Comparison of the Efficacy of Prednisolone and Dexamethazone on Reduction of Pain and Swelling After Impacted Mandibular Wisdom Teeth surgery

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Abstract

Statement of the Problem: Steroids and Nonsteroidal anti-inflammatory drugs are able to effectively reduce postoperative sequelae of impacted third molar surgery.

Purpose: In this study, we wanted to compare the effect of oral administration of dexamethasone and prednisolone on the post-operative pain and swelling of the impacted third molar surgery.

Materials and Method: 40 patients participated in this study. 5 mg prednisolone was prescribed orally, once 12 hours before and again 12 hours after surgery for twenty patients. The others received 0.5 mg dexamethasone with the same method and postoperative pain and swelling were evaluated in a week.

Results: There were no significant differences between prednisolone and dexamethasone on swelling and pain in the first, third and seventh day after the operation .So we can say that both prednisolone and dexamethasone had equal effect in reducing inflammation and pain in patients.

Conclusion: It was found that the use of a single dose of prednisolone and dexamethasone 12 hours before and 12 hours after surgery can help to reduce pain and swelling of impacted wisdom .

Key words: prednisolone, dexamethazone, impacted tooth, surgery

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Introduction

Impaction may be defined as the failure of complete eruption into a normal functional position of one tooth within the normal time due to lack of space in the dental arch, caused by obstruction by another tooth or development in an abnormal position(1). The most often congenitally missing, as well as impacted teeth, are the third molars, which are present in 90% of the population with 33% having at least one impacted third molar (2). They account for 98% of all the impacted teeth (3). The mandibular third molar is the most frequently impacted tooth (4). The incidence varies from 9.5% to 68% in different populations (5-7). According to Elsey and Rock (8) impaction of the third molar occurs in up to 73% of young adults in Europe.

Third molar eruption and continuous positional changes after eruption can be related not only with race but also with nature of the diet, the intensity of the use of the masticatory apparatus and possibly due to genetic background(9).

Surgical extraction of third molars is a traumatic procedure and also is the most common surgical procedure in the Oral and Maxillofacial field (10-14). Wisdom tooth removal is necessary when the jaws are not large enough to accommodate the wisdom teeth or the wisdom teeth are lying in a poor position(12).

The surgical extraction of impacted third molars involves soft and hard tissues and can result in considerable pain, swelling, and trismus. These postoperative sequelae can cause distress to the patient and affect the quality of life of patient after surgery (13, 16-18). Some other complications associated with extraction of impacted mandibular third molars, are alveolitis, infection and paresthesia of the inferior alveolar nerve (19, 20). Hemorrhage during or after surgery and paresthesia of the lingual nerve are relatively rare (21, 22).

Anti-inflammatory drugs with peripheral analgesic action are divided into steroidal (SAID), so called for being analogous to hormones produced by the adrenal glands, and non-steroidal anti-inflammatory drugs (NSAID), which include many drugs that inhibit cyclooxygenase enzyme activity(23).

The introduction of NSAIDs (e.g. diclofenac potassium and ibuprofen) has significantly altered the management of postoperative pain in dentistry and medicine. There are 2 possible mechanisms for the efficacy of NSAIDs when administered prior to surgical trauma. Firstly, the use of the a pharmacokinetic advantage of drug so that with the administration of the NSAIDs prior to pain onset, the absorption of drug would have begun and therapeutic blood level will be present at the onset of pain. Secondly, the presence of a cyclooxygenase-inhibitor at the surgical site may limit the production of prostaglandins and prostacyclins associated with hyperalgesia and edema (24, 25).

Several studies have demonstrated that steroid anti-inflammatory drugs versus non-steroidal anti-inflammatory drugs have a better effect in the control of the swelling and trismus (26-32). Dexamethasone is a type of SAID that inhibits phospolipase-A2 and consequently reduces prostaglandin and leukotriene synthesis and also decreases chemotaxis of polymorphonuclear leukocytes (33). The SAIDs are able to down-regulate many pro-inflammatory cytokines involved in the inflammatory process and immune response (34-37).

The use of the corticosteroids (e.g. dexamethasone, betamethasone) is another preventive strategy for limiting postoperative edema and trismus following third molar extractions(38). Corticosteroids such as dexamethasone have been extensively used in various regimens and routes to lessen inflammatory sequel after third molar surgery (37). In particular, the postsurgical efficacy of dexamethasone administered sub-mucosally remains poorly investigated (37, 39).

Clinical trials in oral surgery have also supported the hypothesis that preemptive NSAIDs and corticosteroids are effective in delaying and preventing of many postoperative sequelae (24). The apparent interactions between the mechanisms of action of the NSAIDs and SAIDs suggests that co-therapy may provide benefits in inflammatory and pain relief without any side effects(38).

When the levels of inflammatory mediators were compared after ingestion of the SAIDs and NSAIDs and placebo, it was observed that both of these anti-inflammatory drugs reduce the levels of prostaglandin E2, and are effective in control of inflammation and postoperative pain(40). For these reasons, researchers have been focusing on alternatives to prevent postoperative pain, by testing different medications and routes of administration (41-43).

In this study, we wanted to compare the effect of oral administration of two types of corticosteroids (dexamethasone and prednisolone) on the postoperative pain and swelling of impacted third molar surgery.

Materials and Method

This prospective randomized clinical study was conducted at the Department of maxillofacial Surgery of dental school of Shiraz University of medical science from 2015 to 2016.

In a year, forty patients with bilateral impacted mandibular wisdom teeth were surgically extracted on both sides by one surgeon. All patients were informed about the study and consent form was completed by all participants. For controlling of postoperative pain and swelling, 5 mg Orally prednisolone was prescribed once 12 hours before and again 12 hours after surgery for twenty patients. The others received 0.5 mg dexamethasone with the same method.

For all patients 2 gr Amoxicillin, 30 minutes before procedure was prescribed. Local anesthesia was obtained using 1.8-3.6 mL Articaine hydrochloride 4% solution with epinephrine 1/100000. A standard incision was used, from the anterior border of the ramus to the disto-facial corner of the second molar following the buccal gingival sulcus along the second and first molar. After periosteal evaluation , surrounding bone of the third molar was removed using a round bur in a low-speed hand-piece and irrigation with copious amount of saline. In the majority of cases, the third molar was split using a tungsten fissure bur and the parts of tooth were then carefully removed with a straight elevator as the routine technique. After the tooth extraction the muco-periosteal flaps were repositioned and partially sutured and an Iodoform drain was inserted for prevention of hematoma formation. We prescribed antimicrobial mouth wash and Ibuprofen for all patients.

Facial swelling was measured by dentist with a measuring tape on the skin surface above the inflation in three dimensions. The pain was evaluated through subjective parameters (visual analogic scale, VAS), so that the pain was declared with numbers between 0 to 10 by the patient. This information was taken on the day before the operation, and the first, third and seventh days after the surgery.

SPSS software version 21 was used for statistical analysis .The cross-table technique was applied for assessment of the variables (pain and swelling) of the two groups: prednisolone and dexamethazone. Pain and swelling recorded by patient and dentist were analyzed by analysis of variance (ANOVA) for repeated measures. The significance threshold was set at 0.05.

Results

As seen in Table 1, there was no significant difference between the two groups (P>0.05) in the first, third and seventh days after the surgery. So we can say that both prednisolone and dexamethasone has equal effect in reducing swelling in patients.

Table 1: The difference between the two groups in terms of inflation (swelling) of patients on the first, third and seventh postoperative days

day	Medicine	N	Mean± Standard deviation	Test statistic (t)	freedom degree	P. Value
1	Prednisolone	20	36.475±1.4279	-0.401	38	0.690
	Dexamethasone	20	36.650±1.3288			
3	Prednisolone	20	37.650±1.3964	-0.853	38	0.399
	Dexamethasone	20	38.000±1.1921			
7	Prednisolone	20	36.650±1.4428	-0.459	38	0.649
	Dexamethasone	20	36.850±1.3089			

As seen in Table 2, the effect of the two medications in control of pain was similar and there was no significant difference between the two groups (P>0.05) in the first, third and seventh days after the surgery.

Table 1: The difference between the two groups in terms of inflation (swelling) of patients on the first, third and seventh postoperative days

Day	Medicine	N	Mean ±Standard deviation	Test statistic (t)	freedom degree	P. Value
1	Prednisolone	20	3.35±1.182	-0.136	38	0.893
	Dexamethasone	20	3.40±1.142			
3	Prednisolone	20	4.35±1.182	-0.136	38	0.893
	Dexamethasone	20	4.40±1.142			
7	Prednisolone	20	3.10±1.373	0.729	38	0.470
	Dexamethasone	20	2.75±1.650			

Three days after operation, the pain and inflation of patients in both groups increased and on the seventh day after surgery, we saw decrease in pain and swelling of patients in both the dexamehazone and prednisolone groups (Figures 1 and 2).

Figure 1: Shows the process of dependent variable (swelling of the patient face) at different levels of the independent variables (the first, third and seventh postoperative day)

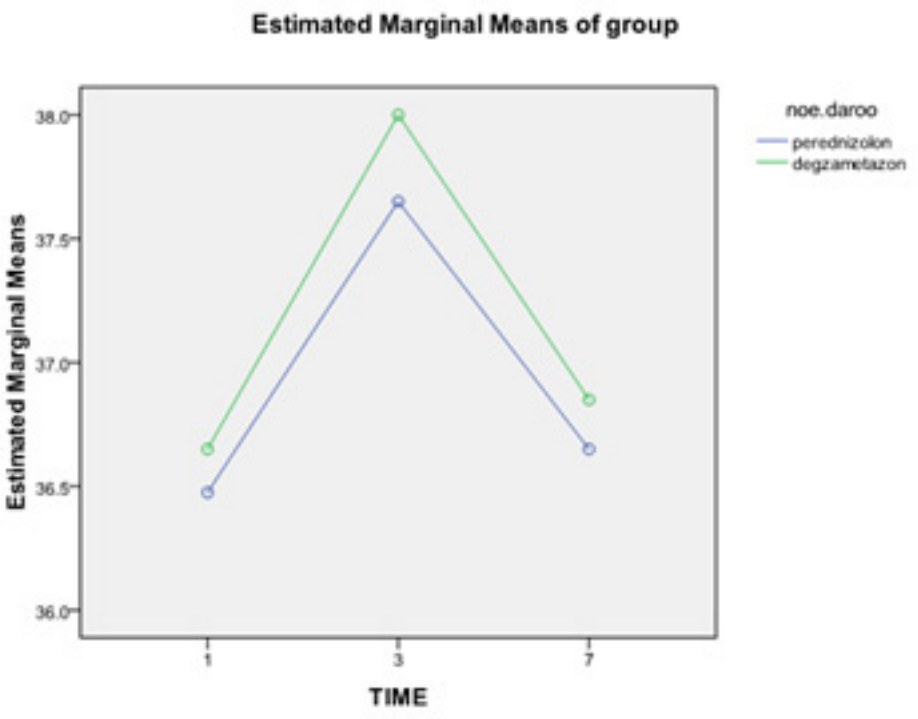
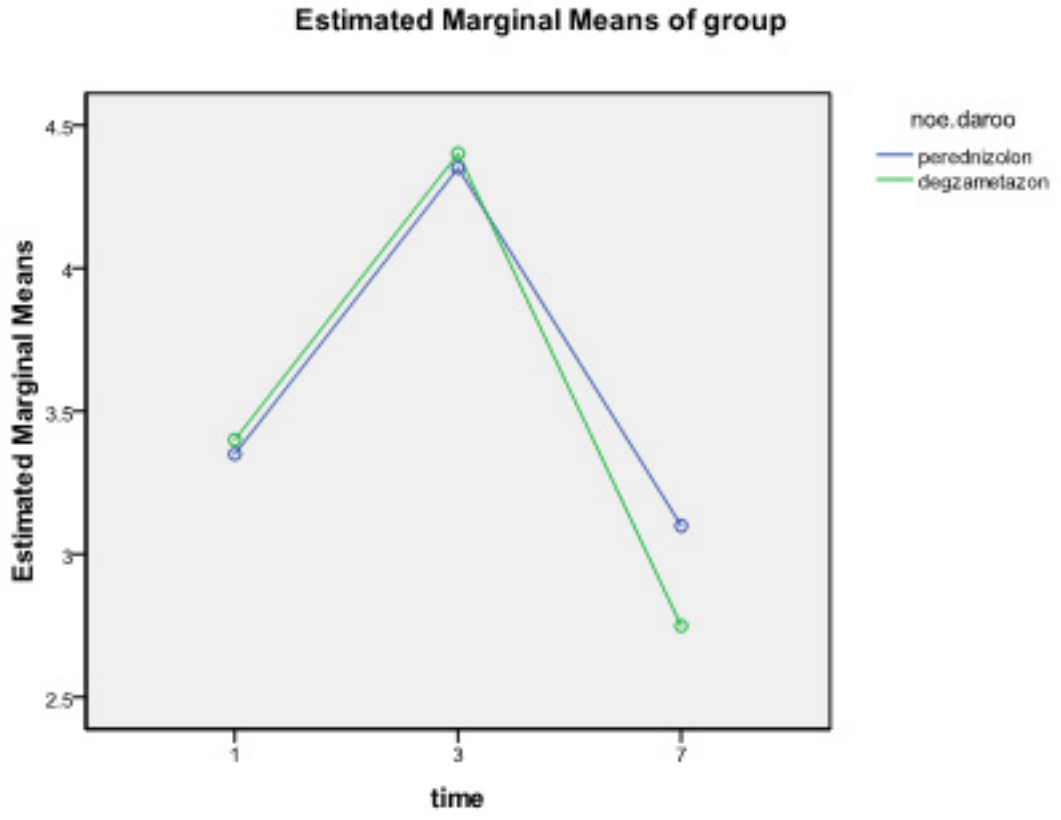


Figure 2: Shows the process of dependent variable (patient's pain) at different levels of the independent variables (the first, third and seventh postoperative day)



Discussion

In this study we examined the efficacy of prednisolone and dexamethasone on pain and swelling after surgery of impacted wisdom tooth. The results of our study showed that a single-dose (12 hours before and after surgery) of prednisolone and dexamethasone has equal effect on control of pain and swelling. Both drugs reduce swelling and pain within 7 days. This means that on the third day after surgery, we had the highest swelling and pain, while in the seventh day we saw a significant decline in signs and symptoms of these. There was no difference between the two drugs in the first, third and seventh days after surgery.

Various studies have been done in this area. Among them we can cite John Tiigimae-Saar in 2010 who studied The effect of prednisolone on reduction of complaints after impacted wisdom surgery and noted that taking a single-dose of 30 mg of prednisolone after surgery is effective in reducing the pain and swelling caused by surgery on removal of wisdom teeth. Also, they found that one-dose of prednisolone and one of NSAIDs is appropriate for treating lockjaw and swelling after dental surgery (44). In another study in 2006 (35) Mikko Lawrence's review of single doses of 40 mg prednisolone to control complications after surgery of wisdom teeth his result showed that methylprednisolone was effective in reducing the problems.

Schmelzeisen (34) evaluated the effect of oral administration of 6 mg dexamethasone 12 hours before and once 12 hours after surgery of two impacted molar teeth, on postoperative lockjaw and the swelling and pain. The result obtained was that a total of 76% of patients preferred to be treated with dexamethasone. Bamgbose found that the concurrent use of dexamethasone and diclofenac potassium gave significantly more effective for pain relief than a single administration of the diclofenac(38).

Darawade in 2014, with comparison of the effect of methylprednisolone and dexamethasone showed that Dexamethasone is more effective in controlling of swelling, but there was no difference between the two drugs on reduction of pain (45). After this research, our study is one of the few studies that compares the effect of prednisolone and dexamethasone to find the right medication to control complaints after surgery of impacted wisdom tooth. We achieved different results about swelling. Probably, the difference in results may be due to differences in dosage and/or how the drug was administered. In our study, 0.5 mg of dexamethasone, 12 hours before and after surgery, was prescribed, while, Ddarawade used 8 mg dexamethasone one hour before surgery. It seems that he was looking for a quick and short-term effect and perhaps this is the reason why the drug has better results on swelling in his study.

Steroids have many systemic side effects and are not recommended unless in necessary situations. Therefore, when administering these drugs, their benefits and detriments should be measured so that the prescriptive dosage of the medicine is better embedded in the packaging in the market instead of prescribing a number of these pills to reach a higher dose and faster results.

Conclusion

In the absence of contraindications of corticosteroids use a single-dose prednisolone and dexamethasone 12 hours before and 12 hours after surgery can help to reduce pain and swelling and complications of impacted wisdom and NSAID drugs can minimize the problems. However, no differences were found between the performance of these two drugs so it cannot be said for certain which of these drugs are more effective but certainly it can be said that the steroids are very helpful in traumatic and wide surgery, reduce the complications of surgery both for patient and surgeon, and accelerate recovery.

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