Original Article

Study on Efficacy of Dexamethasone and Methylprednisolone in Postoperative Swelling and Trismus Following Mandibular 3rd Molar Surgery

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Abstract

Introduction: *Surgical removal of 3rd molars causes significant swelling and trismus which are unpleasant and uncomfortable for the patient even when teeth are removed by gentle surgical technique. Our surgical procedures can lead to serious inflammatory reactions in the facial soft tissues and should be minimized as much as possible. The aim of this study was to compare the effect of a single intramuscular (I/M) dose of two different corticosteroids on postoperative facial soft tissue swelling and trismus.*

Methodology*: This interventional study was conducted in oral and maxillofacial surgery department of BSMMU. 60 patients(33 male and 27 female)were included in this study and were randomly divided into two groups. In Group-I, 30 patients were included and 4mg of Dexamethasone was injected into the Deltoid region 30 minutes prior to extraction of mandibular 3rd molars. In Group-II,another 30 patients were included and 40mg of Methylprednisolone was injected into theDeltoid region 30 minutes prior to extraction of mandibular 3rd molars.Facial swelling was evaluated preoperatively, on 2nd POD and 7th POD by using measuring tape. Trismus was determined by measuring the maximum inter-incisal distance pre-operatively, on 2nd POD and 7th POD by vernier caliper.*

Result*:Result showed that swelling and trismus was significantly reduced in both groups, p>0.05(not significant).*

Conclusion*:The result concluded that the preoperative single dose of I/M administration of Dexamethasone or Methylprednisolone significantly reduces postoperative swelling and trismus after surgical removal of mandibular 3rd molars.*

Key Words:
Mandibular 3rd molar surgery

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Introduction:

Surgery of mandibular 3rdmolar is one of the most frequently performed procedure in Oral and Maxillofacial Surgery Department leads to immediate postoperative discomfort, swelling and trismus. Mandibular 3rd molars can be impacted, unerupted or partially erupted. A partially erupted tooth is a tooth that has failed to erupt fully into a normal position, an impacted tooth is a tooth which is prevented from completely erupting into a normal functional position due to lack of space, obstruction by adjacent tooth or an abnormal eruption path and an unerupted tooth is a tooth lying within the jaws entirely covered by soft tissue and partially or completely covered by bone[1].

Pain, swelling and trismus are three expected sequelae following extraction of mandibular 3rd molarseven when they are removed by gentle surgical technique which are unpleasant and uncomfortable for the patients and should be minimized as much as possible[2].Many modalities are used to reduce pain, swelling and trismus after extraction

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of mandibular 3rd molars. Bustamante reported a single dose of Methylprednisolone reduces the swelling, pain and trismus associated with mandibular 3rd molar surgery[3]. Methylprednisolone have been used extensively in Oral and Maxillofacial Surgery for their active anti-inflammatory effects [4].

Most of the patient coming to the outpatient Department of Oral and Maxillofacial Surgery are clinically diagnosed to have pericoronal infection associated with mandibular 3rd molar but tends to show poor response to conventional drug therapy.No such study has been previously performed in Bangladesh to compare the effect of a single I/M dose of Dexamethasone and Methylprednisolone on postoperative facial soft tissue swelling and trismus following mandibular 3rd molar surgery.Hence, it is relevant to compare if, Dexamethasone or Methylprednisolone is better in managing the postoperative discomfort, swelling and trismus.The outcome of this study would be recommended for the patients residing in Bangladesh.

Materials and Methods:

This was a Cross Sectional study conducted in the outpatient department of Oral and Maxillofacial Surgery, Bangabandhu Sheikh Mujib Medical University, Shahbag, Dhaka in the period of January 2010 to December 2011(two years) 60 patients undergoing, mandibular 3rd molar surgery fulfilling the basic requirements of inclusion and exclusion criteria were included in the series of this study.

Group-I: 30 patients were selected under this group. Patients under this group were given single dose of Injection Dexamethasone 4mg (I/M)in deltoid muscle.

Group-II: 30 patients were selected under this group. Patients under this group were given single dose of Injection Methylprednisolone 40mg (I/M) in deltoid muscle.

Pre-operative antibiotic, Cap. Amoxicillin-500mg and Tab. Metronidazole-400mg, 8hourly for 5days were given to the patients along with analgesic, Tab. Ibuprofen-400mg, 8 hourly for 3 days with anti-ulcerant, Tab. Pantoprazole-20mg, 12 hourly for 5 days in both Group I and II.

Standard history sheet were prepared and data were collected from the sample patients with the above mentioned criterions of inclusion and exclusion. Preoperatively all the patients were clinically & radiologically examined.

Oral preoperative antibiotics were administered to all patients prior to surgery. In both groups, 2% Lidocaine hydrochloride with1:100000 adrenaline wasused for inferior alveolar nerve block & buccal infiltration. Swelling and Trismus were evaluated at 2ndPOD and 7th POD in both groups.

The data were screened and checked for any missing values and discrepancy. Computer based statistical analysis was carried out with appropriate techniques and systems. Data were processed and analyzed using SPSS version 17.0 for windows. Both qualitative and quantitative tests were performed. For comparison between groups, Chi square (x^2) test was performed for qualitative variables and students't' test was performed for quantitative variables. The level of significance was set at 0.05 and $p < 0.05$ considered significant. The summarized data were interpreted accordingly and were then presented in the form of tables, graphs and bar diagrams.

Results and Observations

Table-I

Age distribution of Group I and Group II.

Demographic Variable	Category In Years	Number of Patients		Test Statistics
		Group I (n=30)	Group II (n=30)	
Age	< 20	4/30 (13.3%)	8/30 (26.7%)	χ^2=9.265
	21-25	16/30 (53.3%)	10/30 (33.3%)	df=3
	26-30	3/30 (10.0%)	10/30 (33.3%)	p=0.26ns
	31-35	7/30 (23.3%)	2/30 (6.7%)	
Mean ±SD		25.13±4.862	23.83±4.728	
Range (min-max) (17-35)				

ns = Not Significant.Statistical analysis was done by Chi square (χ^2) test Significant cutoff value <0.05.

Table I shows that the mean age of the patients was 25.13 years with standard deviation + 4.862 years for Group I and the mean age of the patients was 23.83 years with standard deviation + 4.728 years for Group II, ranged from 17 to 35 years. Maximum patients were of 21-25 years age for Group I and 21-25 and 26-30 years age for Group II. The difference between the mean age of Group I and Group II was statistically not significant (p=0.26).

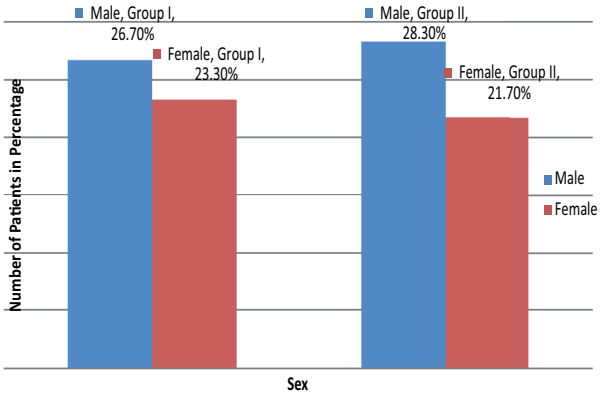

Fig.-1: *Bar diagram showing Sex distribution of Group I and Group II.*

Figure 1 shows that, in Group I, 26.70% and 23.30%of patients were male and female respectively and in Group II, 28.30% and 21.70% of patients were male and female respectively.

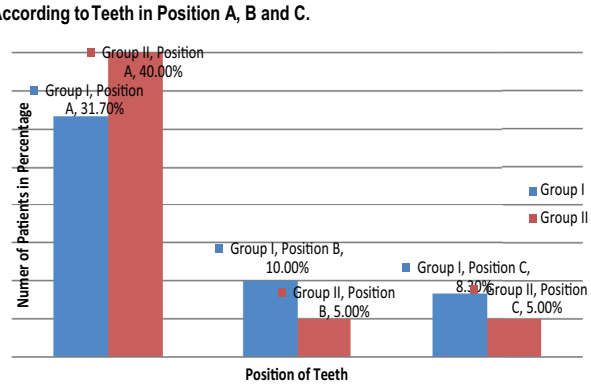

Fig.-2: *Bar diagram showing distribution of patients between Group I and Group II according to Teeth in Position A, B and C.*

Figure 2 shows that, number of patients having their Teeth in Position A, B and C, in Group I were 31.70%, 10.00% and 8.30% respectively and in Group II were 40.00%, 5.00% and 5.00% respectively.

Table-II

Maximum Mouth Opening (MMO) in Group I and Group II in Preoperative, 2nd POD and 7th POD.

Variables	Group I (n=30)	Group II (n=30)	Mean Difference	P Value
MMO	Mean+SD mm	Mean+SD mm	mm	Sig< 0.05
Preoperative	54.842+10.565	54.120+6.897	0.722	0.755^{ns}
2nd POD	51.642+12.246	51.211+6.890	0.431	0.867^{ns}
7th POD	55.140+10.229	54.160+6.629	0.980	0.661^{ns}

ns = Not Significant.Statistical analysis was done by Unpaired't' test.Significant cut off value <0.05.

Table 2 shows the Maximum Mouth Opening in different follow-up visit (Preoperative, 2nd POD and 7th POD).

The mean difference for Maximum Mouth Opening between Group I and Group II, Preoperatively was 0.722 mm, on 2ndPOD was 0.431mm and 7thPOD was 0.980 mm. The Maximum Mouth Opening was more in Group I than in Group II. The mean Maximum Mouth Opening was not statistically significant (p>0.05) between Group I and Group II in different follow-up visit.

Table-III

Swelling on line A (Lateral corner of the eye and angle of the mandible) in Group I and Group IIin Preoperative, 2ndPOD and 7thPOD.

Variables	Group I (n=30)	Group II (n=30)	Mean Difference	P Value
Swelling on line A	Mean+SD mm	Mean+SD mm	mm	Sig< 0.05
Preoperative	99.300+7.475	100.000+6.454	0.700	0.699^{ns}
2nd POD	100.467+7.295	100.833+7.315	0.367	0.847^{ns}
7th POD	99.300+7.475	100.167+6.518	0.867	0.634^{ns}

ns = Not Significant.Statistical analysis was done by Unpaired't' test.Significant cutoff value <0.05.

Table-III shows the amount of Facial Swelling on line A (Lateral corner of the eye and angle of the mandible)in different follow-up visit (Preoperative, 2nd POD and 7th POD).

The mean difference in Facial Swelling on line A between Group I and Group II, Preoperatively, 2nd POD and 7th POD was 0.700 mm,0.367 mmand 0.867 mmrespectively. Facial Swelling on line A was less in Group I than in Group II. The mean Facial Swelling on line A was not statistically significant (p>0.05) between Group I and Group II in different follow-up visit.

Table -IV

Swelling on line B (Tragus and outer corner of the mouth) in Group I and Group IIin Preoperative, 2nd POD and 7th POD.

Variables	Group I (n=30)	Group II (n=30)	Mean Difference	P Value Sig< 0.05
Swelling on line B	Mean+SD mm	Mean+SD mm	mm	
Preoperative	109.000+5.632	109.533+7.628	0.533	0.759ns
2nd POD	111.100+7.067	109.733+7.665	1.367	0.476ns
7th POD	109.200+5.714	109.533+7.628	0.333	0.849ns

ns = Not Significant.Statistical analysis was done by Unpaired't' test.Significant cutoff value <0.05.

Table IV shows the amount of Facial Swelling on line B (Tragus and outer corner of the mouth)in different follow-up visit (Preoperative, 2nd POD and 7th POD).

The mean difference in Facial Swelling on line B between Group I and Group II, Preoperatively, 2nd POD and 7th POD was 0.533 mm,1.367 mmand 0.333 mmrespectively. Facial Swelling on line B was less in Group I than in Group II. The mean Facial Swelling on line B was not statistically significant (p>0.05) between Group I and Group II in different follow-up visit.

Table V

Swelling on line C (Tragus and soft tissue pogonion) in Group I and Group II in Preoperative, 2nd POD and 7th POD.

Variables	Group I (n=30)	Group II (n=30)	Mean Difference	P Value Sig< 0.05
Swelling on line C	Mean+SD mm	Mean+SD mm	mm	
Preoperative	97.933 + 5.800	99.333 + 7.984	1.400	0.440ns
2nd POD	99.533 + 6.307	99.833 + 8.284	0.300	0.875ns
7th POD	98.000 + 5.777	99.467 + 8.029	1.467	0.420ns

ns = Not Significant.Statistical analysis was done by Unpaired't' test.Significant cut off value <0.05.

Table V shows the amount of Facial Swelling on line C (Tragus and soft tissue pogonion)in different follow-up visit (Preoperative, 2nd POD and 7th POD).

The mean difference in Facial Swelling on line C between Group I and Group II, Preoperatively, 2ndPOD and 7thPOD was 1.400 mm,0.300 mmand 1.467 mmrespectively. Facial Swelling on line C was less in Group I than in Group II. The mean Facial Swelling on line C was not statistically significant (p>0.05) between Group I and Group II in different follow-up visit.

Discussion

Surgical removal of mandibular 3rd molar is one of the most frequent procedure in Oral and Maxillofacial Surgery and produces tissue trauma that causes an inflammatory reaction leading to a transitory functional alteration in the mastication due to swelling and trismus.To minimize the postoperative facial swelling and trismus Dexamethasone (4mg) and Methylprednisolone (40mg) were administered, I/M single dose preoperatively in deltoid muscle in our study. This cross sectional study was conducted in the Department of Oral and Maxillofacial Surgery, BSMMU to

compare the efficacy of Dexamethasone and Methylprednisolone on postoperative inflammatory condition following mandibular 3rd molar surgery.60 patients were included in this study (33 male and 27 female), age range from 17 to 35 years and were divided into two Groups, Group I -30 Patients under this group were given single dose of Injection Dexamethasone 4mg (I/M)in deltoid muscle and Group II - 30 Patients under this group were given single dose of Injection Methylprednisolone 40mg (I/M)in deltoid muscle.. The technique was standardized for tooth extraction. Extraction was performed with buccal guttering technique after adequate elevation and reflection of full thickness buccal mucoperiosteal flap.

Another study showed that the restriction of mouth opening was reduced by 28.8% on the 1st POD by methylprednisolone[5]. Llorens reported satisfactory results with methylprednisolone 2days after the surgery following mandibular 3rd molar surgery whereas our study showed that The mean Maximum Mouth Opening in Group I and Group II was not statistically significant ($p>0.05$) in different follow-up visit[6].

A study conducted by Bamgbose reported that the administration of extraneous steroid may synergize the anti-inflammatory effect of NSAIDs and contribute to reduction of inflammatory exudates as well as oedema and pain[7]. Dionne used 4mg dexamethasone 12hourly before and just after mandibular 3rd molar surgery in 33 patients, 28 received a placebo in control group. As a marker of the extent of inflammation sample of prostglandin E2, and thromboxane B2 were collected over time at the mandibular surgical sites. Dexamethasone significantly decreased the level of PG E2 and TXB2. Mosgau reported that the total reduction in swelling on the first postoperative day compared to placebo group was 56% on ultrasound measurement and 58% when measured with tape. The differences found on the third postoperative day corresponded to a reduction in swelling after medication of 26.5% on tape measurement and 22.0% using ultrasound[5]. Post-operative oedema decreased with the use of methylprednisolone whereas our study revealed thatthe mean Facial Swelling on line A, B and C was not statistically significant ($p>0.05$) between Group I and Group II in different follow-up visit.

There was no significant difference between the efficacy of Dexamethasone and Methylprednisolone in reducing facial swelling and trismus, the p value for both the groups was statistically not significant ($p>0.05$). We think that this study can be a base for further studies to examine the differences between Dexamethasone and Methyl-prednisolone.

Conclusion

This study showed good response of Dexamethasone and Methylprednisolone in controlling postoperative morbidity associated with mandibular 3rd molar surgery. Hence, Dexamethasone or Methylprednisolone can be used for reducing postoperative swelling and trismus of the patients following mandibular 3rd molar surgery.

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