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Role of intravascular methylprednisolone in surgical impaction: An original research

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***Abstract*---**Introduction: Mandibular impacted third molar surgical extraction may cause pain, trismus and swelling. Hence in this study we aim to evaluate the effect of methylprednisolone injection into the muscles on pain edema and trismus post third molar impaction. Material and Methods: We injected methylprednisolone acetate into the masseter muscle via the intrabuccal approach, one hour before the surgery and immediately after suturing of the surgical wound, among the 100 subjects divided to two groups as case and controls. .

we evaluated postoperative pain, trismus and swelling. The numeric pain scale (NPS) was used for pain assessment. Results: we observed that superior results in preoperative group for mouth opening, pain and all the facial swelling parameters, they were also statistically significant differences than when the postoperatively administered methylprednisolone acetate. Conclusions: Preoperative administration of the methylprednisolone is more effective in reducing pain, trismus and swelling, when compared to that administered postoperatively.

***Keywords*---**methylprednisolone, impacted lower, third molars, intramuscular injection.

Introduction

The surgical removal of lower third molars is often associated with significant post-surgical sequelae like pain, trismus and swelling.[1] The biological half life of methylprednisolone is 18-36 hours, and it is reflected to be an intermediate-acting steroid.[2] Many studies with the sub-mucosal, intra-alveolar, intravenous, intramuscular and oral use of glucocorticoids had been reported.[1,3-5] But the study with the intra masseter injection of glucocorticoids had been rarely conducted. But still, being paucity of literature, the present study was to evaluate and compare the efficacy of single dose 40 mg (1cc) methylprednisolone acetate when injected into the masseter muscle via the intra-buccal approach, preoperatively, one hour before surgery or post-operatively, immediately following the surgical removal of lower third molars under local anesthesia, in controlling most common postoperative squeal, i.e. trismus, pain and swelling of facial soft tissues.

Material and Methods

We conducted a randomized, control study after taking the institutional ethics approval. After consent was taken we included 100 healthy subjects, of age 18-25 who had bilateral symmetrically impacted mandibular third molars. We excluded patients with medical conditions and on medication. A single surgeon conducted the study. The standardized protocol was followed in the surgical extractions. The subjects were divided to two groups equally. They received 40 mg (1cc) of methylprednisolone acetate injection into the masseter muscle via intrabuccal approach, either preoperatively 1 hour before the surgery or postoperatively, immediately after the surgery. Measurements of facial parameters and mouth opening were made preoperatively and 2nd and 7th day after surgery. Unforced mouth opening was measured with callipers. Facial swelling was recorded as a distance between the following reference points on face by silk thread: tragus–lip commissure, gonion–lip commissure and gonion–external canthus of the eye. Postoperatively, pain was assessed by numeric pain scale (NPS) every hour for 6 hours from the end of surgery, and then during the next 3 days once in the morning and again at bedtime. The data thus collected was compared keeping the $p<0.05$ as significant.

Results

There was no complication attributed to the use of methylprednisolone acetate or the surgical procedure. Table 1 and 2 presents pre and post-operative measurements of mouth opening and facial swelling between the Group I and Group II. There was no significant difference between both the groups preoperatively. But on 2nd and 7th postoperative day a significant statistical difference was observed between the groups in both mouth opening and facial swelling. (p<0.000). The Group I patients who were administered methylprednisolone acetate preoperatively showed less compromised mouth opening (Table 1) and swelling (Table 2) on 2nd and 7th day postoperatively than the patients given methylprednisolone acetate postoperatively. Hence, the difference was statistically significant. A statistically significant decrease was noted in postoperative pain, 6 hours immediately after surgery and during 3 days after the extraction in the Group I patients receiving methylprednisolone acetate preoperatively (Table 3).

Table 1
Comparison of mouth opening

	Group I (cms)	Group II (cms)	p value
Preoperatively	4.10 ± 0.71	4.24 ± 0.87	0.45
Postoperative - 2nd day	3.30 ± 0.41	2.87 ± 0.38	<0.00*
Postoperative - 7th day	4.10 ± 0.44	3.79 ±0.47	<0.00*

Table 2
Comparison of facial swelling

Tragus–Lip Commissure				Gonion–Lip Commissure			Gonion–External Canthus of the Eye		
	Group I (cms)	Group II (cms)	p value	Group I (cms)	Group II (cms)	p value	Group I (cms)	Group II (cms)	p value
Preoperatively	10.51 ± 0.74	10.51 ± 0.74	0.24	9.57 ± 0.60	9.59 ± 0.62	0.34	11.49 ± 0.88	11.51 ± 0.83	0.45
Postoperative - 2nd day	11.20 ± 0.83	11.78 ± 0.94	<0.00*	10.47 ± 1.17	11.06 ± 1.20	<0.00*	12.40 ± 1.04	12.93 ± 0.97	<0.00*
Postoperative - 7th day	10.61 ± 0.77	10.94 ± 0.77	<0.00*	9.62 ± 1.06	10.04 ± 1.02	<0.00*	11.60 ± 0.94	11.88 ± 0.90	<0.00*

Table 3
Comparison of postoperative pain

		Group I	Group II	p value
Day 0	6th hour	3.80 ± 0.56	4.55 ± 0.93	<0.000*
	Morning	3.23 ± 0.73	4.08 ± 0.83	<0.000*
Day 1	Night	3.10 ± 0.81	3.85 ± 0.80	<0.000*
	Morning	2.28 ± 0.75	3.28 ± 0.72	<0.000*
Day 2	Night	1.78 ± 0.95	3.05 ± 0.88	0.01*
	Morning	0.60 ± 0.87	1.98 ± 0.95	0.02*
Day 3	Night	0.30 ± 0.65	1.43 ± 1.01	0.01*

Discussion

In the present study, a single dose of 40 mg (1cc) methyprednisolone was designated. In the present study no adverse effects of single dose of 40 mg (1cc) methylprednisolone acetate, when used intramuscularly were observed or reported. Various administration routes have been used for these drugs in oral surgery.[4] Effectiveness of the oral route of administration is based on patient compliance, and repeated dosing is needed to maintain adequate blood levels at the postoperative period. Success of oral glucocorticosteroids in reducing the postoperative sequelae after third molar surgery is questionable.[1] Research using intravenous dosing suggest that a single preoperative intravenous dose results in immediate but unsustained enhancement in pain, swelling, and trismus. Hence, intravenous dosing may require postoperative supplemental drug administration (oral or intramuscular) to be optimally effective.[2,6]

Intramuscular administration lets the use of repository (acetate) drug forms, which deliver a slow absorption and a prolonged duration of effect. Intramuscular dosing studies suggest that this route of administration can be operational in a single dose given either preoperatively or postoperatively.[7-10] Thus intramuscular administration of glucocorticoids alleviate the need for repeated dosing and patients compliance. Few studies of the administration of the glucocorticoids in the region nearby to the surgical trauma have been available.[21,24,25] Local administration of steroids seems to be more beneficial due to the fact that eicosanoids act locally on the tissues from which they are released. Numerous of these eicosanoids are accountable for vasodilation, capillary permeability, and chemotaxis.[26] The steroids act directly on such eicosanoids and hence stop inflammatory processes. Besides, locally applied glucocorticoids have direct inhibitory effect on signal transmission in nociceptive C-fibers and ectopic neuroma discharge in injured nerve.[7]

Glucocorticoids when given into the masseter muscle, lower the postoperative sequel like swelling, pain and trismus following the surgical removal of lower third molar, which is also observed in the present study.[1-5] Most of the action of glucocorticoids is mediated through an altered protein synthesis, so onset of biologic action is generally 1 to 2 hours, dependent on the route of administration. Since activation of the early mediators of the metabolic response to surgery occurs immediately after the surgical incision, the administration of glucocorticoids later than 1 to 2 hours before surgery might be too late to profit

fully from the anti-inflammatory effects of glucocorticoids.[7] Several studies have shown that when glucocorticoid are given parentally and preoperatively, the marked lowering in inflammation and trismus can be done in the postoperative period.[8-10] The same was seen in present study.

Conclusion

We can conclude that that single dose of 40 mg (1cc) methylprednisolone in acetate form when used intramuscularly and administered adjacent to the surgical site, masseter muscle in present study, provide potent anti-inflammatory effect. This effect is significantly enhanced when the glucocorticoid are administered one hour before the surgery, then when administered postoperatively, following third molar surgical removal.

References

1. Vegas-Bustamante E, Micó-Llorens J, Gargallo-Albiol J, Satorres-Nieto M, Berini-Aytés L, Gay-Escoda C. Efficacy of methylprednisolone injected into the masseter muscle following the surgical extraction of impacted lower third molars. *Int J Oral Maxillofac Surg*. 2008; 37: 260-63.
2. Montgomery MT, Hogg JP, Roberts DL, Redding SW. The use of glucocorticosteroids to lessen the inflammatory sequelae following third molar surgery. *J Oral Maxillofac Surg*. 1990; 48:179-87.
3. Sisk AL, Bonnington GJ. Evaluation of methylprednisolone and flurbiprofen for inhibition of the postoperative inflammatory response. *Oral Surg Oral Med Oral Pathol*. 1985; 60:137-45.
4. Klongnoi B, Kaewpradub P, Boonsiriseth K, Wongsirichat N. Effect of single dose preoperative intramuscular dexamethasone injection on lower impacted third molar surgery. *Int J Oral Maxillofac Surg*. 2012; 41: 376–37.
5. Messer EJ, Keller JJ. The use of intraoral dexamethasone after extraction of mandibular third molars. *Oral Surg Oral Med Oral Pathol* 1975; 40: 594-98.
6. Pederson A. Decadron phosphate in the relief of complains after third molar surgery. *Int J Oral Maxillofac Surg*. 1985; 14: 235-40.
7. Fleischli JW, Adams WR. Use of postoperative steroids to reduce pain and inflammation. *J Foot Ankle Surg*. 1999; 38: 232-37.
8. Holland CS. The development of a method of assessing swelling following third molar surgery. *Br J Oral Surg*. 1979; 17:104-14.
9. Neupert EA 3rd, Lee JW, Philput CB, Gordon JR. Evaluation of dexamethasone for reduction of postsurgical sequelae of third molar removal. *J Oral Maxillofac Surg*. 1992; 50:1177-82.
10. Dionne RA, Gordon SM, Rowan J, Kent A, Brahim JS. Dexamethasone suppresses peripheral prostanoid levels without analgesia in a clinical model of acute inflammation. *J Oral Maxillofac Surg*. 2003; 61: 997- 1003