



# The effect of the submucosal injection of dexamethasone on postoperative discomfort after impacted mandibular third molar surgery

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ARTICLE INFO	ABSTRACT
<p>Article Type: <b>Original Article</b></p> <p>Received: 17 Dec 2015 Revised: 12 Feb 2015 Accepted: 2 Apr 2015</p> <p>*Corresponding author: Mahboube Hasheminasab Craniomaxillofacial Research Center, Shariati Hospital, Tehran University of Medical Sciences, Tehran, Iran</p> <p>Tel: +98-2184902473 Fax: +98-2184902473 Email: mahboube.hasheminasab@gmail.com</p>	<p><b>Introduction:</b> Our study was designed to assess the effect of the submucosal injection of dexamethasone on postoperative discomfort after surgical removal of impacted mandibular third molars.</p> <p><b>Materials and methods:</b> Twenty six patients with bilaterally bony impacted mandibular third molars were recruited to this split mouth study. On the study side, prior to surgery, 8 mg of dexamethasone was injected in buccal vestibule submucosally, while the control side received no steroid. Complications such as swelling, trismus and infection were evaluated postoperatively.</p> <p><b>Results:</b> The results showed that the patients experienced significantly less swelling (<math>p= 0.001</math>) on study side on the 3<sup>rd</sup> and 7<sup>th</sup> postoperative days compared to the control side. The amount of trismus was significantly less (<math>p= 0.001</math>) after submucosal injection of dexamethasone on both time intervals.</p> <p><b>Conclusion:</b> Perioperative submucosal injection of dexamethasone can significantly reduce postoperative swelling and trismus after surgical removal of the impacted teeth.</p> <p><b>Keywords:</b> Third molar, Swelling, Trismus, Dexamethasone.</p>

## Introduction

Mandibular third molars are the most frequently impacted of all teeth and their surgical removal under local anesthesia is widely carried out in the field of oral and maxillofacial surgery, occupying an appreciable amount of clinical time [1]. This procedure is usually associated with complications such as pain, trismus and swelling and has been shown to reduce the patient's quality of life significantly [2]. Many clinicians, thus, have emphasized on the necessity of better postoperative complication control in patients undergoing this procedure. The release of inflammatory mediators due to surgical trauma has been proved to be one important etiologic cause and different strategies such as the prescription of nonsteroidal anti-

inflammatory drugs (NSAIDs) or corticosteroids have been sought to reduce it [3].

Corticosteroids are involved in a wide range of physiologic systems such as stress response, immune response and regulation of inflammation, carbohydrate metabolism, protein catabolism, blood electrolyte levels, and behavior. Dexamethasone and its derivatives are almost pure glucocorticoids and have been widely used to subside inflammatory responses [4]. The administration of enteral and parenteral steroids has shown promising results on the reduction of postoperative sequelae after oral surgeries [5]. Since systemic steroids can have potential side effects [6,7], it is advisable to seek more localized routes of administration to minimize their hazardous adverse effects.

Therefore, in our clinical split-mouth study, we evaluated the effectiveness of submucosal injection of dexamethasone on postoperative complications after third molar surgery.

### Materials and Methods

We performed a randomized clinical trial using a split mouth design; hence the patients served as their own controls. The study was conducted on the patients referred to the department of oral and maxillofacial surgery, faculty of dentistry, Tehran University of Medical Sciences, Tehran, Iran, for surgical removal of their third mandibular impacted third molars. The study protocol was approved by the Ethics Committee of Tehran University of Medical Sciences and informed consent was obtained from all the patients.

A total of 26 patients were recruited to the study. Inclusion criteria were the presence of bilateral bony impacted mandibular third molars with identical position, orientation, depth, and class of impaction according to the Pell and Gregory classification. Exclusion criteria included: 1) the presence of any systemic conditions that would contraindicate oral surgical procedure; 2) presence of pericoronitis or any other inflammatory or pathologic lesions in the area of impacted teeth; 3) taking any kind of medications including analgesics, sedatives, antibiotics or steroids at least 15 days prior to the surgery.

In each patient, one of the two mandibular impacted molars was randomly allocated to the study or control groups and patients were scheduled to undergo lower third molar extraction bilaterally. The two extractions were performed in two separate sessions 15 days apart. All surgical procedures were conducted by the same qualified surgeon. The surgical procedures were performed under local anesthesia with lidocaine 2% and 1:100,000 epinephrine. In the study side, few minutes prior to making surgical incisions, 8 mg of injectable solution of dexamethasone was injected in buccal vestibule distal to the mandibular second molar. Full-thickness mucoperiosteal envelope flaps with same extension were elevated in each side in order to gain access to the impacted teeth. Bone removal and tooth sectioning were performed with carbide burs under constant irrigation with sterile normal saline solution and the surgical sites were irrigated with the same amount of normal saline on both sides. After obtaining hemostasis, wound closure was

achieved with equal number of sutures using 3-0 black braided silk to reposition the flaps on their original positions. All surgical procedures lasted less than 30 minutes.

Postoperatively, all patients were instructed to apply ice pack over the skin of surgical site for 6 hours intermittently and were prescribed 500mg amoxicillin every 8 hours for 5 days, and 400 mg Ibuprofen 4 times daily for 3 days. All patients were advised to rinse their mouth with 0.2% chlorhexidine twice daily for 5 days after each surgery. As an indicator of the amount of the swelling at the surgical site, the distance between corner of the mouth and tip of tragus following the contour of the cheek was measured in millimeters using flexible scales preoperatively (the day of surgery) and postoperatively (days 3 and 7). For the assessment of trismus, mouth opening range was assessed by measuring the distance between incisal edges of the upper and lower central incisors during maximum unassisted opening before surgery and on the 3rd and 7th days after surgery. All the measurements were repeated 3 times on each patient by a single operator and the maximum values were recorded.

In each group, the amount of facial swelling was measured by the detraction of the preoperative facial size from the postoperative values at different time intervals. In the same manner, the amount of trismus experienced in each group was calculated as the preoperative maximum interincisal opening (MIO) minus the postoperative values at different time intervals.

All obtained data were statistically analyzed with the paired t-test and repeated measures analysis of variance using SPSS, version 8.0, for windows (SPSS, Chicago, IL).

### Results

A total of 26 volunteer healthy patients (13 males, 13 females) who were the candidate of surgical removal of bilaterally impacted mandibular third molars participated in this study. The mean preoperative measured amount of facial size were 107.34mm and 106.87mm for the study and control sides, respectively with no significant difference between the two groups ( $p= 1.591$ ). The average of maximum interincisal opening on the day of surgery was 44.4mm on both surgical appointments.

The amount of swelling and trismus was significantly lesser on dexamethasone-receiving side compared to the control side ( $p<0.05$ ) on the 3<sup>rd</sup> and 7<sup>th</sup> postoperative days. The average

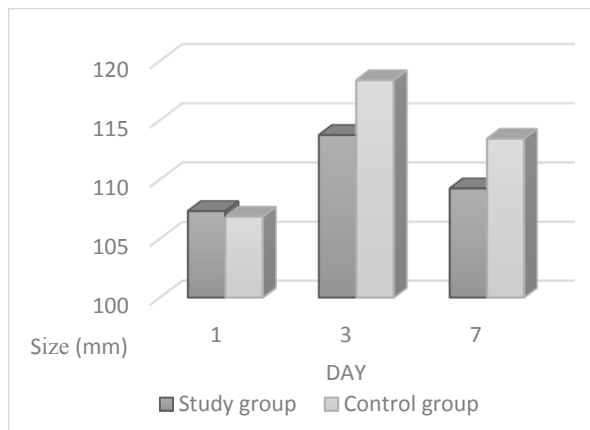


Fig. 1. Average Swelling (mm).

Table 1. Average swelling (mm) at different time intervals. (n= 13 in each group).

day	Study group	Control group
1	107.34	106.87
3	113.75	118.38
7	109.25	113.44

amount of swelling on the 3<sup>rd</sup> postoperative day was 6.4 mm and 11.5mm for the study and control sides, respectively (p= 0.001). In the 7<sup>th</sup> postoperative day, these values were 1.9mm for the study side and 6.5mm for the control side (p= 0.001) (Table 1)(Figure1).

The amount of trismus on the 3<sup>rd</sup> postoperative day was 9.8mm and 14.6mm for the study and control sides, respectively (p= 0.001). These values were 3.9mm for the study side and 7.96mm for the control side on the 7<sup>th</sup> postoperative day (p= 0.001) (Table 2).

Table 2. Average trismus (mm) at different time intervals. (n= 13 in each group)

day	study group	Control group
1	44.4	44.4
3	9.8	14.6
7	3.9	7.96

None of the patients developed postoperative infection and/or alveolar osteitis in any sides. No adverse reaction due to submucosal steroid injection was observed in any patient.

### Discussion

Most commonly, patients complain of pain, swelling, and trismus as the main factors negatively influencing their quality of life after surgery for lower third molar extraction. Pharmacologic strategies for minimizing the clinical manifestations of surgical trauma are

often directed toward blocking the formation or inhibiting the effects of the biochemical mediators of acute inflammation. In 1987, Holland [8] evaluated the influence of methylprednisolone on postoperative swelling following oral surgery and showed that intravenous injection of 40mg methylprednisolone can reduce postoperative swelling and pain. In 2010, Tiigimae-Saar et al [9] conducted a study to assess the effect of prednisolone on reduction of complications after impacted third molar removal and demonstrated that a combination of a single dose of prednisolone and Etorikoxib (NSAID) is well-suited for treatment of postoperative pain, trismus, and swelling after third molar surgery.

In a systematic review and meta-analysis in 2008, Markiewicz et al [10] evaluated 12 clinical trials regarding the effect of perioperative administration of corticosteroids and concluded that perioperative administration of corticosteroids produces a mild to moderate reduction in edema and improvement in range of motion after impacted mandibular third molar removal.

It has been reported that intravenous or intramuscular injection of corticosteroids are associated with adverse effects such as excruciating perineal pain [6] and avascular necrosis of the femoral heads [7], respectively. Besides, although in a recent systematic review performed by Dodson [11] it was shown that in oral surgery there is a minimal risk of chronic adrenal suppression due to administration of oral steroids, it is always advisable to seek more local routes of administration to minimize the potential side effects. In 2007, Grossi et al [12] demonstrated that dexamethasone at 2 different doses (4 or 8 mg) as submucosal injection can significantly reduce facial edema on the second postoperative day but there was no statistically significant difference between all groups when postoperative swelling was evaluated at day 7. Moreover, they observed no statistically significant differences between the 2 dosage regimens of dexamethasone in any terms. In 2010, Majid and Mahmoudi [13] performed a study to compare the effects of submucosal and intramuscular dexamethasone on postoperative sequelae after third molar surgery. In their study, thirty patients underwent surgical removal of a single impacted mandibular third molar. The 2 experimental groups received dexamethasone 4 mg submucosally or

intramuscularly, while the control group received no steroid. The results showed that both dexamethasone receiving groups demonstrated significant reductions in swelling and pain compared with the control group at all intervals (1, 3, and 7 days postoperatively). They concluded that dexamethasone 4 mg given submucosally is an effective way of minimizing swelling, trismus, and pain after removal of impacted lower third molars, and is comparable with the intramuscular route.

### Conclusion

The results of our study indicated that postoperative submucosal injection of a single-dose dexamethasone can significantly reduce the swelling and trismus on the third and seventh postoperative days with no increase in the risk of potential side effects or postoperative complications such as infection or alveolar osteitis. Considering the results of our study along with other similar ones, it will be plausible to suggest submucosal route of steroid administrations a safe, simple, painless and cost-effective way to reduce postoperative inflammatory complications after surgical removal of impacted teeth.

**Conflict of interests:** The authors declared none.

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