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Brief Communication **Open Access**

The role of oral prednisolone on swelling, trismus and pain after removal of impacted mandibular molar third

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Abstract

An open labeled clinical trial aimed at assessing the role of oral prednisolone on swelling, trismus and pain after removal of impacted mandibular molar third. This study was done with 30 healthy patients. The study group comprised of 15 patients and control group also comprised of 15 patients. Only the study group received 5mg of prednisolone orally 1 hour preoperatively. All subjects were evaluated preoperatively. In our study we found a single preoperative dose of prednisolone reduced swelling. Statistical analysis and observations were done to determine the difference in swelling, trismus and pain among the control group and study group. A single pre-operative dose of oral prednisolone will definitely help the patient to cope the post operative squaelae, without causing major side effects. Monitoring for adverse effects is essential.

Key words: Prednisolone, mandibular third, pain, trismus, swelling.

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Introduction

The pain and swelling associated with third molars has been documented since historic times. Many soldiers in the German Army are known to have died from cervical and mediastinal emphysema after crude techniques was employed to extract painful third molars during the Second World War. Adolf Hitler, it is said, was so terrified of wisdom teeth complications that he had a dentist accompany him wherever he went.

Earlier, the great French warrior Napoleon Bonaparte suffered from such severe pain and swelling as a result of impacted lower wisdom tooth, which he's believed to have told his confidante that the pain was worse than a hundred enemy daggers driven through his chest. Napoleon even chose to stay away from the battlefield one day when the pain was excruciating.

The procedure of surgically removing an impacted mandibular third molar is inherently a traumatic one and may cause significant swelling, trismus, and pain. It is generally accepted that good surgical technique and gentle handling of the tissues will minimize the sequelae, but certainly will not prevent them. Possible means by which post-operative sequelae may be minimized are thus of importance both to the surgeon and patient. Several types of medications (anti-inflammatory, antihistamines, enzymes and steroids) have been

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used to reduce these postoperative sequelae. Because steroids are potent anti-inflammatory agents, it has been suggested that their use can reduce the sequelae that follow removal of third molars.

Hooley and Francis- Betamethasone had taken orally reduced edema, pain and trismus following third molar removal [1].

Huffman- methylprednisolone was able to show a decrease in the postoperative edema following third molar removal [2].

Messer & Keller – Dexamethasone also has been proved to be effective in reducing pain, swelling and trismus on a subjective study. But another study by Ware and associates, using objective measurements, it was unable to demonstrate any significant decrease in swelling and trismus after oral dexamethasone [3].

O.Ross Beirne and Brian Hollander studied the effect of a single intravenous dose of methyl prednisolone on the postoperative sequelae after third molar removal using objective rather than subjective criteria [4].

Management of acute post operative reactions are essential to adequately treat oral and maxillofacial surgery patients. Post surgical reactions can be effectively managed by using specific treatment methods that are justified by various researchers. These methods include following:

- Comprehensive pre surgical consultation.
- Use of local anesthesia.
- Use either conscious sedation or general anesthesia.
- Administration of oral analgesics prior to time of surgery.
- Meticulous and careful surgery.
- Administration of perioperative glucocorticoids.
- Postoperative convalescence.
- Regular administration of analgesic for 48 – 72 hours.
- Consideration of rescue medications.
- Return for evaluation of unusual or unexpected pain, as necessary.

Use of such strategies gives the clinician the greatest probability of effective management.

Aims and objectives

To evaluate the efficacy of prednisolone on post operative swelling after removal of Impacted mandibular third molar, the efficacy of prednisolone on post operative trismus after removal of Impacted mandibular third molar, and the efficacy of prednisolone on post operative pain after removal of Impacted mandibular third molar.

Materials and methods

This study was done on 30 healthy patients who had been treated at Department of Oral and Maxillofacial Surgery, Dr. D.Y. Patil Dental College and Hospital, Nerul, Navi-Mumbai. Each in need of surgical removal of impacted mandibular third molars agreed to participate in the present study. All are informed of the possible risks and benefits of participation and written consent form has been taken from the participants. local ethical committee has approved this study.

The study subjects were randomly divided into two groups, study Group and control Group.

The study group comprised of 15 patients and control group also comprised of 15 patients. Only the study group received 5mg of prednisolone orally 1 hour preoperatively.

Inclusion criteria: Subjects between age group of 20-50years. Impacted mandibular third molars not associated with acute infection. No concomitant medical problems.

Exclusion criteria:

- Any known or suspected allergies or sensitivities to sulfites, amide type local anesthetics or ingredients in the anesthetic solution.
- Concomitant cardiac or neurological disease.
- Pregnancy/lactation
- Subjects who are on sedatives.

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- Subjects who are on steroid therapy.
- History of chronic alcoholism or drug abuse.
- Patients with local and systemic acute infection.

Materials used in this study

- 2% Lignocaine HCL with 1:80000 adrenaline
- Disposable syringe with 1 5/8 inch, 25 gauge needle
- Standard surgical kit
- Tablet Prednisolone 5mg

Procedure

Anesthesia: Classical inferior alveolar nerve block technique by halstead landmarks: Mucobuccal fold, anterior border of ramus of mandible, coronoid notch, external oblique ridge, retromolar triangle, pterygomandibular raphe, buccal sucking pad, occlusal plane of mandibular posterior teeth.

Technique: The patient is positioned comfortably in dental chair; the head is positioned such that when the mouth is open, body of mandible is parallel to the floor. The finger or thumb is moved posteriorly until contact is made with the external oblique ridge on the anterior border of the ramus of the mandible. Coronoid notch is identified. The palpating finger is moved lingually across the retromolar triangle and onto the internal oblique ridge. While palpating intra oral land mark with thumb the index finger is placed extra orally behind the ramus of mandible to access the anteroposterior width of ramus of mandible. A syringe with a 15/8 inch 25 gauge needle is then inserted parallel to occlusal plane of the mandibular teeth from the opposite side of the mouth, at a level bisecting the finger, penetrating the pterygotemporal depression, entering the pterygomandibular space. The needle is penetrated in to the tissues until gently contacting bone on the internal surface of ramus of mandible. The needle is then withdrawn about 1 mm, aspirated and on negative aspiration 1 to 1.5 ml solution deposited slowly over one minute. The needle is now withdrawn slowly, and when about one half of its inserted depth has been withdrawn, needle is positioned toward the side of injection aspirated and 0.5 ml of solution is deposited to anesthetize lingual nerve [5].

Long buccal nerve block: Land marks: external oblique ridge, Retromolar triangle. The needle is inserted into the retromolar triangle area, confirmed for negative aspiration and 0.3 to 0.5 ml of solution is deposited.

Incision: A standard Terence Ward's incision [6] was placed in all cases and vertical incisions were also placed. Utmost care was taken to minimize the trauma to the soft tissues during reflection of the flap.

Bone removal: Bone removal was done by buccal guttering technique and was performed using rotary instruments with proper cooling [7]. Maximum care was taken to preserve the alveolar bone on the buccal side. Wherever there was locking of the tooth sectioning of the tooth was performed with rotary instruments.

Toilet of the wound and hemostasis: Following delivery of the tooth a thorough toilet of the surgical wound was done and hemostasis was achieved.

Closure of wound: A perfect soft tissue closure was achieved with 3-0 braided black silk sutures. Pressure pack was given with sterile gauze.

Post operative instructions and medication

All patients were given following post operative instructions and medications. To maintain pressure pack over the surgical site for a period of half an hour to achieve hemostasis. To prevent any mechanical disturbances to the surgical site either in the form of vigorous gargling or chewing food was to be avoided. External cold application was advised.

From the second post operative day antiseptic mouth wash was advised to maintain a good oral hygiene. Post operatively, Amoxicillin 500mg, thrice daily for 5 days for all the patients was standardized after 24 hours.

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Acquisition of data

All patients were explained about the study medications which were used. Time of injection, amount of anesthetic injected, duration of surgery, efficacy, adverse events and the need of rescue medication were recorded. The Performa was filled by the patient based on their pain experiences postoperatively. They were told to report to the doctor on 1st day, 3rd day and 7th day after surgical procedure.

Assessment of pain

Post operative pain was evaluated by having the patients report the number of pills they used on 1st, 3rd and 7th post operative days and assess the severity of their pain. Pain was assessed as
0- No pain
1- Mild (1 tab)
2-Moderate (2 tabs)
3- Severe(3 tabs) and
4- Very severe(> 3 tabs)

Assessment of swelling

Vertical Dimension: Midpoint on ala tragus line to inferior border of mandible.

Horizontal Dimension: Angle of mandible to midpoint of chin.

Assessment of trismus

Trismus was determined by measuring the distance on maximal mouth opening between the right maxillary and mandibular central incisors. The differences between the preoperative and postoperative values were used as a measure of trismus.

Results

We analyzed 30 patients, of these 15 were in study group and 15 patients in control group (Table 1). Only the study group received 5mg of prednisolone orally 1 hour preoperatively. All subjects were evaluated preoperatively. Consent was taken from all the patients who were included in the study. All the patients underwent surgical removal of impacted mandibular third molar under 2% lignocaine with 1:80000 adrenaline. Statistical analysis and observations were done to determine the difference in swelling, trismus and pain among the control group and study group.

Variables	Study group	Control group
Number of subjects	15	15
Male : Female	7:8	7:8
Age (years)	25 – 33	23 – 42
Mean Amount Of LA Used (ml)	2.513	2.593
Mean Operating Time (min)	**50.67**	**55.67**

Table 1: Demographic and operation details of study subjects

Even though there were differences in the mean age, sex distribution of the subjects, statistically there was no significance (Table 1A and 1B). Student's t (unpaired) test was done for Trismus, swelling and pain. Values were compared and statistically analyzed. Results are tabulated and depicted graphically (Table No. 2, 3 and 4).

Table 1A: Sex Distribution

Sex			Study Group	Control Group	Total
	Male	Count	7	7	**14**
		%	46.7	46.7	**46.7**
	Female	Count	8	8	**16**
		%	53.3	53.3	**53.3**
	Total	Count	15	15	**30**
		%	**100**	**100**	**100**

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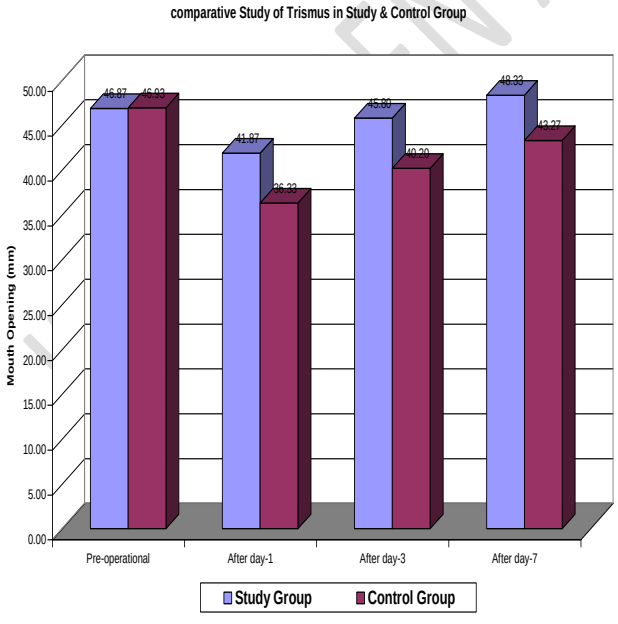
Group	N(Count)	Mean	SD
Study	15	32	3.1
Control	15	34	6.8

Table 1B: Age Distribution

Trismus	Group	N	Mean (mm)	Std.Deviation	Std.Error Mean	P* value
Pre. Op	Study	15	46.87	5.01	1.29	**0.53**
	Control	15	46.93	5.28	1.36	
Day 1	Study	15	41.87	4.55	1.17	**0.006**
	Control	15	36.47	5.36	1.38	
Day 3	Study	15	45.80	4.31	1.11	**0.005**
	Control	15	40.20	5.71	1.47	
Day 7	Study	15	48.33	4.61	1.19	**0.008**
	Control	**15**	**43.27**	**5.13**	**1.33**	

Table 2: Assessment of Trismus (Descriptive Analysis of Trismus)

For p* value (unpaired t- test is used as test of significance at 99% confidence interval)



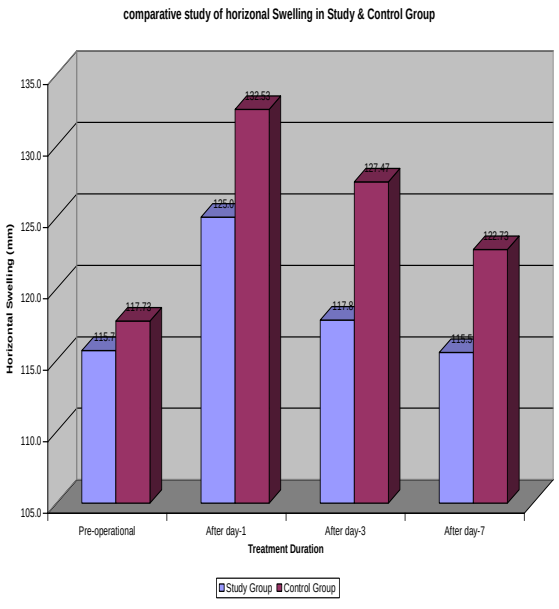


Figure 1:Comparative study of Trismus in both the groups. **Figure 2**:Comparison of horizontal swelling

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Horizontal swelling	Group	N	Mean (mm)	S.D	Std.Error Mean	P* value
Pre.Op	Study	15	115.67	6.84	1.76	0.05
	Control	15	117.73	6.01	1.55	
Day 1	Study	15	125	8.01	2.07	0.009
	Control	15	132.53	6.51	1.68	
Day 3	Study	15	117.80	9.19	2.37	0.002
	Control	15	127.47	6.42	1.66	
Day 7	Study	15	115.53	6.17	1.59	0.004
	Control	15	122.73	6.42	1.66	

Table3: Assessment of Swelling (Descriptive analysis of Horizontal swelling)

For p* value (unpaired t- test is used as test of significance at 99% confidence interval)

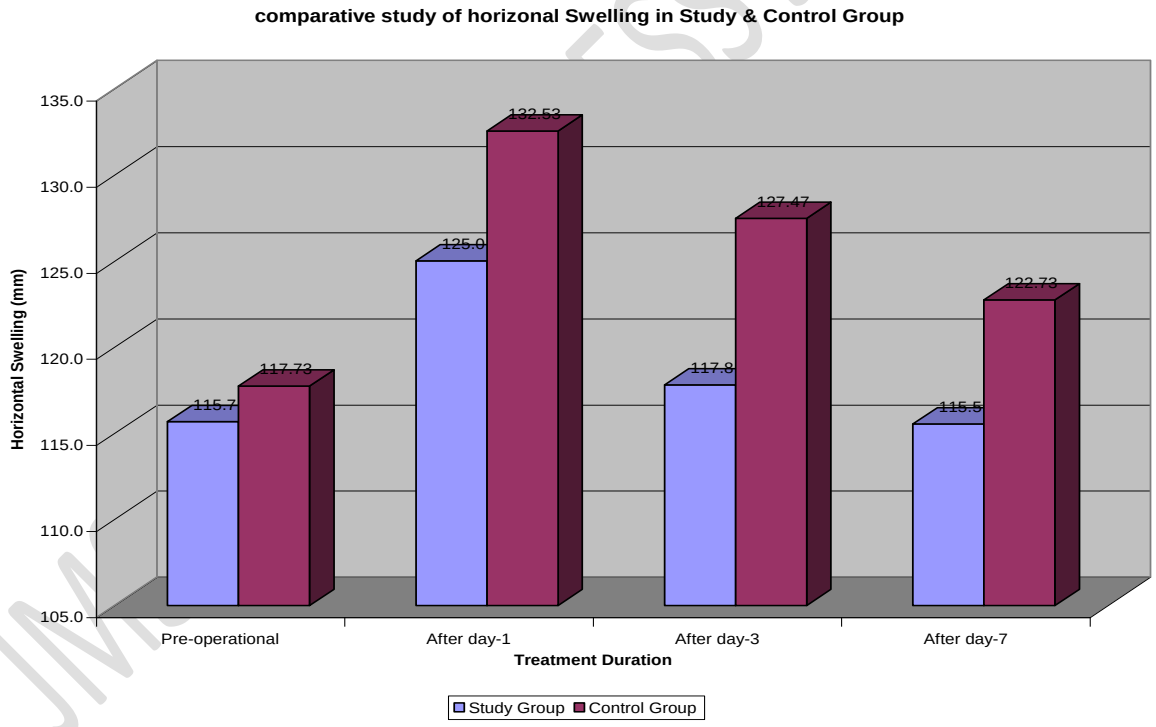

Figure 3

Study group had significantly reduction in swelling (horizontal and vertical) on 1st, 3rd and 7th post operative day as compared to control group. Trismus was also significantly less in study group as compared to control group,i.e., study group had better mouth opening compared to control group on 1st , 3rd and 7th post operative days.

Study group had significant reduction in pain compared to the control group.

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Vertical swelling	Group	N	Mean (mm)	S.D	Std.Error Mean	P* value
Pre.Op	Study	15	66.13	2.64	0.68	0.08
	Control	15	67.73	5.34	1.37	
Day 1	Study	15	74.93	4.25	1.10	0.008
	Control	15	80.20	5.71	1.47	
Day 3	Study	15	67.73	8.75	2.26	0.008
	Control	15	75.20	4.96	1.28	
Day 7	Study	15	65.13	3.11	0.80	0.009
	Control	15	69.87	5.63	1.45	

Table 4: Descriptive Analysis of vertical swelling

	Study group										Control group									
Pain	0	%	1	%	2	%	3	%	4	%	0	%	1	%	2	%	3	%	4	%
Pre-OP	10	66.66	5	33.33	0	0	0	0	0	0	12	80	2	13.3	1	6.7	0	0	0	0
Day 1	11	73.3	3	20	1	6.7	0	0	0	0	8	53.3	5	33.3	2	13.4	0	0	0	0
Day 3	14	93.3	1	6.7	0	0	0	0	0	0	12	80	2	13.3	1	6.7	0	0	0	0
Day 7	15	100	0	0	0	0	0	0	0	0	14	93.3	1	6.7	0	0	0	0	0	0

Table 5: Assessment of pain (Descriptive Analysis of pain)

Discussion

Impaction of third molar teeth is a common disorder, which often necessiates their removal. Surgical removal of an impacted third molar is a model used commonly to test the post operative pain. With the advent of newer nonsteroidal anti-inflammatory drugs and long-acting local anesthetics, the use of synthetic glucocorticosteroids for reduction of sequelae in exodontia has been questioned [8]. Synthetic steroids are used in exodontia to inhibit mediators of acute inflammation. The primary mechanisms are thought to involve suppression of leukocyte and macrophage accumulation at the site of inflammation and prevention of prostaglandin formation. Prostaglandins are inhibited by the disruption of the arachidonic acid cascade. Lipocortin, an endogenous protein produced by steroids, block the activity o phospholipase A2 thus influencing the release of arachidonic acid from cell membranes and the synthesis of prostaglandins, leukotriens, and thromboxane [9]. Prednisolone is a steroid with potent anti-inflammatory properties [10, 11]. Our study shows that a single oral (5mg) dose of this drug can significantly reduces post-operative swelling, trismus and pain.

As with the use of any medication, benefits must overweigh risks. Potential side effects and risks with the use of steroids include suppression of the immune system, hypertension, hyperglycemia, a sense of euphoria, and glaucoma [9]. Absolute contraindications noted are Ocular herpes,

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Tuberculosis, primary glaucoma, acute psychosis and allergy [12]. Perhaps the greatest concern about the use of prednisolone in the third molar surgery is suppression of the hypothalamus-pituitary adrenal axis (HPA). However, the literature indicates that short term, high-dose steroids do not significantly impair the HPA, and in over 20 studies in which steroids were used in exodontias no significant side effects or untoward reactions were noted [4].

Currently there are many glucocorticosteroids to choose from, with differing potencies, biologic half-lives and mineralocorticoid effects. The synthetic steroids have been used extensively in Oral and Maxillofacial surgery for their active anti-inflammatory, longer acting, low mineralocorticoid effects, and have high oral activity.

In this study, Prednisolone was chosen over other steroids because of its higher potency, anti-inflammatory effects and causes less pituitary adrenal suppression [9, 10, 11]. A dose of 5mg was used pre-operatively.

This study showed that there is significant reduction in swelling in study group ('p' value are 0.002, 0.002, 0.004) on 1st, 3rd & 7th post operative days respectively.

The result of this study is concurrent by the study carried out by Cacif, Gluck GM (1976) [10] found that Prednisolone is effective in reducing post operative sequelae swelling, trismus, pain.

During this study it was observed that trismus was significantly less on 1st & 3rd post operative days in the study group as compared to control group (p value are 0.006, 0.005, 0.008) on 1st, 3rd, & 7th post operative days respectively. Trismus is directly proportional to edema. Neupert and Lee [13] found that the steroid significantly affected trismus.

This study showed that there is significant reduction in pain in study group ('p' value are 0.009, 0.045, 0.775) on 1st, 3rd & 7th post operative days respectively. Lin *et al*. [11] concluded that combination of Diclofenac and Prednisolone has better anti-inflammatory and analgesic effect.

Using objective criteria, we have shown that a single oral dose of Prednisolone can decrease the severity of the sequelae to the surgical third molar. Several investigators have reported that long acting local anesthetics and nonsteroidal anti-inflammatory agents can decrease pain following third molar removal.

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