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ORIGINAL ARTICLE

COMPARATIVE EVALUATION OF PRE-OPERATIVE SUBMUCOSAL DEXA-METHASONE INJECTION IN MANDIBULAR THIRD MOLAR SURGERIES

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ABSTRACT

Introduction: *Surgical removal of third molar is most common surgical procedures carried out in oral and maxillofacial surgery and is quite stressful for many patients. Surgical removal of third molar results in an intense inflammatory response that consists of edema, erythema, pain, warmth and loss of function*

Objective*: objective is to evaluate the efficacy of submucosally infiltrated dexamethasone in reducing inflammatory sequelae following surgical removal of lower third molar and its comparison with that of control group.*

Methods*: This study was conducted on 80 patients having mesio-angularly impaced mandibular third molars as an outpatient procedure in the Department of Oral Maxillofacial Surgery, they were randomly divided into two groups, each group of 40 patients. One group of patients (Group A) were administered 8mg dexamethasone submucosally five minutes prior to the surgery after achieving local anesthesia. The other group of patients (Group B) received normal saline submucosally five minutes prior to the surgery. Swelling, pain and trismus were measured on the first, third and the seventh post-operative days.*

Results*: Results of this study revealed that injection dexamethasone administered submucosally was effective in controlling post-operative swelling and mouth opening.*

Conclusion*: Submucosal route of dexamethasone is quite simple, cost effective, less invasive, painless, convenient to surgeon and the patient in minimizing the post-operative sequellae and discomfort associated with the surgical removal of impacted lower third molars.*

Key Words: *Dexamethasone, Submucosal, Pain, Swelling, Trismus and Third molar*

INTRODUCTION

The removal of impacted mandibular third molar is one of the most important and most frequently performed oral surgical procedures (1,2). Surgical extraction results in post-operative inflammation, significant pain, swelling and trismus. Many pharmacological and physical methods have been employed in an attempt to reduce them (3). Although steroids appear to be most successful, immunosuppressive effects of Cortisol's and its synthetic analogues are well recognized in medicine (4)

Among these synthetic corticosteroids, dexamethasone and methylprednisolone have been proved to be highly effective. Dexamethasone exerts basic glucocorticoid action and is apparently 25 times more potent than hydrocortisone (5). At equipotent anti-inflammatory dose it essentially lacks the sodium retaining properties. They cannot be administered in high doses systemically for a prolonged period of time and in certain category of patients.

Therefore, studies are now being conducted to check the efficacy of these drugs (steroids) when used locally (6,7). Here we are using submucosal injection of dexamethasone, which offers a simple, safe, painless, non-invasive, and cost-effective treatment (8).

Thus the objective of this study was to compare the effects of preoperative submucosal dexamethasone sodium phosphate injections with that of a control (comparison) group based on post-operative sequelae of 3rd molar impaction surgeries like swelling, pain and trismus.

METHODOLOGY

The prospective double blinded study conducted in the Oral and Maxillofacial Surgery post Graduate Department of Sri Hasanamba Dental College, Karnataka, India includes 80 patients who were divided in to two groups randomly of 40 patients each i.e the study group (Group A) and the control group (Group B) after getting a written consent from individual patients.

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Sample size was calculated on the basis of number of patients inflow, duration of study from June 2012 to June 2013. Submucosal injection of 8mg dexamethasone was administered in Group A and Group B was taken as control irrespective of sex (sex selection was random). The following were the criteria for selection of the patients for study for both the groups.

Inclusion criteria:

1. Partially or completely impacted mandibular third molars with Class I & Class II Occlusal relationship;
2. Pell and Gregory classification of position B on the radiograph;
3. Patients between 20 years to 35 years of age; and
4. Had no pericoronitis or infection at the time of operation.

Exclusion criteria:

1. Immunocompromised patients;
2. Patients with Diabetes Mellitus;
3. Long-term use of any drug; pregnancy or lactation;
4. Patients allergic to penicillin;
5. Those who refused to take part in the study; of Those who used other drugs during the observation period.

Preoperative assessment:

Detailed dental and general medical history of patient was recorded in each case, followed by clinical examination and radiographic examination using IOPA X-ray by marking Winter's WAR lines to measure position and difficulty of impacted teeth. Following measurements were made for all the selected patients.

- ***Swelling:*** To record the extent of the swelling preoperatively, measurements were taken in closed mouth position by marking four fixed points, which were marked on tip of tragus of ear, gonion, corner of mouth, external canthus of eye.

Using a silk thread to follow the contour of the face, linear distances were noted (Figure 1). The sum of all measurement was taken as the facial size.

Figure 1a: S1 - From the tip of tragus of the ear to corner of mouth

Figure 1b: S2 - From the lateral canthus of the eye to the angle of the mandible

Figure 1c: S3 - From the corner of the mouth to the angle of the mandible

Pain: It was measured using a visual analogue scale 10cm long, that ranged from 0= "no pain" to 10= "the worse possible pain "

Trismus: Inter- incisal distance was measured in centimeters with the help of calibrated scale between left maxillary and mandibular central incisors when the patient's mouth was maximum opened. In the absence of any of these two teeth, adjacent teeth were taken into consideration

Operative Technique: Surgery was performed by a single operator on all patients using a standard technique and operator and patient is unaware of the group patient belongs to. After achieving local anaesthesia with 2% lignocaine hydrochloride with 1:80,000 Adrenaline, surgical access was gained through Terrence wards incision in both groups (Figure 2).

Buccal and disto-buccal Bone removal was done by Moore Gilbe collar technique and odontectomy was done after longitudinal tooth sectioning using straight fissure bur and straight hand piece with copious irrigation using normal saline in all the 80 patients of both groups.

Primary closure was achieved by placing two interrupted sutures using 3-0 black braided silk suture material in both groups. Patients were advised to take antibiotic course (Cap Amoxycillin 500mg 8th hourly) for five days and analgesics (Tab Diclofenac sodium 50mg and paracetamol 325mg 12 hourly) for five days.

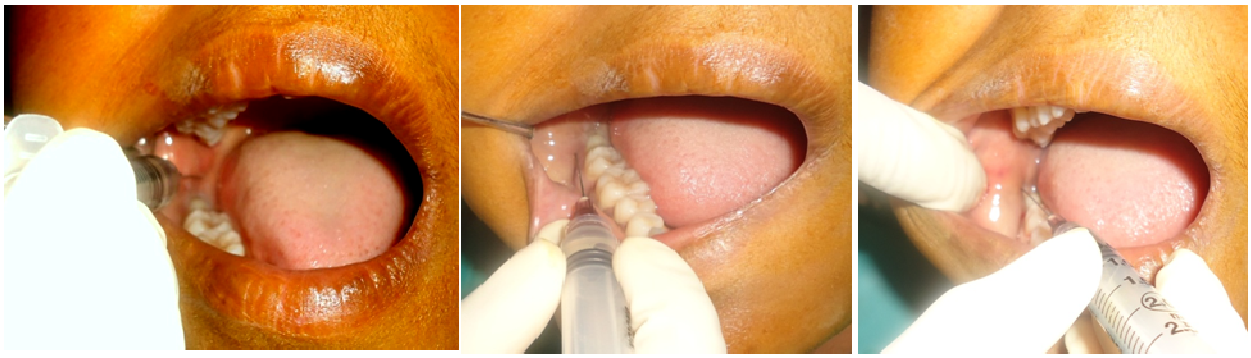

Figure 2: technique of sublingual injection of Dexamethasone

Post-operative Assessment and Follow up:
Measurements of facial swelling, trismus, and pain were recorded first, third, and seventh post-operative days and they were compared with preoperative measurements. Postoperative pain was evaluated with a visual analogue scale (VAS).

Statistical Analysis: Results were subjected to statistical analysis by:

1. Mann-Whitney U test
2. Wilcoxon matched pair test
3. Paired 't' test

Ethical Approval: The study was ethically cleared by the by Sri Hasanamba Dental College and Hospital.

RESULTS

A total of 80 patients were included in this randomized clinical study between the age group of 20-35 years of age having mesio-angularly impacted mandibular third molar.

Mouth opening: In Group A, mean difference in inter-incisal opening was measured on 1st, 3rd and 7th post-operative days. There was decrease in inter-incisal opening by 1.64±0.6 (36.1%) on first post-operative day (P<0.05), 1.14±0.57 (25.2%) on 3rd post-operative day (P<0.05) and 0.56±0.52 (12.4%) on 7th post-operative day (P<0.05) from base line pre -operative measurement

In Group B, mean difference in inter-incisal opening was measured on 1st, 3rd and 7th post-operative days. There was decrease in inter-incisal distance of 2.15±0.59 (44.6%) on 1st pre-operative day (P<0.05), 1.76±0.64 (38.18%) on 3rd post-operative day (P<0.05), 0.90±0.59 (19.52%) on 7th postoperative day (P<0.05) from baseline pre-operative measurement (Table 2).

Mean comparison of change in inter-incisal distance on 1st, 3rd and 7th post-operative days from pre-operative day between group A and group B. A statistically significant difference (p=0.0002) was seen between the group A and group B on 1st, 3rd and 7th post-operative days. Difference from the baseline on 1st post-operative day in group B (2.15±0.59) is significantly higher than that of group A (1.64±0.60), on the 3rd post-operative day in group B (1.76±0.64) is statistically significant and higher than that of group A(1.14±0.57) and baseline on 7th post-operative day in group B (0.90±0.59) is significantly higher than that of group A (0.56±0.52) (Table 3).

Swelling:
In group A mean difference in facial measurement on 1st, 3rd and 7th post-operative day was taken. There was an increase in facial size on first, third and seventh post-operative day by 1.05±0.75cm (3.40%), 0.35±0.46 (1.14%) and 0.11±0.19 cm (0.34%) respectively from baseline measurement.

Table 1: Comparison of trismus (inter-incisal distance) on 1st, 3rd & 7th post-operative day with pre-operative day in group A

	Mean	Std. Dv.	Mean Diff.	SD Diff.	% of change	Paired t	P-value
Pre OP	4.5	0.49					
1st post OP	2.9	0.54	1.64	0.60	36.1	17.3140	0.00001*
Pre OP	4.5	0.49					
3rd post OP	3.4	0.59	1.14	0.57	25.2	12.5872	0.00001*
Pre OP	4.5	0.49					
7th post OP	4.0	0.65	0.56	0.52	12.4	6.8731	0.00001*

Table 2: Comparison of trismus (inter-incisal distance in centimeters) on 1st, 3rd and 7th post-operative day with pre-operative day in group B

Time point	Mean	Std.Dv.	Mean Diff.	SD Diff.	% of change	Paired t	P-value
Pre OP	4.6	0.48	2.3.2	0.59	44.6	22.9862	0.00001
1st post OP	2.5	0.59					*
Pre OP	4.6	0.48	1.8	0.64	38.2	17.4979	0.00001
3rd post OP	2.9	0.64					*
Pre OP	4.6	0.48	0.9	0.59	19.5	9.5877	
7th post OP	3.7	0.65					000001*

Table 3: Comparison of change in inter-incisal distance on 1st, 3rd and 7th post-operative days from pre-operative day between group A and group B

Variable	Groups	Mean	SD	t-value	P-value
Pre OP- 1st post OP	Group A	1.6	0.60	-3.8695	0.0002*
	Group B	2.12	0.59		
Pre OP- 3rd post OP	Group A	1.1	0.57	-4.5658	.00001*
	Group B	1.8	0.64		
Pre OP- 7th post OP	Group A	0.7	0.52	2.7196	0.0081
	Group B	0.9	0.59		

Table 4: Comparison of swelling on 1st,3rd and 7th post-operative day with pre-operative day in group A

Time point	Mean	Std.Dv.	Mean Diff.	SD Diff.	% change	Paired t	P-value
Pre OP	30.80	1.96					
1st post OP	31.85	2.01	-1.1	0.75	-3.4	-8.7849	0.00001*
Pre OP	30.80	1.96					
3rd post OP	1.15	1.94	-04	0.46	-1.1	-4.8740	0.00001*
Pre OP	30.80	1.96					
7th post OP	30.90	1.95	-0.1	0.19	0.3	-3.5316	0.0011*

In group B mean difference in facial measurement was measured on 1st, 3rd and 7th post-operative days. There was increase in facial size on first, third and seventh postoperative day by 2.93±1.30 cm (9.56 %), 1.15±3.12cm (3.73%) and 0.38±0.27cm ((1.22%) from the preoperative measurements (p<0.001).

There was less statistically difference in size of swelling on 7th post-operative day (Table 4).

Table 5: Comparison of swelling measurements in centimeter on 1st ,3rd and 7th post operative day with pre operative day in group B

Time point	Mean	Std. Dv.	Mean Diff.	SD Diff.	% of change	Paired t	P-value
-9.56	30.68	2.36	-2.3	1.30		-14.2865	0.00001
1st post OP	33.61	2.34					*
Pre OP	30.68	2.36	-1.2	3.12	-3.7	-2.3177	0.0258*
3rd post OP	31.82	3.84					
Pre OP	30.68	2.36	-0.4	0.27	-1.2	-8.7658	0.00001
7th post OP	31.05	2.32					*

Mean comparison in relation to the baseline pre-operative values of group A and group B in reducing the swelling on 1st, 3rd and 7th post-operative days are as follows (Table 6):

Table 6: Comparison of increase in swelling on 1st, 3rd and 7thpost operative days from pre-operative day between group A and group B

Variable	Groups	Mean	SD	t-value	P-value
Pre OP- 1st post OP	Group A	-1.05	0.75	8.0785	0.0000*
	Group B	-2.95	1.28		
Pre OP- 3rd post OP	Group A	-0.35	0.46	1.6438	0.1042
	Group B	-1.17	3.12		
Pre OP- 7th post OP	Group A	-0.11	0.19	5.3492	0.00001*
	Group B	-0.38	0.27		

- A statistically significant difference (p=0.00001) was seen between the group A and group B on 1st post-operative day. Difference from the baseline on operative day 1st post in group B (2.95±1.28) is significantly higher than that of group A (1.05±0.75)
- A statistically significant difference (p=0.1042) was found between group A and group B on the 3rd post-operative day. Difference from the baseline on 3rd post-operative day in group B (1.17±3.12) is statistically significant and higher than that of group A (0.35±0.46).
- On 7th post-operative day a statistically significant difference (p=0.00001) was found between the group A and group B. Difference from the baseline on 7th post-operative day in group B (0.38±0.27) is significantly higher than that of group A (0.11±0.19).

Pain: No statistically significant difference in pain score was noted on 1st and 3rd post-operative day between group A and group B .whereas there was significant difference noted on 7th day in group B which showed higher mean pain values (1.50±0.82) than group A (0.45±0.71) (Yable 7).

Table 7: Comparison of pain on 1st, 3rd,7th post-operative days between group A and group B

Variable	Groups	Mean	SD	P-value
1st post OP	Group A	6.38	1.21	1.0000
	Group B	6.38	1.21	
3rd post OP	Group A	3.95	1.45	0.00001
	Group B	3.95	1.45	*
7th post OP	Group A	0.45	0.71	1.00001
	Group B	1.50	0.82	

DISCUSSION

The adverse effects of the third molar surgery on the quality of life have been reported to show a three-fold increase in patients who experienced swelling, pain, and trismus, compared to those who are asymptomatic (9,10). The factors contributing to post-operative pain, edema and dysfunction are related to the inflammatory process. However, the inflammatory reaction often seems more pronounced than what is required for healing (5,11) and is undesirable, as it adversely affects and delays the process of healing (1,12). Trismus or prolonged tetanic spasm of the jaw muscles was described by Rowe as a protective reflex, mediated by the feedback mechanism of the orthokinetic reflex. This limits mouth opening in an attempt to prevent additional trauma or pain, after third molar surgery. Once the cause is eliminated trismus disappears.

The route of corticosteroid administration, its proximity to the surgical site is also an influential factor, we used submucosal route of administration pre-operatively around the 3rd molar to be removed, as it was in close proximity with operating site. This route offers a high drug concentration at the site of injury and less absorption in to systemic circulation, if steroid is given parenterally then the concentration of drug in blood passing through the hypothalamus rises, this results in decreased function and atrophy of adrenal cortex. Under these circumstances a rapid withdrawal of steroid may lead to adrenal crises if in case patients gets an infection or accident; that is patients may pass in to the state of profound shock (13). This is avoided in submucosal infiltration technique and also provides another advantage that it serves as painless administration due to already achieved local anesthesia of the operative site. The results of this study were encouraging. Various parameters assessed in this study were swelling, trismus, and pain.

There was a statistically significant difference in swelling between the two groups. Clinically less significant swelling was seen in group A on 1st, 3rd and 7th post-operative day, Similarly there was significantly less trismus noted in group A than group B when measured on 1st , 3rd and 7th post-operative days, this result coincides with swelling results, which suggest decreased edema and inflammation in the surgical site and retromolar region. Therefore steroids though do not have any direct influence on muscle contraction, decrease in trismus would be secondarily related to less degree of local inflammation. In terms of severity of pain there was no statistically significant difference between two groups on 1st and 3rd postoperative day but significant difference on the 7th post-operative day was noted with almost no pain in group A. This suggested that healing was faster and completed on the 7th day in Group A without a single sign of inflammation, even pain in comparison with group B. Similar results were obtained by Warraich et al. (2013) (14), in his study patients receiving dexamethasone submucosally, which showed significant reduction in pain, swelling, trismus, a tendency to less neurological complaints and improved quality of life compared with the control group. Another study by Majid OW (2011) presented with significant reduction in swelling and pain compared with the control group at all intervals and also improvement in trismus in dexamethasone group in comparison with the control group.

Thus the results of this study showed submucosal dexamethasone infiltration is effective in controlling post-operative swelling, trismus and pain after third molar surgery, Thus dexamethasone can be effectively used for reduction in post-operative inflammatory sequelae without the possibility of any side effects as an alternative to dexamethasone given systemically.

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Conflict of Interest: Authors have no conflict of interest to declare.

REFERENCES

1. Khateeb T.L, Marouf H, Mahammod M.A. Clinical Evaluation of Dexamethasone Vs Methylprednisolone for reducing postoperative inflammatory sequelae following third molar surgery. The Saudi Dental Journal 1996;8(3):131-5.
2. Olga Garcı´a-Martı´nez, Lourdes Dı´az-Rodrı´guez, Laura Rodriguez- Perez, Elvira De Luna-Bertos, candela Reyes Botella, C.concepcion Ruiz .Effect of acetaminophen, ibuprofen and methylprednisolone on different parameters of human osteoblast-like cells. Arch Oral Biol 2011;56:317-23.
3. Grossi GB et al. Effect of sub mucosal injection of Dexamethasone on postoperative discomfort after third molar surgery: A Prospective study. J Oral Maxillofac Surg 2007;65(11):2218-26.
4. Kim K, Brar P, Jakubowski J, Kaltman S, Lopez E. The use of corticosteroids and nonsteroidal anti-inflammatory medication for the management of pain and inflammation after third molar surgery: A review of the literature. Oral Surg Oral Med Oral Pathol Oral RadiolEndod 2009;107:630-40.
5. Laureano Filho JR, Maurette PE, Allais M, Cotinho M, Fernandes C. Clinical comparative study of the effectiveness of two dosages of Dexamethasone to control postoperative swelling, trismus and pain after the surgical extraction of mandibular impacted third molars. Med Oral Patol Oral Cir Bucal 2008;13(2):129-32.
6. Mardirossian G, Cooper SA. Comparison of the analgesic efficacy of Flurbiprofen and Aspirifectn for postsurgical dental pain. J Oral Maxillofac Surg 1985;43:106-109.
7. Yuasa H, Sugiura M. Clinical post-operative findings after removal of impacted mandibular third molars: Prediction of postoperative facial swelling and pain based on preoperative variables. Br J Oral Maxillofac Surgery 2004;42:209-14.
8. Omer Waleed Majid, Waseem Khalid Mahmood. Effect of submucosal and intramuscular dexamethasone on sequelae after third molar surgery: comparative study: British Journal of Oral and Maxillofacial Surgery (2010).
9. Osunde OD, Adebola RA And Omeje UK. Management of inflammatory complications in third molar surgery: A review of the literature. African Health Sciences 2011; 11(3): 530 – 537
10. Alexander RE, Throndson RR. A review of perioperative corticosteroid use in dentoalveolar surgery. Oral Surg Oral Med Oral Pathol Oral RadiolEndod 2000;90:406-15.
11. Leone M et al. Comparison of methyl prednisolone and ketoprofen after multiple third molar extraction: a randomized controlled Study. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2007;103(1):e7-9.
12. Lin S, Levin L, Emodi O, Abu El-Naaj I, Peled M. Etodolac versus dexamethasone effect in reduction of postoperative symptoms following surgical endodontic treatment: A double-blind study. Oral Surg Oral Med Oral Pathol Oral RadiolEndod 2006;101:814–817.
13. Geoffery L Howe. Minor oral surgery. Third edition: page no 41.
14. Warraich R et al. Evaluation of postoperative discomfort following third molar surgery using submucosal dexamethasone e a randomized observer blind prospective study. Oral Surg Oral Med Oral Pathol Oral Radiol 2013;116:16-22.