

Original Research Article

Evaluation of efficacy of submucosal tramadol after mandibular third molar surgery: a prospective pilot study

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ABSTRACT

Background: Surgical extraction of mandibular third molar is one of the most commonly performed procedure in oral and maxillofacial surgery. Its removal causes swelling, trismus, and moderate to severe pain which can be treated with various NSAID's drugs, which have numerous side effects and gastric disturbances. In order to bypass such disturbances, Tramadol may be considered as an alternative for such patients. The aim of the study was to evaluate analgesic efficacy of submucosal tramadol and its implication over swelling and mouth opening after mandibular third molar surgery.

Methods: This is a prospective study where in after post-surgical extraction of mandibular third molar, efficacy of submucosal injection of tramadol is evaluated in terms of pain and its implication over swelling and mouth opening.

Results: The present study suggested there was statistically significant VAS score for pain after submucosally injecting tramadol post-surgical extraction of mandibular third molar in the following visits- 4hourly, 8hourly and 24hourly. In respect to swelling, statistically significant values was noted during 24hr and 72 h our post extraction. Also in case of mouth opening, statistically significant values were found 24 hourly.

Conclusions: The present pilot study concluded that submucosal tramadol post mandibular third molar extraction has been effective in reducing pain, limiting post-extraction swelling and less impacting mouth opening by inducing less complications thereby bypassing gastric disturbances.

Keywords: Impaction, Post-extraction pain, Third molar, Tramadol

INTRODUCTION

The surgical removal of impacted mandibular third molars is one of the most commonly performed dentoalveolar procedures in oral and maxillofacial surgery and is associated with various postoperative sequelae.

Permanent nerve damage and infections are the most severe complications following third molar extractions, but the rate of occurrence of such complications is low.¹⁻⁴

Though surgical removal of impacted third molar is performed with at most precaution and a traumatically; it's removal causes swelling, trismus and moderate to severe pain.⁵

Pain is a major postoperative symptom after many dental procedures and its management is challenging part of dentistry. In dentistry, postoperative pain relief can be efficiently achieved with various analgesics, anti-inflammatory drugs, or associations thereof. It is well known that better pain control after oral surgery may lead

to improved recovery in terms of lifestyle and oral function.⁶ However, nonsteroidal anti-inflammatory drugs are associated with numerous side effects and are contraindicated in a significant number of patients, such as those with a history of peptic ulcer disease or bleeding disorders, those taking anticoagulants or corticosteroids, and those with a history of allergy or intolerance to aspirin-like drugs.⁷

The main problems with the use of opioid analgesics, particularly for outpatients, are their side effects of nausea, vomiting, drowsiness and dizziness, as well as their depressive effects on the cardiovascular and respiratory systems. It is also important with the increase in the incidence of drug abuse, not to forget their potential for dependency.⁸ However, tramadol hydrochloride (tramadol) is an opioid agonist that has been shown to have an analgesic effect to equal that of pentazocine but with significantly fewer side-effects.⁹ It also has no depressive effects on the respiratory or cardiovascular systems and minimal potential to cause physical dependence or abuse.¹⁰⁻¹³

Tramadol may be an alternative for such patients, because it lacks sedative and respiratory depressant effects. Tramadol is a centrally acting synthetic analgesic composite that is structurally related to codeine and morphine. Parenteral and oral are the most common administration routes, and its effectiveness for managing of moderate to severe postoperative pain has been demonstrated in both in- and outpatients.

Drug injected within/through the submucosa of buccal mucosa in order to achieve a local or systemic effect, is particularly attractive since substances absorbed through the buccal mucosa bypass gastrointestinal enzymatic degradation and the hepatic first-pass effect. The buccal mucosa consists of a surface layer of stratified squamous epithelium linked to the underlying connective tissue by a basal lamina. In the connective tissue a network of blood capillaries is present where drugs that have permeated through the epithelium can enter the systemic circulation.^{16,17} Tramadol once submucosally injected locally provides adequate analgesic effect for a longer duration hence multiple local administrations of injection tramadol is not required then after. Existing literature suggests that, orally administered tramadol medication is effective but not many studies have evaluated its analgesic efficacy. Effect of submucosal injection of tramadol after surgical extraction of third molar and its implication over swelling and mouth opening needs to be evaluated, and hence this reason, study need to be evaluated.

METHODS

Study design: Prospective study

Period of study: 3 months

Test for statistical analysis used: Paired sample test

Study population: Eight

Inclusion criteria

- Participants referred to Department of Oral and Maxillofacial surgery requiring surgical extraction of mandibular third molar.
- Participants who agree for the consent of the surgery.
- Participants with Age group-18 year onwards

Exclusion criteria

- Patients with uncontrolled systemic disease, that compromise dental extraction.
- Participants with restricted mouth opening.
- Patient with known allergic to medications (tramadol).

After obtaining ethical approval from ethics committee, a total of 8 healthy adult patients who reported to the Department of Oral and Maxillofacial Surgery, requiring surgical extraction of mandibular third molar were included in the study. Third molar position was classified according to Pell and Gregory (1933) as evaluated in a panoramic radiograph. Evaluation of pain intensity with the use of a 0 to 10 visual analog scale (VAS) was measured before extraction. Under complete aseptic precaution, inferior alveolar nerve block along with long buccal nerve block of the respective side was given using 2% lidocaine with 1:2,00,000 adrenaline. A mucoperiosteal flap was elevated distally to the second molar providing access to the third molar from the buccal aspect. Osteotomy was done using continuous sterile saline solution irrigation and if necessary, sectioning of crown and roots was performed with a fissure bur. After extraction, the alveolus was inspected, curetted, and irrigated with sterile normal saline solution. Post-surgical extraction, Injection Tramadol (50 mg) was injected submucosal into the buccal mucosa adjacent to the third molar alveolus immediately after extraction. Primary closure of the extraction socket was then done with 3-0 silk suture. Post extraction instructions were given to patient. Evaluation of pain intensity with the use of a 0 to 10 visual analog scale (VAS) was recorded at 4, 8, 24 hr after surgery, wherein 0 indicated "no pain" and 10 as "very intense pain". Swelling in score of 0 to 3 in pre and post extraction, and mouth opening in score of 1 to 3 were calculated on day 1, 3 and 7th day post extraction. Patients who experienced severe pain described by visual analogue scale of 8 or more than 8, tablet paracetamol 650 mg tid was prescribed. Patient were then recalled on post extraction day 1,3 and 7th day for follow-up and suture removal on 7th day.

RESULTS

A total of 8 patients were included in the study, wherein patients were injected 50 mg Inj Tramadol submucosally buccal to third molar, to evaluate analgesic efficacy as well as swelling and mouth opening post-surgical extraction of mandibular third molar. With respect to

Visual analogue scale (VAS) for pain, the present study showed significant difference in pain score at different time durations post-surgical extraction 4 hrly, 8 hrly and

24 hrly thereby indicating statistically significant difference in p values at those different time durations (Table 1).

Table 1: VAS Score for pain.

VAS score for pain	Mean	N	Std. Deviation	Std. error mean	Mean difference	p Value
pre extraction	4.75	8	1.04	0.366	-1.63	0.048
4hr post extraction	3.13	8	2.10	0.743		
pre extraction	4.75	8	1.04	0.366	-2.50	0.000
8hr post extraction	2.25	8	0.89	0.313		
pre extraction	4.75	8	1.04	0.366	-3.38	0.000
24hr post extraction	1.38	8	0.52	0.183		

Considering the swelling the 2nd common aspect after extraction, in the present study swelling graded from 1 to 3 on the basis of mild, moderate and severe showed that the p value for the score of the swelling on day 1 and 3 are statistically significant (Table 2) also indicates significant difference among values for the 1st and 3rd day. Mild swelling (score 1) was found to be associated post-surgical extraction for the day 1 and even

considerably lower on the day 3. Mouth opening was also evaluated in the study wherein post-surgical extraction of impacted third molar, mouth opening was found to be less impaired having score 2(16-25 mm) on day 1(24 hrly) and day 3(72 hrly) as a result of mild swelling associated thereafter (Table 3). The p value was found to be statistically significant on the day 1(24 hourly) in comparison to pre-extraction mouth opening.

Table 2: Score for Swelling.

Score for swelling	Mean	N	Std. deviation	Std. error mean	Mean difference	p Value
pre extraction	0.00	8	0.00	0.000	1.13	0.000
24hr post extraction	1.13	8	0.35	0.125		
pre extraction	0.00	8	0.00	0.000	0.38	0.080
72hr post extraction	0.38	8	0.52	0.183		
pre extraction	0.00	8	0.00	0.000	0.00	NP
7days post extraction	0.00	8	0.00	0.000		

Table 3: Score for mouth opening.

Mouth opening score	Mean	N	Std deviation	Std. error mean	Mean difference	p Value
Pre extraction	3.00	8	0.00	0.000	-0.75	0.003
24hr post extraction	2.25	8	0.46	0.164		
Pre extraction	3.00	8	0.00	0.000	-0.13	0.351
72hr post extraction	2.88	8	0.35	0.125		
Pre extraction	3.00	8	0.00	0.000	0.00	NP
7days post extraction	3.00	8	0.00	0.000		

DISCUSSION

Surgical extraction of mandibular third molar is one of the most commonly performed dento-alveolar procedure in oral and maxillofacial surgery.

Even if surgical extraction of impacted mandibular third molar (Figure 1) is performed with much care and done a

traumatically, the complications such as nerve injury and local infection following third molar extractions might occur; apart from these removal of a differently angulated impacted mandibular third molar also causes moderate to severe pain, trismus, and swelling which can impact patients quality of life for next few days. Management of pain is an important aspect and is a challenging in dentistry, as pain is a major postoperative symptom after

many dental procedures. In dentistry postoperative pain relief can be efficiently achieved with various non-steroidal anti-inflammatory drug analgesics, anti-inflammatory drugs, or their synergistic combinations. Moreover, it is well known that better pain control after oral surgery procedure may lead to improved recovery in terms of lifestyle and oral function.



Figure 1: Pre-Operative photograph.



Figure 2: Submucosal infiltration of injection Tramadol photograph.

However, NSAID's are notorious in causing various adverse effects and are not indicated to a certain patient, such as those with a medical history of peptic ulcer disease or bleeding disorders, those taking anticoagulants or corticosteroids, and those with a history of allergy or intolerance to aspirin-like drugs.

In order to avoid and bypass gastric disturbances Tramadol may be considered as an alternative for such patients, because it lacks sedative and respiratory depressant effects. Tramadol hydrochloride is a centrally acting analgesic, is clinically effective in the treatment of moderate to moderately severe pain potency with both opioid and nonopioid modes of action. Apart from lacking sedative and respiratory depression action, it also has reduced potential to cause dependence which can be of particular value in day care surgery patients. Tramadol

has been found to act at opioid receptors and also seems to alter transmission of pain impulses by blocking of monoamine reuptake.

The common sequelae during post-operative period which one can expect after third molar surgery are pain, inflammation, and trismus. The sensation of pain is totally subjective, and there are no uniform criteria for its measurement. Pain sensation depends on each individual's subjective pain threshold, which may be influenced by diverse factors including age, gender, anxiety, and surgical difficulty.

Tramadol has been proven to be an effective analgesic which is well tolerated by adults and children. It is a safe drug which lacks side effects like respiratory depression and constipation. The adverse effects that are generally reported include vomiting, nausea, dizziness, dry mouth, and profuse sweating. The submucosal route of administration could be advantageous over systemic analgesics or nonsteroidal anti-inflammatory drugs because they entail reducing the risk of side effects. In the present research, no major adverse effects were observed when tramadol was used.

In the present study, 50 mg injection Tramadol was injected submucosally buccal to third molar, to evaluate analgesic efficacy as well as swelling and mouth opening post extraction (Figure 2). With respect to Visual analogue scale (VAS) for pain, the present study showed that the p values are statistically significant post-surgical extraction 4hrly, 8hrly, 24hrly determining a significant difference in pain score at those different time durations. Various studies have found that patients experience severe pain on the day of surgery also various other studies have found that pain reaches its maximum intensity during the first 8 hours after surgery, attributable to increased production of pain mediators and to the declining effect of the local anaesthetic.

Here in the present study, tramadol was injected submucosally buccal to third molar immediately after surgical extraction, which helped in reducing peak pain which normally reaches its peak in a duration of 8 hours, accordingly to certain studies post extraction. As a result of which in the current study it was found that tramadol is adequately effective in reducing considerable amount of pain, post-surgical extraction during subsequent intervals when compared to pre extraction pain, which improved quality of life of patients. Superior analgesic effect of tramadol by submucosal application is most probably due to the achievement of a higher drug concentration at the site of wound without loss, due to its body distribution and elimination.

In one of their patient, out of sample size of 8 as a result of surgical difficulty, had VAS score of pain-8; 4 hrly post-surgical extraction, which according to our criteria was prescribed rescue medication (tablet paracetamol 650mg). Cecchetti et al, in their study post-surgical extraction of third molar, the extraction site was randomly assigned

submucosal 100 mg tramadol injection or normal saline solution immediately after surgery, in their study mean postoperative pain scores after the first procedure were lower in patients who had received tramadol ($p=0.001$) when compared to normal saline group, which was similar to our study.¹⁵ Nine patients in their tramadol group did not require rescue medication after either surgery during the study period, whereas only 1 in the placebo group required medication metamizole.

Onur Gönül et al, also in their randomized study found that VAS scores of the control group (saline group) were significantly higher compared to the tramadol group (group T) which were found to be in accordance with the present study.¹⁶ There were no significant group differences in VAS scores 24 and 48 h postoperatively ($p>0.05$). The first analgesic was taken significantly later in the tramadol group compared to the control group ($p=0.0001$). Total analgesic intake in the control group was significantly higher ($p=0.000$). Muhammad Nazir khan et al, in their study had results similar in accordance with the present study wherein, the patients in group tramadol who were injected tramadol submucosally, had less pain intensity (average 4.73 on VAS).¹⁴ whereas Sussan Sultanimohammadi et al, in their comparative study comparing analgesic effect of tramadol with lidocaine when used as subcutaneous local anesthetic did not found similar results wherein the VAS score did not differ significantly between the two groups in recovery ($p=0.119$), 12 hrly ($p=0.316$) and 24 hrly after the operation ($p=0.108$).¹⁷ After pain, swelling is second most common sequelae associated after surgical extraction of impacted third molar and is the one of the normal physiological response associated with any surgery, which may vary with the tissue handling, difficulty and length of the surgery. In the present study, swelling graded from 1 to 3 on the basis of mild-moderate and severe showed that the P value for the score of the swelling on day 1 and 3 are statistically significant also indicates significant difference among values for the 1st and 3rd day. Mild swelling (score 1) has been found to be associated post-surgical extraction for the day 1 and even considerably lower on day 3.

Swelling which occurs as normal physiologic response post-surgical extraction impacts mouth opening to a certain extent based on various factors such as tissue handling, length of surgical procedure, and difficulty of surgery. In the present study, the mouth opening 24 hrly (day 1) are statistically significant showing significant difference in score in comparison to pre-extraction mouth opening. Post-surgical extraction of impacted third molar mouth opening has been found to be less impaired having score 2(16-25 mm) on day 1(24 hrly) and day 3(72 hrly) as a result of mild swelling associated thereafter.

CONCLUSION

The present pilot study concluded that submucosal tramadol post mandibular third molar extraction has been effective in

reducing pain, limiting post-extraction swelling and less impacting mouth opening by inducing less complications thereby bypassing gastric disturbances.

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