

Original Research

Assessment of the effects of 8 mg dexamethasone injection into the pterygomandibular space on the postoperative sequelae of lower third molar surgery

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ABSTRACT:

The aim of this study was to assess the effects of 8 mg dexamethasone injection into the pterygomandibular space on the postoperative sequelae of lower third molar surgery. A prospective, randomized, controlled, split-mouth study was carried out involving 52 lower third molar extractions (26 patients). Preceding surgical procedure, the study group received 2 ml of 4 mg/ml (8 mg) dexamethasone injection through the pterygomandibular space following local anaesthesia; the control group received 2 ml normal saline injection. Facial swelling, and mouth opening were evaluated. Descriptive statistics and the independent-samples t-test were used to compare the two groups at $P < 0.05$. The swelling had reduced significantly postoperatively and there was significant increase in mouth opening on day 2 in the dexamethasone group. The pterygomandibular space injection of 8 mg dexamethasone was effective in reducing postoperative swelling, and trismus following surgical removal of lower third molar.

Keywords: dexamethasone, pterygomandibular space, third molar surgery.

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INTRODUCTION

The most common surgical procedure in oral and maxillofacial surgery is the surgical removal of impacted third molars¹. This procedure results in postoperative sequelae such as pain, swelling, decreased mouth opening, and general oral dysfunction during the postoperative period.² one of the most important space related to the lower third molar and the space where conventional inferior alveolar nerve block is administered is the pterygomandibular space. Limited mouth opening or Trismus being the most common presenting sign and symptom of isolated pterygomandibular space infection.^{3,4} It is the surgical technique and minimal tissue trauma during tissue handling can partly resolve or eliminate the pain and

discomfort associated with trismus or limited mouth opening.¹

Various drugs have been administered to reduce the post surgical sequelae following third molar removal, mentioned in published literature. Linenberg (1965) employed dexamethasone to control swelling or edema and to improve mouth opening and reduce pain following oral surgery. After which the use of synthetic steroids has increased in reducing post inflammatory signs and symptoms following oral surgical procedures.⁵⁻⁷ The effects of submucosal and intramuscular dexamethasone were studied by Majid and Mahmood following surgical removal of third molars. The results in their study showed that submucosal dexamethasone is an effective alternative to

dexamethasone systemically.⁸ There are many studies reporting the submucosal ,intra-alveolar, intravenous, intramuscular , and oral uses of dexamethasone.

On contrary, studies regarding the use of dexamethasone injection into the pterygomandibular space have rarely been conducted. Therefore, the objective of this study was to assess the efficacy of dexamethasone as single dose 8mg ,preoperatively into the pterygomandibular space in reducing postoperative sequelae following surgical removal of third molar.

MATERIALS AND METHOD

This prospective study, randomised, controlled split mouth study included 26 patients (12 male and 14 female were included in the study;mean age 22yrs, range 16-32 yrs) with bilaterally similar impacted lower third molars .This study involved 52 surgical removal of lower third molars in 26 patients.This study was performed in the department of oral and maxillofacial surgery,Govt Dental College , Srinagar with ethical clearance obtained from the institutional ethical committee. The lower third molar surgical removal was done under local anesthesia in all the cases. The sample

was divided randomly into two sites : a study site and a control site. (Table 1)

Study site	Control site
Dexamethasone used Preoperatively , after local anesthesia 2ml of dexamethasone i.e 8mg (4mg/ml) injected into the pterygomandibular space	No Dexamethasone used Preoperatively , after local anesthesia 2ml of normal saline injected as a placebo into the pterygomandibular space

Table 1.study and control sites for the administration of dexamethasone or normal saline in the pterygomandibular space.

Lower third molars in terms of positions and classes are depicted in Figs 1 and 2, respectively. Angulation of the third molars were done as per winters classification which showed that 16 were mesioangular, 18 were horizontal ,12 were vertical , and 6 were distoangular .

Position of lower third molars each side

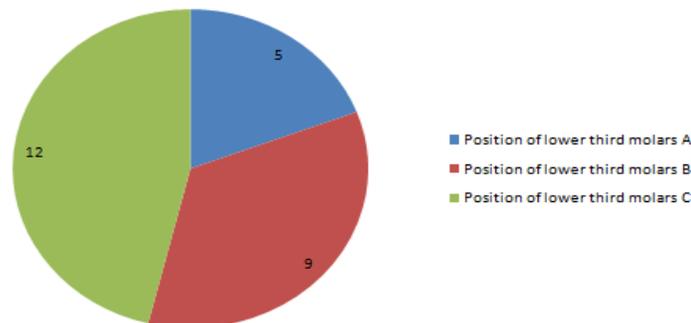


Fig 1. Positions of the lower third molars in this study.

Classes of lower third molars each side

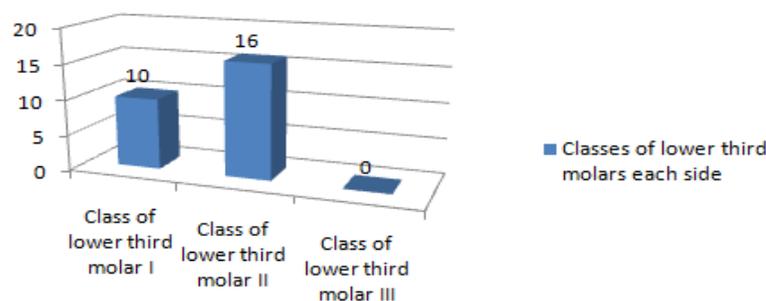


Fig 2.Classes of the lower third molars in this study.

In the sample, the patients were blinded to the use or not of dexamethasone. using standard technique, all surgical removal of lower third molars were performed by the same surgeon. Local anesthesia (2% Lignocaine hydrochloride with 1:200,000 epinephrine) by inferior alveolar nerve block and buccal nerve block was administered. 2ml of 4mg/ml dexamethasone or 2ml of normal saline (placebo) were administered into the pterygomandibular space after the objective signs of anesthesia were evident. The contralateral third molar removal was performed 21 days later in each patient. Atraumatic, standard technique was followed during surgical removal of lower third molars with adequate access to the surgical field along with bone guttering and tooth sectioning. After tooth removal, soft tissue curettage and socket irrigation were done followed by primary closure with interrupted black silk sutures.

Postoperatively, all patients received amoxicillin for 5 days (500mg 4times daily before meals) and acetaminophen for use only in the case of pain (500mg every 6 h).

Facial swelling was assessed preoperatively before the procedure and on the second and seventh day postoperatively using following three measurements: Lateral canthus of the eye to the gonion angle, tragus to the commissure of the mouth, and tragus to pogonion.

Mouth opening was also evaluated preoperatively before the procedure and on the second and seventh day postoperatively. Maximum inter-incisal opening was measured and recorded (distance between the upper and lower incisal edges of the central incisors).

Statistical analysis was done using Independent – sample t-test

Table 2. Measurement of swelling (mm):mean values and p values in the study.

Variable	Evaluation	Dexamethasone group Mean (SD)	Control group Mean (SD)	P-value
Tr-com	Preoperative	115.9 (5.6)	116.5(6.5)	0.68
	Day 2	119.8 (5.4)	123.5(6.8)	0.04 ^a
	Day 7	117.8 (4.9)	118.6(6.7)	0.60
	P value	0.31	0.00 ^a	
Tr-Pog	Preoperative	151.0 (10.3)	150.1 (12.6)	0.76
	Day 2	154.8 (10.2)	158.0 (10.2)	0.22
	Day 7	152.3 (9.8)	152.9 (10.3)	0.81
	P value	0.04 ^a	0.02 ^a	
Gn-Lc	Preoperative	110.8 (6.3)	110.5 (7.9)	0.87
	Day 2	114.3 (6.3)	118.5 (6.7)	0.01 ^a
	Day 7	112.7 (6.0)	114.8 (6.3)	0.2
	P value	0.00 ^a	0.00 ^a	

SD, standard deviation; Tr-com, tragus to the commissure of the mouth; Tr-Pog, tragus to pogonion; Gn-Lc, gonion angle to lateral canthus of the eye.

^aSignificant, $p < 0.05$.

Table 3. Measurements of maximum mouth opening (mm):mean values and p values in the study.

	Dexamethasone group Mean (SD)	Control group Mean (SD)	P-value
Preoperative	42.9 (5.8)	42.3 (5.9)	0.7
Day 2	32.1 (8.9)	27.3 (9.3)	0.04
Day7	39.3 (8.0)	37.7 (8.5)	0.43
p-value	0.27	0.04 ^a	

SD, standard deviation; MIO, maximum inter-incisal opening.

^aSignificant, $P < 0.05$.

RESULTS

The duration of surgery in the dexamethasone group was 23.8 ± 8.3 min and in the control group was 22.5 ± 7.2 min. There was no significant difference in the operation time between the two groups ($P=0.3$).

No postoperative complications were observed in either of the groups.

In the control group, there was a significant increase in the swelling ($p<0.05$).

TR-Com swelling measurement was not statistically significant in the Dexamethasone group ($p=0.31$). Tr-Pog and Gn-Lc measurements were significantly different ($p=0.04$ and $p=0.00$, respectively) on days 2 and 7 postoperatively. There was a significant reduction in the magnitude of swelling on the second postoperative day in the dexamethasone group compared with the control group. Moreover, the measurements of swelling between the second postoperative day and the preoperative value also significantly different between the control and study groups.

Mouth opening measurements differed significantly ($p=0.04$) in the control group, but the measurements in the dexamethasone group did not differ significantly ($p=0.27$). There was a significant difference in mouth opening between the groups on day 2 postoperative ($P=0.04$). (Table 3).

DISCUSSION

Glucocorticoids reduce the acute inflammatory conditions following oral surgeries⁹. Corticosteroids for reducing swelling, trismus and pain after the removal of impacted mandibular third molars has been mentioned as a pharmacological agent in various studies^{10,11}

There is a dose dependent effect of dexamethasone in reducing postoperative swelling, pain, and limited mouth opening⁹. Alexander and Thronson suggested the use of 8-12mg dexamethasone. Therefore in this study 8mg of dexamethasone was used. Corticosteroids may not be necessary for all lower third molars removal as per previous studies^{12,13}. Bone removal and tooth sectioning was done in all cases. Blood flow in the area of administration is the main controlling factor for the drug to be absorbed¹⁴. The reason for choosing Pterygomandibular space for the drug administration, is its proximity to the lower third molar surgical area.

Swelling was assessed by measuring three linear facial distances. This is a simple, non-invasive, cost-effective, and time saving method. In this study, mean values for postoperative swelling were significantly lower in the dexamethasone group compared to the control group on day 2 postoperatively, with the exception of the tragus to Pogonion measurement. Filho et al found same results when 8mg of dexamethasone was used¹⁵.

Blackwell et al¹⁶ and Hong and Levine¹⁷ showed that glucocorticoids inhibit the release of arachidonic acid and its metabolism to prostaglandins and thromboxanes, which increase capillary permeability. Drug half-life is an important factor to be considered for facial swelling reduction. Dexamethasone has a half life of 36-54h and is 20-30 times more potent than cortisol. Therefore, single dose of dexamethasone is useful to reduce surgery-induced inflammation¹⁸.

Regarding maximum mouth opening, the dexamethasone group showed better results in comparison to the control group, especially on the second postoperative day. Postoperative swelling is usually followed by limited mouth opening. Antunes et al in his study found better results with both tablet and injectable forms of dexamethasone in comparison to control group³.

No postoperative complication was reported in this study. Blondeau and Daniel, in a study of 551 cases, reported that the postoperative complication rate in lower third molar removal was 6.9%, with complications including infection, alveolitis, and lower lip paresthesia¹⁹.

To reduce operator-based variability, a single surgeon performed all the surgical removal of lower third molars. This study utilized a bilateral split-mouth design with impacted third molars of similar types and in similar positions.

CONCLUSION

Pterygomandibular space injection of 8mg dexamethasone was effective in reducing the postoperative swelling, and limited mouth opening following surgical removal of lower third molar. Due to the close proximity of the pterygomandibular space to the surgical site and rich vascularity of this space with loose areolar tissue, provides an excellent site for efficient drug absorption. Thus, dexamethasone injection can be used as the drug for controlling postoperative swelling and trismus after the lower third molar removal.

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