A Comparative Study of the Efficacy of Methylprednisolone Administration Route on Postoperative Sequelae Following Impacted Third Molar Extraction

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Abstract

Background: Surgery on the lower-impacted third molar typically includes injury to the heavily vascularized loose connective tissue due to its anatomical location, leading to inflammatory sequelae during the immediate post-operative stage, including postoperative pain, oedema and trismus.

Aims: This prospective, randomized, comparative clinical study was conducted in 30 patients to assess pain, oedema and trismus in patients undergoing surgical removal of impacted third molars.

Method: The study sample involves 30 patients, randomly categorized into 3 groups: group 1 (control; no steroids), group 2 (Intra-Muscular injection in Masseter muscle), group 3 (oral tablets). Patient aged between 18 and 30, with a similar anatomical position, and similar surgical difficulty, no allergies, without any systemic diseases are included. Syndromic patients, patients with periapical pathologies were excluded from the study. A single surgeon was working on all patients using a standard technique. On the 2nd and 7th postoperative day, linear oedema and maximal mouth opening were evaluated for both routes of methylprednisolone administration and compared.

Results: We observed a higher range of mouth opening found in masseter injection group relative to the oral tablet group on Day 2 & 7, for the steroid treatment groups. On postoperative days 2 and 7, the overall increase in the tragus-commissure, canthus-gonion and tragus-pogonion lines, for control & oral tablet groups were identical and higher than the masseter injection group.

Conclusion: Comparison to the control group following lower third molar surgery, intramassetric injection provided improved outcomes than tablet form in limiting oedema and trismus.

Keywords*: Methylprednisolone Administration; Postoperative Sequelae; Impacted Third Molar Extraction*

Introduction

Inflammation & analgesia are biological reactions of the body to trauma of several origins. Following any surgical procedure, inflammatory mediators are emitted into the tissues in reaction to analgesia, resulting in increased vascular dilatation and permeation, resulting in oedema.[1] In oral & maxillofacial surgery, surgical extraction of mandibular 3rd molars has been the most frequent surgical technique. Owing to the anatomical location of the affected 3rd molars, both soft and hard tissue lesions occur during surgery, leading to postoperative oedema & trismus.[2,3] Furthermore, management of postoperative reactions, can improve patient outcomes by all way. Methylprednisolone is a drug used as a corticosteroid to suppress the immune system and reduce inflammation.

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Mechanism of Action: Unbound glucocorticoids invade cell membranes and attach with certain cytoplasmic receptors, altering transcription and protein synthesis. Glucocorticoids can prevent leukocyte infiltration at the inflammation site through this mechanism, interact with inflammatory mediator production, such as prostaglandins and leukotrienes, and suppress immune function.[4]

Routes Of Administration- Oral; Intramuscular; Intravenous

Indications

1.Endocrine diseases- Primary & secondary adrenal insufficiency & Congenital adrenal hypoplasia

2.Rheumatic diseases-Rheumatoid arthritis & Ankylosing spondylitis

3.Allergic states

4.Dermatological diseases- Pemphigus Vulgaris

5.Ophthalmic diseases

6.Respiratory diseases

7.Neoplastic diseases- Leukaemia

8.Gastrointestinal diseases- Ulcerative colitis

Contraindications: Methylprednisolone is contraindicated when there is known hypersensitivity to components and systemic infection. Its use cautiously in chronic treatment (will lead to adrenal suppression), paediatric patients, obstetrics and neonates

Aim: Purpose of the study "to compare the efficacy of two different routes of administration of methylprednisolone on oedema and trismus after impacted lower 3rd molar surgery".

Inclusion Criteria-

- Age-18 -35
- Asa category-1
- Impacted mandibular third molar –

Ø Winter's classification- Mesioangular,

Ø Pell and Gregory classification-Class 11, Position B

Exclusion Criteria

Ø Smoking

Ø Pregnancy or lactation

Ø Medications interfering healing process

MATERIALS & METHODS

This randomised, prospective and controlled trial involved 30 patients requiring the extraction of a lower 3rd molar that had been impacted. In the control category (group-1), the first 10 patients did not receive preoperative or postoperative steroids. Two further categories were allocated to the remaining 20 patients, with 10 patients in each. Group-2 patients were administered methyl-prednisolone (single dose of 20 mg/ml) into the masseter muscle by parenteral injection; it was achieved in the immediate postoperative time by the intra-buccal method. Group-3 patients were administered methyl-prednisolone(single 20 mg dose) 1 h before treatment as oral medication.

Parameters To Be Evaluated

Trismus and oedema were examined after the surgical intervention and compared to preoperative measurements on day 2 and 7.

Using 3 facial lines Edema was evaluated (Fig. 1):

(1) lateral canthus of eye to gonion angle distance;

(2) tragus to mouth commissure distance on treatment side;

(3) tragus to the soft pogonion distance.

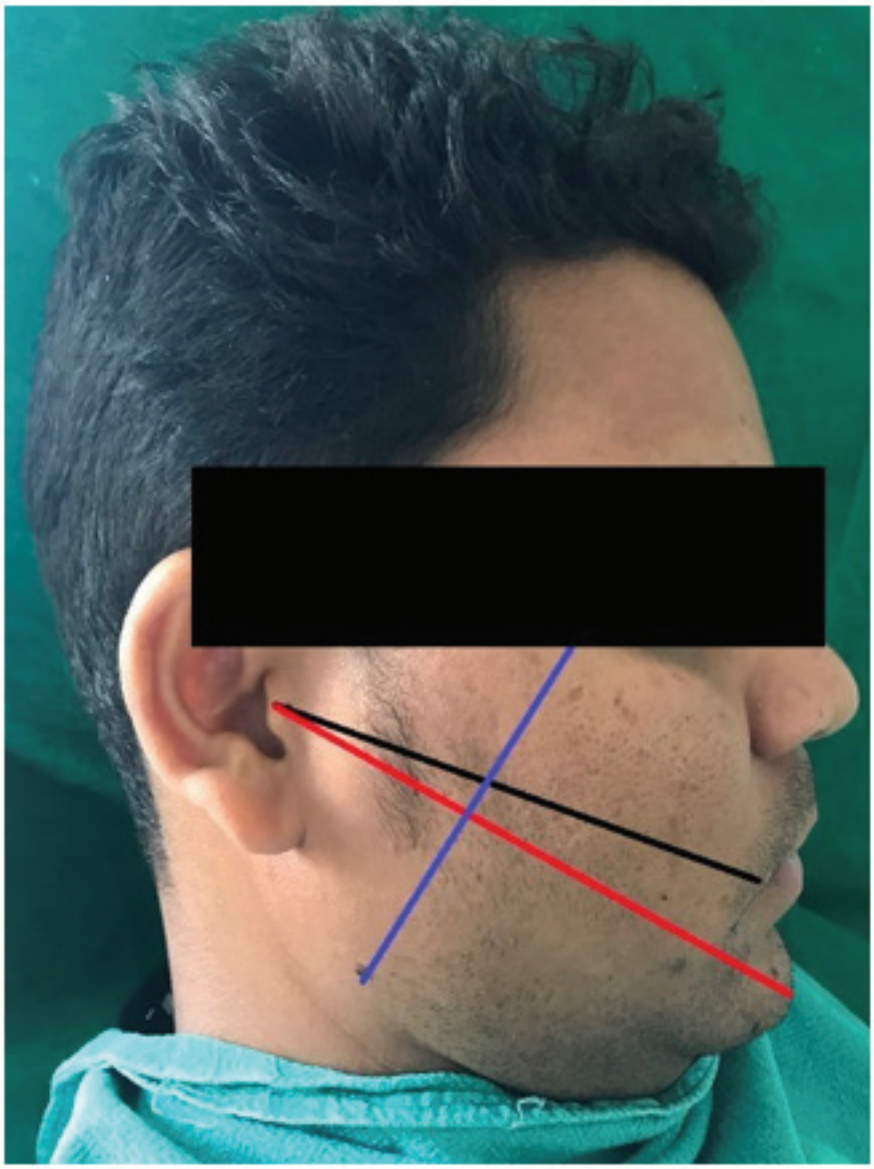

Figure 1. Linear demarcation measures for swelling: canthus–gonion line(blue line); tragus–commissure line(black line); tragus–pogonion line(red line).

The range between upper & lower incisional edges of central incisors was assessed for the evaluation of trismus.[5] For all patients, initial preoperative assessment has been performed. A single surgeon was working on all patients. Patients were prepared for the surgical operation, following standardized surgical and aseptic guidelines.[6] Inferior alveolar, lingual and long buccal nerve blocks were administered. To obtain access, a regular Ward's incision was used, and the tooth was extracted after sufficient bone cutting and tooth splits as were required. To ensure minimum trauma to the tissues, precaution was taken. The socket was furiously irrigated after extraction, using betadine solution combined with equivalent parts of regular saline. With 3-0 mersilk the flap was sutured. All patients were given routine postoperative instructions & were prescribed a 5 days course of antibiotic and analgesic. On a postoperative day 7, intra-oral sutures were removed.[7]

Results

Trismus: The opening of the mouth after the injection of the masseter & oral tablet of methylprednisolone on postoperative days 2 and 7 was observed to be better than in the control group. The higher range of mouth

opening found in masseter injection group relative to the oral tablet group on Day 2 & 7, for the steroid treatment groups.[8] This implies that methylprednisolone is more effective in regional injection form than the oral tablet group in reducing postoperative trismus.

Postoperative Swelling: On postoperative days 2 and 7, the overall levels of the rise in the tragus-commissure, canthus-gonion and tragus-pogonion lines, for control & oral tablet groups were identical and higher than the masseter injection group. [9] For masseter injection group, relevant change was not observed between pre-operative & post-operative measures in canthus-gonion distance and tragus-pogonion line on day 7. In the present study, masseteric methylprednisolone injection is most efficient in lowering swelling on a postoperative day 2 and day 7.[10]

Table 1. Randomised, prospective and controlled trial values

	Time	Control Group	Local Infiltration Group	Oral Tablet Group	Average
Interincisal Distance(cm)	Preop Postop day 2 Post-op day 7 Average	4.6 3.1 3.7 3.8	4.3 3.6 4.2 4.0	4.5 3.2 4.0 3.9	4.4 3.3 3.9
Tragus-commissure line(cm)	Preop Postop day 2 Post-op day 7 Average	11.2 12.4 11.8 11.8	11.6 11.9 11.7 11.7	11.5 12.4 11.8 11.9	11.4 12.2 11.7
Tragus-commissure line(cm)	Preop Postop day 2 Post-op day 7 Average	9.3 9.8 9.5 9.5	9.5 9.7 9.5 9.6	9.6 9.9 9.7 9.7	9.4 9.8 9.6
Tragus-pogonion line(cm)	Preop Postop day 2 Post-op day 7 Average	14.2 15.7 15.2 15.0	14.5 14.7 14.5 14.6	14.3 15.3 14.7 14.7	14.3 15.2 14.7

Disscussion

Inflammatory responses are a protective system in the tissues of the body. Oedema, trismus, pain and prolonged recovery, however, can decrease the patient's quality of life and are difficult to tolerate. With a large degree of possibility, these post-operative conditions are shown.[11]The effectiveness of corticosteroids has been researched in several trials. Since it has minimal mineralocorticoid production and maintains a level of therapeutic plasma in the early postoperative stage, methylprednisolone was chosen for this analysis.[12]

For both the surgeon & patient, this procedure is simple, quick and the injection site is near to the surgical field that is already anaesthetized. Pain is a subjective phenomenon and is caused by variables such as age, sex, levels of anxiety and surgical difficulty about which it is hard to achieve an objective conclusion and was not assessed in the present analysis.[13] The possible adverse

reactions with glucocorticoids depend on the therapy duration and intensity.[14] Chronic steroid usage can induce adrenal suppression, but it has been shown by Novak et al that no complications resulted from a single large dose / short term of methylprednisolone. In this analysis, side effects were not observed. In this present study, the predicted points (the tragus, lateral canthus, oral commissure, gonion, and pogonion) were used to assess oedema, as described by Antunes et al, for validity, convenience, low cost & procedure repeatability purposes, to compare oedema.[15, 16]

Conclusions

Our findings confirm the observation that methylprednisolone injection into masseter is successful in minimising postoperative oedema & trismus. To achieve the most accurate results and to mitigate adverse effects in patients, more trials with larger samples are required.

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Ethical Statement: This study was approved by the institutional ethical committee.

Conflict of Interest: The author declares that there was no conflict of interest.

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