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COMPARISON OF INTRAMUSCULAR DEXAMETHSONE AND METHYLPREDNISOLONE IN CONTROL OF POST OPERATIVE SEQUALAE FOLLOWING SURGICAL EXCISION OF IMPACTED MANDIBULAR THIRD MOLARS

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ABSTRACT

Aim: The aim of this study was to compare the efficacy of dexamethasone with methylprednisolone with regards to postsurgical pain and swelling following third molar surgery. **Material and Methods:** 90 patients were divided into Group 1 (Dexamethasone) and Group 2 (Methylprednisolone). Following surgical removal of impacted third molar, each was administered either 8mg of dexamethasone or 40mg of methylprednisolone intramuscularly. Each patient was followed up and readings taken on the 1st, 3rd and 7th postoperative day. Variables recorded were swelling measured with a silk thread and calipers, and pain assessed via a Visual Analog Scale. **Results:** Out of the 90 patients, 47 were male and 43 female, with a mean age of 25 years. There was no stastistical significance between the two groups for both variables, except for swelling on the 1st postoperative day. The results indicated that dexamethasone is more effective at reducing postsurgical swelling on the 1st postoperativeday compared to methylprednisolone. (P<0.05). **Conclusion:** 8mg Dexamethasone is more effective than 40mg methylprednisolone at reducing swelling on the 1st postoperative day when administered intramuscularly. Both are equally effective at reducing postsurgical pain.

KEYWORDS: Methylprednisolone; Dexamethasone; third molar surgery.

INTRODUCTION

Impacted third molar surgery is frequently associated with significant postoperative complications like pain, edema and trismus, regardless of surgical technique. Over the years, attempts to reduce the severity of complications have been advocated to improve patient comfort during the postoperative period.[1]

The use of corticosteroids for this role has been studied and proven to have a significant benefit towards reducing the severity of postoperative sequelae.[2] It is known that corticosteroid reduces and inhibits the synthesis of inflammatory mediators, and this in turn reduces edema by reducing fluid transudation.[3] Although corticosteroids are associated with certain adverse effects like delayed wound healing and disruption of the HPA axis, these effects are clinically insignificant with minor oral surgical procedures.[4]

The use of glucocorticoids in minor oral surgical procedures has been elaborated by many studies, and also the preferred route of administration of the drug; be it oral, submucosal, intramuscular or intravenous, has been explored by many authors. However there is no study that compares intramuscular long acting dexamethasone against the shorter acting methylprednisolone with regards to reducing postoperative edema and pain after third molar surgery.

MATERIALS AND METHOD

DATA SOURCE

A prospective, randomised, double blinded clinical trial that included 90 patients with impacted mandibular third molars in the Department of Oral and Maxillofacial Surgery, Saveetha Dental College, Chennai, from March 2011 to October 2012 after obtaining approval from the Ethical Committee.

INCLUSION CRITERIA

1. Patients aged 18 to 30
2. Impacted lower third molars requiring surgical removal

EXCLUSION CRITERIA

1. Diabetics
2. Immuno-compromised patients
3. Hypertensive patients
4. Pregnancy

5. lactating mothers
6. Peptic Ulcer
7. Cardiovascular Disease
8. Pulmonary Tuberculosis
9. Patients currently on steroid therapy

METHOD OF STUDY

A detailed case history was recorded, relevant clinical examination done, procedure explained and Informed consent was obtained from patients participating in the clinical trial. The patients were then randomised into two groups using a double blinded block randomisation method:-

1. Group 1: Dexamethasone Group (n=45)
2. Group 2: Methylprednisolone Group (n=45)

MATERIALS AND METHODS

Surgical extraction of impacted third molar carried out, followed by administration of either 40mg of methylprednisolone or 8mg of dexamethasone intramuscularly postoperatively. Under Injection 2% Xylocaine (1:200000) with adrenaline impacted mandibular wisdom teeth were removed after bone guttering/tooth division if required using saline cooled surgical bur, wound closure done using 2-0/3- 0 silk sutures. A regime of antibiotics (Amoxicillin 500mg capsules for three days three times a day), and Analgesic (Piroxicam Dolonex-DT 20mg) twice daily for three days).

Following Variables of interest were recorded:

1. Tooth number (FDI) to be removed, along with type of impaction (Mesioangular, Distoangular, Horizontal, Vertical)
2. Postoperative swelling in centimetres, recorded on the first, third and seventh postoperative day across the largest diameter of the swelling; measured using calipers and a silk thread
3. Distance between point A and point B was used to document the size of the swelling.

POINT A

Point where anterior margin of the swelling merges with the adjoining normal facial skin.

POINT B

Point where the posterior margin of the swelling merges with the adjoining normal facial skin.

4. Postoperative pain on a 10 point Visual Analogue Scale recorded on the first, third and seventh postoperative day

Visual Analogue Scale
0- Absolutely no pain
1- Very mild pain
2 to 4- Mild pain
5 to 7- Moderate pain
8 to 9- Severe pain
10- Unbearable pain

The data was then analysed using Statistical Package for the Social Sciences (SPSS) 17, using a Student's t-test to compare between the two groups. The level of significance was set as P < 0.05.

RESULTS

Of the 90 patients involved, 47 were male and 43 were female (Table 6.1). The mean age of the patient's recruited for this study was 24.92 years, with a range from 19 to 30 (Table 6.2).

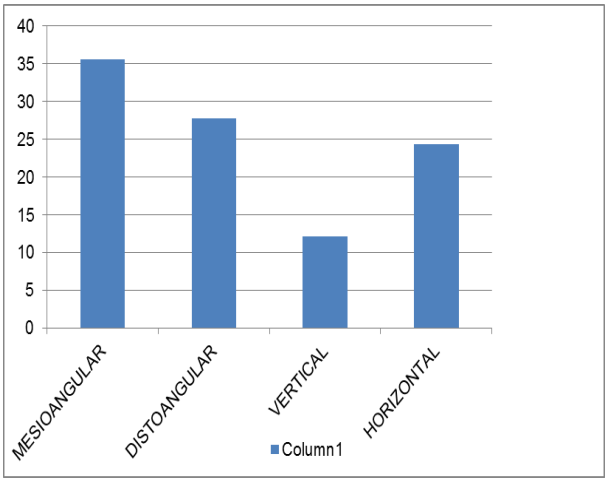
Table 6.1: Illustrates distribution of male to female ratio of patients in this series (n=90).

	N	Minimum	Maximum	Mean	Std. Deviation
Age	90	19	30	24.92	2.797
Valid N (listwise)	90				

The type of impaction was also recorded. The findings can be seen in Table 6.3 and Graph 6.1.

Table 6.3 Illustrates the frequency of the different types of impactions according to winter's classification.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	MESIOANGULAR	32	35.6	35.6	35.6
	DISTOANGULAR	25	27.8	27.8	63.3
	VERTICAL	11	12.2	12.2	75.6
	HORIZONTAL	22	24.4	24.4	100.0
	Total	90	100.0	100.0	



Graph 6.1: Graph representing the frequency of the different types of impactions according to winter's classification.

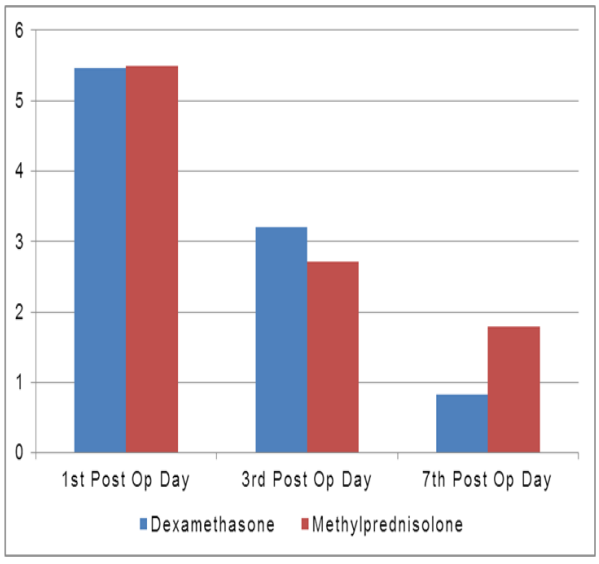
The data between the two groups was analysed using a Student's t-test. There was no statistically significant difference between both Dexamethasone and Methylprednisolone groups for pain on the 1st, 3rd and 7th post-operative days. Pain scores also gradually decreased from the 1st postoperative day onwards.

For swelling, there was a statistically significant difference between both groups on only the 1st postoperative day ($P<0.05$). The results show that the Methylprednisolone group had more postoperative swelling compared to the Dexamethasone group. On the 3rd day and 7th day the differences were not significant. Again, swelling size gradually decreased after the 1st postoperative day.

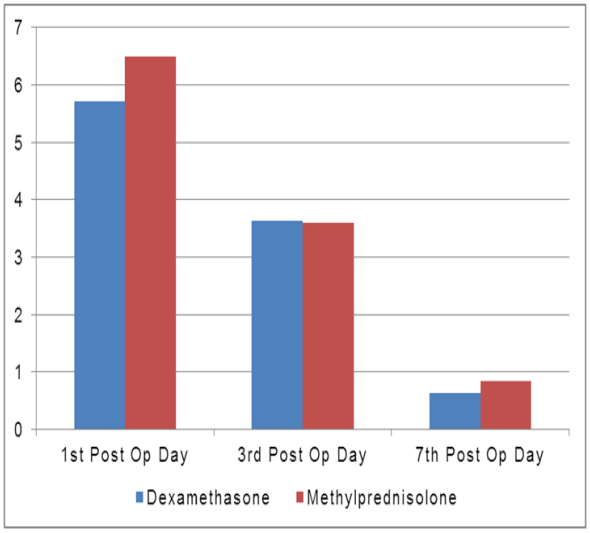
Tables 6.4 and 6.5 display the statistical analysis.

Table 6.4: Illustrates the mean pain scores and mean swelling size on all three follow-up appointments for dexamethasone and methylprednisolone groups.

	GROUP	N	Mean
1st Post Operative Day (Pain)	DEXAMETHASONE	45	5.47
	METHYLPREDNISOLONE	45	5.49
3rd Post Operative Day (Pain)	DEXAMETHASONE	45	3.20
	METHYLPREDNISOLONE	45	2.71
7th Post Operative Day (Pain)	DEXAMETHASONE	45	.82
	METHYLPREDNISOLONE	45	.67
1st Post Operative Day (Swelling)	DEXAMETHASONE	45	5.71
	METHYLPREDNISOLONE	45	6.49
3rd Post Operative Day (Swelling)	DEXAMETHASONE	45	3.64
	METHYLPREDNISOLONE	45	3.60
7th Post Operative Day (Swelling)	DEXAMETHASONE	45	.64
	METHYLPREDNISOLONE	45	.84



Graph 6.2: Compares the mean pain scores on each postoperative day for the dexamethasone and methylprednisolone groups.



Graph 6.3: Compares the mean swelling size on each postoperative day for the dexamethasone and methylprednisolone groups.

Table 6.5: Illustrates the statistical test of significance (t-test for equality of means) between the two groups on each postoperative day for pain and swelling parameters.

		Mean equality of t-test		
		t	df	Sig. (2-tailed)
1st Post Operative Day (Pain)	Equal variances assumed	-.083	88	.934
	Equal variances not assumed	-.083	86.585	.934
3rd Post Operative Day (Pain)	Equal variances assumed	1.427	88	.157
	Equal variances not assumed	1.427	87.222	.157
7th Post Operative Day (Pain)	Equal variances assumed	.920	88	.360
	Equal variances not assumed	.920	83.856	.360
1st Post Operative Day (Swelling)	Equal variances assumed	-2.620	88	.010
	Equal variances not assumed	-2.620	85.791	.010
3rd Post Operative Day (Swelling)	Equal variances assumed	.119	88	.905
	Equal variances not assumed	.119	85.656	.905
7th Post Operative Day (Swelling)	Equal variances assumed	-.994	88	.323
	Equal variances not assumed	-.994	87.736	.323

DISCUSSION

Third molar surgery is commonly associated with postoperative discomfort for the patient, most commonly post-surgical pain, swelling and trismus.[5] Montgomery et al[6] said that the selection of an appropriate glucocorticoid must have minimal mineralocorticoid activity, specific glucocorticoid action, low incidence of adverse effects and extended biological activity. For this reasons, methylprednisolone and dexamethasone have emerged among the glucocorticoids as the more commonly administered drugs to combat postoperative discomfort.

Although many studies exist that compare various routes of administration[7,8,9], dosing of the drug[10] and evaluation compared to a placebo[11,12], there have been few studies that compare the efficacy between two types of glucocorticoids administered as intramuscular injections postoperatively.

In the past, there have been concerns that administration of glucocorticoids could potentially upset the Hypothalamus-Pituitary-Adrenal axis due to the negative feedback mechanism. Various authors have published and confirmed that short term administration of glucocorticoid does not affect the HPA axis.[13]

Inflammation due to tissue injury is the primary factorresulting in postoperative pain following third molar surgery.[14] It appears that although glucocorticoids alone have no clinically significant analgesic effect, they do appear to aid in suppression of inflammatory mediators[15,16] Dionne et al[17] said that although glucocorticoids suppress inflammatory mediator action, the effect on pain report is minimal without a concomitant analgesic. Hyrkas et al[18] postulated that non steroidal anti-inflammatory drugs in combination with a glucocorticoid produce greater relief from postoperative pain than either drug alone. This study shows that no significant difference between the two glucocorticoids might have been masked by the administration of a non-steroidal anti-inflammatory drug, which provided pain relief up to the third postoperative day; following which pain reduced significantly after that.

Regarding postoperative swelling, the only significant difference was on the 1st postoperative day, with dexamethasone showing greater ability to reduce postoperative swelling than methylprednisolone. Glucocorticoids have long been known to reduce postoperative edema and swelling at any surgical site.[19,20,21] The reason the authors believe that this is so is due to the more potent, specific action and longer half-life of dexamethasone compared to methylprednisolone. Dexamethasone also has that added advantage of having a lower Sodium retaining capacity compared to methylprednisolone.[11] Also the relative dosage of the individual drugs when compared to hydrocortisone might have played a role. 40mg of methylprednisolone is equivalent to 200mg of hydrocortisone; whereas 8mg of dexamethasone is equivalent to 212 mg of hydrocortisone.[22] Thus the findings suggest that potency and dosage of the steroid can have an impact on the clinical outcomes of the drug.[23]

Calipers and a silk thread to measure the greatest diameter of the swelling was in this study, a method also used by Vegas-Bustamante et al[24] due to its ease and relative inexpensiveness. Although the method used is subject to individual bias, all measurements were made by a single evaluator in an effort to limit the discrepancy of the results. Other methods that have been used include stereophotography[25], computed tomography[21], compass[26], palapation and observation.[27]

This study shows that both drugs are suitable for clinical use to reduce postoperative complications. Quality of life studies[28,29] indicate that the use of glucocorticoids improve the severity of postoperative symptoms. Absolute contraindications to corticosteroid use include tuberculosis, active viral or fungal infections, acne vulgaris, primary glaucoma, acute psychosis, and allergies to drug components.[6,22] The authors advocate their continued use in the absence of contraindications for the prevention of postoperative complications, not

only due to their therapeuticeffect, but also their lack of complications following short term use.

The use of glucocorticoids intramuscularly following third molar surgery is beneficial to the third molar surgery patient. Future scope for research includes the determination of a protocol for maximum efficacy in combination with non- steroidal anti-inflammatory drugs, antibiotic regiment combinations, and local anaesthetics to reduce postsurgical discomfort following third molar surgery.

CONCLUSION

This study concludes that there is no difference in the efficacy between methylprednisolone and dexamethasone with regards to reducing postoperative pain. However dexamethasone is more effective than methylprednisolone in the early postoperative period to reduce facial swelling following third molar surgery.

It is the final desire of every doctor, clinician, physician, or surgeon, to ensure the total rehabilitation, alleviation of symptoms and improvement in comfort and satisfaction following any treatment or medical procedure. Keeping this in mind, the surgical techniques and postoperative medication should as soon as possible alleviate postoperative discomfort for patients undergoing third molar surgery. It is possible, with the administration of glucocorticoids, to reduce the incidence and severity of postsurgical pain and swelling following this minor oral surgical procedure.

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