ISSN: 2581-5989
PubMed - National Library of Medicine - ID: 101738774

International Journal of Dental Science and Innovative Research (IJDSIR)

IJDSIR : Dental Publication Service

Available Online at: www.ijdsir.com

Volume – 5, Issue – 3, May - 2022, Page No. : 166 - 177

Comparison of the efficacy of lignocaine hydrochloride and tramadol hydrochloride for extraction of maxillary tooth under supraperiosteal infiltration

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Citation of this Article: Dr. Vishal Kumar Poddar, Dr. Srimathy S. Arora, Dr. Ankita Pati Upadhyay, Dr. Ashutosh Abrol, Dr. Samrat Ganguly, Dr. Swapnil Mahaveer Jain, "Comparison of the efficacy of lignocaine hydrochloride and tramadol hydrochloride for extraction of maxillary tooth under supraperiosteal infiltration", IJDSIR- May - 2022, Vol. – 5, Issue - 3, P. No. 166 – 177.

Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

Objectives: To investigate the efficacy of anesthesia by comparing the anesthetic efficacy of lignocaine without adrenaline versus tramadol.

Methods: A total of 200 patients to undergo maxillary teeth extractions were divided randomly into 2 equal groups. Group 1 (100 patients) received Tramadol Hydrochloride while Group 2 (100 patients) received Lignocaine Hydrochloride without adrenaline. Intra-operative and post-operative anesthesia and analgesia were measured for each patient on 1st day and were recalled for a second visit on 5th day postoperatively.

Results: The results showed a faster onset of anesthesia for Group 2 patients as compared to Group 1. Similar

result was observed for both the groups when compared for Intra-operative Analgesia. A longer Duration of Anesthesia was noted in Group 2 patients on the operative day as compared to Group 1. Post-Operative Analgesic parameters such as VAS Scoring for Pain Assessment, Time to Remedication, Total Analgesic Consumption with Global Assessment was found to be significantly better in Group 1 than Group 2 patients.

Conclusion Tramadol Hydrochloride works as an effective analgesic, with a comparable Anesthetic efficacy when compared to Lignocaine Hydrochloride for managing post-operative pain following maxillary extractions.

Keywords: Tramadol Hydrochloride, Lignocaine Hydrochloride, Maxillary Extractions, Supraperiosteal Infiltration

Introduction

In the practice of dentistry tooth extraction remains the most common oral-maxillofacial surgical procedure. Mostly the patients believe that tooth extraction procedures are painful, which cause them to feel anxious and stressed out, ultimately leading to increased difficulty for both the patient and the clinician. Local anesthetics blocks nerve conduction temporarily without affecting patient consciousness; thus, are widely used to control this fear of pain.[1]

Although the efficacy of various local anesthetics has been studied, intraoperative or postoperative pain seems inevitable in some patients because of the varying sensation of pain threshold and the effectiveness of the local anesthetics used. Recent in vitro and in vivo studies have shown cases of in sensitization of the commonly used local anesthetics in some patients. There are reports of allergic reactions and other complications with some of the local anesthetics used in daily procedures. Opioids like Tramadol exerts additional local anesthetic effects apart from their usual analgesic properties as reported in recent studies.[2]

Tramadol Hydrochloride is a well-known centrally acting opioid analgesic, was synthesized in 1962 by Grunenthal GmbH in Germany and is used for management of pain since 1977. It is known to be effective in treatment of moderate to severe type of pain.[3] Tramadol is a synthetic analogue of codeine with a low affinity for opioid receptors but exerts double action by causing activation of both the non-opioid and opioid pain inhibition systems. Much of its non-opioid component action is due to inhibition of the neuronal uptake of monoaminergic receptors such as nor-epinephrine and serotonin at synapses in the descending inhibitory pain pathways by displacing the stored serotonin from the nerve endings. Thus, it inhibits the transmission of pain in the central nervous system and blocks nociceptive impulses. So, this property creates a combined analgesic/adjuvant effect.[4]

The side effect profile of tramadol is more acceptable to ambulatory surgical patients compared with the traditional opioids owing to its minimal respiratory depression and few gastrointestinal effects and has less potential for opiate like physical dependence or abuse. However, even when tramadol is taken at higher doses, its physical and psychological addiction or possible side effects are not as much of the other opioids like morphin.[5,6]

Tramadol is reported to have an anesthetic activity on peripheral nerves by producing peripheral antinociceptive effects by interaction with peripheral opioid receptors. When administered locally, it has both analgesic as well as anesthetic properties similar to lignocaine or prilocaine. Literature studies have proven the efficacy of tramadol as an anesthetic in intradermal application or for excision of cutaneous lesions and even

for extraction of molars under supraperiosteal infiltration, whereas as an adjuvant to local anesthetics when used with mepivacaine or articaine.[7,8,9]

The present study aims at comparision of the efficacy of lignocaine hydrochloride, which is considered to be the gold standard in local anesthetics due to its minimal side effects and effective pain control, with tramadol hydrochloride for extraction of tooth under supraperiosteal infiltration.

Aim

To investigate the efficacy of intraoperative and post-operative anesthesia and analgesia of lignocaine without adrenaline versus tramadol following maxillary extractions.

Objectives

To investigate the efficacy of anesthesia by comparing the anesthetic efficacy of lignocaine without adrenaline versus tramadol, by comparing the active treatment groups for:

1. Onset of Anesthesia
2. Intraoperative Analgesia
3. Duration of Anesthesia
4. Postoperative Analgesia
5. Incidence of Allergic Reactions
6. Adverse Reactions

Materials and methodology

Source of Data: Patients reporting to the Department of Oral and Maxillofacial Surgery of Swami Devi Dyal Hospital and Dental College, Barwala, for the maxillary extractions.

Methods of Data Collection: A sequential enrolment of 200 patients reporting from October 2019 to December 2021, for the maxillary teeth extractions was done with an informed/written consent.

Inclusion Criteria

A. Two hundred patients under ASA-1 category in the age group of 18–65 years, both male and female were included in this study.

B. The patients included in the study were those requiring maxillary extractions in an outpatient setting.

Exclusion Criteria

A. Patients were excluded, if they had a history of hypersensitivity tolignocaine and/or tramadol.

B. Patients were excluded if they have systemic disorders such as uncontrolled diabetes, bleeding disorders, and having any medical risk.

C. Pregnant and lactating females.

D. Patients with acute infections.

Ethical Approval: All procedures performed in this study (involving human participants) were in accordance with the ethical standards of the institutional research committee and with the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards.

Sequence of Patient Care: On initial presentation, patients were clinically and radiographically examined (IOPA) to assess the complaint and its relevant history presenting illness.

Study Design

- Prospective, randomized, double blinded study.
- The participants were randomly divided into two groups of 100 each.
- Patients were allocated according to a computer-generated randomization list for Tramadol and Lignocaine.

Surgical Overview: Before the study, all patients were checked for normal vital signs. Detailed medical history was also obtained, and all patients were submitted to a

standardized surgical technique performed under local anaesthesia.

Each patient was assigned to receive either a maximum of 2 ml of 5% Tramadol Hydrochloride (Besto dol 50 mg, Salute" Besto Chem), Group 1 (n = 100), or a maximum of 2 ml of 2% Lignocaine Hydrochloride without adrenaline (XICAINE 2%, ICPA Health Product Ltd.), Group 2(n = 100) as a LA solution for extraction of maxillary teeth under supraperiosteal infiltration following strict aseptic precaution. Each patient initially received 0.6 mL of either tramadol or lignocaine as supraperiosteal infiltration on buccal side and 0.1 mL on the palatal side.

Outcome Measures: All the patients were assessed for the following parameters in both thegroup:

1. Incidence of allergic reaction: Every patient underwent drug allergy testing for lignocaine and tramadol which was injected as anesthestic agent. 0.1 ml of test dose was injected intradermally under all aseptic precaution on the forearm of either hand using sterile 1 mL syringe with a short needle. The formation of ''bleb'' was an indication that the injection is performed properly. Each injection site was then evaluated for 5-10 minutes. Evaluation of the response –

The response was measured by the diameter of skin change or wheal, if present.

Scale: 0 = no reaction. 1 = mild rash. 2 = erythema. 3 = urticaria.

In patients with no allergic reaction on injection, intraoral anesthetic procedure was carried out.

2. Onset of Anesthesia: Immediately after injection was complete (considering as time zero) to the time the numbness appeared as checked after every 10 seconds at the injection site by straight probe, was recorded as objective onset.

3. Intraoperative Analgesia: The pain experienced by the patient during extraction of the tooth will be recorded using visual analogue scale (VAS) ranging from 0 to 10 as interpreted by the patient, where 0 means no pain and 10 means the worst pain. Visual analogue scale will be explained to each patient before the start of procedure.

If during extraction procedure the patient will experience pain and the pain score will be less than 3 on VAS, then the extraction will be carried out, and if it will be more than 3, then an additional 0.6 mL of the same drug will be injected using the same technique on the buccal side, and after waiting for about 5 min, the extraction procedure will be proceeded.

Again, if the patient will experience pain during extraction and the pain score will be less than 3 on VAS, then the extraction will be carried, out and if it will be more than 3, then an additional 0.6 mL of the same drug will be injected using the same technique on the buccal side, and after waiting for about 5 min, the extraction procedure will be proceeded.

If the third time the patient will experience pain where the score will be more than 3 on VAS, then that case will be considered as failure. Then, they will receive conventional LA, 2% lignocaine with 1:80,000 adrenaline, as nerve block for the completion of the procedure.

4. Duration of Anesthesia: The time interval between the appearance of numbness at the site of drug delivery and its disappearance, as reported by the patient, will be recorded as the duration of anesthesia.

5. Postoperative Analgesia: Analgesic efficacy will be assessed on the basis of four key end-points:

- **Pain Intensity (Visual Analogue Scale - VAS)0** Patients will be asked to record on VAS, the pain intensity at 1st, 3rd, 6th and 12th hour after the surgery.

Anchor points will be 0: no pain and 10: worst pain possible.

- **Median Time to Remedication:** Time to remedication is defined as the time from the end of surgery until the intake of rescue medication became necessary for the patient. Time of intake of rescue medication (Paracetamol 500mg) is noted as reported by the patient.
- **Total Analgesic Consumption**: Total amount of analgesic (Paracetamol 500 mg tablets) consumed during the full recovery period (5 days) will be recorded.
- **Global Assessment**: Patients will be asked to provide an overall evaluation of the efficacy of the agent used on a four-point categorical scale, at the end of the trial (5^{th} day recall). The categories of scale will be – 0: poor, 1: fair, 2: good and 3: excellent
- Excellent: minimum pain versus poor: maximum pain.

6. Adverse Reactions: The adverse effects (if any) of the drugs injected will be recorded when the patient will be recalled for the follow-up after 24 h.

Statistical analysis

Data was analyzed using the statistical package SPSS 22.0 (SPSS Inc., Chicago, IL) and level of significance was set at $p<0.05$. Descriptive statistics was performed to assess the mean and standard deviation of the respective groups. Normality of the data was assessed using SHAPIRO WILKINSON TEST. Inferential statistics to find out the difference between the groups was done using T TEST.

Results

Out of the 200 patients selected, equal distribution of both the genders was done. Out of these, GROUP 1 had 47 males and 53 females, while GROUP 2 had 41 males and 59 females. All the patients ranged between 18 and 65 years of age. The demographic details are enlisted in Table 1.

1. Incidence of allergic reaction: None of the patients in both the groups experienced any allergic reaction when tested by intradermal injections of the respective agents used in either of the groups.

2. Onset of Anesthesia: The objective onset of anesthesia was noted as 44.5 second for Group 1 (Tramadol), while it was 42.6 seconds for Group 2 (Lignocaine). The analysis using T test between the groups reported significant difference ($p<0.05$), where GROUP 2 reported a FASTER ONSET OF ANESTHESIA compared to GROUP 1 (Table 2, Graph 1).

3. Intra-Operative Analgesia: Using VAS, intra-operative analgesia was reported to be 1.70 for Group 1, while it was 1.51 for Group 2. The analysis using T test (Table 3, Graph 2) between the groups shows the comparision of INTRA-OPERATIVE ANALGESIA reporting NO significant difference ($p>0.05$).

4. Duration of Anesthesia: The mean Duration of Anesthesia was recorded to be 61.6 minutes for Group 1 and 77.5 minutes for Group 2. Table 4, Graph 3 shows the comparision of DURATION OF ANESTHESIA between the study groups. The analysis using T test reported significant difference ($p<0.05$), as DURATION OF ANESTHESIA as observed LASTED LONGER in GROUP 2 compared to GROUP 1.

5. Post Operative Analgesia: Post-operative analgesia was recorded under 4 key end-points, and the observed recordings are noted down as:

(a) Pain Intensity (VAS) Score: NO statistically significant difference was found when checked at 1^{st} Hour, while Reduction in pain intensity was BETTER in Group 1 than in Group 2 at 3^{rd}, 6^{th} and 12^{th} Hour respectively (Table 5, Graph 4). The scores are:

- 1ST HOUR – Group 1: 1.58 and Group 2: 1.75
- 3RD HOUR – Group 1: 1.83 and Group 2: 3.3
- 6TH HOUR – Group 1: 2.06 and Group 2: 4.7
- 12TH HOUR – Group 1: 2.48 and Group 2: 6.1

(b) Remedication Time: The remedication time for Group 1 ranged from 9th to 14th Hour, and the mean value was 12.8 Hour, while for Group 2 the time range was 5th to 8th Hour, and the mean value was 6.7 Hour. The analysis using T test between the groups reported significant difference ($p<0.05$), where GROUP 1 reported BETTER RESULTS FOR REMEDICATION TIME compared to GROUP 2 (Table 6, Graph 5).

(c) Total Analgesic Consumption: The total analgesic consumption in Group 1 ranged from 4 to 7, and the mean value was 6.26, while the range was 6 to 10 with a mean value of 8.4 in Group 2. The analysis using T test between the groups reported significant difference ($p<0.05$), where GROUP 2 reported MORE TOTAL ANALGESIC CONSUMPTION compared to GROUP 1 (Table 7, Graph 6).

(d) Global Assessment: Global Assessment as recorded at 5th day recall was 2.57 in Group 1, and 1.7 in Group 2. The analysis using T test between the groups reported significant difference ($p<0.05$), where GROUP 1 reported throughout a BETTER GLOBAL ASSESSMENT compared to GROUP 2 (Table 8, Graph 7).

6. Adverse Effects: None of the patients in both the groups presented with any post-operative adverse effects.

Table 1: demographic details

	Group 1 (Tramadol hydrochloride)	Group 2 (Lignocaine hydrochloride)
No. of subjects	100	100
Age: Mean age ± SD Range	53.2 ± 2.3 18 - 65	55.3 ± 3.3 18 - 65
Sex: Female Male	53 47	59 41

*P<0.05 is statistically significant (T TEST)

Table 2: comparison of onset of anesthesia

	Mean	sd	T value	P value
Group 1	44.5	5.67	2.51	0.016*
Group 2	42.6	15.72		

Graph 1: comparison of onset of anesthesia

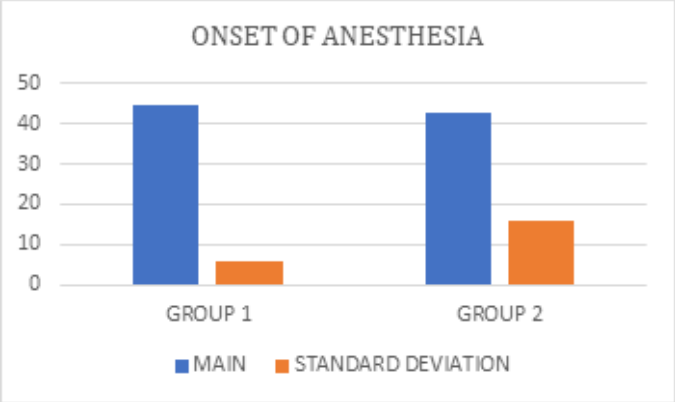


Table 3: comparison of intra-operative analgesia

Groups	Mean	Sd	T value	P value
Group 1	1.7	0.6	5.29	0.425
Group 2	1.51	0.52		

*P<0.05 is statistically significant (T TEST)

Graph 2: comparison of intra operative analgesia

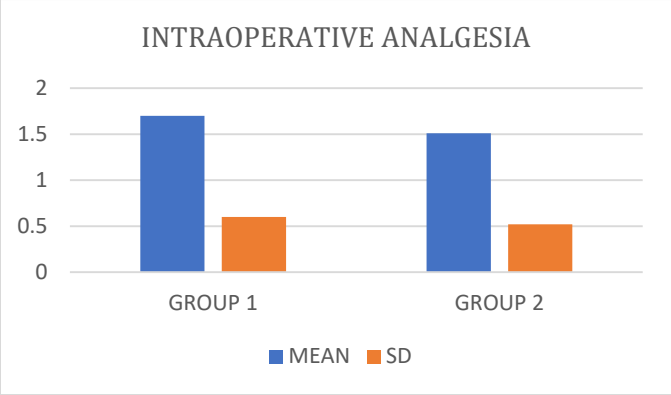


Table 4: comparison of duration of anesthesia

Groups	Mean	sd	T value	P value
Group 1	61.6	16.02	3.908	0.0061*
Group 2	77.5	9.48		

*P<0.05 is statistically significant (T TEST)

Graph 3: comparison of duration of anesthesia

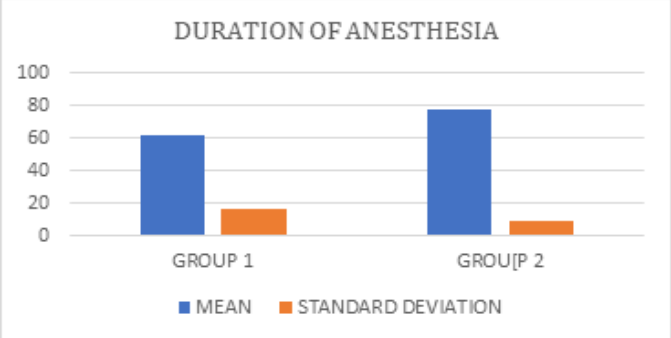


Table 5: between group vas comparison (post treatment)

	1st Hour (mean)	3rd Hour (mean)	6th Hour (mean)	12th Hour (mean)
Group 1	1.58±0.49	1.83±0.77	2.06±1.39	2.48±0.97
Group 2	1.75±0.59	3.3±1.78	4.7±3.46	6.1±3.75
T value	1.86	2	4.605	5.905
P value	0.085	0.0022*	0.0071*	0.0011*

*P<0.05 is statistically significant (T TEST)

Graph 4: between group vas comparison (post treatment)

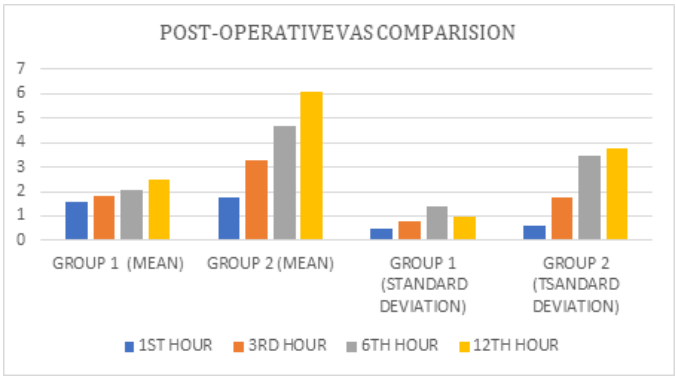


Table 6: between group remedication time

	Mean (in Hour)	SD	T value	P value
Group 1	12.8	1.63	2.02	0.016*
Group 2	6.7	2.47		

*P<0.05 is statistically significant (T Test)

Graph 5: between group remedication time

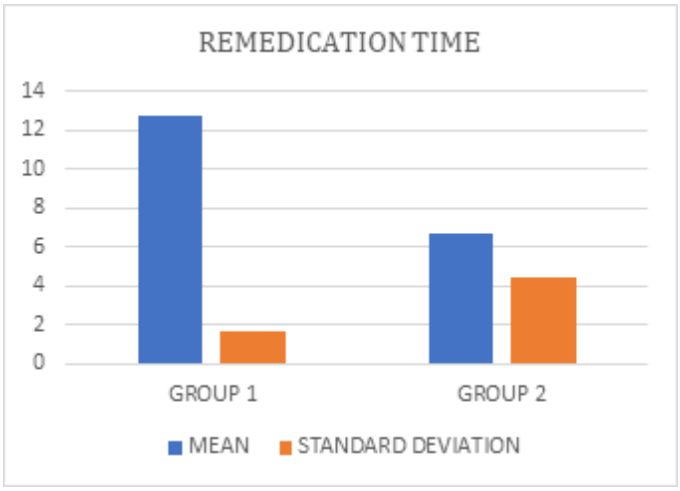


Table 7: between group total analgesic consumption

	Mean	sd	T value	P value
Group 1	6.26	2.3	1.65	0.026*
Group 2	8.4	1.06		

*P<0.05 is statistically significant (T TEST)

Graph 6: between group total analgesic consumption

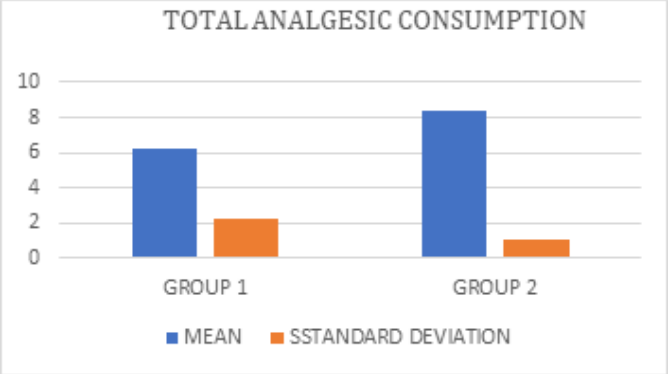
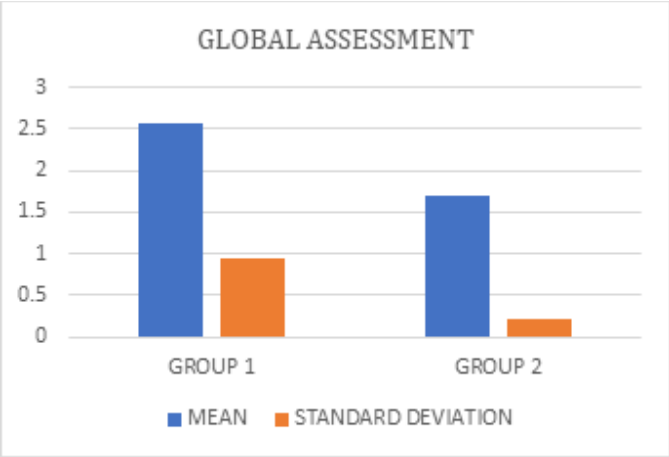


Table 8: between group global assessment

	Mean	sd	T value	P value
Group 1	6.26	2.3	1.65	0.026*
Group 2	8.4	1.06		

*P<0.05 is statistically significant (T TEST)

Graph 7: between group global assessment



Discussion

Efficacy of anaesthetics and anaesthesia techniques control the pain intraoperatively as well as postoperatively. However, in dentistry, there are no local anaesthetics that have both anaesthetic and analgesic action. Hence, the need to ascertain a drug that gives excellent local anaesthesia along with good postoperative analgesia is the need of the hour.[10]

Opioids have been successfully used for pain management for many decades. In recent studies, of all the opioids, the peripheral local anaesthetic effect of tramadol was elucidated, and is known to have a low addiction rate.[8]

The effect of tramadol anaesthesia has also been investigated in dentistry by various researchers in a combination with another established local anesthetic agent or as a single anesthetic agent. Danic P et al.,[11] and Jaber L et al.,[12] reported the mechanism of local anaesthesia by tramadol to be as follows:" Weak peripheral agonism over peripheral mu-opioid receptors whose number is heightened in hyperalgesia and inflammatory conditions, favouring the opening of non-specific voltage-dependent potassium channels, acting in the nitric oxide pathway, agonistic action on vanilloid receptor one that apart from local analgesic effect, exerting undesired local side effects, such as burning pain and erythema, with a high concentration of tramadol blockade of the N-methyl- D-aspartate receptors and direct blocking of voltage-dependent sodium channels explains the local anaesthetic effect of tramadol." Pang et al.,[13,14] for the first time reported that when tramadol was injected intradermally (study conducted in 1998), it had a local anesthetic effect and it can also lessen the pain from propofol injection (study conducted in 1999), which leads to the postulation of tramadol exerting a peripheral analgesic activity. Combination of tramadol with known anesthetic agents to study the combined effects were investigated. Pozos et al.,[15] De Pedro-Muñoz and Mena-Álvarez[7] used 4% articaine with 1:100,000 epinephrine and applied tramadol 50 mg/mL to the surgical site. They found that tramadol supplementation greatly increased the efficacy of articaine in the surgical procedure. Much confusion prevails among different researchers as how this opioid analgesic works as a LA. Mert et al.,[16,17] in 2001 and 2002, reported that Tramadol has an Anesthetic effect which is similar to but weaker than lidocaine, and that tramadol may have a mechanism different from

lidocaine for producing conduction blockade. The various mechanisms proposed were –

A. Tramadol may follow hydrophobic pathway like benzocaine, by passing through the nerve membrane and blocking the sodium channels.

B. LA effect of tramadol is not mediated by opioid receptors.[18]

C. The presence of $Ca^{?}$ concentrations increase the anesthetic activity of tramadol.

D. Non-specific binding to membrane proteins or non-specific membrane effects.[19]

Nizamettin et al., in 2009 suggested that Na^{+} channels in fast conducting fibres are more susceptible to the effect of tramadol than Na^{+} channels in slow conduction fibres[20], which might be the reason for more delayed onset of tramadol in the oral cavity when compared to its onset on skin.

Tramadol as a LA for tooth extraction was first reported by Yahya Al- Haideri and Tahani Al-Sandook from Iraq in 2013.[8,10] They reported that tramadol alone or in combination with adrenaline can be used as a local anaesthetic for the extraction of upper molar tooth under supraperiosteal infiltration. This is one of the studies of its kind in dentistry where tramadol was used as a LA agent for extraction of tooth.

Tramadol was used in this study as the authors aimed to answer the question: "What is the anesthetic activity of tramadol on the tooth and the surrounding structures?" Although limited literature shows that tramadol has both local anaesthetic and postoperative analgesic action, it can be used to avoid additional intake of analgesics in patients undergoing simple extraction of maxillary teeth. There are also studies showing that tramadol can be used as a single local anaesthetic agent to achieve local anaesthesia. Similar to previously published studies, lidocaine HCl as gold standard was used for comparison.

The present study used a dose of 1 mL of 50 mg Tramadol HCL for buccal and palatal infiltration, as per the studies done by Atunkaya H et al.,[9] Al-Haideri YA,[8] Ege B et al.,[21,22] Alsandook TA and Al-Haideri YA.[10] In terms of the ideal dosage of tramadol, Kakagia D et al., reported that the maximum safe dose for local infiltration should not exceed 2 mg/kg.[23] The 50 mg dose used in this study is way within the maximum recommended safe dose of 2 mg/kg.

In the present study, tramadol and lignocaine was used for extraction of maxillary teeth under supraperiosteal infiltration to assess Onset of Anesthesia, Intraoperative Analgesia, Duration of Action and Postoperative Analgesia.

The mean onset of anesthesia was faster in Lignocaine than Tramadol, and was statistically significant. The findings were in accordance with the study by Ege B et al., who reported the Anesthetic onset in tramadol was delayed as compared to lignocaine, when given as buccal infiltration in the maxilla; however, tramadol provided statistically more effective anaesthesia in the gingiva and the skin than lidocaine.[21,22] Similar reports were observed by Jendi SK and Talathi A[24], Bedi SR et al., in 2018[25] in their studies. On the contrary, studies by Alsandook TA and Al-Haideri YA[10] and U Siva K et al.,[26] found no relevant difference for anesthetic onset in between the two groups.

Intraoperative analgesia was found to be similar with no statistical difference in between the groups. The findings are similar to study by Alsandook TA and Al-Haideri YA where they elucidated no difference in pain scores between lignocaine and tramadol when used in minor oral surgical procedures as a nerve block.[10] A study by Ege B et al.,[27] stated that though, lidocaine was more effective at 5th minute, tramadol was

found to be more effective in the later durations. Tramadol has been shown to have similar efficacy with strong opioids in acute and chronic pain states.

The mean duration of action was significantly increased in Lignocaine group when compared to the Tramadol group. The findings were in congruence with the studies by Alsandook and Al-Haideri[10], and Ege B et al.,[22] where they observed a marked difference in the duration of total anesthesia and the duration in the lidocaine group was effective for a longer time. A contrary result was observed by Ege B et al., in his another study[21,27] which states that there was no statistically significant difference between the two groups in total anesthetic duration; however, the authors also observed that the anesthetic effect of lidocaine started statistically significantly earlier than tramadol but also started to decrease earlier. Studies by Jendi Sk and Talathi A[24], and U Siva K et al.,[26] in 2020 also observed no significant difference in between the two groups regarding anesthetic duration.Post operative analgesia was found to have significantly better results with Tramadol than Lignocaine group in our study. The results of the postoperative analgesic efficacy of tramadol in the present study are concurrent with the investigations of Kargi E et al.,[28,29] Ege B et al.,[21] Kaakagia D et al.,[23] Ege B et al.,[22] Mert T et al.,[18] U Siva K et al.[26] However, these results are contrary to the conclusions drawn by Mannion S et al.,[30] where they emphasise that tramadol does not exhibit any significant peripheral analgesic property. In the study of Ege B et al.,[27] the authors observed that the efficacy of tramadol was delayed compared with lidocaine but was statistically more effective than lidocaine in the gingiva and the skin, especially at 15, 20, and 30 minutes. These results show that the efficacy of tramadol starts later, but its activity lasts longer than lidocaine, which explains the faster time to remedication in Lignocaine group and decreased total analgesic consumption in Tramadol group as observed in our study.

In our present study, none of the patient in both the group showed any incidence of allergic reactions. Pang et al.,[13,14] and Altunkaya et al.,[9] in their study found that intradermal injection of tramadol produced erythema and/or wheal more than lidocaine. However, in the study of Kargi et al.,[29] and Vahabi et al.,[31] it was found that tramadol did not have any significant local side effects when injected as local infiltration on skin.

Ege B et al.,[22] concluded that tramadol, besides its analgesic property is a harmless alternative to existing local anaesthetics when given in conjunction with adrenaline. Jendi SK and Talathi A[24] drafted a similar report stating that the local anaesthetic effect of tramadol and lignocaine on soft tissues, which was indistinguishable according to the author. Alsandook TA and Al-Haideri YA[10] further emphasised that minor oral surgeries can be performed using a combination of tramadol and adrenaline and that tramadol may be an alternative to lidocaine for extractions.

Limitations

The limitations of this study are that it has not considered teeth with acute infections, complicated extractions, mandibular teeth. In this study, the only subperiosteal infiltration was given for extraction, but the nerve block was not administered using tramadol.

Conclusion

In conclusion, tramadol HCl might be a good alternative agent for local anesthesia in oral and maxillofacial surgeries and its multifaceted effect as anesthesia and as analgesia could be extremely beneficial for long-term surgical operations, considering its strong analgesic activity. Although, further research is needed to confirm

and repeat these findings and to evaluate the efficacy of locally administered tramadol HCl through multiple aspects.

Informed Consent: Informed consent was obtained from all individual participants included in the study.

Practical Implications: Tramadol Hydrochloride can be used as an alternative to Lignocaine, aiding in better reduction of post-operative sequelae. It can also be used as an alternative to standard local anesthetic agents for extraction of tooth, like diphenhydramine, in situations where lignocaine cannot be used due to some unusual reason.

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