ORIGINAL ARTICLE

USE OF PREOPERATIVE SUBMUCOSAL DEXAMETHASONE IN THIRD MOLAR SURGERY: A STEP TOWARDS IMPROVEMENT IN QUALITY OF LIFE

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Background: Surgical removal of impacted mandibular third molar is one of the most common procedures performed by Oral surgeons globally. The objective of the study was to ascertain the efficacy of pre-operative administration of submucosal dexamethasone on post-operative sequelae in surgically extracted impacted mandibular third molar. It was a double-blind randomized controlled clinical trial that was performed in the Department of Oral & Maxillofacial Surgery at Abbottabad International Dental Hospital, Abbottabad from March 2019 to March 2020. **Methods**: A total of 150 patients were divided into two groups, each having 75 patients. Group A received a placebo after administration of local anesthesia whereas, group B received 4mg submucosal dexamethasone. A post-operative visit was scheduled after 48 hours to evaluate pain, facial swelling, and Trismus. **Results**: On the second postoperative day, the patients in the experimental group presented with significantly reduced pain, facial swelling, and trismus in comparison to the control group. **Conclusion**: Pre-operative administration of 4mg dexamethasone through the submucosal route is efficacious in the reduction of post-operative pain, swelling, and trismus in mandibular third molar surgery thus enabling the patient to return to daily life activities earlier.

Keywords: Quality of Life; Dexamethasone; Third Molar Surgery; Swelling; Trismus

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INTRODUCTION

Surgical removal of impacted mandibular third molar (M3) is one of the most common procedures performed by Oral surgeons globally.[1] The procedure involves reflection of the flap, bone trimming, and tooth sectioning thus associated with several complications including pain, swelling, limited mouth opening, dry socket, injury to regional nerves, infection, and jaw fracture.[2] This procedure usually takes 20–45 minutes and at times even more depending upon the difficulty of the tooth to be removed. The severity of the postoperative discomfort relies on the degree of hard and soft tissue damage which results in the release of inflammatory mediators. Despite the cautious technique pain, swelling and trismus are almost always there which are not only disruptive and debilitative for the patient but also have a significant impact on patients' quality of life in the immediate postsurgical period.[1]

Several pharmacological preparations had been tried to reduce the intensity of the postoperative discomfort including antiseptic mouthwashes, antibiotics, muscle relaxants, Non-Steroidal Anti-Inflammatory Drugs (NSAIDs), corticosteroids, physiotherapy, and even laser therapy has also been tried.[3,4]

Corticosteroids are universally employed medications to reduce the aftermath of the inflammatory process; differing from all other anti-inflammatory drugs in a way that they are capable of suppressing all the constituents of inflammation.[2,5,6] Most widely used steroids in oral surgery include Dexamethasone and Methylprednisolone as both of these drugs have predominant glucocorticoid activity thus sparing sodium retention and other mineralocorticoid effects. They exert an anti-inflammatory response by inhibiting vasodilatation, limiting leukocyte migration to the site of injury, decreasing transudation and edema formation, and suppressing the production of inflammatory mediators through interruption of the arachidonic acid cascade.[3,5,7] Numerous studies have been performed to assess the role of corticosteroids use in third molar surgery by comparing different preparations of corticosteroids[8], the different dosage of the same drug[9–12,] and different routes of administration[13]. The submucosal route is convenient for oral surgery as the injection is administered in already anesthetized area in proximity to the surgical field. Many studies concluded that the anti-inflammatory effect of corticosteroids can be utilized to reduce postoperative edema but their role in pain control and trismus is contentious.[8,10,14]

Despite the large number of studies carried out on submucosal dexamethasone, no clear practice consensus has developed as yet. Due to the deficiency of studies in terms of comparability in patient selection,

minimizing bias, and non-standardized parameters, the topic is still considered poorly investigated. Our study has taken care of all these deficiencies by controlling bias through double-blinding technique and randomization while both control and experimental groups are comparable in terms of age and gender distribution. The rationale of this study was to assess the effect of preoperative submucosal dexamethasone in reducing postoperative pain, swelling, and trismus to minimize patients' discomfort in pursuance of improvement in their quality of life. In this era where individuals are socially conscious more than ever before, even a few days' compromises in quality of life is unacceptable. Thus, we have a liability to introduce such methods which can reduce postoperative morbidity enabling our patients to be socially and psychologically confident to pursue daily life activities in the immediate postoperative period.

MATERIAL & METHODS

This Randomized controlled double-blind clinical trial was carried out in out-patient department of Oral and Maxillofacial Surgery, Abbottabad International Dental Hospital, Abbottabad from March 2019 to March 2020. Sampling was carried out by non- probability, purposive sampling technique. The sample size was 150; divided into control and experimental group labeled as Group A and Group B respectively, each having 75 patients. Randomization was done by using a random number table. All patients having impacted mandibular third molar at Level B and Class II (Pell and Gregory Classification)[15] were included in the study. Patients with infection at the site of extraction and medically compromised patients having diabetes mellitus, glaucoma, tuberculosis, and those who refused to participate were precluded from the study.

Ethical approval was obtained from the ethical committee of Abbottabad International Medical Institute, Abbottabad. Patients were explained about the study and procedure in detail and written consent was taken. A structured *proforma* was used to record patients' demographic data like patients' names, age, gender, the position of the tooth, depth of the tooth, preoperative mouth opening, and preoperative facial measurements were also recorded. All patients were instructed to perform rinses with 0.02% chlorhexidine mouthwash before starting the procedure. The procedure was performed under local anesthesia using 2% lignocaine with adrenaline 1:100,000. Patients in Group A (control group) received a placebo after the administration of local anesthetic while patients in Group B (experimental group) were injected 4mg dexamethasone through the submucosal route immediately after local anesthesia. Neither the operating doctor nor the patient was informed about the group allocation. Randomization was done through a random number generator by an assistant nonoperating doctor who prepared injections of placebo and dexamethasone accordingly.

After confirmation of profound anesthesia, surgical access was achieved by Ward's incision. Bone was removed from the buccal & distal aspect of the tooth using a round bur. To prevent overheating and necrosis of bone, irrigation with sterile saline was continued throughout bone cutting. Tooth sectioning was performed where necessary. Complete removal of the tooth was followed by copious irrigation of the socket and the flap was replaced and sutured. Three interrupted sutures using 3/0 silk were placed. A gauze pack was given for ten minutes to control haemorrhage and postoperative instructions were explained to the patient. Patients were prescribed Paracetamol 500mg 2tabs 8 hourly for 2 days and were instructed for a follow up visit after 48 hours.

On follow up visit, a visual analog scale (VAS) was used to assess pain while facial swelling of the surgically treated side was determined by using two facial measurements: tragus-midline and gonion-lateral canthus.[1] Measuring tape was the instrument used to quantify facial swelling. The preoperative measurement of the same side was used as a baseline. The difference between postoperative and preoperative measurements was considered as facial swelling of that particular side. Trismus was measured as the maximum interincisal distance between maxillary and mandibular incisors using a ruler. The variation between preoperative and postoperative evaluation was considered as the level of trismus.

Data analysis was performed using SPSS version 25. Continuous variables like age, pain, trismus, and swelling were calculated as mean±SD. Categorical variables like gender were presented as frequency and percentage. The significance of mean pain, swelling, and trismus between control and experimental groups was tested by applying t-test. $p \leq 0.05$ was considered significant.

RESULTS

A total of 150 patients with impacted mandibular third molar were included in the study. The mean age of the patients was 25.98 (S.D±3.67) ranging from 18 to 37 years of age. In group A, the mean age was 25.94±4.00 while in group B mean age was 26.01±3.35. Out of 150 patients, 90 (60%) were males and 60(40%) were females. The mean age of males was 26.28±3.81 while the mean age of females was 25.51±3.44.

The mean pain noticed in group A was 31.2±13.3 while in group B mean pain noticed was 27.06±10.75. In group A maximum pain recorded was 80 while the minimum was 10 having a range of 70. While, in group B, the maximum pain noted was 70 and the minimum was 10 having a range of 60. Results

indicated that there was a significant reduction in pain in the experimental group, i.e., *p*= 0.039

Mean swelling noticed in group A, i.e., the control group was 4.48±1.49mm having maximum trismus of 9 mm, and the minimum was 2mm with a range of 7. Mean swelling noted in group B, i.e., the experimental group was 3.62±1.68 mm with maximum trismus of 7mm, and the minimum was 1mm having a range of 6. Results suggested that there is a significant reduction in postoperative swelling in the experimental group, i.e., *p*= 0.001

The mean trismus noted in the control group i.e. group A was 23.73±2.13 mm where the maximum trismus was 27 mm while the minimum was 16 mm with a range of 11. The mean trismus noted in the experimental group, i.e., group B was 21.90±4.42 mm with maximum trismus of 27 mm while the minimum was 10 mm having a range of 17. Results showed that there is a significant improvement in trismus after third molar removal in the experimental group, i.e., *p*= 0.002

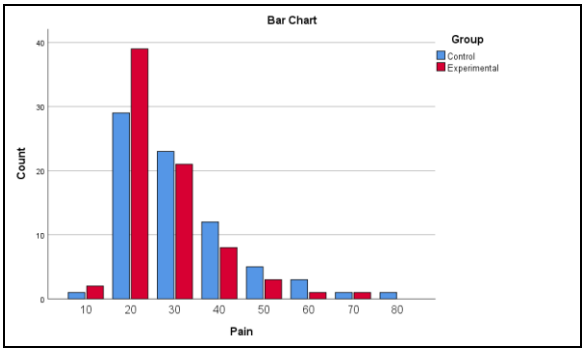
Thus, results indicated that use of 4mg submucosal preoperative dexamethasone significantly reduced postoperative morbidity of the surgical procedure by reducing postoperative pain, swelling, and trismus.

Table-1: Gender distribution in control and experimental group

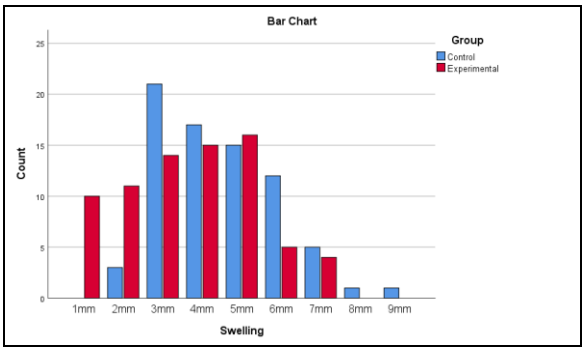
	Group		
Gender	**A**	**B**	**Total**
Male	46	44	90
Female	29	31	60
Total	75	75	150

Table-2: Age distribution in control and experimental group

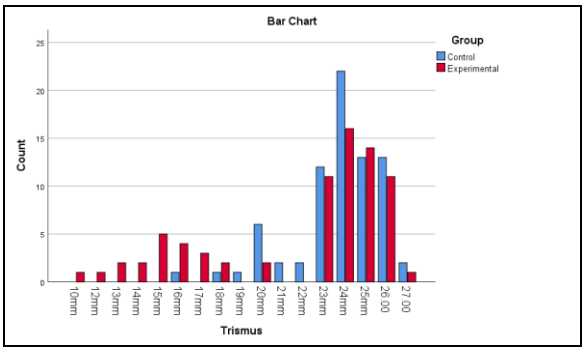
Age Range	Group A	Group B
18–22	11	8
23–27	39	44
28–32	20	19
33–38	5	4



Graph-1: **Postoperative pain in control (Group A) and experimental group (Group B)**



Graph-2: Postoperative swelling in control (Group A) and experimental group (Group B)



Graph-3: **Postoperative trismus in control (Group A) and experimental group (Group B)**

DISCUSSION

Surgical procedures involving the maxillofacial region have a tremendous impact on a patient's quality of life in the postsurgical phase when patients are not only affected physically but social and psychological dysfunction leads to serious consequences. The importance of such effects is paramount as facial disfigurement greatly influences social relations. In addition to imperfections in the facial profile, functions of the oral cavity are also compromised resulting in difficulty in mouth opening, chewing, and speaking as well as attenuated self-confidence.[16]

Many of these unavoidable sequelae of surgery are directly related to inflammation in response to surgical trauma. Clinicians have adopted many non-pharmacologic strategies as well as pharmacological means of reducing inflammation sequelae. Perioperative administration of corticosteroids had been tried to reduce inflammatory effects after M3 removal.[17] Dexamethasone and Methylprednisolone have been extensively used in dentoalveolar surgery due to pure glucocorticoid activity and minimal effects on leukocyte chemotaxis.[18] Administration of corticosteroids via different routes has been tested in literature including intramuscular, submucosal, intravenous, and intra-alveolar routes. All of these have been demonstrated to reduce one or more postoperative sequelae after surgical extraction of M3.[7,19,20]

A great deal of literature is already available on the role of submucosal administration of dexamethasone on postoperative morbidity of mandibular third molar surgery. However, many of these studies have focused on only one aspect of postoperative morbidity while ignoring others. Moreover, many of these studies had limitations in their study design or sampling techniques. We conducted this double-blind study to eliminate any bias. In our study, we observed the efficacy of the drug on all three aspects, namely post-operative pain, swelling, and trismus. Our study showed that submucosal injection of 4 mg dexamethasone significantly reduced postsurgical morbidity by reducing pain, swelling, and trismus.

The results of our study are consistent with the findings of the study conducted by Waraich et al and Ehsan et al.[2,3] Waraich and colleagues found similar results in their study, however, they only considered the vertical component of Pell and Gregory Classification in their inclusion criteria and ignored the classification of impacted teeth based on a relationship with the anterior border of the ramus. The amount of tooth structure that is covered by the bone of the anterior border of ramus is an important determinant in terms of surgical trauma which is going to be induced during its removal. The amount of bone that needs to be removed for extraction of an impacted M3 having Pell and Gregory class 1 would be much less than Pell and Gregory class 3 and so are the surgical sequelae of both cases. It indicates the importance of selecting patients with teeth having a similar classification. In our study, all the patients had impacted mandibular third molars at level B and class 2 of Pell and Gregory classification.

The control and experimental groups in our study were similar in terms of patient demographics. The mean age of patients in the two groups was almost the same with minor differences (25.94 years vs. 26.01 years). Similarly, the gender distribution in the two groups was also comparable (Table-1). Age plays an important role in third molar surgery as with an increase in age bone becomes denser and inelastic which leads to increased surgical trauma.[1] Similar to age, the role of gender is no less important because, in the previous literature, few studies have quoted the presence of more swelling in females than males, while few proposed comparatively more swelling in males.[21]

Nair et al. mentioned no significant pain reduction between the dexamethasone group and the control group (p-value ≥ 0.05).[14] Mojsa and colleagues, on the contrary, observed better control of postoperative pain, edema, and trismus with perioperative use of submucosal dexamethasone.[22] Post-operative pain was assessed by using a visual analog scale (VAS), numerical rating scale (NRS), and McGill Pain Questionnaire (MPQ). Similarly, Waraich et al concluded that there was a significant reduction in pain in the dexamethasone group as compared to the control group, i.e., 2 vs. 6.7.[3] The results of our study are in accordance with these studies, in which we observed a statistically significant reduction in postoperative pain in the experimental group in comparison to the control group using VAS (2.7 vs. 3.1). $p \leq 0.05$.

Trismus is one of the most common postoperative complications of wisdom tooth surgery caused as a result of the collection of edematous fluid in and around masticatory muscles. Ehsan et al, in their study, observed significantly better mouth opening and less trismus in the dexamethasone group as compared to the control group when observed on the second postoperative day (p-value 0.0001)[2] Waraich et al, on the other hand, noticed an insignificant difference regarding trismus between two groups in the whole course of follow-up.[3] Similar results were presented by Nair et al. who noted an insignificant role of submucosal dexamethasone in reducing post-operative trismus when observed on day 2 as well as day 7. (p-values 0.965 & 0.447 respectively).[14] Grossi et al, too, in his study found no significant relationship between the use of submucosal dexamethasone and reduction in postoperative trismus and pain in wisdom tooth surgery (p-value 0.19).[10] The results of our study are in accordance with the study of Ehsan et al. and showed significantly less trismus and improved mouth opening in group B (experimental group) as compared to group A (control group), i.e., p-value ≤ 0.01.

Facial swelling as a result of surgical trauma develops gradually in the postsurgical period with a peak at 48 hours of surgery. This swelling can be mitigated by the use of dexamethasone as it affects the edema formation in the early stages of inflammation by inhibiting leukotrienes and prostaglandin. Studies conducted by Waraich et al, Nair et al and Ehsan et al showed significantly less post-operative oedema in the experimental group as compared to the control group.[2,3,10] Similar results were reported by Majid & Mahmood showing significantly less post-operative swelling in the groups of patients who received submucosal dexamethasone as compared to the control group (p-value ≤ 0.001).[13] Results of our study support the results of the above-mentioned studies as we noticed significantly less postoperative oedema in the experimental group as compared to the control group (p-value ≤ 0.001)

CONCLUSION

The study concludes that preoperative submucosal dexamethasone helps to increase patient's quality of life in the immediate postoperative period by reducing pain, swelling, and trismus which in turn enables the patient to engage in daily life activities way earlier than those not receiving it preoperatively.

AUTHORS' CONTRIBUTION

SS: Literature search, conceptualization of study design, data collection. AM: Literature search, write-up. AS: Data analysis. SMHS: Data interpretation, write-up. AF: Referencing, proof reading. RG: Proof reading.

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