

Evaluation of the Effectiveness of Two Methods Using Methylprednisolone on Post Operative Sequelae Following Lower Third Molar Surgery

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Abstract

The surgical extraction of lower wisdom tooth like any surgical procedure is usually associated with postoperative sequelae (pain, swelling and trismus). Different drugs and surgical techniques were used to decrease these inflammatory responses. Steroids have been used commonly for this purposes particularly methylprednisolone (MP). The aim of this study was evaluating the efficacy of preoperative systemic and local administration of MP (10 mg) on the post operative sequelae following surgical removal of lower third molar. Patients included in the study were (60) divided into 3 groups each group consist from (20) persons. The first group was the control one while the second group received (10mg) of MP orally and the third group injected with (10mg) of MP locally around the site of surgery one hour preoperatively. The postoperative sequelae were assessed on the 2nd, 5th, and 7th days following the operation. The result showed significant reduction in pain and oedema with the use of systemic MP and there was no effect on trismus. The local injection of (10mg) of MP was significantly affecting the oedema formation on the 5th, and 7th days. The administration of oral methylprednisolone (10mg) played a good role in reducing pain and oedema following lower third molar surgery. The method used was simple, applicable and easily accepted by the patients.

Keywords: Wisdom Tooth, Trismus, Steroids , Methylprednisolone, Impaction

Introduction

The lower third molar is the most common impacted tooth in oral cavity and its surgical removal is one of the most frequent interventions done in dental clinic. When body tissue injured regardless of the cause, the normal physiologic response is inflammation as part of healing process. Surgical treatment induces a complex interaction between local inflammatory and general neurohumoral responses, which at the macroscopic level manifests as the five classical cardinal signs of inflammation; heat, redness, swelling, pain and disturbed function⁽¹⁾. There is also considerable variation from patient to patient in occurrence and relative severity of the inflammatory response.

The surgical extraction of lower wisdom tooth like any surgical procedure is usually associated with postoperative sequelae (pain, swelling and trismus). Reducing or

minimizing these inflammatory responses seems a laudable goal of the oral surgeon⁽²⁾. Usually the related technique of surgery (less destructive) and the use of some drugs have to lessen postoperative complications and sequelae⁽³⁾.

This fact led to the use of a variety of medications and surgical techniques to control the physiological response to trauma. The use of laser and cryosurgery after surgical removal of lower third molar have reported to decrease pain, swelling and dysfunction during the postoperative period^(4,5). Among many drugs which were used before or just after lower third molar surgery, corticosteroids become most widely accepted option^(6,7).

The use of corticoids as anti-inflammatory agents dates back to 1949, when Hench and Kendall first described the anti-inflammatory effects of these substances in the treatment of rheumatoid arthritis⁽⁸⁾. The first publication involving the administration of corticoids in dental practice was that of Spies in 1952⁽⁸⁾. Since then, the use of these drugs has become widely accepted in oral surgery, and many articles have been published reporting the synthesis of new molecules, the administration of different active substances, various administration routes and doses. However, there is this great diversity in these studies make it difficult to define solid guidelines for the administration of these drugs in the surgical extraction of impacted lower third molars. However 2 types of glucocorticoids mainly used in this field which are dexamethasone and methylprednisolone⁽⁹⁾.

Methylprednisolone had been used in different doses either locally, systemically, intramuscular or intravenously in the preoperative period during third molar surgery. This study was designed to evaluate the efficacy of two methods (systemic and local) of administration of methylprednisolone (10mg) on the post operative sequelae following surgical removal of lower third molar.

Material & Methods

The sample included 60 patients that underwent surgical removal of mandibular third molars in the department of oral surgery in Pera Merd Specialized Dental Center in Sulimani. Age of patients was from 17 to 30 year. The 60 patients were divided in to three groups: group A (20 patients) regarded as control group and they were not received MP. Group B (20 patients) took MP tablets orally (10 mg), one hour before the surgical procedure. Group C (20 patients) injected with MP (10mg) locally in the gingiva around the site of surgery one hour before surgery.

The patients had to be periodontally healthy and not showing pericoronitis at the time of surgery. Third molar was mesioangular impaction diagnosed by orthopantograph. (Fig.1). Exclusion criteria included a clinically significant medical history, drugs allergy, anti-inflammatory treatment within one month before the surgery, chronic use of medications that obscure assessment of the inflammatory response (antihistamines, NSAID, steroids and antidepressants), pregnant or lactating woman.

All patients were operated on under local anesthesia (2% lidocaine with 1: 100. 000 epinephrine). All surgical operations were done by the same surgeon using standardized technique (all with triangular flap). Prescription of 10 tablets 500 mg amoxicilline capsuls (3 times daily) and 10 tablets of paracetamol 500mg (3 times daily) was done for all groups. Any surgical procedure took more than 45 minutes was excluded from the analysis data. The study patient has been approved by ethical form.

Assessment of swelling

Facial edema will be evaluated by tape method described by Gabka and Matsumara⁽¹⁰⁾. Three measurements were made between 5 reference points: tragus, soft tissue pogonion, lateral corner of the eye, angle of the mandible, and outer corner of the mouth, preoperatively, and on the second, fifth and seventh postoperative days (Fig.2). The preoperative sum of the 3 measurements was considered as the baseline for that side. The difference between each postoperative measurement and the baseline indicated the facial swelling for that day.

Assessment of pain

Severity of patient pain perception was assessed via a simplified visual analogue scale (VAS)⁽¹¹⁾. This scale was further divided into 100-mm lines. The patient was required to place a mark on the scale to indicate the pain intensity. These measures done on 2nd, 5th, and 7th post operative days.

Assessment of trismus

Trismus will be recorded as the difference in inter-incisal distance at maximum opening pre operatively and on 2nd, 5th, and 7th post operative days.

Statistical Analysis

Data were presented as mean values and standard deviations($x \pm SD$). Analysis of variance (ANOVA) was used to compare the differences among the three groups studied. Whenever statistical analysis was performed, P values less than 5% (< 0.05) was considered statistically significant.

Results

The patients included in this study were 36 females and 24 males. The mean age for the patient's was 22.05yrs. The results compared between the 3 groups as following including the post operative sequelae:

Pain

The group used systemic (oral) methylprednisolone showed significant ($p < 0.05$) pain relief over the two another groups in the 2nd and 5th post operative days. In the 7th day post operatively there were no statically significant differences in all groups .Tables 1,2 and 3.

Swelling

The swelling was in its maximum size in the 2nd post operative day in all groups. There was significant reduction in swelling size in both groups using methylprednisolone compared with control group on 5th and 7th days. While there was no differences between local and systemic steroids on the 5th and 7th days. Tables 4,5and 6.

Trismus

The statistical analysis showed no significance in the relief of trismus in the 2nd and 5th post operative days in any group while there is significance of systemic group in the 7th day (postoperatively) fig (3).Comparison between the results of three groups in mean

values there was somewhat slight relief in trismus in the 5th day in systemic group over the other two groups (while it is statistically not significant) .

Table(1) : Descriptive analysis of pain

Day	group	N	Mean difference	Std. Deviation	Std. Error
Day2	Control	20	1.57	0.646	0.173
	Systemic	20	0.47	0.514	0.125
	Local Injection	20	1.60	0.507	0.131
Day5	Control	20	1.00	0.679	0.182
	Systemic	20	1.13	0.332	0.081
	Local Injection	20	0.29	0.516	0.133
Day7	Control	20	0.21	0.469	0.125
	Systemic	20	0.00	0.000	0.000
	Local Injection	20	0.33	0.488	0.126

Table (2) ANOVA analysis of pain

Day		Sum of Squares	df	Mean Square	F	Sig.
Day2	Between Groups	13.34	3	6.672	21.631	0.001
Day5	Between Groups	9.83	3	4.914	18.377	0.001
Day7	Between Groups	1.05	3	0.524	3.642	0.035

Table (3) Post hoc test: LSD (Least Significant Difference) (pain)

Day	Group code		mean difference	Std. error	Sig.
day 2	control	systemic	1.100	0.200	0.001
	control	local injection	0.028	0.206	0.891
	systemic	local injection	1.129	0.196	0.001
day 5	control	systemic	0.882	0.186	0.003
	control	local injection	1.333	0.129	0.492
	systemic	local injection	1.015	0.183	0.002
day 7	control	systemic	0.285	0.136	0.043
	control	local injection	0.476	0.141	0.737
	systemic	local injection	0.333	0.134	0.017

Table (4) Descriptive analysis of swelling(sum of three measurements)

Day	group	No.	Mean difference	SD. Deviation	SD. Error
Day 2	Control	20	0.73	0.276	0.074
	Systemic	20	0.42	0.211	0.051
	Local Injection	20	0.45	0.203	0.052
	Total	60	0.52	0.263	0.039
Day 5	Control	20	0.41	0.166	0.044
	Systemic	20	0.21	0.152	0.037
	Local Injection	20	0.26	0.135	0.035
	Total	60	0.29	0.172	0.025
Day 7	Control	20	0.19	0.086	0.023
	Systemic	20	0.08	0.066	0.016
	Local Injection	20	0.09	0.080	0.021
	Total	60	0.1152	0.089	0.013

Table (5) ANOVA analysis of swelling

Day		Sum of Squares	df	Mean squ.	F	Sig.
Day2	Between Groups	0.847	3	0.424	8.001	0.001
Day5	Between Groups	0.350	3	0.175	7.650	0.001
Day7	Between Groups	0.102	3	0.051	8.555	0.001

Table (6) Post hoc test: LSD (Least Significant Difference) (swelling)

Day	groups		mean difference	SD error	sig.
day 2	control	systemic	0.31	0.08304	0.001
	control	local	0.28	0.0855	0.002
	systemic	local	0.02	0.08151	0.778
Day 5	control	systemic	0.21	0.05456	0.001
	control	local	0.15	0.05617	0.009
	systemic	local	0.05	0.05355	0.318
Day 7	control	systemic	0.11	0.0279	0.001
	control	local	0.09	0.02873	0.002
	systemic	local	0.02	0.02739	0.541

Figures



Fig. (1)

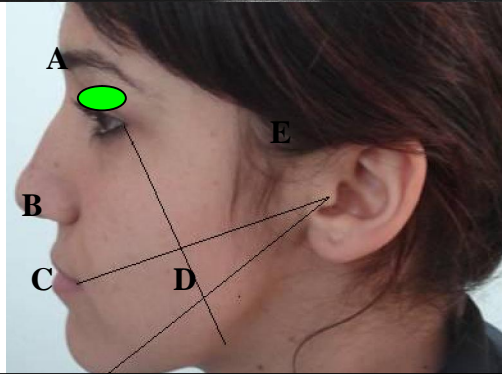


Fig. (2)

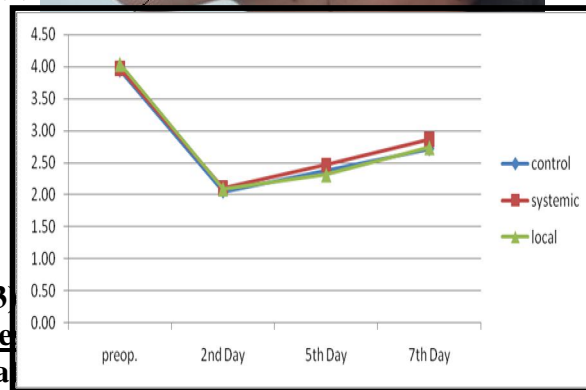


Fig. (3)

Legends of figure

Fig.(1) :Preopera

paction.

Fig (2): Five facial point used to determine the size of odema in the three measurements (A-D) ,(E-B) and (E-C).

Fig.(3): Mean values of the trismus measures

Discussion

The inflammatory response following third molar surgery can be reduced by the use of glucocorticoids. These drugs inhibit the synthesis and/or release of proinflammatory mediators, and facilitates the synthesis and/or release of anti-inflammatory mediators in a variety of major surgical procedures⁽¹²⁾. This property of glucocorticoids is well known and they are widely used to decrease inflammatory sequelae after lower third molar surgery. All steroids must be administered before the infliction of tissue damage, and not during or after surgery⁽⁹⁾. However, no clear practice consensus has emerged because published studies lack comparability with regard to patient dosage, timing, type and route of administration of steroids⁽¹³⁾. A single dose of glucocorticoids was reported not to delay wound healing or produce infection in oral surgery⁽¹⁴⁾.

Methylprednisolone was widely used in oral surgical procedures for its anti-inflammatory action. This drug was used in different doses and routes of administration. The doses used were (10mg, 40mg, 80mg and 125mg) or according to the body weight 1.5mg/kg and 3mg/kg and these medications were given in different routes either systemically or locally injected⁽¹⁴⁻¹⁸⁾.

The principle finding in this study was, the group that used methylprednisolone orally (10mg) showed great reduction in pain and swelling in post operative days (P value 0.05). The use of locally injected (10mg) also significantly affects the formation of swelling in the 5th and 7th days.

Steroids are known to exert their anti-inflammatory activity by preventing the release of fatty acids from membrane phospholipids, thereby reducing formation of cyclo-oxygenase and lipo-oxygenase products. The oxygene centered radicals (cyclo-oxygenase and lipo-oxygenase) are important inducer of post operative inflammatory process mainly pain and edema⁽¹⁾.

The swelling is caused by extravasation of fluid and involves both vascular and cellular events. The surgical wounding triggers the release of cascades of mediators include eicosanoids, platelet activating factor, cytokines, histamine, serotonin, neuropeptides and many others which plays an important role in odema formation⁽¹⁾. Glucocorticoids act on inflammatory cells by decreasing the number and activity of leukocytes in areas of acute inflammation. This will lead to reduce the generation of inflammatory mediators, decrease vasodilation, and reducing plasma extravasation

Our result indicated the correlation between edema and pain relief postoperatively after administration of methylprednisolone systemically. The analgesic effect of corticosteroids has been recognized in oral surgical procedures⁽¹⁹⁾. The analgesic activity of glucocorticoids has been related to their anti inflammatory by inhibiting phospholipase A2 and thus inhibits the formation of arachidonic acid. Another study correlates the relief of edema and pain due to the release of anti inflammatory mediators (Antibradykinin) which has analgesic effect⁽²⁰⁾.

In this study the use of local infiltration of (10mg) methylprednisolone showed no significant pain relief on the 2nd and 5th days while its effects was more obvious on oedema formation. Generally the ideal drug possesses only minimum mineralcorticoid action and provides therapeutic activity in the immediate postoperative period i.e. when the inflammatory reaction is most intense⁽²¹⁾ The pharmacological properties of locally injected steroid (methylprednisolone) are slow absorption and prolonged duration of action with a biological half life of (18-36) hours. On the other hand pain usually peaks 6-8 hrs. and odema reach its maximum size about 36-48hrs. after third molar surgery. This may explain the limited effects of locally injected methylprednisolone compared with systemic one. Additionally the surgical trauma in the area (field) of operation

may also affect absorption of the drug. The use of 10mg of the drug locally also may affect the results as other studies showed significant reduction in amount of pain using doses of (40mg, 80mg and 125mg) ^(14,22,23).

The use of methylprednisolone showed no significance effect on trismus in both groups on the 2nd and 5th post operative day while there was statistical significance of systemically used methylprednisolone in the 7th post operative day. Trismus is understood as the restriction of the mouth opening capacity after extraction of lower third molar, is caused by a combination of factors, such as pain, hematoma, edema and trauma in muscles and tendons. These factors made the use of corticosteroid were not effective in management of trismus. Limitation of mouth opening may be observed until 7 to 10 days after surgery and can be the consequence of voluntary act to avoid the appearance of pain. Norhlt believes that the psychological component really exists because of the patient fears that pain can appear when opening the mouth⁽²⁴⁾.

In conclusion the administration of oral methylprednisolone (10mg) played a good role in reducing pain and oedema following lower third molar surgery. The method used was simple, applicable and easily accepted by the patients.

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