

Dexamethasone after Third Molar Surgery: Worth It or Lose It

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ABSTRACT

Background: To determine the effect of submucosal Dexamethasone injection given pre-operatively in third molar surgery on facial swelling and trismus.

Materials and Methods: 40 patients in the age group ranging from 18-40 years having mesio angular impaction were divided into two groups. Group A (20 patients) received prophylactic 4 mg submucosal Dexamethasone intraoral injection and group B (20 patients) acted as a control group. Facial swelling and trismus were assessed at baseline, 3rd and 7th postoperative day. Data was analyzed using SPSS-10.

Results: There were 14 males and 6 females in group A, 13 males and 7 females in group B. Administration of Dexamethasone has a statistically significant effect in reduction of facial swelling and trismus on third post-operative day ($p < 0.05$) in group A. At seventh day no facial swelling and trismus was found in both groups.

Conclusion: Pre-operative 4 mg Dexamethasone submucosal intraoral injection had significant effect in reducing facial swelling and trismus.

Keywords: Dexamethasone, impaction, steroid, inflammation, inter-incisal opening, trismus.

INTRODUCTION

In routine dental care effective control of postoperative complications plays an important role. The surgical extraction of impacted mandibular third molar is one of the most commonly performed day care procedures in oral and maxillofacial surgery and is associated with varying degree of postoperative discomfort.² The surgical removal of impacted third molars involves trauma to soft and bony tissue and can result in considerable pain, swelling, and trismus. These post-operative sequelae can cause distress to the patient and affect the patient's quality of life after surgery. Reduction of these comorbidities using

several strategies has been an area of interest in the field of minor oral surgery. Surgical strategies include using different flaps, bone cutting techniques, and sectioning techniques among others. However, these may not effective in all clinical situations. Consequently, a lot of research has gone into the field of pharmacological agents to reduce postoperative sequelae.³

Surgical insult to the tissue results in vasodilation, migration of leukocytes and plasma transudation via endothelial gap junctions. Corresponding clinical manifestation includes swelling (tumor), redness (rubor), increase in temperature (calor), pain (dolor) and loss of function (function laesa).⁴

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Post-operative swelling and edema may be due in part to the conversion of phospholipids into arachidonic acid by phospholipase A₂ and the resultant synthesis of prostaglandins, leukotrienes, or thromboxane related substances act as mediators of the inflammatory response¹. Swelling may be particularly significant when the duration of surgery is prolonged and manipulation (like retractors and elevation) of tissues is extensive².

These symptoms are not observed immediately after surgery but rather begin gradually, peaking 2 days after the extraction. Corticosteroids such as dexamethasone may inhibit the initial step in this process and have been extensively used in varying regimens and routes to lessen inflammatory sequelae after third molar surgery¹. Since Dexamethasone has been shown to reduce post-operative edema, it was decided to do a confirmation study of Dexamethasone on third molar surgery.

MECHANISM OF ACTION

The amount of endogenous cortisol from the adrenal cortex does not appear to alter the process of inflammation significantly; on the other hand, large doses of exogenous cortisol or synthetic steroids appear to block all stages. Steroids prevent diapedesis, the initial leakage of fluids from the capillaries, and stabilize the membranes of the cellular lysosomes which hold large quantities of hydrolytic enzymes. There is also a decrease in the formation of bradykinin, a powerful vasodilating substance. Glucocorticoids act by controlling the rate of synthesis of anti-inflammatory proteins. Blackwell et al and Hong and Levine have shown that glucocorticoid can induce the release of antiphospholipase proteins, which presumably can inhibit the release of arachidonic acid and its metabolism to prostaglandins and thromboxanes, which increase capillary permeability. Tam et al also have shown that glucocorticoids block deacylation of phospholipids or transport arachidonic acid to the cyclo-oxygenase enzyme system after deacylation. The low analgesic effect at the low dose suggests that any putative analgesic effect of glucocorticoid occurs by a mechanism that is distinct from that mechanism responsible for reducing facial swelling.⁶

MATERIALS AND METHODS

A prospective randomized control study was carried in Department of Oral & Maxillofacial Surgery, DivyaJyoti Dental college, Modinagar from November 2015 to November 2017.

Inclusion criteria

1. Patients in the age group of 18-45 years.
2. Patients with Class II position B third molar according to the Pell and Gregory's classification.

Exclusion criteria

1. Patients with existing active infections.
2. Patients with systemic disorders.
3. Patients on long term steroids.
4. Pregnant and lactating women.

Informed written consent was obtained from all patients.

50 patients were divided into two groups. 25 Patients were randomly allocated to each group. In group A Dexamethasone 4mg per ml was injected submucously 1 hour prior to surgery, in group B surgery is done without any drug.

Surgical Technique

Initial pre-operative assessment was done for all patients. Following standard surgical and aseptic protocols, the patients were prepared for the surgical procedure. Classical inferior alveolar nerve block along with lingual nerve block was administered. A standard Ward's incision was utilized to gain access, and the tooth was delivered after adequate bone cutting and tooth splits as was deemed necessary. Care was taken to ensure minimal trauma to the tissues. Post extraction, the socket was copiously irrigated using 5% povidone-iodine solution diluted with equal parts of normal saline. The flap was sutured back with 3-0 silk sutures using the two interrupted sutures. (Fig 1, 2)



Fig 1: Dexamethasone group- dexona given locally 1 hour prior to the procedure (a) impacted third molar (b) disimpacted third molar.

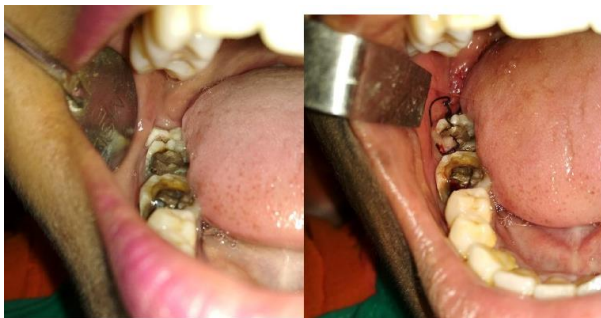


Fig 2: Non-Dexamethasone group (a) impacted third molar (b) disimpacted third molar.

All patients were given standard post-operative instructions and were told to apply an ice pack on the region intermittently for next 6 hours. All patients were put on 500 mg of amoxicillin thrice daily for 5 days and paracetamol 500 mg combination thrice daily for 3 days.

All patients were followed up at intervals of 1st, 3rd and 7th post-operative days. Suture removal was done on the 7th post-operative day if the healing was deemed to be satisfactory.

The following were assessed:

Swelling: Evaluated by modification of tape measuring method described by Schultje- mosgue et al. two measurements were made between three reference points: Tragus, pogonion, and the corner of the mouth. The pre-operative sum of the two measurements was considered as the baseline for that side. (fig 4)



Fig 4: Swelling assessment- no significant difference (a) pre op (b) post-op.



Fig 4b: Swelling assessment- (a) pre op (b) post-op.

Trismus: Measured as the difference in maximal mouth opening (taken as the distance between upper and lower central incisors, assessed by a measuring to the nearest mm) before and after operation.(fig 3)



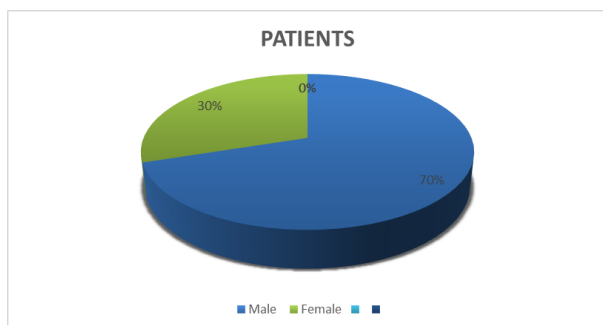
Fig 3: Interincisal opening remains normal postoperatively (a) pre-op (b) post-op.



Fig 3b: Interincisal opening decreased in Non-dexona patients (a) pre-op (b) post-op.

RESULTS

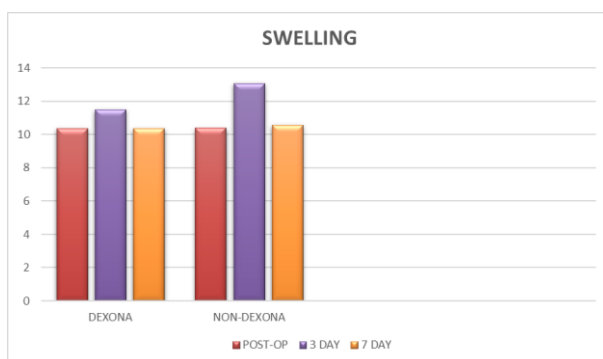
Of the 40 patients who met the inclusion criteria, 28 were males and 12 were females (Pie chart 1). The age of the patients ranged from 18 to 45 years, with the average age being 27 years. All the patients were followed up on the 1st, 3rd, and 7th post-operative days.



Graph 1: Gender of patients

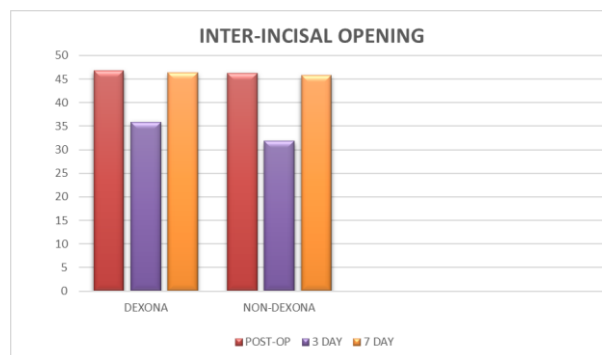
Obtained data was analyzed using SPSS™ 1.8 statistical software package. The statistical tools used were mean values with standard deviation and one way analysis of variance test to compare the mean values. Swelling from earlobe-corner of mouth plane at baseline was 10.36 (+/-) 0.532 cm for group- A and 10.38 (+/-) 0.697 cm for group B. The difference was statistically insignificant ($p > 0.05$).

Swelling on third post-operative day in earlobe-corner of mouth plane was 11.51 (+/-) 0.724 cm for group A and 13.07 (+/-) 0.963 cm for group B. This difference was statistically significant ($p < 0.05$). On 7th day postoperatively day, swelling from earlobe – corner of mouth plane in group A was 10.37 (+/-) 0.547 cm and 10.578 cm for group B. This difference was statistically insignificant ($p > 0.05$).



Graph 2: Post operative swelling after 3 and 7 days.

Interincisal mouth opening at base line was at baseline was 46.74 (+/-) 2.85 mm in group – A and 46.27 (+/-) 2.674 mm in group B. Difference was statistically insignificant ($p > 0.05$). On 3rd postoperative day, group A patient's interincisal distance was 35.85 (+/-) 3.695 mm and group – B had 31.82 (+/-) 5.447 mm interincisal distance. The difference was statistically significant ($p < 0.05$). On 7th day, group- A interincisal distance was 46.35 (+/-) 2.686 mm and group – B interincisal distance was 45.75 (+/-) 2.872 (Bar graph 1). Difference was statistically significant ($p < 0.05$).



Graph 3: Inter incisal opening

DISCUSSION

Surgical extraction of the third molar is one of the most common procedures performed by maxillofacial surgeons. Like any surgical procedure, these are also associated with post-operative sequelae such as pain, swelling, and trismus. The extent of postoperative sequelae depend on many factors such as individual physiologic response to the procedure, duration of surgery, amount of tissue trauma, and manipulation among many others.

Although the phenomenon of inflammatory reaction plays a vital role in post-operative healing, an exaggerated response often leads to severe patient discomfort. Since maxillofacial region is richly vascularized and has areas of loose connective tissue, the inflammatory responses tend to be significant.

Corticosteroids are well-known adjuvant to surgery for suppressing tissue mediators of inflammation, there by reducing transudation of fluids and lessening edema. Dexamethasone is a highly selective, long-acting, synthetic corticosteroid, which has potent anti-inflammatory action. It exerts

basic glucocorticoid action and is approximately 25 times more potent than hydrocortisone, 6 times than of prednisolone, 4 times that of methyl prednisolone and triamcinolone, and equipotent to betamethasone.

Effects of corticosteroids on pain control are still debated and not very clear. Studies have not been able to attribute definite analgesic properties to corticosteroids. However, thromboxane A₂ levels decrease post steroid administrations, prostaglandin E₂ levels, which are the main pain mediators remain unaltered. However reduction in swelling and trismus is perceived by many as alleviation of pain.

Sub mucosal route is a simple technique of administering corticosteroids to reduce exacerbated inflammatory responses. The site of injection is close to the already anesthetized region which makes it a painless procedure. This technique also ensures immediate local availability; however their absorption depends on the local blood flow in the area of administration and could also be influenced by the presence of infection, severe inflammation.

Local administration of steroids seems to be more advantageous due to the fact that eicosanoids act locally on the tissues from which they are released. Several of these eicosanoids are responsible for vasodilation, capillary permeability, and chemotaxis. The steroids act directly on such eicosanoids and hence prevent inflammatory processes. Moreover, locally applied glucocorticoids have direct inhibitory effect on signal transmission in nociceptive C-fibers and ectopic neuroma discharge in injured nerve³.

The dose of the drug should be more than the cortisol released normally by the body. Due to this reason, the present study 8mg dexamethasone is used which corresponded to 200 mg of cortisol⁵.

This study showed that prophylactic administration of dexamethasone injection through intraoral submucosal route has significantly reduced swelling and trismus. These results are in accordance to those of Laureno⁴ and his colleagues found that use of corticosteroids reduced edema and improved the range of mouth opening. Similarly, Deo⁶ reported the reduction of edema and trismus after use of

dexamethasone. The study of Majid⁷ proved that dexamethasone can significantly reduce the swelling. Graziani¹² et al. showed test side treated with dexamethasone had greater reduction of swelling and trismus. Bamgbose⁸ and colleagues observed that treatment with dexamethasone and diclofenac provided relief of postsurgical pain with swelling. Moore and colleague's study on pre-emptive effect of rofecoxib and dexamethasone 10 mg (i.v) demonstrated reduction of postoperative swelling and trismus⁹.

Cortisol has the capacity to interfere with the physiologic processes of inflammation and, thus, suppress the development of inflammatory sequelae. Therefore, in literature, emphasis on the use submucosal dexamethasone injection have been reported for significant reduction of swelling and trismus.³

In agreement with Graziani et al¹², our data show that the submucosal administration of dexamethasone 4 mg per ml resulted in a highly significant decrease in edema on the second post-operative day.

Another quiet common postoperative sequel of lower third molar surgery is trismus, which is often secondary to surgical trauma, masticatory muscle spasm and inflammation of surrounding tissues. It is also due to postoperative swelling, lead to compression of nervous structures and producing mild to moderate pain. The patient may feel jaw stiffness and difficulty to eat normally postoperatively.¹

Oral, local/submucosal route or parenteral/intramuscular route of dexamethasone achieves similar results. However submucosal route is a simple, safe, painless, non-invasive, cost-effective. No reports in the literature have been found about the complications from the use of a single dose of corticosteroid.³

CONCLUSION

The results of this study are in support to earlier literature and it is found that the administration of 4 m.g. dexamethasone injection is effective in reduction of postoperative swelling and trismus. It can thus be, safely used pre-operatively as single dose through intraoral submucosal route. Hence, we

strongly recommend that preoperative use of dexamethasone is worth in third molar surgery.

CONFLICTS OF INTEREST

The authors declare they have no potential conflict of interests regarding this article.

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