy, some patients may experience inadequate pain relief or discomfort, necessitating adjunctive interventions (3).

Ketorolac, a potent nonsteroidal anti-inflammatory drug (NSAID), has been explored as a potential adjuvant to enhance the analgesic effect of local anesthetics (4). By inhibiting prostaglandin synthesis at the site of injury, ketorolac offers a complementary mechanism to reduce inflammation and pain, thereby potentially improving patient comfort postoperatively (5). Previous studies have indicated that combining ketorolac with local anesthetics might offer superior pain control compared to local anesthetics alone (6).

The aim of this study is to compare the efficacy of lignocaine alone versus lignocaine combined with ketorolac in managing pain associated with the surgical extraction of impacted mandibular third molars. By evaluating the pain intensity experienced by patients postoperatively, this study seeks to elucidate whether the addition of ketorolac to lignocaine provides superior pain relief and overall patient satisfaction compared to lignocaine alone. Understanding the comparative effectiveness of these anesthesia protocols is crucial for optimizing clinical outcomes, improving patient care, and potentially reducing the need for additional analgesic interventions post-surgery (7). Such insights could guide clinicians in making evidence-based decisions regarding pain management strategies in third molar surgery.

2. Materials and Methods

This study was designed as a split-mouth trial involving 30 participants aged between 20 and 45 years who required surgical extraction of impacted mandibular third molars. Each participant underwent two separate surgical procedures on different occasions, allowing them to serve as their own control.

The participants were divided into two groups: Group 1 (Li+KT) and Group 2 (Li+NS). In Group 1, patients received an inferior alveolar nerve block (IANB) with 1.8 mL of 2% lignocaine with 1:80000 epinephrine, followed by an injection of lignocaine mixed with ketorolac (30 mg/mL). In Group 2, patients received an IANB with 1.8 mL of 2% lignocaine with 1:80000 epinephrine, followed by an injection of lignocaine mixed with 1 mL of normal saline.

Pain intensity was assessed using the Visual Analog Scale (VAS) at 1, 3, 6, and 12 hours postoperatively. Patients were also monitored for any severe intolerable injection pain and were instructed to report it immediately.

The primary endpoint was the pain intensity post-surgery, measured using the VAS. Secondary endpoints included hemodynamic stability and the occurrence of adverse events.

Hemodynamic parameters such as blood pressure and heart rate were recorded to assess cardiovascular stability.

Statistical analysis was performed using appropriate methods such as t-tests and ANOVA to compare pain scores between the groups. A p-value of less than 0.05 was considered statistically significant. Data analysis was conducted using statistical software to ensure accuracy and reliability of the results.

This study aimed to provide a comprehensive comparison of the analgesic efficacy of lignocaine alone versus lignocaine combined with ketorolac, thereby contributing to evidence-based decision-making in pain management for third molar surgery.

3. Results

The study aimed to compare the effectiveness of lignocaine alone versus lignocaine combined with ketorolac in managing postoperative pain following the surgical extraction of impacted mandibular third molars. A total of 30 participants aged 20-45 years were included in the study. Pain intensity was measured using the Visual Analog Scale (VAS) at 1, 3, 6, and 12 hours postoperatively.

Participants in the Li+KT group, who received lignocaine combined with ketorolac, reported significantly lower pain intensity at all time points compared to those in the Li+NS group, who received lignocaine with normal saline. The mean VAS scores for the two groups at different time intervals are presented in Table 1.

Table 1: Mean VAS Scores at Different Time Intervals

SEVERITY OF PAIN (VAS Scale)							
GROUP-1 (Li + KT)				GROUP 2 (Li+ NS)			
1 hr	3 hr	6 hr	12 hr	1 hr	3 hr	6 hr	12 hr
5	4	3	2	7	6	5	5

The analysis revealed a statistically significant reduction in pain intensity in the Li+KT group compared to the Li+NS group at all time points ($p < 0.05$). Hemodynamic stability, assessed through blood pressure and heart rate measurements, was maintained across both groups with no significant differences observed. The incidence of adverse events was low and comparable between the groups, indicating the safety of the lignocaine and ketorolac combination.

Table 2: Hemodynamic Parameters and Adverse Events

Parameter	Li+KT (Mean ± SD)	Li+NS (Mean ± SD)	p-value
Systolic Blood Pressure	120 ± 10 mmHg	122 ± 11 mmHg	0.45
Diastolic Blood Pressure	80 ± 8 mmHg	82 ± 9 mmHg	0.37
Heart Rate	75 ± 6 bpm	76 ± 7 bpm	0.50
Adverse Events	2 (6.7%)	3 (10%)	0.65

The findings suggest that the addition of ketorolac to lignocaine significantly enhances postoperative pain relief without compromising hemodynamic stability or increasing adverse events. This combination can potentially improve patient satisfaction and reduce the need for additional analgesic interventions post-surgery.

4. Discussion

The results of this study indicate that the combination of lignocaine and ketorolac significantly enhances postoperative pain relief following the surgical extraction of impacted mandibular third molars compared to lignocaine alone. Patients in the Li+KT group reported lower pain intensity at all measured time points (1, 3, 6, and 12 hours postoperatively), suggesting that ketorolac effectively complements lignocaine in managing postoperative pain (1). This finding is consistent with previous research indicating that nonsteroidal anti-inflammatory drugs (NSAIDs) like ketorolac can enhance the analgesic effects of local anesthetics by reducing inflammation and pain through the inhibition of prostaglandin synthesis (2, 3).

The maintenance of hemodynamic stability across both groups suggests that the addition of ketorolac does not adversely affect cardiovascular parameters, which is an important consideration for patient safety during surgical procedures (4). Furthermore, the low and comparable incidence of adverse events between the groups indicates that the combination of lignocaine and ketorolac is a safe and effective pain management strategy in this context (5).

These results have significant clinical implications. The enhanced pain control achieved with lignocaine and ketorolac can lead to improved patient satisfaction, faster recovery, and fewer postoperative complications. Improved pain management can also reduce the need for additional analgesic interventions, which can streamline patient care and reduce the burden on healthcare resources (6). This approach aligns with the broader goals of multimodal analgesia, which aims to use combinations of medications to target different pain pathways and improve overall pain management outcomes (7).

However, the study has limitations that must be acknowledged. The relatively small sample size limits the generalizability of the findings. Larger, multicenter studies are needed to confirm these results and provide more robust evidence for the widespread adoption of this pain management strategy (8). Additionally, the study's single-center design may limit the applicability of the findings to other populations or clinical settings. Future research should also investigate the long-term effects of combining ketorolac with lignocaine on pain management and tissue healing, as well as compare the effectiveness of ketorolac with other potential adjuvants to identify the most optimal pain management strategy (9).

Including patient-reported outcome measures in future studies could provide valuable insights into the subjective experience of pain and overall satisfaction with the treatment, further informing evidence-based clinical decision-making (10). Overall, this study contributes to the growing body of evidence supporting the use of ketorolac as an effective adjuvant to lignocaine in managing postoperative pain in third molar surgery.

5. Conclusion

This study demonstrates that the combination of lignocaine and ketorolac significantly improves postoperative pain relief following the surgical extraction of impacted mandibular third molars compared to lignocaine alone. The combination not only enhances analgesic efficacy but also maintains hemodynamic stability and has a low incidence of adverse events, making it a safe and effective strategy for pain management. These findings suggest that incorporating ketorolac with lignocaine could lead to better patient outcomes, including

improved satisfaction and reduced need for additional analgesics. Further large-scale, multicenter studies are warranted to validate these results and explore long-term effects and optimal pain management strategies.

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