Effectiveness of submucosal injection dexamethasone in third molar surgery

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ABSTRACT
Objectives: The effectiveness of oral and submucosal injection of dexamethasone to prevent inflammatory sequelae after surgical removal of lower third molars was studied.
Methods
In this Randomized Controlled Trial study, fifty-one healthy patients, age range between 20 to34 years who need to extract unilateral side of upper and lower third molars were randomly assigned for either one of the three, oral dexamethasone 4 mg, submucosal injection of dexamethasone 4 mg and not received any dexamethasone administration. Postoperative facial edema, trismus and pain were evaluated on the 1st, 2nd, 3rd and 7th postoperative day with an ANOVA repeated analysis.
Results
This study revealed that both submucosal injection and oral dexamethasone can reduce significantly postoperative edema, trismus and pain in compare with the control on postoperative 1st, 2nd and 3rd day but not on 7th day ($P< 0.001$). Although the submucosal injection of 4 mg of dexamethasone reduces the postoperative edema comparable with or greater than oral route of administration ($P= 0.005$), pain and trismus were not significantly reduced between oral dexamethasone and submucosal injection of dexamethasone. The intraoral submucosal injection of 4 mg dexamethasone at the time of operation was the most effective in the prevention of postoperative edema, trismus and pain among these groups.
ConclusionThe present study concluded that single dose of 4 mg of submucosal injection of dexamethasone is more preferable than 4 mg of oral dexamethasone in moderate to severe oral surgical procedure and can be used to reduce the common postoperative morbidity of pain, swelling and trismus.

Introduction
Surgical extraction of impacted third molar is one of the most common surgical procedures carried out in the routine oral and maxillofacial surgery practice and daily dental practice which can result in considerable pain, edema and trismus. Therefore it has been a major interest in reducing the postoperative morbidity following third molar surgery by oral and maxillofacial surgeons. In this study, it was focused on the effectiveness of submucosal injection and oral dexamethasone on the postoperative edema, trismus and pain after impacted third molar surgery.
Material and Methods
Fifty-one patients, 20 to 34 years of age with impacted lower third molars of one side were included in the randomized control trial study. All the patients were equally and randomly divided into 3 groups, who were one hour preoperatively taken 4 mg oral dexamethasone (Group A), perioperative submucosal injection of 4mg of dexamethasone (Group B) and control group with no perioperative usage of dexamethasone (Group C). Subjects were ASA I, no known hypersensitivity and contraindications in usage of dexamethasone, free of acute and active infection, impacted molars' Pells and Gregory's classification class I or II, position A or B, and any Winter's angulations. Operative procedure should not be more than 1 hour from the start of incision to final suture. Additional exclusion criteria included pregnant women or lactating mother, patients who were previously using anti-inflammatory drugs and uncooperative patients who could not strictly obey the postoperative instructions. All surgical procedures were performed by an experienced and skilled oral surgeon. The surgical procedures were standardized by triangular flap and the chisel method. The duration of the procedures were recorded as the period between the first

incision and the last suture. No postoperative anti-inflammatory drugs were prescribed. All the patients were recorded preoperatively for pain, trismus and edema as baseline measurement. All the patients were recalled on postoperative 1st day, 2nd day, 3rd day and 7th day for assessment of objective signs of postoperative trismus and edema. Subjective symptom of level of postoperative pain was recorded by patient themselves and measured by Numerical Rating Scale (NRS). Level of facial edema was determined by modification of tape measuring method1.Three measurements were made between 5 reference points: tragus, soft pogonion, lateral canthus of the eye, angle of the mandible, and outer corner of the mouth. The difference between each postoperative 1st day, 2nd day, 3rd day, 7th day measurement and the preoperative baseline data indicated the facial edema for the corresponding day. Trismus was evaluated by measuring the distance between the mesio-incisal corners of the upper and lower right central incisors at maximum opening of the jaws. The differences between each postoperative 1st, 2nd, 3rd, 7th and the preoperative measurement indicated the trismus for the corresponding day. Data were entered to SPSS version 16 by using stat transfer software. Data cleaning and error checking were done. In analytic statistics, chi square tests were used for categorical variable, ANOVA were used for continuous variable like measurement of facial swelling. P value for the tests was set as 0.05 and confidence interval was 95 percent.

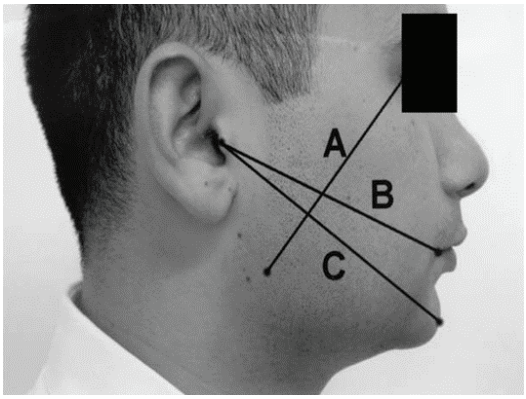

Figure (1) Measurements of facial swelling

Results

Data from 51 patients, there were no statistically significant differences between patients' demographics, difficulties and duration of surgery. For edema, both oral and submucosal injection of dexamethasone groups were highly significant ($p < 0.001$) in postoperative first day to third day in compare with control group, but not in postoperative 7 days. Submucosal injection was significantly reduce the edema in postoperative second day ($p=0.005$) than the oral group. Postoperative pain of oral and submucosal injection groups significantly lesser than the control group in postoperative first day only ($p=0.003$). Patients in submucosal injection group suffered least pain than other groups in all study time. Both oral and submucosal injection groups were highly significantly reduced ($p<0.001$) in postoperative 1st to 3rd day in compare with control side. Trismus of all three groups returned to normal and near to normal on postoperative 7th day.


Figure (2) Measuring of trismus using Boley gauge

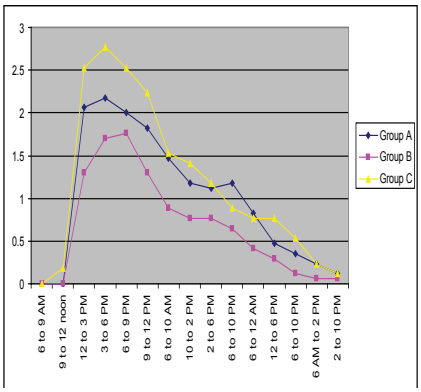

Figure (3) Comparison of Pain

Discussion

Many studies have been done to overcome the common postoperative morbidity of pain, edema and trismus. Corticosteroids are widely used in different routes of administration. Most glucocorticoids used in oral surgical procedures do not exert their effect beyond 24 hours if given as a single dose. To maintain their anti-inflammatory efficacy, steroid doses should be maintained for a minimum of 3 days and a maximum of 5 days to maximize their benefit and minimize their risk 2. But in our study, single dose of submucosal injection of dexamethasone 4 mg or single dose of oral dexamethasone 4 mg could overcome the morbidity of postoperative 48 to 72 hours period in which postoperative edema reaches peak level. The prefer route of administration was submucosal injection around

	Group A n= 17 (mean)	Group B n= 17 (mean)	Group C n= 17 (mean)
Difference between day 1 and baseline	- 3.76	- 1.76	- 7.29
Difference between day 2 and baseline	-2.52	-1.17	- 6.94
Difference between day 3 and baseline	-1.17	- 0.47	- 4.11
Difference between day 7 and baseline	0.35	0.00	- 1.35

Table (1) Comparison of Trismus among three groups in millimeter

operative site to achieve the higher concentration at the injury site. Steroids given through this route could provide an immediate pharmacologic response, reduce patient noncompliance, and provide a more predictable response. When surgical removal of the lower third molar was performed under local anesthesia, there was a convenience for both the surgeon and the patient to use the painless submucosal route. Oral route did provide a convenient, economic, and safe route of administration of drug to most patients. In our study, postoperative edema was well controlled with the oral or submucosal injection of dexamethasone within the period of three days. Graziani et.al., (2006) investigated the effect of dentoalveolar application of dexamethasone powder 4 mg and 10 mg and submucosal injection of dexamethasone 4 mg, in 43 subjects undergoing bilateral surgical extraction of lower third molars reduced postoperative degree of edema compared with the control group, as highly significant on the second postoperative day3. Filho et.al. (2008) reported that the oral administration

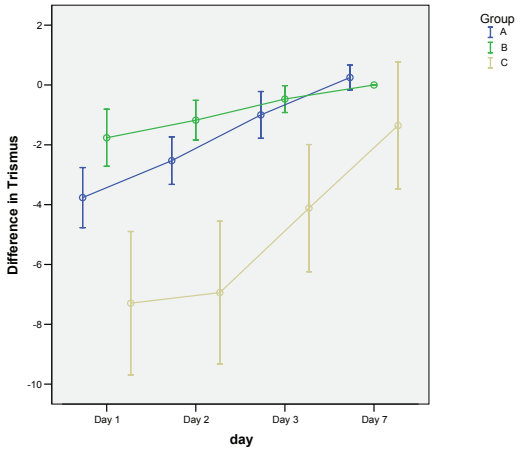

Figure (4) Trismus of all three groups returned to normal on postoperative 7th day

of dexamethasone one hour preoperatively, produced a significant reduction in postoperative edema on postoperative 24 and 48 hours after impacted third molar removal. In our study postoperative pain of oral dexamethasone group and submucosal injection group were significantly lesser than control group in postoperative first day (P=0.003) but not significant in day 2, day 3, and day 74. Grossi et.al.,(2007) reported that no significant differences in the both submucosal injection of dexamethasone 4-mg and 8-mg

groups compared with the control group in postoperative pain5. Trismus in our study presented with variable degree to all patients. It was maximum on postoperative first day and gradually reduced afterwards. Neupert et. al.,(1992) reported that mouth opening as measured by the interincisal opening pre and postoperatively was improved with 4 mg of intravenous dexamethasone in the first few days after surgery6. Filho et.al., (2008) evaluated the effect of 4 mg and 8 mg of oral dexamethasone to decrease the trismus after the surgical extraction of impacted lower third molars (p=0.001)4.

Conclusion

This study can be concluded that single dose of 4mg of submucosal injection of dexamethasone is more preferable than 4mg of oral dexamethasone in moderate to severe oral surgical procedure and can be used to reduce the common postoperative morbidity of pain, edema and trismus.

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