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Full Length Research Article

THE EFFECT OF SUBMUCOSAL, INTRAMUSCULAR AND ORAL DEXAMETHASONE IN THIRD MOLAR SURGERY- A COMPARATIVE CLINICAL STUDY

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ABSTRACT

Purpose: Of the study was to evaluate the efficacy of submucosal dexamethasone injection in reducing post operative pain, swelling, trismus and number of analgesics taken following third molar surgery. Comparison was made with oral dexamethasone, intramuscular dexamethasone and control group, managed without steroids.
Materials and methods: A prospective study was conducted for a period of 2 years and 50 patients were randomly allotted to each group. Patients were evaluated on 3rd and 7th post operative days. Subjective factors such as pain (using visual analog scale), number of analgesics taken and objective factors such as trismus (interincisal distance), edema (tragus- midline distance and gonion – lateral canthus distance) measured and compared between each group.
Results: Control group who did not receive dexamethasone had severe pain, swelling and discomfort. Comparing the three groups submucosal , intramuscular and oral dexamethasone, submucosal dexamethasone group had minimal pain and discomfort, normal mouth opening and very minimal odema.
Conclusion: Third molar surgery is one of the common intra oral surgical procedure. Surgical removal of teeth is a nightmare for the patients. Profound local anesthesia can make the patient comfortable during the procedure. Submucosal dexamethasone injection is thus useful in reducing the post operative discomfort and increase patient compliance towards the procedure.

Key words: Dexamethasone, Submucosal, Intramuscular, Oral, Third Molar, Impaction.

INTRODUCTION

Third molar surgery is a routine procedure performed by Oral and Maxillofacial surgeons. The anatomical position of the third molar makes the procedure difficult. The close proximity to vital structures and reduced access causes several complications. Surgeons are constantly improving the technique so that this most commonly performed oral surgical procedure becomes the most comfortable one. Several flap designs are employed to reduce the complications. Bone removal is one of the most common cause of post operative discomfort. Other factors such as surgical duration, experience of the surgeon, level of impaction also determine the post operative sequelae. Steroids are used since decades to reduce swelling and inflammation. Most of the anti-inflammatory and immunosuppressive actions of glucocorticoids are attributable either directly or indirectly to the transcriptional effects of GR agonism which alters transcription of numerous genes in leukocytes, both up and down.

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It inhibits the initial response in an inflammtatory insult, such as vasodilation, increased vascular permeability and migration of leukocytes. Swelling and pain mediated by the inflammatory response is thus reduced. Intramuscular injection of dexamethasone has proved to reduce post operative inflammation and swelling. Oral dexamethasone has improved compliance, palatability, and economical. Submucosal injections of dexamethasone can also be administered locally to reduce the post operative pain and trismus following third molar surgery. This study was conducted to compare the efficacy of different routes of dexamethasone administration in reducing the post operative pain,swelling and trismus in third molar surgery.

PATIENTS AND METHODS

Patients who required surgical removal of mandibular third molar was included in the study. Detailed case history was taken and patients with pericoronitis, systemic diseases, poor oral hygiene were not included in the study. Intraoperative periapical radiographs and orthopantamogram was taken to assess the class of impaction.

Written informed consent was taken from each patient and institutional ethical committee clearance was obtained. Patients were randomly allotted to three groups. All the patients were operated by the same surgeon under local anesthesia. A triangular mucoperiosteal flap was raised followed by bone removal using no.703 TC straight bur. Tooth sectioning was done as and when required. After removing the tooth, the socket was irrigated and sutured with two interrupted 3/0 silk. Following surgery, the patients in group A were given 4mg dexamethasone sodium phosphate as submucosal injection near the surgical site. Patients in Group B received 8mg intramuscular dexamethasone injection. Patients in group C received 8mg oral dexamethasone tablet. Patients in group D did not receive dexamethasone. All patients were given amoxicillin 500 mg TID for 5 days and tramadol 50 mg BD for 3 days. Patients were recalled on 3rd and 7th post op day for evaluation of pain,edema, trismus and number of analgesics taken. Post operative pain was assessed using Seymour (Seymour *et al*., 1982) visual pain scale.

Numerical scale	Severity of pain	Clinical scale
0-2 cm	No pain	0
>2-4 cm	Mild pain	1
>4-6 cm	Moderate pain	2
>6-8 cm	Severe pain	3
>8-10 cm	Pain as bad as it can be	4

Trismus was evaluated by measuring the inter incisal distance. Post-operative swelling was recorded measuring tragus – midline distance and Gonion – Lateral canthus distance. The number of analgesics taken by the patients were recorded. All the measurements were taken preoperatively, three and seven days post operatively. The data were analysed using Statistical Package for Social Sciences, version 16. Unpaired t test was used to compare the variables and p value <0.05 was considered significant.

RESULTS

200 patients who underwent surgical removal of impacted teeth were studied with 50 patients allotted to each group. Preoperative pain score in Seymour visual pain scale was 0 for all the patients. Pain score was less in majority of patients in group A(40 patients – pain score 1 mild pain). Patients in group B had more number of patients with moderate pain and patients in group C had more number of patients with moderate and severe pain. Patients who did not receive dexamethasone (group D) had severe pain on post op day 3. The result was statistically significant with Pearson Chi-Square value 236.442[a] and p value <0.05. Patients in group A had mild/no pain on post op day 7. Patients in group B and C had mild/moderate pain. Patients in group D had moderate to severe pain. The result was statistically significant with Pearson Chi- Square value 240.602[a] and p value <0.05. The mean inter-incisal distance was higher in group A on post op day3 and 7 compared to the other groups. The mean tragus-midline and gonion- lateral canthus distance was greatest in group D indicating increased edema. Group A had very minimal increase in the distance compared to group B and C indicating very minimal edema. The patients in group A took less number of antibiotics compared to the other groups.

DISCUSSION

Surgical extraction of mandibular third molar mostly involves rotary cutting bur for bone removal resulting in post operative pain,trismus and edema. Administraton of dexamethasone can reduce the post operative sequelae. This study compares the efficacy of different routes of administration of dexamethasone. Group A – submucosal dexamethasone injection, group B – intramuscular dexamethasone injection, Group C- oral dexamethasone injection, Group D – without dexamethasone. 200 patients were studied with 50 patients in each group. Pain is usually high on 3-4 post op days due to the inflammatory mediators. Patients in groupA had only mild pain. Pain was moderate to severe in other groups. The efectivness of submucosal dexamethsone in reducing discomfort after third molar surgery has been published in several studies (Grossi *et al*., 2007; Majid, 2011). The studies showed increased pain control when dexamethasone was given submucosal and intramuscular.

Table 1. Shows the number of patients in each group

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	group A	50	25.0	25.0	25.0
	group B	50	25.0	25.0	50.0
	group C	50	25.0	25.0	75.0
	group D	50	25.0	25.0	100.0
	Total	200	100.0	100.0	

Table 2. Shows class wise distribution of impacted teeth in each group

		Group				Total
		group A	group B	group C	group D	
impacted teeth	class 1	17	15	21	24	77
	class 2	16	18	18	14	66
	class 3	17	17	11	12	57
Total		50	50	50	50	200

Table 3. Shows the number of patients in each group with different pain scores on post op day 3.

		group A				Total
		GROUP A	GROUP B	GROUP C	GROUP D	
POST OP DAY 3 PAIN	1	40	8	0	0	48
	2	10	42	17	0	69
	3	0	0	33	50	83
Total		50	50	50	50	200

Table 4. Shows the number of patients in each group with different pain scores on post op day 7

			group A				Total
			GROUP A	GROUP B	GROUP C	GROUP D	
0	49	18	0	0	67		
1	1	27	11	0	39		
2	0	5	34	29	68		
3	0	0	5	21	26		
Total			50	50	50	50	200

Table 5. Shows the mean pre-operative interincisal distance, tragus-midline distance and gonion- lateral canthus distance in mm

	Inter-incisal distance(mm)	tragus-midline distance (mm)	gonion- lateral canthus distance (mm)
Mean	48.3464	107.9128	94.3540
Std. Deviation	.69530	.37924	.15651

Table 6. Shows the mean interincisal distance in each group on post op day 3

Mean inter-incisal distance on postop day 3				
	group A	group B	group C	group D
Mean	47.3076	44.9988	40.4660	38.3596
Std. Deviation	.13543	1.80730	.52106	.67143

Table 7. Shows the mean inter-incisal distance in each group on post op day 7

Mean inter-incisal distance on postop day 7				
	group A	group B	group C	group D
Mean	47.9208	46.2634	41.8338	42.5940
Std. Deviation	.11437	.96290	1.14024	.94205

Table 8. Shows the mean tragus-midline distance in each group on post op day 3

Mean tragus-midline distance on postop day 3				
	group A	group B	group C	group D
Mean	108.4076	109.9746	111.2410	111.9928
Std. Deviation	.42126	.34118	.89016	.29885

Table 9. Shows the mean tragus-midline distance in each group on post op day 7

Mean trgus-midline distance postop day 7				
	group A	group B	group C	group D
Mean	108.0418	109.5156	110.1862	110.5772
Std. Deviation	.14399	.59875	.19779	.86874

Table 10. Shows the mean gonion-lateral canthus distance in each group on post op day 3

Mean gonion-lateral canthus distance on postop day 3				
	group A	group B	group C	group D
Mean	95.5508	95.7884	96.0752	105.2928
Std. Deviation	.26180	.21196	.06597	.18168

Table 11 Shows the mean gonion-lateral canthus distance in each group on post op day 7

Mean gonion-lateral canthus distance on postop day 7				
	group A	group B	group C	group D
Mean	95.1254	95.5548	95.7464	104.5128
Std. Deviation	.00503	.12112	.34398	.05551

Hargreaves KM (Hargreaves *et al*., 1987) reported increased pain after suppression of beta-endorphin released by the pituitary during the post operative period. The low dose of dexamethasone given intravenously inactivates beta-endorphin, increasing the postoperative pain. Trismus was evaluated using interincisal distance. The action of dexamethasone locally on submucosal injection was highly effective in reducing the inflammatory reactions compared to the other routes of administration. Patients who did not receive dexamethasone had a significant reduction in mouth opening during the immediate post operative period. The increase in mean tragus-midline and gonion- lateral canthus was minimal in group A. Giovanni Battista Grossi (2007) reported that parenteral use of dexamethasone 4 mg, given as an intraoral injection at the time of surgery, is effective in the prevention of postoperative edema the number of analgesics taken was comparatively less in submucosal dexona injection group. The anti-inflammatory effects of dexamethasone has increased its use in reducing post operative pain and discomfort (Alexander, 2000; Gersema, 1992; Montgomery *et al*., 1990). Oral and intramuscular routes of administration has also been widely used. The oral route though safe is not reliable. The dose available for distribution varies and hence a significant reduction in post operative swelling and pain is not obtained. Intramuscular route shows better result compared to oral route (Dionne *et al*., 2003). Surgical extraction of third molar is usually done on out patient basis. Hence invasive route of administration becomes inconvenient. Submucosal injection is highly convenient to administer. The anesthetised surgical site will also cause minimal patient discomfort. Greater concentration of drug becomes available locally and loss of drug by distribution through other routes can be minimized.

Conclusion

The surgical removal of third molar can cause post operative discomfort even done with fine surgical skill. The submucosal administration of dexamethasone is highly effective in reducing the post operative sequelae compared to the intramuscular and oral routes of administration.

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