

Comparative study for effectiveness of preemptive analgesia on postoperative pain and swelling following gingivectomy

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Abstract

Introduction: Prevention of postoperative pain can be achieved by effective blockade of noxious stimuli generated during surgery that is after central sensitization. Preventive analgesia or antinociceptive treatment started before surgery in order to prevent central sensitization and limit the subsequent pain experience.¹

Aim and Objective: The aim of the study was to evaluate the role of NSAIDs as preemptive analgesia in controlling pain and swelling after gingivectomy.

Materials and Methods: total of 60 patients were randomly divided into 3 groups, Group A: Tab Aceclofenac 100mg given 30 minutes before gingivectomy, Group B: Tab Ibuprofen 400mg and in Group C: Placebo given to the patients 30 minutes before gingivectomy procedure. Pain intensity were recorded at 6hr, 12hrs, 24hrs, day2 and day3 post gingivectomy. Swelling and No. of rescue analgesic taken by the patient recorded at day 1, day 2 and day 3 after gingivectomy.

Result: The result showed that postoperative pain and swelling reduction was better with Aceclofenac followed by Ibuprofen then Placebo. The distribution of pain reduction was statistically significant at 6hr postgingivectomy.

Conclusion: A preoperative single dose of anti-inflammatory drugs (NSAIDs) can regulate the release of inflammatory mediators and reduce the amount of pain and swelling during postoperative period.

Keywords: Nonsteroidal anti-inflammatory drugs, Chemical mediators, Gingivectomy, Preemptive analgesia, Visual analog scale.

Introduction

Gingivectomy is one of the most common periodontal surgical procedure for the treatment of gingival enlargement. Most of the patients complaint pain following gingivectomy. This pain may be produced either by central or peripheral sensitization. Peripheral sensitization is the reduction in the threshold and increased responsiveness of nociceptive afferent peripheral nerve terminals. Peripheral nociceptors becomes more responsive with repeated application of noxious stimulus.^{2,3} Following peripheral tissue injury, chemical changes can occurs within the CNS. A variety of neurotransmitters are released of which are the most important is substance P. Substance P induces the release of excitatory amino acids such as glutamate and aspartate involved in the increased excitability of N-methyl D aspartate(NMDA) receptor site within the spinal cord. It has been proposed that NMDA receptor sites by excitatory amino acids enhances depolarization, making the neurons more responsive and this leads to amplification and increased duration of pain.⁴ Noxious stimuli causing tissue damage can cause hypersensitivity, hyperalgesia is attributed to combination of peripheral sensitization associated with the lowered threshold of nociceptors and central sensitization linked to the increased excitability of central nervous system.⁵ The aim of preemptive analgesia is to minimize or prevent onset of peripheral and central sensitization by employing various interventions at different stages of pain pathways.

Materials and Methods

This double blind, active control, randomized clinical study was carried out in out patient dept. of Periodontics, Purvanchal Institute of Dental Sciences and Dental Surgery Department, B.R.D. Medical College, Gorakhpur. All patients were explained about study and an informed consent was obtained from them. Ethical committee clearance was obtained before starting of the study.

Study design

Patient with both sexes, age group ranging between 18-45 years with good general health and oral hygiene habit were selected for the study. Subject were not taken any systemic antibiotic since last 6 months before the commencement of the study. Patient with moderate to advanced periodontal destruction with suprabony pocket more than 5mm in depth or gingival enlargement in which the bottom of the pocket not apical to the mucogingival junction were included in the study. The patients were divided into three groups, Group A: 20 patients were given Tab Aceclofenac (100mg) orally, Group B: Tab Ibuprofen (400mg) orally and in Group C: Placebo drug orally administered 30 minutes before gingivectomy. A definite set of questionnaires are given to the patients to fill at 6hrs, 12hrs, 24hrs, day 2 and day 3 after gingivectomy to assess the patients experience of pain and discomfort postoperatively.

Presurgical consideration

All patients were subjected to a thorough initial mouth preparation, oral hygiene instructions, scaling, root planning and polishing etc. at least one week before gingivectomy to

minimize gingival inflammation so that identical clinical pictures existing in all the surgical areas.

Surgical procedure

Following administration of local anaesthesia (Lignocaine HCl 2% with Adrenalin 1:100000), pocket depth marked with the help of pocket marker facially. External bevel gingivectomy was performed as described by Goldman.⁶

Postsurgical consideration

Patients were under proper antibiotic coverage and advised to take 1 tab Acetaminophen (Paracetamol) 650mg as a rescue medication. Patients were recalled at day 1, day 2 and on day 3 postoperatively. At each of recall visit oral hygiene was assessed and oral hygiene instructions were reinforced. All postoperative pictures were recorded and compared with just before surgical intervention on a carefully prepared history sheet utilizing same parameters.

Parameters studied

1) Plaque index, 2) Gingival index, 3) Postoperative pain, 4) No. of analgesic taken 5) Postoperative swelling.

Postoperative pain

The visual analog scale (VAS) was used to evaluate the pain experienced by the patients. It consist of 0-10cm scale with 1cm graduations. The level no pain was given the position zero and the level most severe pain was given the position ten. Pain scoring: Score 0-No pain, Score 1-Mild pain, Score 2-Moderate and Score 3-Severe.

No. of analgesic (Acetaminophen 650mg) tablets taken by the patient on postoperative days

Tab Acetaminophen 650mg was prescribed as rescue medication for pain relief in all the patients. They were strictly instructed to take analgesic drugs whenever the subject suffered from pain and could repeat the dose every 6 hr. The pain score and no. of analgesics taken by the patients were recorded at every recall visits.

Postoperative swelling

At every postsurgical recall visit operated areas were assessed for swelling by visual scoring system. Swelling scoring: Score 0-none (No swelling), Score 1-Mild, Score 2-Moderate, Score 3-Severe

Statistical analysis

Statistical analysis employed to compare the study results using a computer software (Epi info software). To determine the differences in the distribution of various parameters between groups one way analysis of variance (ANOVA) test were utilized. The level of $P < 0.05$ was considered significant.

Results and Analysis

A total of 60 patients with gingival enlargement were selected for external bevel gingivectomy. A number of clinical parameters namely pain at 6hr, 12hr, 24hrs, day 2

and at day 3 postgingivectomy evaluated. No. of analgesic (Acetaminophen 650mg) taken by the patient, swelling, plaque index and gingival index were evaluated at day 1, day 2 and at day3 postgingivectomy. Data obtained were statistically analysed. At 6hr postgingivectomy the mean value for Group A (Aceclofenac), Group B (Ibuprofen) and Group C (Placebo) were 1.6, 1.85 and 2.05 respectively. This shows that with Aceclofenac patients experienced comparatively less pain as compared to Ibuprofen and Placebo. The distribution of pain reduction was statistically significant between these three group at 6hr postgingivectomy. At 12hrs, 24hrs, day 2 and day 3 postgingivectomy pain reduction was more with the Aceclofenac followed by Ibuprofen and least with the Placebo, but the result was statistically insignificant. (Table 1)

No. of rescue medicine (Acetaminophen 650mg) taken by the patients was more with the Placebo group and least with the Aceclofenac group but it was statistically insignificant. (Table 2)

At day 1 and day 2 the swelling was almost same in all three groups but at day3 it was noted that swelling was least with Aceclofenac followed by Ibuprofen then Placebo but the p value was statistically insignificant. (Table 3)

Discussion

Preemptive analgesia is defined as an antinociceptive treatment that prevents establishment of altered central processing of afferent input from injury.⁷ Owing to this protective effect on nociceptive system, preemptive analgesia has potential to be more effective than similar analgesic treatment started after surgical procedure. As a consequence preemptive analgesia can reduce immediate postoperative pain and also prevent the development of chronic pain by decreasing the altered central sensory processing.⁸ Many studies have confirmed the positive effect of preemptive analgesia such as administration of NSAIDs (Nonsteroidal anti-inflammatory drugs), SAIDs (steroidal anti-inflammatory drugs), Opioid analgesic or presurgical administration of Ketamine as an NMDA(N-methyl-D-aspartate) antagonist and peritoneal infusion of long acting local anaesthetics through abdominal incision. For dental pain, NSAIDs are one of the most frequently taken analgesic medication. NSAIDs inhibits inflammation and induce analgesia by inhibiting the activity of cyclooxygenase (COX). Two forms of COX enzymes have been identified COX1 and COX2. COX1 enzyme is present in all tissue and responsible for synthesizing prostanoids that have a cytoprotective function. COX1 enzyme regulates normal activities in stomach, kidney and platelets. COX2 enzymes normally are not present in the tissues and come into play when tissue injury and inflammation occur. Thus NSAIDs exerts their analgesic, antipyretic and anti-inflammatory action by central as well as peripheral mechanism. Aceclofenac (NSAIDs) is predominantly a potent inhibitor of COX2 which is used for pain management. It share structural similarity with another NSAIDs Diclofenac. The therapeutic index of aceclofenac

was reported to be four times greater than that of Diclofenac. Chunduri et al 2013 studied the preemptive effect of Aceclofenac and diclofenac in third molar surgery observed reduction in postoperative pain when administered NSAIDs preoperatively.^{9,10}

Ibuprofen is a NSAIDs that is used for treating pain, fever and inflammation. Compared to other NSAIDs it have fewer side effects such as gastrointestinal bleeding. It works by inhibiting production of prostaglandin by decreasing the activity of cyclooxygenase. Ibuprofen is a nonselective COX inhibitor, in that it inhibits two isoforms of cyclooxygenase COX1 and COX2. Its action mainly through inhibition of COX2.

Pillati et al 2006 in mucoperiosteal flap surgery¹¹ and in crown lengthening Peres et al found no significant difference for the pain intensity when steroidal anti-inflammatory drugs and NSAIDs were compared as

preemptive medications.^{11,12} Steffens et al (2010) also showed no significant difference for pain between Dexamethasone 8mg and Celecoxib 120mg group, this was also true for mucoperiosteal flap surgery.¹³ On the other hand Mehra et al in 2013 compared different pharmacological regimen using SAIDs and NSAIDs and demonstrated that the NSAIDs (Ibuprofen) produced an increased reduction of pain.¹⁴ They observed that patients receiving 600mg of Ibuprofen preemptive and postoperative for a week reported increased effectiveness in reducing PGE2 level in urine and saliva compared to Dexamethasone alone after the removal of impacted lower third molar.

Placebo used in this study had not any anti-inflammatory characteristics as those of Aceclofenac and Ibuprofen so it is not expected to influence any inflammatory response. Therefore placebo group showed least reduction of postoperative pain.

Table 1: Shows postgingivectomy pain at 6hrs, 12hrs, 24hrs, day 2 and day 3 in Aceclofenac, ibuprofen and placebo groups

Groups	Postoperative pain at 6 hours			
	N	Mean	Std. Deviation	Significance
Aceclofenac (Group A)	20	1.6	0.68	<0.05
Ibuprofen (Group B)	20	1.85	0.37	
Placebo (Group C)	20	2.05	0.39	
Groups	Postoperative pain at 12 hours			
	N	Mean	Std. Deviation	Significance
Aceclofenac (Group A)	20	1.0	0.79	>0.05
Ibuprofen (Group B)	20	1.4	0.60	
Placebo (Group C)	20	1.55	0.51	
Groups	Postoperative pain at 24 hours			
	N	Mean	Std. Deviation	Significance
Aceclofenac (Group A)	20	0.6	0.51	>0.05
Ibuprofen (Group B)	20	0.6	0.60	
Placebo (Group C)	20	1.15	0.49	
Groups	Postoperative pain at day 2			
	N	Mean	Std. Deviation	Significance
Aceclofenac (Group A)	20	0.4	0.50	>0.05
Ibuprofen (Group B)	20	0.55	0.51	
Placebo (Group C)	20	0.75	0.44	
Groups	Postoperative pain at day 3			
	N	Mean	Std. Deviation	Significance
Aceclofenac (Group A)	20	0.15	0.37	>0.05
Ibuprofen (Group B)	20	0.35	0.49	
Placebo (Group C)	20	0.55	0.51	

Table 2: Shows number of analgesic taken by the patients at day1, day2 and day3 in Aceclofenac, ibuprofen and placebo groups after gingivectomy

Groups	No. of analgesics at day 1			
	N	Mean	Std. Deviation	Significance
Aceclofenac (Group A)	20	2.3	0.47	>0.05
Ibuprofen (Group B)	20	2.4	0.50	
Placebo (Group C)	20	2.55	0.51	
Groups	No. of analgesics at day 2			
	N	Mean	Std. Deviation	Significance
Aceclofenac (Group A)	20	1.65	0.49	>0.05
Ibuprofen (Group B)	20	1.8	0.52	

Placebo (Group C)	20	1.95	0.51	
No. of analgesics at day 3				
	N	Mean	Std. Deviation	Significance
Aceclofenac (Group A)	20	0.55	0.51	>0.05
Ibuprofen (Group B)	20	1.35	0.49	
Placebo (Group C)	20	1.5	0.51	

Table 3: Shows postgingivectomy swelling at day 1, day and day 3 in Aceclofenac, ibuprofen and placebo groups

Groups	Postoperative swelling at day 1			
	N	Mean	Std. Deviation	Significance
Aceclofenac (Group A)	20	1.5	0.51	>0.05
Ibuprofen (Group B)	20	1.75	0.44	
Placebo (Group C)	20	1.9	0.55	
Postoperative swelling at day 2				
	N	Mean	Std. Deviation	Significance
Aceclofenac (Group A)	20	1.75	0.44	>0.05
Ibuprofen (Group B)	20	1.65	0.49	
Placebo (Group C)	20	1.85	0.37	
Postoperative swelling at day 3				
	N	Mean	Std. Deviation	Significance
Aceclofenac (Group A)	20	0.5	0.51	>0.05
Ibuprofen (Group B)	20	1.3	0.66	
Placebo (Group C)	20	1.4	0.60	

Conclusion

Aceclofenac was better in reduction of pain and swelling after gingivectomy procedure followed by Ibuprofen then Placebo when administered 30 minutes preoperatively. To avoid exaggerated claim and drawing a definite conclusion regarding efficacy of preemptive analgesia further study involving higher number of samples are warranted.

Source of funding

None.

Conflict of interest

None.

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