

Role of 0.2% Chlorhexidine Mouthwash in Incidence of Alveolar Osteitis after Third Molar Surgery: A Clinical Split Mouth Comparative Study

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ABSTRACT

Background: The purpose of this study was to evaluate the role of 0.2% chlorhexidine mouthwash in incidence of alveolar osteitis which is the most common complication in the healing of wounds following the surgical extraction of impacted mandibular third molar teeth.

Materials and method: 50 patients were included in this study with bilaterally impacted lower third molars which were indicated for surgical extraction. The surgical sites were divided into two: study site in which the patient's mouth was rinsed with chlorhexidine gluconate 0.2% postoperatively and control site in which the patient's mouth was rinsed with a normal saline. All the patients were evaluated for pain, presence or absence of integrity of blood clot and coverage of the alveolar bone for the diagnosis of dry socket.

Results: It had shown that the incidence was reduced from 16% to 6% although data was clinically significant but statistically insignificant. ($p > 0.05$)

Conclusion: 0.2% chlorhexidine reduced the incidence of alveolar osteitis after the surgical extraction of impacted mandibular third molars by approximately 10%-15%.

Keywords: AO - alveolar osteitis, dry socket; fibrinolytic alveolitis; 0.2% chlorhexidine gluconate mouthrinse.

INTRODUCTION

Third molars are frequently impacted owing to skeletal insufficiency in the area where they normally erupt [1]. Peterson stated, "If impacted teeth are left in the alveolar process, it is highly probable that one or more of a number of problems such as pericoronitis, periodontal diseases, crowding of mandibular incisors, formation of cysts and tumors, root resorption of adjacent teeth, unexplained pain, will result". To prevent this, impacted teeth should be removed.[2] The ability of

operated tissue after surgical removal of third molar to heal is an essential part of surgery. When healing fails, either totally or partially, the patient experiences the untoward effects of a surgical complication. [1] Osborn and associates, reported overall complication rates of third molar surgery as follows: dry socket 6.3%, secondary infection 3.7%, dysesthesia 0.6%, bleeding 0.2%.[3] The term "Dry socket" was first described in the literature in 1896 by Crawford.[4] Since then, other terms have been

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used to refer to these complications, such as "alveolar osteitis", "alveolitis", "localized osteitis", "alveolitis sicca dolorosa", "localized alveolar osteitis", "fibrinolytic alveolitis", "septic socket", "necrotic socket", and "alveolgia". For routine dental extraction, the incidence of alveolar osteitis has been reported in the range of 0.5% to 5% whereas the incidence of alveolar osteitis after extraction of mandibular third molars varies from 1% to 37.5% thus showing that surgical extractions result in about 10 times higher incidence of alveolar osteitis.^[5,6]

IR BLUM defined dry socket or alveolar osteitis as postoperative pain in and around the extraction site, which increases in severity at any time on 3rd to 5th day after the extraction accompanied by a partially or totally disintegrated blood clot within the alveolar socket with or without halitosis^[5].

There are many other predisposing factors affecting the incidence of dry socket, like extraction of mandibular rather than maxillary teeth, extraction of third molars especially impacted lower third molars, traumatic and difficult extractions, female sex especially if using oral contraception, poor oral hygiene and plaque control, diabetes, smoking, especially if > 20 cigarettes per day, previous history of dry sockets following extractions, excessive irrigation and curettage of the alveolus after extraction, heavy sucking or spitting post operatively.^[9]

There are different regimens for treatment of dry socket like, among all methods of prevention of dry socket no single method is 100% curative. The most effective method for reducing dry socket has been through the use of agents that systemically or topically reduce the oral microbes in the wound.^[6] Chlorhexidine is a bisbiguanide antiseptic with antimicrobial properties. Oral rinsing with chlorhexidine has shown to reduce the quantity of oral microbial population.^[11] So, we carried out this study to evaluate the role of 0.2% chlorhexidine mouthwash in incidence of alveolar osteitis

MATERIALS AND METHOD

A prospective clinical split mouth comparative study was carried out on 50 patients who were undergoing bilateral surgical removal of mandibular impacted third molar teeth.

INCLUSION CRITERIA

Healthy individuals, aged over 18 years of either sex (ASA Class I and Class II) with bilaterally impacted mandibular third molars indicated for surgical removal who were willing for informed sign consent and follow up on 3rd and 5th postoperative day and subsequent day if needed

EXCLUSION CRITERIA

Patient having clinically significant medical history and falling in category ASA other than I and II (eg. Systemic infective disease, haematological disease, deficiency of coagulation factors, diabetes and neoplastic disease), taking medications like oral contraceptives allergic to amide type of local anaesthesia, chlorhexidine and chronic smokers

METHODOLOGY

All the patients were informed regarding the study and informed consent was obtained. Preoperative investigations were carried out to rule out any pathology in the jaws, teeth with routine blood investigations (Such as Hb, BT, CT, RBS) for all the patients.

Patient's face was painted with povidone iodine solution and standard draping was done using sterile drapes. Anesthesia was secured with 2% lignocaine hydrochloride with 1:80,000 adrenaline through inferior alveolar nerve block, lingual nerve block and long buccal nerve block. Sites of disimpaction were randomly divided into two, control site and study site. **Control site :-** Patients received normal saline for oral rinse **Study site :-** Patients received chlorhexidine for oral rinse

A standard Ward's incision, osteotomy and Odontotomy (whenever necessary) done for to facilitate impacted tooth removal on both the sites on alternate 7 days period. Wound was closed with 3-0 silk suture using interrupted suture technique and the patient was given postoperative instructions. Patients were advised to take amoxicillin 500 mg TDS and Ibuprofen 400 mg TDS for 3 days post-operatively. After surgical procedure was carried out on control site patient was treated with using normal saline mouth rinse postoperatively. After removal of third molar on study site, patients were instructed to use 0.2% chlorhexidine mouth rinse for 7 days following the

surgery. They were instructed to use chlorhexidine 0.2% mouth rinse for 30 seconds twice a day with 10 ml of the rinse with 1:1 dilution with clean water. The patients were examined on 3rd and 5th post-operative day on both sides for:

1. Pain: Pain was recorded objectively using VAS (visual analogue scale). The end points of the scale were no pain and severe pain. The values on scale were categorized as: a) no pain (0) b) mild pain (1-2) c) moderate pain (3-6) d) severe (7-10)

2. Integrity of Blood clot: extraction socket was examined for blood clot clinically and recorded as present or absent.

3. Alveolar Bone: extraction socket was examined clinically and recorded as covered or uncovered.



Fig 1: OPG



Fig 2: Clinical photograph of Bilateral Partially Impacted Lower Third Molars.



Fig 3: Reflection of Flap: a) Study site b) Control site.



Fig 4: Extraction Socket After Removal of Third Molar: a) Study site b) Control site.

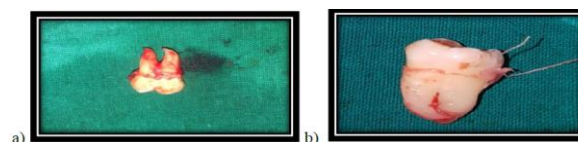


Fig 5: Extracted Teeth: A) Study Site B) Control Site.



Fig 6: Closure of The Wound : a) Study site b) Control site.

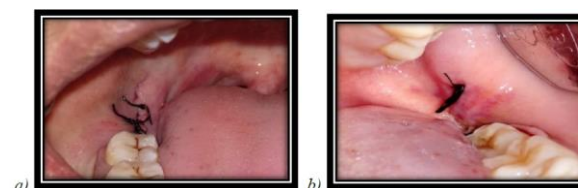


Fig 7: Comparison Between Study Site And Control Site Showing Integrity Of Blood Clot On 3rd Post-Operative Day : a) Study site b) Control site.



Fig 8: Comparison Between Study Site And Control Site Showing Integrity Of Blood Clot On 5th Post-Operative Day : a) Study site b) Control site.

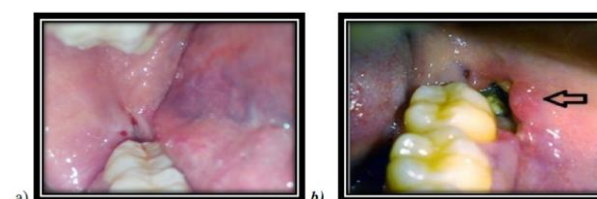


Fig 9: Presence Of Alveolar Osteitis On Control Site : a) Study site b) Control site.

RESULT

A total of 50 Subjects participated in the clinical split mouth study based on the inclusion and exclusion criteria to evaluate the effect of chlorhexidine mouthwash oral rinse on incidence of dry socket after surgical removal of lower third molar. The results were evaluated based on post-operative pain, integrity of blood clot and alveolar bone coverage. All results were calculated using the mean value and standard deviation for each of the parameters considered and checked for statistical significance using **Pearson Chi-Square t test**.

Among 50 patients included in the study, 25 were male and 25 were female patients that out of which, 4(16%) female patients and 7(28%) male patients had dry socket post-operatively. (Table 1). Pain assessment (Visual Analogue Scale) was done by using paired chi square t test and recorded on 3rd and 5th day post-operatively showing statistically significant result respectively (P value: 0.008 and 0.026) (Table 2,3 and Graph 1,2). Blood clot was compared on both the sites using paired chi square t

test showing which was clinically significant but statistically insignificant in both groups P value: 0.110 (Table 5 and Graph 3).

Postoperatively on day 5 assessment of blood clot in extraction socket was done which revealed that on study site integrity of blood clot was present in 47 patients and disintegrity of blood clot was seen in 3 patients out of 50 patients. While on control site integrity of blood clot was present in 42 patients and disintegrity of blood clot was seen in 8 patients out of 50 patients. This showing P value: 0.110 which was clinically significant but statistically insignificant (Table 4 and Graph 3,4).

Healing was assessed on the basis of alveolar bone coverage which was compared on both the sites on day 3 and day 5 postoperatively using paired chi square t test which was clinically significant but statistically insignificant in both the groups (P value: 0.110) (Table 6 and Graph 5,6). At non chlorhexidine site dry socket was seen in 8 patients whereas at chlorhexidine site dry socket was seen in 3 Patients. (Table 6 and Graph 7)

Table 1: Age and Gender distribution

Group Statistics					
SEX		N	Mean	Std. Deviation	Std. Error Mean
AGE	M	25	31.56	8.52487	1.70497
	F	25	30.40	5.72276	1.14455

Table: 2 Comparison of intensity on pain between two groups on 3rd post-operative day

COUNT		Pain on 3 rd post-operative day				TOTAL	P-VALUE= 0.008
		NO PAIN	MILD	MODERATE	SEVERE		
STATUS	STUDY SITE	25	10	15	0	50	
	CONTROL SITE	12	20	14	4	50	
TOTAL		37	30	29	4	100	

Table: 3 Comparison of intensity on pain between two groups on 5th post-operative day.

COUNT		Pain on 5 th post-operative day				TOTAL	P VALUE = 0.026
		NO PAIN	MILD	MODERATE	SEVERE		
STATUS	STUDY SITE	28	9	13	0	50	
	CONTROL SITE	18	14	12	6	50	
TOTAL		46	23	25	6	100	

Table 4: Integrity of blood clot between two groups on 3rd and 5th post-operative day.

COUNT		Integrity of Blood clot on 3 rd post-operative day		Integrity of Blood clot on 3 rd post-operative day		TOTAL	P VALUE =
		PRESENT	ABSENT	PRESENT	ABSENT		
STATUS	STUDY SITE	47	3	47	3	50	
	CONTROL SITE	42	8	42	8	50	
TOTAL		89	11	89	11	100	0.110

Table 5: Alveolar bone coverage on day 3rd and 5th post-operative day.

COUNT		Alveolar Bone Coverage on 3 rd post-operative day		Alveolar Bone Coverage on 5 th post-operative day		TOTAL	P VALUE =
		COVERED	UNCOVERED	COVERED	UNCOVERED		
STATUS	STUDY SITE	47	3	47	3	50	
	CONTROL SITE	42	8	42	8	50	
TOTAL		89	11	89	11	100	0.110

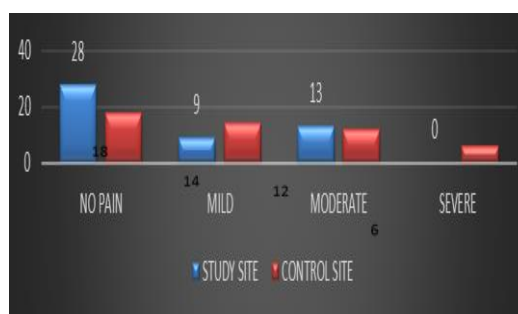
Table 6: Incidence of alveolar osteitis in both group.

	Incidence			
STATUS	alveolar osteitis present	alveolar osteitis absent	Total	%
STUDY SITE	3	47	50	6
CONTROL SITE	8	43	50	16
TOTAL	11	83	100	

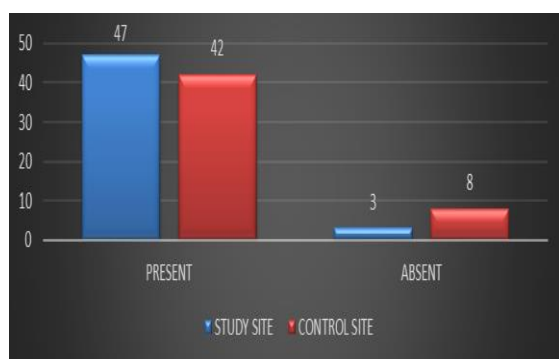
Graph 1: Comparison of intensity on pain between two groups on 3rd post-operative day.



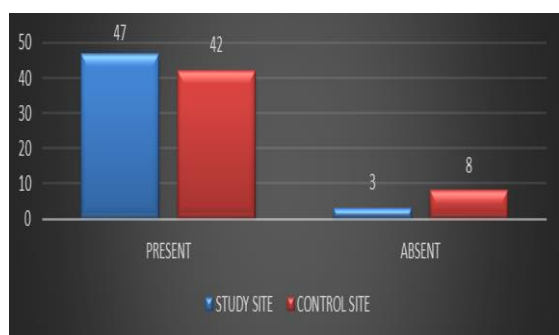
Graph 2: Comparison of intensity on pain between two groups on 5th post-operative day.



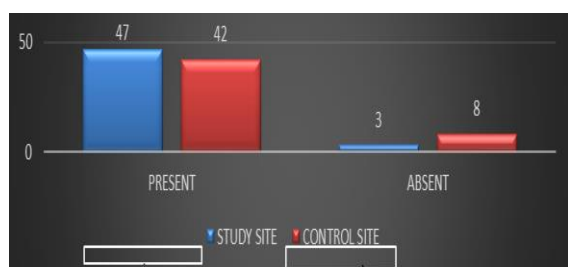
Graph 3: Integrity of blood clot between two groups on 3rd post-operative day.



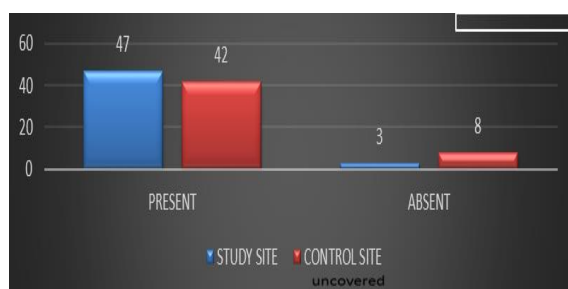
Graph 4: Integrity of blood clot between two groups on 5th post-operative day



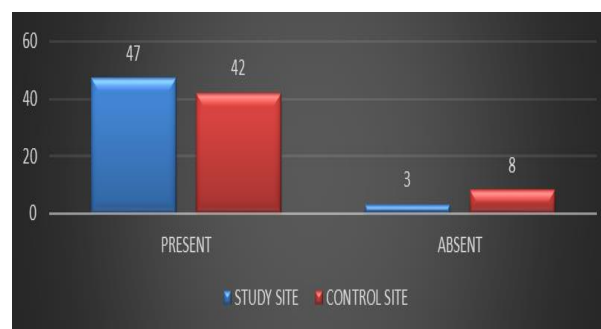
Graph 5: Alveolar bone coverage on 3rd post-operative day.



Graph 6: Alveolar bone coverage on 5th post-operative day



Graph 7: Incidence of alveolar osteitis in both groups



DISCUSSION

Removal of third molar is a routine clinical practice in oral surgery. Third molars are frequently impacted owing to skeletal insufficiency in the area where they normally erupt.^[1] Various symptoms associated with retained third molars include pericoronitis, periodontal defects posterior to the 2nd molars, caries of the 2nd/3rd molars, neurogenic and myofacial pain, as well as odontogenic cysts and tumors, which requires surgical removal of mandibular 3rd molars. Because the region of surgery is mostly composed of loose connective tissue that contains blood and lymph vessels, a series of functional and structural alteration is expected after the surgical removal, like post-operative pain, swelling and trismus. Some times after surgical removal of impacted lower third molar unwanted complications like dry socket might occur.^[4] Hence, quality of life would be a focus in routine clinical trials to determine the ability of newer drugs and procedures to achieve improvement in various aspects of the patients life.

If any disturbance occurs in socket healing stages can disturb or retard socket healing are the breakdown of the socket coagulum, whereby a condition called alveolitis sicca dolorosa is created. This dry socket is regarded as local imbalance between the inhibitors and activators of fibrinolysis, which normally regulate the resolution of the clot.^[6]

Alveolar osteitis was first described by Crawford in 1896. Like other diseases for which etiopathogenesis have not been determined, this disease has also acquired numerous names like alveolar osteitis, fibrinolytic alveolitis, alveolitis sicca dolorosa, avascular socket, dolor post extraction, epithelialized socket, leeren alveole, necrotic alveolar socket, painful socket, alveolitis, circumscribed osteitic foci, localized alveolitis, osteitis post extraction, localized acute alveolar

osteomyelitis, post exodontic alveolar osteitis and post extraction osteomyelitic syndrome.^[4]

The term “dry socket” refers to a post-extraction socket where some or all of the bone within the socket, or around the occlusal perimeter of the socket, is exposed in the days following the extraction, due to the bone not having been covered by an initial and persistent blood clot or not have been covered by a layer of vital, persistent, healing epithelium.^[5] This condition is a well-known complication occurring after the surgical extraction of teeth. The clinical features include disintegration of blood clot in the alveolus 2 or 3 days after treatment which results in an empty alveolus with partially or completely denuded and very sensitive bone surface. The reported incidence following the surgical extraction of impacted mandibular third molars ranges from 1% to 65%.^[3] This great variability is most likely due to differences in diagnostic criteria and uncontrolled variation within the population evaluated. The incidence of dry socket was more in cases of radio-graphically difficult impactions scored by PDI (Pederson difficulty index).^[4] Many authors also observed that incidence rate of dry socket formation was significantly high in habitual tobacco users.^[46]

Birn hypothesized, that the surgical trauma and/or infection induce inflammation in the bone marrow of the alveolus induces the release of tissue activators of plasminogen resulting in transformation of plasminogen into plasmin, inducing the formation of kinins, explaining the two cardinal symptoms of dry socket (pain and lysis of the clot) by the fibrinolytic theory.^[7] Although the exact cause of dry socket has not yet been established, a number of clues have been established based on clinical and experimental finding seems to indicate that most cases of dry socket are due to an in situ fibrinolytic activity, including the effect of contamination of the coagulum with saliva-borne bacteria.^[3]

Attempts to prevent its occurrence have thus focused on reducing oral microbes within the wound either through oral administration of antibiotics^[3,4,9] or local application of antiseptic solutions.^[11,48,49,58-65] The local use of antimicrobial solutions, such as chlorhexidine, also appears to be of value in the control of infection. Chlorhexidine has been used as a rinse and also in combination

with antibiotics and it is effective in the reduction of dry socket. Also it exhibits a residual antibacterial effect with repeated use. Chlorhexidine gluconate 0.2% exerts its antibacterial action by disruption of the bacterial cell membrane. It has both bactericidal and bacteriostatic mechanisms of action, it is effective against many gram -ve and gram +ve micro-organism. It is also useful against fungi and enveloped viruses, though this has not been extensively investigated.^[4,9] Some side effects of chlorhexidine reported are staining of teeth and tongue, an alteration in taste perception, minor irritation and superficial desquamation of the oral mucosa, parotid gland swelling and inflammation etc.^[9]

A recent meta-analysis of the available literature suggests that although 0.12% chlorhexidine rinse has demonstrated effectiveness in reducing the incidence of dry socket, 0.2% chlorhexidine gel applied to the socket every 12 hours for seven post-operative days post extraction is the most effective therapeutic option to prevent dry socket.^[52] Various literatures show that use of chlorhexidine rinse after surgical removal of lower third molar reduce the number of oral microbes which shows the incidence of dry socket was significantly reduced^[4] which is similar to our study.

The present clinical split mouth comparative study was carried out to evaluate role of 0.2% chlorhexidine mouth wash in incidence of dry socket after surgical removal of impacted lower third molar surgery comparing postoperative pain, integrity of blood clot and healing between the two sites. Pain, integrity of blood clot and healing were the parameters that were assessed on 3rd and 5th postoperative day in all the patients requiring surgical removal of impacted mandibular third molar.

The results of the present study revealed that chlorhexidine gluconate 0.2% mouth wash is an effective preventive method of alveolar osteitis after the surgical extraction of impacted mandibular third molars & reduced the incidence of dry socket from 16% to 6%. This is considered clinically as an acceptable limit, although data was statistically insignificant ($p > 0.05$).

The relatively small sample sizes of these studies may be related to the failure to demonstrate

statistically insignificant differences between the treatment groups. But complete prevention was not obtained, this is due to the fact that the most common etiological factors for the clot lysis and the development of dry socket are trauma and infection which causes inflammation of the marrow spaces of the alveolar bone and other main factor is habit and life style of the patients(smoking) which we can not control, this gives rise to the liberation of tissue activators which converts plasminogen to plasmin, this dissolves the blood clot.

CONFLICTS OF INTEREST

The authors declare they have no potential conflict of interests regarding this article.

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