

Outcome of Dexamethasone and Methylprednisolone as Submucosal Injection for Control the Edema, Trismus and Pain after Surgery of Third Molar

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Received: October 2020

Accepted: October 2020

ABSTRACT

Background: Surgical removal of impacted teeth is one of the most common procedures performed by oral and maxillofacial surgeons in day-to-day practice. It involves intentional trauma to the bone and soft tissues that leads to inflammatory reaction. The objective of this study is to compare the outcome of dexamethasone and methylprednisolone as submucosal injection for control the edema, trismus and pain after surgery of third molar. **Methods:** This is a Randomized clinical trial conducted at Oral and Maxillofacial Surgery Department of Liaquat University of Medical & Health Sciences, Jamshoro/Hyderabad, Pakistan from March 2018 to February 2019. After selection and diagnosis patients were randomly divided into two groups by lottery method, Group-A will be undergone submucosally 8mg dexamethasone preoperatively and group-B will be undergo submucosally 40mg methylprednisolone submucosally infiltrated. **Results:** Significant association was found between groups and Pain Reduced regarding gender with p-value 0.000. By using chi-square test it was observed that there was a significant association between groups and Pain Reduced regarding Postoperative time having p-value = 0.000. **Conclusion:** The findings of this study may have a significant clinical impact as submucosal dexamethasone injection is an effective therapeutic strategy for improving the quality of life of the patient. Overall, the present study has shown that dexamethasone is better than methylprednisolone as submucosal injection to control the swelling, trismus and pain after surgery of third molar.

Keywords: Dexamethasone, Methylprednisolone, Third molar, Submucosal.

INTRODUCTION

Minor Oral surgical procedures cause the most pain in Dentistry. During these procedures, damage caused to soft and hard tissues leads to an inflammatory reaction. The inflammatory reaction occurs during and after surgical procedure due to damage to the soft tissue. The biological mediators such as Histamine, Serotonin, kinin and Prostaglandin are released due to tissue damage.^[1] Pain after extracting third molar is high on the day of surgery and post-operative swelling increases from the next day.^[2] Age, Gender may or may not be associated with post-operative pain and swelling. Some studies have recommended the use of steroids to minimize pain and swelling. Dexamethasone reduces pain and swelling

following oral surgical procedures. Corticosteroids before or just after third molars surgery reduces pain and inflammation.^[3] They act by inhibiting, through a variety of proposed mechanisms, the body's inflammatory response to injury, with a reduction of fluid transudation and studies have concluded that perioperative administration of corticosteroids has a mild to moderate value in reducing postoperative inflammatory signs and symptoms.^[4] Several studies have shown a better effect in the control of trismus, swelling and pain when using steroid anti-inflammatory drugs versus non-steroidal anti-inflammatory drugs.^[5] But, steroids used should be moderate because they cause immune suppression and it takes a longer period to return to normal levels. Schmelzeisen and Frolich found that dexamethasone administered orally, preoperatively, and postoperatively reduced pain by 50% and postoperative analgesic needs by 37% in patients who had osteotomy of impacted molars.^[6]

In a double-blind study, Pedersen examined the effect of preventive dexamethasone on pain and swelling after removal of an impacted mandibular

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molar. Postoperative pain was reduced by 30%. In a randomized double-blind study, Baxendale et al examined the effect of a single prophylactic dose of oral dexamethasone, 8 mg, on postoperative complications after extraction of third molars and found a significant reduction in pain.^[7]

The decision to remove symptomatic third molars is not usually difficult, but the decision to remove symptomatic third molars is sometimes less clear and requires clinical experience. A wide body of literature attempts to establish clinical practice guidelines for dealing with impacted teeth.^[8] Data are beginning to accumulate from third molar studies, which hopefully will provide surgeons and their patients with evidence based guidelines regarding elective third molar surgery.^[9] The association of periodontal pathology and occlusal caries with asymptomatic third molar has been studied previously Twenty-five percent of patients with asymptomatic third molars were found to have increased periodontal probing depths and attachment loss, increased periodontal pathogen colonization, and increased levels of inflammatory mediators.^[10] The patient may have pain, swelling, and trismus postoperatively. Reduction of these postoperative sequelae seems to be a logical goal. When there is tissue injury leading to inflammation, there is conversion of phospholipids to arachidonic acid under the influence of phospholipase A2 and forms prostaglandins, leukotrienes or thromboxane related substances that are mediators of inflammation.^[11] Drugs that can prevent the formation of these mediators of inflammation can reduce the symptoms of inflammation. Corticosteroids (CS) fall under the category of these drugs, and they are used widely nowadays to reduce the postoperative sequelae following impaction surgeries.

Methylprednisolone is intermediate-acting products, are four to five times more potent than hydrocortisone. Dexamethasone is a long-acting, systemic corticosteroid; its potency is about 25 times greater than the short-acting products. Dexamethasone controlled swelling better than methylprednisolone at all postoperative evaluations and led to greater mouth opening 48 h after surgery. No statistically significant difference was found between drugs with regard to pain.^[12]

MATERIALS AND METHODS

This is a Randomized clinical trial with Non-probability consecutive sampling technique conducted at Oral and Maxillofacial Surgery Department of Liaquat University of Medical & Health Sciences, Jamshoro/Hyderabad, Pakistan from March 2018 to February 2019.

Sample Size: The sample calculation was done using the raosoft software for "Sample size calculation" by using the proportion pain 50% by

administration of dexamethasone, and 3.3% pain in methylprednisolone group), with level of significance 5% and power of test 90%, the sample size of my study will be 100, following by 50 patients in group A and 50 patients in group B141.

Inclusion Criteria:

- Age between 15 to 40 years
- Patients diagnosed with impacted third molar (wisdom teeth which do not fully erupt into the mouth because of blockage from other teeth) assessed radiologically on Orthopantomogram
- Both genders

Exclusion Criteria:

- Pregnant women (patients history showed pregnancy labeled as +ve)
- Alcohols abuse (patients history showed alcohol consumption labeled as positive)
- Uncontrolled diabetes and hypertension (RBS more than 170) and BP systolic more than 130 and diastolic more than 90 labeled as positive)
- Chronic liver disease (Patients history showed liver disease more than 6 months)
- Patients not agree to participate in the study

Data Collection Procedure:

This study was performed after the permission of ethical committee of Liaquat university medical hospital Hyderabad/Jamshoro. Subject was selected in the department of dental surgery of Liaquat Medical University Hospital Hyderabad/Jamshoro. All the patients those fulfilling the inclusion criteria were selected in the study. Consent was taken. All the necessary laboratory investigation including radiology was carried out. After selection and diagnosis patients were randomly divided into two groups by lottery method, Group-A was undergone submucosally 8mg dexamethasone preoperatively and group-B was undergone submucosally 40mg methylprednisolone submucosally infiltrated. Patients were informed regarding procedure and it was used for study purpose and was kept confidential. Surgery was performed by the senior consultant surgeon who had 5 years' experience in dental surgery department. Impacted teeth were extracted in a routine fashion, using a bur, an air-driven hand piece and rinsing with saline to remove bone and sectioned teeth.

The patients were followed after 24 hours to assess the pain score and after one week for the evaluation of swelling and trismus. Pain was evaluated as per operational definition on visual analog scale. Swelling and trismus was measured as per operational definition. Data was analyzed by statistical software package SPSS version 22.0.

RESULTS

From 100 patients, it was observed that the minimum age was found 15 years and maximum

age was 40 years with mean and standard deviation of the age was 27.59 ± 7.61 years. The minimum Pain score was 1 and maximum as 10 while minimum post-operative time was 1 day, and maximum was 7 days. Males were 55/100 (55%) while females were 45/100 (45%). Pain was reduced in 25/100 (25%) patients while it was not reduced in 75/100 (75) patients. There was no Swelling in 55/100 (55%) patients. Trismus was present in 1/100 (1%) patients while it was absent in 99/100 (99%) patients. By using chi-square test it was observed that there was significant association between groups and pain having p-value = 0.001. Significant association was not found between groups and Swelling with p-value 0.159. By using chi-square test it was observed that there was no significant association between groups and Trismus having p-value = 0.315. There was significant association between groups and age groups regarding Pain Reduced having p-value =

0.000. Significant association was found between groups and Pain Reduced regarding gender with p-value 0.000. By using chi-square test it was observed that there was a significant association between groups and Pain Reduced regarding Postoperative time having p-value = 0.000.

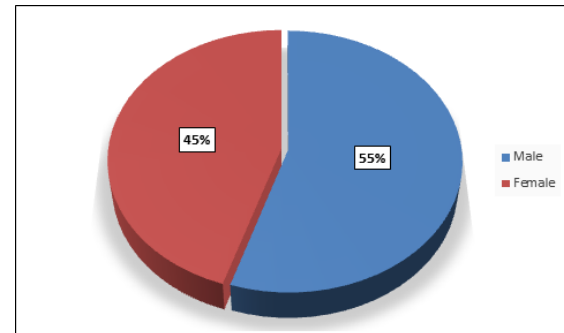


Figure 1: Pie of gender

Table 1: Descriptive statistics (n = 100)

	Minimum	Maximum	Mean	Std. Deviation
Age	15	40	27.59	7.61
Pain score	1	10	5.22	2.46
Postoperative time (Days)	1	7	4.05	1.94

Table 2: Stratification of pain in both groups

Group	Pain Reduced		Total	p-value
	Yes	No		
Group A (Dexamethasone)	24	26	50	0.001
Group B (Methylprednisolone)	1	49	50	
Total	25	75	100	

Table 3: Stratification of swelling in both groups

Group	Swelling		Total	p-value
	Yes	No		
Group A (Dexamethasone)	26	24	50	0.159
Group B (Methylprednisolone)	19	31	50	
Total	45	55	100	

Table 4: Stratification of trismus in both groups

Group	Trismus		Total	p-value
	Yes	No		
Group A (Dexamethasone)	0	50	50	0.315
Group B (Methylprednisolone)	1	49	50	
Total	1	99	100	

Table 5: Stratification of outcome in both groups with regards to postoperative time

Postoperative time	Group	Pain Reduced		Total	p-value
		Yes	No		
< 5 days	Group A (Dexamethasone)	13	14	27	0.000
	Group B (Methylprednisolone)	1	28	29	
>days	Group A (Dexamethasone)	11	12	23	0.000
	Group B (Methylprednisolone)	0	21	21	
Total		25	75	100	

DISCUSSION

Alveolar osteitis (AO) is the most common complication after permanent tooth extraction.^[11] The frequency of AO after mandibular third molar surgery varies from 5% to 30%.^[12] AO is a self-

limited condition and generally resolves after 5-10 days, but it causes severe pain, foul taste, halitosis, and regional lymphadenitis and negatively affects a patients' quality of life.^[13] Periodontal problems occur mainly on the distal surface of the second molar and manifest as continued sensitivity owing

to root exposure or increased probing depth.^[14] Many attempts, including pharmacological agents, platelet-rich plasma (PRP), or platelet-rich fibrin (PRF) administration, cryotherapy, ultrasound, and laser, have been made to reduce the frequency and severity of complications and improve postoperative healing.^[15] PRF is a second-generation platelet concentration, produced by a simplified technique lacking biochemical handling, is associated with the ease of manipulation, and exhibits a more controlled release of growth factors compared with that of PRP.^[14,15] Moreover, PRF exhibits a cicatricial capacity that creates a physiological architecture to improve the healing process.^[16] To evaluate the efficacy of platelet-rich fibrin on frequency of alveolar osteitis following Mandibular third molar surgery, A total of 136 patients of both gender age between 18-60 years came for Mandibular third molar surgery were included in this study. These patients were randomly allocated into two groups. Sixty eight patients in group A were treated with platelet rich fibrin and 68 were without platelet rich fibrin. In our study out of 136 patients there were 55.9% males and 44.1% females. In a similar study by Tegginamani and Prasad 58 % of the patients were males and 42% females thus indicating the male predominance which is consistent with the results reported in the present study.^[17] The male predominance (55% males and 44% females) was also seen in another study done by Monica .Similarly, a study in the U.S.A reported that majority of the patients were males (57%) whereas 74% females and 26% males have been reported in the study done by Khorasani and Samiezadeh.^[18-20] This gender difference can be due to certain geographical, environmental and social factors. The application of PRF in the extraction sockets of impacted mandibular third molars decreased the frequency of AO significantly. In accordance with the present results, Hoaglin and Lines reported that applying PRF significantly decreases the frequency of AO after mandibular third molar surgery.^[10] Haraji et al.^[21] studied PRGF application in preventing dry socket in bilateral impactions of 40 patients divided in two groups, and showed good healing with PRGF and significant decrease in incidence of dry socket. In accordance to these studies the comparison of efficacy of platelet-rich fibrin on frequency of alveolar osteitis following mandibular third molar surgery at 3rd day in our study, we found incidence of dry socket was significantly low in group A (PRF treated group) than group B [17.6% vs. 36.8%; p=0.0005]. At 7 day, incidence of dry socket was also significantly low in group A than group B [5.9% vs. 26.5%; p=0.001]. The frequency of AO is age dependent, with most studies marking the peak age of 20 to 40 years old.^[6,9] Hence, in the present study, stratification analysis was performed and observed

that incidence of dry socket was not statistically significant between group for below and equal to 40 years of age [Table 4] while it was significant between groups for above 40 years of age patients. The lower frequency of AO after PRF application could be related to the hemostasis and cicatricial properties of PRF, in addition to its sealing ability. Birn reported higher fibrinolytic activity in sockets with AO, which affects the integrity of the clot and inhibits clot formation and maturation.^[22] PRF produces a 3-dimensional architecture that provides a reservoir of platelets, leukocytes, and various cytokines. In addition, PRF provides a natural fibrin matrix that supports clot formation and covers the clot to prevent mechanical dislodgement.^[23,24]

CONCLUSION

In conclusion, within the limitations of the study, PRF showed potential in lowering the incidence of AO after mandibular third molar surgery. Because PRF is autologous and contains no additives, it is highly biocompatible. In addition to its availability, the cost is reasonable and the production technique is simple. However, further investigation with larger numbers of patients and more strict inclusion criteria regarding the difficulty level of surgery are needed.

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How to cite this article: Rana A, Shahzad M, Rathore M, Siyal ZH, Ghauri N, Shams S. Outcome of Dexamethasone and Methylprednisolone as Submucosal Injection for Control the Edema, Trismus and Pain after Surgery of Third Molar. Ann. Int. Med. Den. Res. 2020; 6(6):DE56-DE60.

Source of Support: Nil, **Conflict of Interest:** None declared