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Mystery Revealed on Efficacy of Intravenous Dexamethasone vs Methylprednisolone on Post-Operative Sequelae after 3rd Molar Surgery

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Abstract---Background: Owing to its potent mode of action and lengthy half-life, dexamethasone has been used in oral surgery for many years. Several dexamethasone delivery methods for third molar surgery have been proposed. Dexamethasone administration has been a source of debate, with studies being unable to agree on the best

effective method for reducing post-extraction complications. Aim: To carry out comparative evaluation of effect of intravenous 8 mg Dexamethasone and 40 mg Methylprednisolone on pain, swelling and trismus post-operatively after mandibular impacted 3rd molar surgery. Methods and Materials: The study used a split mouth technique, in which the impacted mandibular 3rd molars were extracted one at a time, separated by at least 21 days. Following surgical removal of an impacted mandibular third molar, the patient was given 8mg Dexamethasone intravenously at the first appointment. The surgical removal of the mandibular third molar on the contralateral side was performed on the same patient at the second session after 21 days, and 40 mg Methylprednisolone was administered intravenously post-operatively. Results: For the 2nd, 5th, and 7th day postoperative evaluations, patients showed decreased swelling with the Dexamethasone protocol compared to the Methylprednisolone protocol. There was a statistically significant difference between the two groups. Regardless of the medicine administered, both postoperative examinations revealed a reduction in mouth opening. There were no statistically significant variations in postoperative pain between the two procedures ($p > 0.05$). However, when dexamethasone was given instead of methylprednisolone, the majority of the mean pain scores were lower for every postoperative evaluation. Conclusion: It can be concluded from the study that 8mg dexamethasone was more effective than 40mg methylprednisolone when injected via intravenous route postoperatively in reducing the post-operative pain, swelling and trismus following third molar surgery.

Keywords---Mandibular 3rd molar surgery, 8mg Dexamethasone, 40mg methylprednisolone, Intravenous route.

Introduction

The most common minor surgical intervention in oral surgery is the surgical extraction of impacted third molars. An inflammatory reaction is elicited by this intrusive technique, which might appear as pain, swelling, and trismus. An aggravated response can sometimes result in moderate to severe short-term transitory impacts on quality of life. These post-extraction morbidities are frequently the source of apprehension and hesitation in having the tooth extracted.¹

Inflammation and pain are the physiological responses of body tissues to any type of injury, and they differ from patient to patient. Inflammatory mediators (prostaglandins, leukotrienes, bradykinin, and others) are released into the tissues in response to irritation, resulting in increased vascular dilation and permeability, generating oedema and amplifying the interstitial tissue response.²

Because of its potent mode of action and lengthy half-life, dexamethasone has been used in oral surgery for many years. Several dexamethasone delivery methods for third molar surgery have been proposed. Dexamethasone

administration has been a source of debate, with studies being unable to agree on the best effective method for reducing post-extraction complications. Betamethasone, triamcinolone, prednisolone, hydrocortisone, methylprednisolone, and other synthetic corticosteroids are also used to treat discomfort, trismus, and edema. Dexamethasone and Methylprednisolone, among these synthetic corticosteroids, have been shown to be particularly successful in mandibular third molar surgery.^{3,4} Comparative evaluation of the effect of intravenous 8 mg Dexamethasone and 40 mg Methylprednisolone on pain, edema, and trismus postoperatively after mandibular impacted 3rd molar surgery," according to the study's goal.

Methods and Materials

Source of dData

The study included 20 patients (11 males and 09 females) who required surgical removal of bilaterally symmetrical impacted mandibular third molars. The approval of the Institutional Review Board and the Ethics Committee was obtained.

Methods of collection of data

The study comprised patients with bilaterally symmetrical impacted mandibular third molars. The investigation was carried out using a split mouth approach, in which the impacted mandibular 3rd molars were extracted one at a time, separated by at least 21 days.

Following surgical removal of an impacted mandibular third molar, the patient was administered 8mg Dexamethasone intravenously at the first consultation. The surgical removal of the mandibular third molar on the contralateral side was performed on the same patient at the second session after 21 days, and 40 mg Methylprednisolone was administered intravenously post-operatively. On the 2nd, 5th, and 7th days after surgical removal of bilaterally impacted mandibular third molars, parameters such as discomfort, edema, and trismus were recorded for the patients.

Following the surgical removal of impacted mandibular 3rd molars, all patients were administered the same antibiotics [TAB.ALMOX 500MG (AMOXICILLIN 500MG)] and painkiller [TAB ENZOFLAM (DICLOFENAC 50MG+ PARACETAMOL 325MG+ SERRATIOPEPTIDASE 15MG) for 5 days postoperatively.

Statistical analysis

For each group, descriptive statistics were presented as means and standard deviations. The Student t test was used to compare discomfort, edema, and trismus between groups. A p value of less than or equal to 0.05 (p0.05) was considered statistically significant in the tests above. SPSS software version 20 was used for all analyses.

Results

For the 2nd, 5th, and 7th day postoperative evaluations, patients showed decreased swelling with the Dexamethasone protocol compared to the Methylprednisolone protocol. (See Tables 1–3, Tables 2–3, and Table 3.) There was a statistically significant difference between the two groups.

For all the 3 locations (AB, CD, CE),

Point A- Lateral canthus of the eye.

Point B- Soft tissue gonion.

Point C- Tragus Of Ear.

Point D- Outer Corner Of Mouth.

Point E- Soft Tissue Pogonion.

Line AB= Lateral canthus of the eye to the gonion.

Line CD= Tragus to the corner of the mouth.

Line CE= Tragus to pogonion.

Regardless of the medicine administered, both postoperative examinations revealed a reduction in mouth opening (Table 4). On the second postoperative day, the Methylprednisolone protocol reduced mouth opening more [mean (SD) = 12.95(3.17)] than the Dexamethasone protocol [mean (SD) = 10.05(3.02)], and this difference was statistically significant ($p=0.005$). On the fifth day after surgery, the Methylprednisolone treatment had a higher reduction in mouth opening [mean (SD) = 6.95(2.74)] than the Dexamethasone protocol [mean (SD) = 4.5(1.73)], and this difference was statistically significant ($p=0.02$). Similarly, when comparing the Methylprednisolone and Dexamethasone protocols on the 7th day postoperative evaluation, the Methylprednisolone protocol had a higher reduction in mouth opening [mean (SD) = 1.85(1.53)] than the Dexamethasone protocol [mean (SD) = 0.05(0.76)]. This was a statistically significant change ($p=0.01$).

There were no statistically significant variations in postoperative pain between the two procedures ($p>0.05$). However, when dexamethasone was given instead of methylprednisolone, the majority of the mean pain scores were lower for every postoperative evaluation (Table 5).

Table no.1: Comparison of facial swelling (mm) for AB between protocols (dexamethasone and methyl-prednisolone) on the 2nd day, 5th day and 7th day postoperative.

Post operative evaluation times	Dexamethasone 8 mg mean(SD)	Methylprednisolone 40mg mean(SD)	P value (Student T test)
2nd day	0.43 (0.16)	0.64 (0.37)	0.021*
5th day	0.18 (0.10)	0.29 (0.13)	0.005*
7th day	0.04 (0.06)	0.11 (0.08)	0.005*

* $p \leq 0.05$ is considered statistically significant.

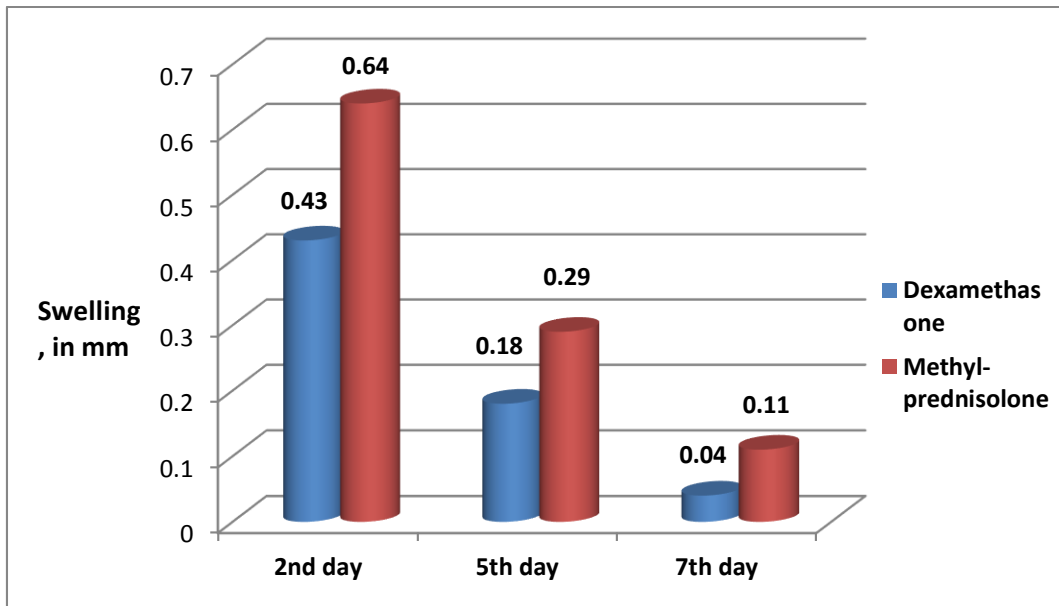


Table no.2: Comparison of facial swelling (mm) for CD between protocols (dexamethasone and methyl-prednisolone) on the 2nd day, 5th day and 7th day postoperative

Post operative evaluation times	Dexamethasone 8 mg mean(SD)	Methylprednisolone 40mg mean(SD)	P value (Student T test)
2nd day	0.40 (0.14)	0.61 (0.29)	0.006*
5th day	0.17 (0.09)	0.31 (0.16)	0.002*
7th day	0.04 (0.06)	0.13 (0.09)	<0.001*

* $p \leq 0.05$ is considered statistically significant.

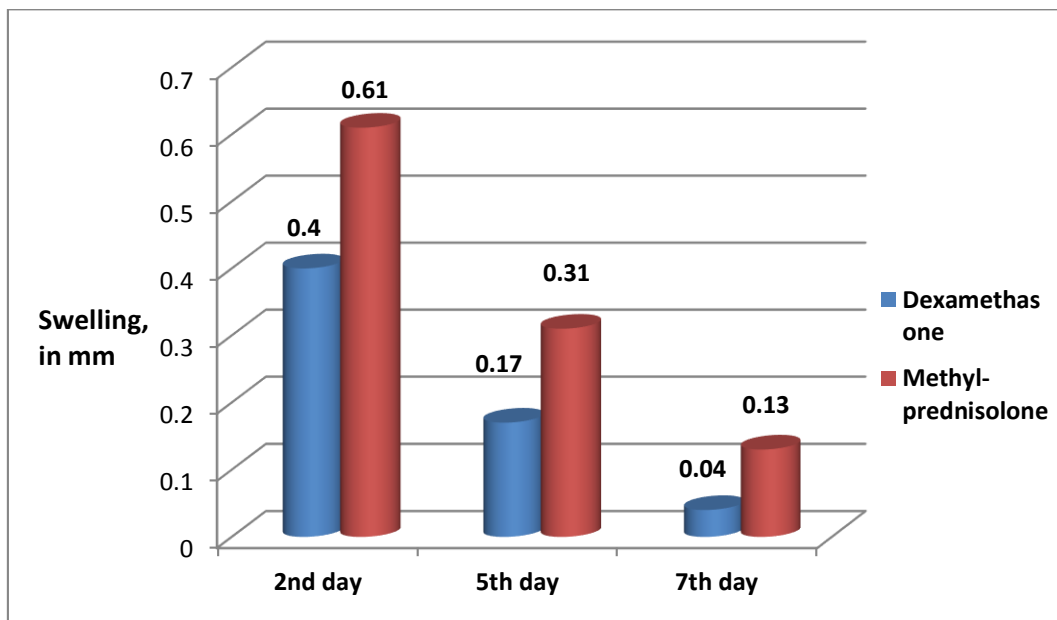


Table no.3: Comparison of facial swelling (mm) for CE between protocols (dexamethasone and methyl-prednisolone) on the 2nd day, 5th day and 7th day postoperative

Post operative evaluation times	Dexamethasone 8 mg mean(SD)	Methylprednisolone 40mg mean(SD)	P value (Student T test)
2nd day	0.37 (0.15)	0.57 (0.32)	0.017*
5th day	0.17 (0.10)	0.29 (0.13)	0.002*
7th day	0.03 (0.05)	0.14 (0.09)	<0.001*

*p ≤ 0.05 is considered statistically significant.

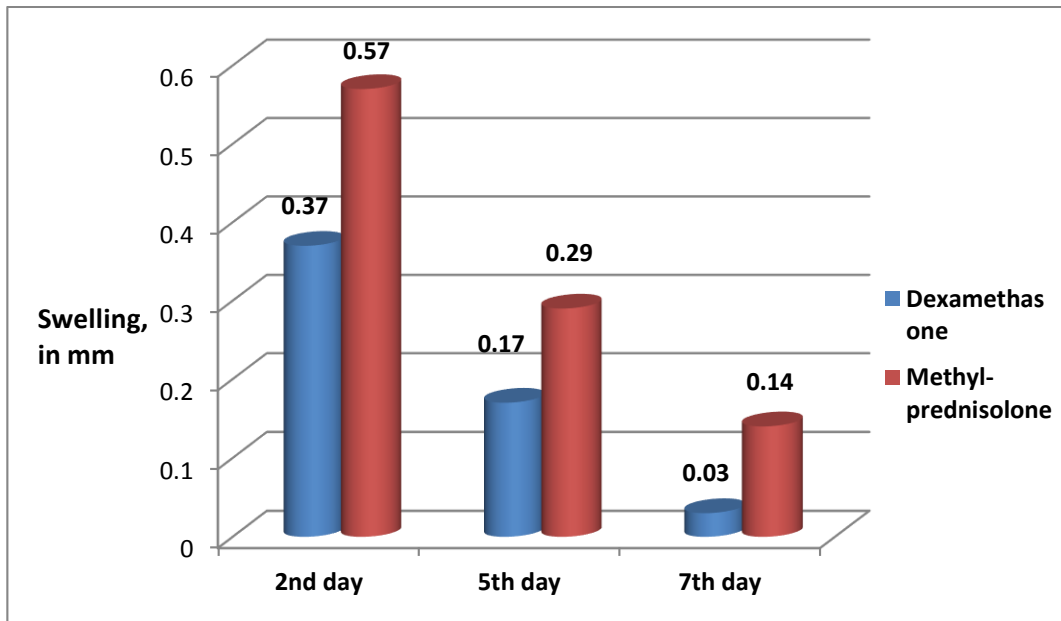


Table no.4: Comparison of reduction in mouth opening between protocols (dexamethasone and methyl-prednisolone) on the 2nd day, 5th day and 7th day postoperative

Post operative evaluation times	Dexamethasone 8 mg mean(SD)	Methylprednisolone 40mg mean(SD)	P value (Student T test)
2nd day	10.05 (3.02)	12.95 (3.17)	0.005*
5th day	4.5 (1.73)	6.95 (2.74)	0.002*
7th day	0.05 (0.76)	1.85 (1.53)	0.001*

*p ≤ 0.05 is considered statistically significant.

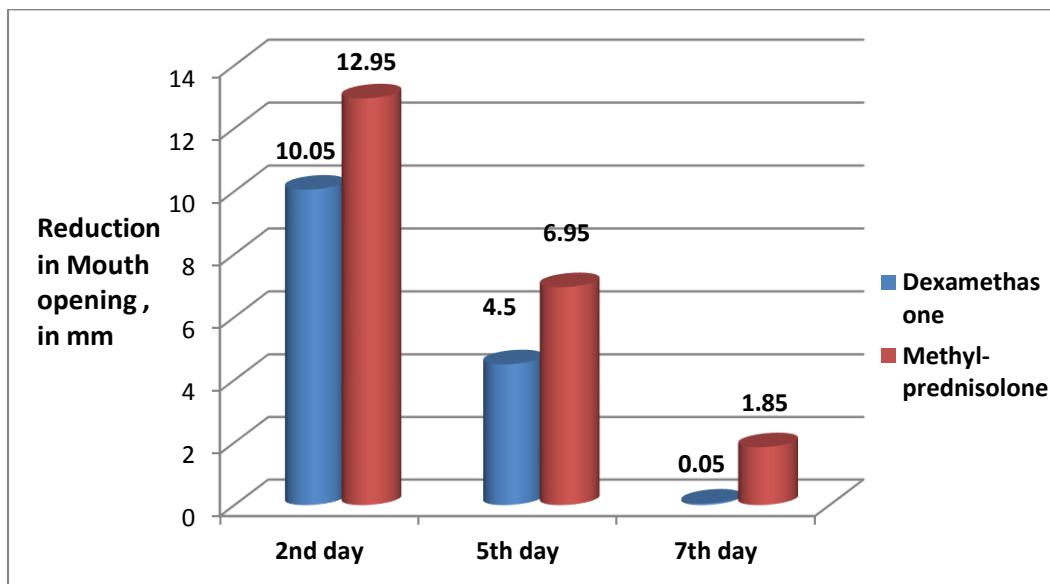
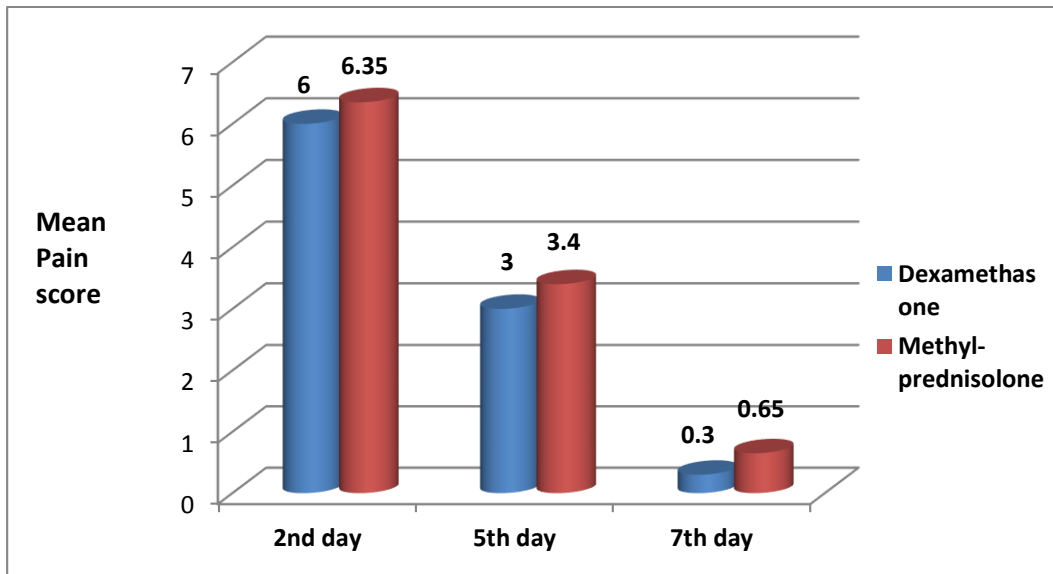


Table no.5: Comparison of pain between protocols (dexamethasone and methyl-prednisolone) on the 2nd day, 5th day and 7th day postoperative

Post operative evaluation times	Dexamethasone 8 mg mean(SD)	Methylprednisolone 40mg mean(SD)	P value (Student T test)
2 nd day	6.00 (0.86)	6.35 (0.75)	0.177
5 th day	3.00 (0.92)	3.40 (0.88)	0.168
7 th day	0.30 (0.57)	0.65 (0.75)	0.104

*p ≤ 0.05 is considered statistically significant.



Discussion

Impacted mandibular 3rd molar surgery is one of the most common procedures performed by oral and maxillofacial surgeons. Like any surgical procedure, surgical removal of impacted 3rd molar is also associated with post-operative complications such as pain, swelling, and trismus.

Although inflammatory reaction plays a major 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.⁵

The literature offers a number of studies on the analgesic and anti-inflammatory effects of different doses and routes of administration of either Dexamethasone or Methylprednisolone.⁶⁻⁹

Laureano Filho et al¹⁰ suggested that the administration of 8mg Dexamethasone is reported to be more effective in reducing the degree of trismus and swelling in comparison to 4 mg. Ustun Y. Erdogan et al¹¹ suggested that the administration of 40mg Methylprednisolone is effective in reducing the degree of trismus and swelling. Equivalent doses of 8 mg Dexamethasone and 40 mg of Methylprednisolone were adopted to make the drugs compatible so that they correspond to approximately 200 mg of cortisol.

A total of twenty patients undergoing bilateral symmetrical mandibular third molar surgery were chosen at random. 8 mg intravenous Dexamethasone was administered intravenously after surgical extraction of the third molar (unilaterally). After 4 weeks on the contralateral side of the same patient, 40mg methylprednisolone was given. The effectiveness of both medicines was determined by measuring pain, edema, and trismus (on 2nd, 5th and 7th post operative day).

On the second postoperative day, the swelling found in the Methylprednisolone group was statistically significantly higher than that seen in the Dexamethasone group. The difference in swelling between the Methylprednisolone and Dexamethasone groups continued to diminish until the 5th and 7th postoperative days. There was a statistically significant difference in swelling between the two groups, demonstrating that Dexamethasone is far more effective than Methylprednisolone at reducing edema (swelling).

Regardless of the medicine administered, both postoperative examinations revealed a reduction in mouth opening. On the 2nd, 5th, and 7th postoperative days, significant differences in trismus were identified in the Dexamethasone group compared to the Methylprednisolone group, demonstrating that Dexamethasone is more successful in reducing trismus than Methylprednisolone.

In terms of severity of pain there was not statistically significant mean difference between two groups on 2nd, 5th and 7th postoperative day. However, when Dexamethasone was used most of the mean pain scores were lower for every postoperative evaluation as compared to when Methylprednisolone was used. This result coincides with facial swelling which was significantly high in Methylprednisolone group indicating more of edema and inflammatory reaction on 2nd post-operative day. As observed edema was more in Methylprednisolone as compared to Dexamethasone due to inflammatory reaction hence pain score was less in Dexamethasone as compared to Methylprednisolone.

Pain score in Dexamethasone group was significantly less as compared to Methylprednisolone on 2nd, 5th and 7th postoperative day. However, parameters such as swelling, trismus are more reliable than pain rating as the observation of pain is subjective and is highly prone for individual pain threshold and anxiety.

No patient in our study complained of side effects like nausea, vomiting, urticaria etc. No enzymes were prescribed in this study. In this study it was aimed to achieve an optimum reduction in swelling, trismus and pain. It was chosen to use single dose of 8mg Dexamethasone and 40mg of Methylprednisolone to make the drugs compatible so that they correspond to approximately 200 mg of cortisol. This regimen significantly reduced the inflammatory reaction in the postoperative period.

Our results were in correlation with the previous study of C. E. P. Alcantara et al¹², who emphasized that no statistically significant difference was found between drugs with regard to pain. Swelling and mouth opening were significantly less with Dexamethasone 8mg in comparison to 40mg Methylprednisolone.

Conclusion

The study indicated that when delivered by intravenous method postoperatively, 8mg dexamethasone was more beneficial than 40mg methylprednisolone in lowering post-operative pain, swelling, and trismus following third molar surgery.

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