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

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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, periodontitis, 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 immunosuppressiv 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 steriods 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
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 continuous 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 ≤ 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
Dexamethasone is delivered for third molar surgeries by either oral, intravenous, intramuscular in masseter, gluteal or deltoid region, sub mucosal injection, endo alveolar powder. 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. No special skill is required to give a submucosal injection as essential for intramuscular and intravenous injection. Moreover, the third molar surgery is done under local anesthesia so it is convenient to administer submucosal dexamethasone painlessly at the site of surgery which gives submucosal route an advantage over IV and IM routes of administration.

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 submucoally. 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.

Different studies use measurement of the distance between the incisal edges of the upper and lower incisors at maximum aperture to quantify trismus in both study group i.e. intramuscular group and 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.

In current study, submucosal injection of dexamethasone of 4 mg administered pre operatively showed significant decrease in edema (p ≤ 0.001) and trismus (p ≤ 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.

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

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

surgery. 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. 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. The half-life is roughly 36-72 hour. 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.
(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


CONTRIBUTIONS BY AUTHORS

1 Bibi Khalida: Article writer, conception, design and analysis of 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.