ORIGINAL ARTICLE

EFFECT OF SUBMUCOSAL INJECTION OF DEXAMETHASONE ON POST-OPERATIVE SWELLING AND TRISMUS FOLLOWING IMPACTED MANDIBULAR THIRD MOLAR SURGERY

[1]BIBI KHALIDA, [2]MOHSIN FAZAL, [3]SIDRA TUL MUNTAHA, [4]KAMRAN KHAN

ABSTRACT

The study was designed to determine the effectiveness of single pre-operative submucosal injection of dexamethasone in reducing post operative swelling and trismus after surgical removal of impacted mandibular molar when compared with control. This randomized control study was carried out at Islamic International Dental Hospital from September 2015 to April 2016 on 60 patients requiring the surgical removal of impacted mandibular third molar. All patients were divided randomly into two equal groups that is group A (Experimental) and group B (Control). Baseline and post operative data were recorded by measuring facial width, inter incisal distance of the upper and lower right central incisor. Data were analyzed through SPSS version 17. Patient's age in group-A and group B at the time of surgery ranged from 17 to 44 years (29.67±7.6) and 17 to 41 years(27.87±6.43) respectively. There were 57% males and 43% females in group-A. Group-B had 70% males and 30% females. Experimental group showed a significant reduction in swelling ($p < 0.001$) and trismus ($p < 0.001$) when compared with control group on second postoperative day. It was concluded that pre operative submucosal injection of 4mg of dexamethasone was effective approach for controlling post operative swelling and trismus. Submucosal route is simple, painless, safe, non invasive and cost effective option for moderate cases. So it is recommended to bring this technique in practice which will put the positive impact on quality of life of patient.

Key Words: *Dexamethasone, Third molar removal, Swelling, Trismus.*

INTRODUCTION

Third molar is the last tooth to erupt as a result it is one of the most common impactions of permanent dentition. It is estimated to be found in almost 90% of population.[1] It is also often associated with pathosis such as pericoronitis, peridontitis, caries of second or third molar, pathological root resorption of second molar, neurogenic and myofacial pain, cystic lesion, neoplasm.[2] That's why removal of the third molar impaction is one of the most frequent procedures which oral and maxillofacial surgeon perform very commonly in their practice.

Impacted third molars lie in close proximity to inferior alveolar vessels hence surgical procedure to the highly vascular area results in the liberation of exudates leading to severe edema, pain and trismus in the immediate postoperative days.[4] This is due to activation of arachidonic acid metabolism by phospholipase A2 leading to synthesis and release of prostaglandins, leukotrienes and thromboxane A2 which are responsible for inflammation.[3]

In order to reduce these post operative complications different treatment modalities such as non steroidal anti inflammatory drugs, antibiotics, mouthwashes, anti histamines, laser therapy, muscle relaxants, corticosteroids and physiotherapy have been used.[5,6] Among these corticosteroids are widely used in oral surgery to control post operative discomfort following surgical removal of impacted third molar.[7]

Corticosteroids are basically synthetic analogue of steroid hormone which are synthesized and produced by adrenal cortex.[8] They have anti inflammatory and immunosuppressive effect thus protecting the body from damage caused by its own defense mechanism. Recent studies have reported that corticosteroids such as dexamethasone and methylprednisolone showed effective control of post operative discomfort.[10,11]

Many authors revealed that better control of the swelling and trismus can be achieved when using steroids anti-inflammatory drugs versus non steroidal anti-inflammatory drugs (NSAID).[2] There are also many studies which compared the administration of submucosal route with intramuscular route. One such

[1] Dr Bibi Khalida, Post Graduate Resident in Oral & Maxillofacial Surgery, Islamic International Dental College & Hospital, Islamabad

[2] Dr Mohsin Fazal, Assistant Professor Oral & Maxillofacial Surgery, Islamic International Dental College & Hospital, Islamabad

[3] Dr Sidra Tul Muntaha, Post Graduate Resident in Oral & Maxillofacial Surgery, Islamic International Dental College & Hospital, Islamabad

[4] Dr Kamran Khan, Associate Professor Oral & Maxillofacial Surgery, Islamic International Dental College & Hospital, Islamabad

Received for Publication: April 11, 2017
Revised: May 20, 2017
Approved: May 25, 2017

study done by Majid et al found significant reduction in pain and swelling in both submucosal and Intramuscular dexamethasone but a greater immediate effect on trismus (p = 0.04) was seen in submucosal route.[9] Javier et al reported that preoperative administration of dexamethasone has greater post operative effects.[10] Waraich et al in his study demonstrated that submucosally administered dexamethasone is more efficient to manage post operative discomfort related to swelling and pain compared to control group after the removal of third molar.[6] Ehsan et al compared the effect of submucosal dexamethasone and found statistically significant reduction of swelling and trismus on 2nd postoperative day when compared with control group.[1] Although number of studies reported the effect of dexamethasone during third molar surgery but researchers still unable to find a consensus on the most effective dosage and administration method to reduce post-operative discomfort.

The aim of the present study was to provide evidence for effectiveness of pre-operative submucosal injection of dexamethasone (4mg) in reducing post operative swelling and trismus after surgical removal of impacted mandibular third molar.

METHODOLOGY

This prospective randomized control study was conducted at the Department of Oral and Maxillofacial Surgery, Islamic International Dental Hospital (IIDH), Islamabad from September 2015 to April 2016 over the period of eight months. Approval of this study from the ethical committee of IIDH was obtained. Sixty patients (38 males, 22 females) in the 18-50 years old range were recruited from the OPD who came with mesioangular class II position B mandibular third molar impaction requiring surgical removal. The patients selected for this study were medically fit for surgical procedure and were capable of providing informed consent. Patients having pericoronitis/ infection at the time of operation, who were unable to give informed consent, known hypersensitivity or allergic reactions to corticosteroids and having a recent history of or currently taking anti-inflammatory, antibiotic, or narcotic drugs were excluded from the study. Patients with history of systemic disease, pregnant/ lactating women and who refused to take part in the study were also excluded. Non probability consecutive sampling technique was used to select the required sample. Each patient was assessed by complete history, clinical examination and radiographic examination for eligibility to participate in this study. All patients were divided randomly into two equal groups that is group A (Experimental) and group B (Control). Informed written consent was obtained from each subject after explaining risks and benefits of the procedure.

Baseline data was recorded by doing preoperative assessment which included facial width, inter incisal distance. Facial width was measured with measuring tape from tragus of ear to corner of mouth and outer canthus of eye to gonion angle on operated side. Inter incisal distance of the upper and lower right central incisor was measured at maximum opening of jaw preoperatively by using vernier caliper.

Local anesthesia containing 2% lidocaine and 1:100,000 adrenaline was given to block inferior alveolar, lingual and buccal nerve. Experimental group received Decadron (dexamethasone 4mg/ml) injection 4 to 5 minutes preoperatively in mucogingival junction on buccal aspect of molar and loose submucosa distal to third molar, and control group did not receive any pre-operative medication. Envelope incision with releasing incision on mesiobuccal aspect of second molar was made and full thickness mucoperiosteal flap elevated. Bone guttering around the tooth and tooth sectioning was done under continues irrigation with normal saline. After extraction of tooth, irregular bone of alveolus evened out and irrigation of socket was done and flap repositioned and sutured with 3-0 silk suture. Post operative instructions and medications which include Co-amoxiclav 625mg three times daily and flurbiprofen100mg three times daily for five days were given to all patients in both the groups.

Post operative trismus and facial swelling was measured on second postoperative day (48 hours after surgical procedure). All the measurements were done by one operator. Means ± standard deviations was calculated for quantitative variables like age, swelling and trismus. Frequencies and percentages were calculated for gender. The independent t-test was used for comparison of the mean swelling and trismus between two groups at the significant level of $P \leq 0.05$. All analyses were done by means of SPSS Version 17 software.

RESULTS

A total 60 patients were selected in this study. Mean patient ages, in group-A and group B at the time of surgery was 29.67 ±7.613 years and 27.87 ±6.426 years respectively. Among 60 patients of impacted lower third molars, there were 38 (63.3%) males and 22 (36.7%) females with male to female ratio of 1.8:1 (Fig 1). No data were missing, and all patients included in this study came for study visit. At follow up, no patients developed alveolar osteitis, wound infection or serious post-operative complications. Facial Swelling at baseline for group-A and for group-B was statistically insignificant ($p > 0.05$) while on 2nd postoperative day it was statistically significant ($p < 0.001$) in both groups. Interincisal mouth opening at baseline in group-A and in group-B was statistically insignificant ($p > 0.05$). On second postoperative day, trismus was statistically significant ($p < 0.001$) in both groups.

DISCUSSION

Surgical removal of impacted third molar is a traumatic procedure causing post-operative pain, swelling and trismus in immediate post-operative period. In present study we evaluated the efficacy of a single dose of submucosal dexamethasone in the control of facial swelling and trismus associated with the surgical removal of impacted third molar among 60 patients.

Although literature provides numerous studies that support the use of corticosteroids in third molar

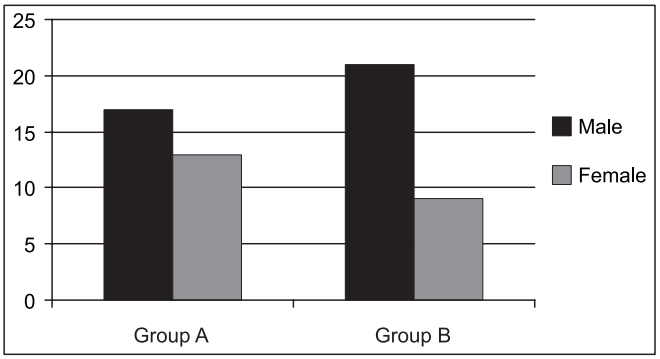

Fig 1: Gender distribution of patients between Group A (Experimental) and Group B (Control)

TABLE 1: COMPARISON OF POST-OPERATIVE SWELLING AND TRISMUS IN BOTH GROUPS

Variables	Control group Mean ± SD	Dexamethasone group Mean ± SD	P - value
Swelling 1 (tragus of ear to corner of mouth)			
Baseline	10.98 ±0.704	10.86 ± 0.518	p > 0.05
2nd post-operative day	10.57 ± 0.692	10.91 ±0.565	p < 0.001
Swelling 2 (outer canthus of eye to gonion angle)			
Baseline	13.21± 0.667	11.97± 0.648	p > 0.05
2nd post-operative day	12.83 ±0.779	12.02 ± 0.554	p < 0.001
Trismus			
Baseline	41.30 ±5.018	41.20± 3.253	p > 0.05
2nd post-operative day	22.97± 5.196	30.93± 3.321	p < 0.001

surgery.[10-12] But investigators are still unable to find consensus regarding the patient selection, most appropriate dosage, time and administration technique of corticosteroids with least potential complications to reduce post operative sequalea.[5,9,16] The corticosteroid selected should have few mineralocorticoid effects and good biological activity. Dexamethasone meets these requirements, as it has no mineralocorticoid activity. It has been used by oral surgeons since 1965 in an attempt to reduce pain and trismus following surgery[3]. The half-life is roughly 36-72 hour.[13,15] Dexamethasone was chosen for the study because it has been considered to be a drug of safe management and acts for longer duration, if time and dosages are strictly followed.[2,12]

Dexamethasone is delivered for third molar surgeries by either oral, intravenous, intramuscular in masseter, gluteal or deltoid region, sub mucosal injection, endo alveolar powder.[17] Submucosal route was used in the current study because it is simple, painless, non invasive, convenient for surgeon and the patient and offers cost effective method.[5] No special skill is required to give a submucosal injection as essential for intramuscular and intravenous injection.[9] Moreover, the third molar surgery is done under local anesthesia so it is convenient to administer the submucosal dexamethasone painlessly at the site of surgery which gives submucosal route an advantage over IV and IM routes of administration.[6,9]

Various studies have been done to compare the outcome after the administration of 4mg and 8mg doses of dexamethasone. Grossi GB et al found no difference in post operative discomfort between two different doses of dexamethasone i.e. 4mg and 8mg administrated submucosally.[16] In the current study, 4mg dexamethasone was used because it is considered that sub therapeutic dose of dexamethasone has less morbidity due to minimal systemic absorption and therefore minimal immunosuppression, resulting in significant reduction in post operative discomfort.[1]

Different studies use measurement of the distance between the incisal edges of the upper and lower incisors at maximum aperture to quantify trismus.[18,19,20,21] In present study we also used the same method for measuring inter incisal distance. The method employed for the measurement of swelling in present study was selected because it is valid easy and inexpensive. Recent large multicenter trial indicated that symptoms reach a maximum at day 1 or day 2 postoperatively and generally resolve by day 7. In the current study, second post operative day was used to assess facial width and trismus.[2]

In current study, submucosal injection of dexamethasone of 4 mg administered pre operatively showed significant decrease in edema($p \leq 0.001$) and trismus ($p \leq 0.001$) on 2nd post-operative day (48 hours after the surgical procedure) in comparison to the control group. Waraich et al, in their study showed that sub mucosal injection of 4 mg is effective in controlling post-operative discomfort after third molar surgery.[6] Saravanan et al, in their study also reported that all the patients in the sub mucosal group had better comfort particularly in terms of mouth opening compared to both study group i.e. intramuscular group and control group. Between the intramuscular groups and Sub mucosal group, those who underwent bilateral impactions, had improved quality of life when given submucosal dexamethasone.[22] The study by Majid et al proved that 4 mg dexamethasone showed significant decrease in swelling ($p< 0.05$).[9] Similarly Deo found that with use of submucosal dexamethasone there is significant decrease in swelling and trismus.[23] Ehsan et al compared the effect of submucosal dexamethasone with the control group and found statistically significant reduction of swelling and trismus on 2nd postoperative

($p< 0.05$). All of the above mentioned studies support current study findings.[1]

It has been reported by various studies that the post-operative sequelae after the removal of impacted third molar are also influenced by various factors such as age, gender, depth and position of tooth and surgeon experience. Since this study was conducted on mesioangular class II position B mandibular third molar impaction and surgery was performed by single operator so the depth and position of tooth and surgeon experience does not have any impact on the results. Another important factor that can also affect the post-operative sequelae especially the degree of facial swelling is the duration of operating time which in turn related to the difficulties in extraction.[6,24] In present study the duration of surgery was almost same for both the groups.

CONCLUSIONS AND RECOMMENDATIONS

It was concluded that pre-operative single sub therapeutic dose of submucosal of dexamethasone will help in reducing the post-operative discomfort. However current study had some limitations as only mesioangular class II position B mandibular third molar impaction were included. Further studies are required with other types of impactions and then their results should be compared to determine the effectiveness of submucosal dexamethasone injection. Age of the patient should be standardized along with the gender, angulation and depth of impaction to attain more accurate results.

REFERENCES

1 Ehsan A, Bukhari SGA, Ashar AM, Junaid M. Effects of pre-operative submucosal dexamethasone injection on the postoperative swelling and trismus following surgical extraction of mandibular third molar. J Coll Physicians Surg Pak. 2014; 24(7):489-92.

2 Channar Ka, Kumar N, Ul Hassan Q, Memon Ab. Dexamethasone In Control Of Post-Operative Sequelae After Extraction Of Mandibular Impacted Third Molars. MC. 2013; 19: 63-66.

3 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: 129-32.

4 Antunes AA, Avelar RL, Martins Neto EC, Frota R, Dias E. Effect of two routes of administration of dexamethasone on pain, edema, and trismus in impacted lower third molar surgery. Oral and maxillofacial surgery. 2011; 15(4):217-23.

5 Majid OW. Submucosal dexamethasone injection improves quality of life measures after third molar surgery: a comparative study. Journal of oral and maxillofacial surgery: official journal of the American Association of Oral and Maxillofacial Surgeons. 2011; 69(9):2289-97.

6 Warraich R, Faisal M, Rana M, Shaheen A, Gellrich NC, Rana M. Evaluation of postoperative discomfort following third molar surgery using submucosal dexamethasone - a randomized observer blind prospective study. Oral surgery, Oral medicine, Oral pathology and Oral radiology. 2013; 116(1):16-22.

7 Alexander RE, Throndson RR. A review of perioperative corticosteroid use in dentoalveolar surgery. OralSurg Oral Med Oral Pathol Oral Radiol Endod 2000; 90:406-15.

8 Ngeow WC, Lim D. Do Corticosteroids Still Have a Role in the Management of Third Molar Surgery? Advances in Therapy. 2016;33(7):1105-39.

9 Majid OW, Mahmood WK. Effect of submucosal and intramuscular dexamethasone on postoperative sequelae after third molar surgery: comparative study. Br J Oral Maxillofac Surg. 2011; 49(8):647-52.

10 Herrera-Briones FJ, Prados Sanchez E, Reyes Botella C, Vallecillo Capilla M. Update on the use of corticosteroids in third molar surgery: systematic review of the literature. Oral surgery, Oral medicine, Oral pathology and Oral radiology. 2013; 116(5):342-51.

11 Das J, Sreejith V, Anooj P, Vasudevan A. Use of Corticosteroids in third molar surgery: Review of literature. Universal Research Journal of Dentistry. 2015;5(3):171-75.

12 Shaikh MI, Khatoon S, Rajput F, Shah SYA. Impacted mandibular third molar surgery; the role of dexamethasone in postoperative swelling and trismus. Professional Med J 2014; 21(6):1272-78.

13 Mushtaq M, Khan HA, Hussain A. Effect of dexamethasone on swelling, pain and trismus following third molar surgery. Gomal Journal of Medical Sciences. 2011;9:74-77.

14 Graziani F, D'Aiuto F, Arduino PG, Tonelli M, Gabriele M. Perioperative dexamethasone reduces post-surgical sequelae of wisdom tooth removal. A split-mouth randomized double-masked clinical trial. Int J Oral Maxillofac Surg. 2006; 35(3):241-46.

15 Quadri A, Imran M, Quadri S. Comparative Clinical Evaluation of Submucosal and Intramuscular Dexamethasone In Reducing Post Operative Sequelae Following Impacted Mandibular Third Molar Surgery. IJSS Journal of Surgery 2016; 2(6):84-87.

16 Grossi GB, Maiorana C, Garramone RA, Borgonovo A, Beretta M, Farronato D, et al. Effect of submucosal injection of dexamethasone on postoperative discomfort after third molar surgery: a prospective study. Journal of oral and maxillofacial surgery : official journal of the American Association of Oral and Maxillofacial Surgeons. 2007;65(11):2218-26.

17 Prakash Dhanavelu S, Vijay Ebenezer, Balakrishnan And M Elumalai Dexamethasone For Third Molar Surgery- A Review Int J Pharm Bio Sci. 2013;4(4):9-13.

18 Zandi M. Comparison of corticosteroids and rubber drain for reduction of sequelae after third molar surgery. Oral Maxillofac Surg. 2008; 12:29-33.

19 Moore PA, Brar P, Smiga ER, Costello BJ. Preemptive rofecoxib and dexamethasone for prevention of pain and trismus following third molar surgery. Oral Surg Oral Med Oral Pathol Oral Radiol Endod.2005;99:1-7.

20 López-Carriches C, Martinez Gonzalez JM, Donado-Rodríguez 11. M. Analgesic efficacy of diclofenac versus methylprednisolone in the control of postoperative pain after surgical removal of lower third molars. Med Oral Patol Oral Cir Bucal. 2005;10:432-39.

21 Buyukkurt MC, Gungormus M, Kaya O. The effect of a single dose prednisolone with and without diclofenac on pain, trismus, and swelling after removal of mandibular third molars. J Oral Maxillofac Surg. 2006 ; 64:1761-66.

22 Saravanan, K., Kannan, R., John, R.R., Nantha Kumar, C. A single pre operative dose of sub mucosal dexamethasone is effective in improving post operative quality of life in the surgical management of impacted third molars: a comparative randomised prospective study. J Oral Maxillofac Surg. 2016;15:67-71.

23 Deo SP. Effect of submucosal injection of dexamethasone on post-operative sequelae of third molar surgery. JNMA; journal of the Nepal Medical Association. 2011; 51(182):72-78.

24 Haug RH, Perrott DH, Gonzalez ML, Talwar RM. The American Association of Oral and Maxillofacial Surgeons Age-Related Third Molar Study. Journal of Oral and Maxillofacial Surgery. 2005;63(8):1106-14.

CONTRIBUTIONS BY AUTHORS

1 Bibi Khalida:	Article writer, conception, design and analysis and interpretation of data
2 Mohsin Fazal:	Final drafting of the manuscript
3 Sidra Tul Muntaha:	Data collection and interpretation of data
4 Kamran Khan:	Provided substantial help in various aspects.