ORIGINAL ARTICLE

ROLE OF 0.2% BIO-ADHESIVE CHLORHEXIDINE GEL IN REDUCING INCIDENCE OF ALVEOLAR OSTEITIS

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Background: Alveolar osteitis is a frequent postoperative complication of third molar surgery. A number of preventive methods have been tried. Chlorhexidine is most widely used antiseptic which is thought to be helpful to prevent alveolar osteitis. The objective of this study was to evaluate role of 0.2% bio-adhesive chlorhexidine gel in reducing incidence of alveolar osteitis after surgical removal of mandibular third molars which causes extra monetary burden on the patients in the form of several follow up visits. **Methods**: A randomized clinical trial was performed in the Dental Section, Ayub Medical College, Abbottabad. Approval from ethical committee was obtained. Total 180 patients were randomly divided into Group A in which patients received 0.2% bio-adhesive chlorhexidine gel and Group B where patients received placebo gel in the extraction socket after removal of mandibular third molar. **Results**: 0.2% bio-adhesive chlorhexidine gel used after mandibular third molar removal reduced incidence of alveolar osteitis by 10% in comparison to control group with statistically significant difference, i.e., p=0.044. **Conclusion**: 2.3 times reduction in the incidence of alveolar osteitis was observed after use of 0.2% bio-adhesive chlorhexidine gel.

Keywords: Alveolar Osteitis; Dry Socket; Chlorhexidine Gel; Mandibular Third Molar

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INTRODUCTION

One of the most common postoperative complications of tooth extraction is dry socket, starting 2–4 days after surgery.[1] First described by Crawford in 1876,[2] is also known as Alveolar Osteitis (AO), Localized Osteitis, Alveolalgia, Alveolitis sicca dolorosa, Septic socket, Necrotic socket etc.[1] The incidence of dry socket ranges from 1–4% for routine dental extractions while it is 45% for mandibular third molars.[1,3] Many definitions and descriptions of dry socket have been reported time to time, but most recent definition is "Postoperative pain surrounding the alveolus, increases in intensity from 1–3 days after extraction characterized by partial or complete loss of clot with or without halitosis."[4]

Aetiology of dry socket is not precisely defined as yet. However, several local and systemic contributory factors are described. Local fibrinolytic activity has been reported as principal etiological factor in previous clinical and experimental studies.[5,6] According to Brin, inflammatory mediators result in partial or complete destruction of clot leading to activation of plasminogen which converts into plasmin resulting in clot disruption by disintegration of fibrin.[5–7] Other contributory factors are oral microorganisms, difficult and traumatic extractions, dental and osseous remnants in the socket, poor oral health, pre-existing infection in the area, smoking, oral contraceptive use and presence of vasoconstrictors in the local anesthesia.[5]

A number of pharmacological preparations have been tried to prevent Alveolar Osteitis such as Obtundent dressings, Antibacterial, Antiseptics, Antifibrinolytics, Anti-inflammatory agents and recently plasma rich in growth factors has also been used.[1,8,9] Recently, a few investigators have studied the effect of 0.2% bio-adhesive Chlorhexidine gel in reducing the incidence of AO and reported positive results with 60–70% reduction.[10,11] But, on the contrary, others found insignificant results regarding effect of 0.2% CHX gel on the incidence of AO.[12–14]

Decreased quality of life and multiple follow up visits are experienced by patients of AO which is devastating for them. The rationale of the current study is to evaluate the efficacy of 0.2% bio-adhesive CHX gel in prevention of AO after the extraction of impacted mandibular third molar to reduce the discomfort and extra monetary burden on the patient in the form of follow up visits.

MATERIAL AND METHODS

A randomized controlled trial was conducted at Dentistry department of Ayub Medical College, Abbottabad from Jan 2015 till 31st July 2017. Ethical committee of Ayub Medical College, Abbottabad approved the study protocol. Informed consent was taken from each patient. Total 180 patients with impacted mandibular third molars were studied.

Blocked randomization of patients to Group A and B, each having 90 patients, was done. Patients in Group A received 0.2% bio-adhesive

chlorhexidine gel after removal of impacted mandibular third molar while patients in Group B received placebo. Age of patients ranges from 21–35 years. Clinical history of the patients was taken regarding medical status, use of oral contraceptives, smoking and previous infection. Intraoral periapical radiograph was used to classify the impacted teeth and assess the difficulty index (Pederson Difficulty Index). Patients with mild and moderate difficulty were included in the study. Patients with uncontrolled metabolic disease, taking oral contraceptives, smokers, immunocompromised patients, pregnant patients, patients who have received antibiotic within 2 weeks before extraction and those who received more than two cartridges of local anaesthetic were excluded from study to control bias.

The procedure was performed under local anaesthesia (2% Lignocaine 1:100,000 adrenaline). Inferior alveolar and lingual nerve block with local infiltration for long buccal nerve was used. Wards incision was planned and mucoperiosteal flap was raised to gain access to third molar.

Buccal bone guttering was done and elevator was used for an easy tooth while sectioning of tooth and distal bone removal was planned in case of difficult extractions. Socket was rinsed with normal saline and gentle curettage was done to remove any osseous or dental remains. 0.2% bio-adhesive CHX gel was placed in patients of group A while placebo gel placed in group B patients and flap was closed with interrupted sutures using 3/0 silk. Postoperative instructions and medications were given. Patient was recalled for follow up on 3rd and 5th day after extraction. Presence of dry socket was confirmed when there was postoperative pain which increased in intensity 2–3 days after extraction and there was partial/total disintegration of clot resulting in empty socket and denuded bone with or without halitosis. All the surgical procedures were performed by an experienced surgeon having 5 years of experience.

Appropriate descriptive statistics were used to report data on continuous and categorical variables. To analyse data, SPSS version 19 was used. Effect of 0.2% chlorhexidine gel on extraction sockets was compared with control. For comparison, Chi-square test was applied with 95% confidence interval. p-value < 0.05 was considered significant.

RESULTS

Total 180 patients were studied. The mean age was 27.47 years (SD±3.98) ranging from 21 to 35 years. Mean age of males was 27.4 years (SD±3.70) while mean age of females was 27.5years (SD±4.22). Both groups have almost equal gender distribution.

Out of total 180, 157 patients, i.e., 87.2% did not show any signs of AO including 74 males and 83 females while 23 patients, i.e., 12.7% showed signs of AO including 9 males and 14 females. There were 7 patients in group A, who suffered from AO including 2 males and 5 females. In group B, 16 patients showed signs of AO including 7 males and 9 females. There is no significant association between AO and gender of the patient (p=0.472)

Among total of 180 patients, 23 patients suffered from AO. Out of these 23 patients, 7 belong to group A where 0.2% bio-adhesive chlorhexidine gel was placed after surgical extraction of mandibular third molar, whereas 16 patients belong to group B where placebo gel was used. (Table-3) There is significant association between intra alveolar placement of chlorhexidine gel and reduction of frequency of AO (p= 0.044).

Of the 180 impacted mandibular third molars, 75 were mildly difficult (Pederson difficulty score 3–4) while 105 were moderately difficult (Pederson difficulty score 5–7). In 23 patients who suffered from AO, 5 patients had mild difficulty level while 18 had moderate difficulty. There is significant association between difficulty level of impacted mandibular third molar and occurrence of AO. (p= 0.038)

Table-1: Gender distribution in group A and B

Gender	Chlorhexidine		Total
	Group A	Group B	
Male	41 (45.5%)	42 (46.6%)	83 (46.1%)
Female	49 (54.4%)	48 (53.3)	97 (53.9%)
Total	90	90	180

Table-2: Distribution of AO according to gender

Gender	Alveolar Osteitis		Total	p-Value
	Present	Absent		
Male	9 (10.84%)	74 (89.1%)	83 (46.11%)	0.472
Female	14 (14.43%)	83 (85.56)	97 (53.88%)	
Total	23	157	180	

Table-3: Distribution of AO according to CHX gel use

Alveolar Osteitis	Chlorhexidine		Total	*p*-Value
	Group A	Group B		
AO Present	07 (7.7%)	16 (17.7%)	23 (12.7%)	0.044
AO Absent	83 (92.22%)	74 (82.22%)	157 (87.2%)	
Total	90	90	180	

Table-4: Distribution of AO according to difficulty index of impacted tooth

Alveolar Osteitis	Difficulty Index		Total	*p*-Value
	Mild	Moderate		
AO Present	05 (21.7%)	18 (78.26%)	23	0.038
AO Absent	70 (44.58%)	87 (55.41)	157	
Total	75	105	180	

DISCUSSION

Alveolar Osteitis is the most common postoperative complication in third molar surgery. It is one of the most studied complications in dentistry and a number of studies have been done and still going on to search for an effective method of its prevention and management. The study was carried out to evaluate the effect of 0.2% bio-adhesive CHX gel on the incidence of AO after surgical removal of impacted mandibular third molar.

There was no significant difference between males and females regarding frequency of AO with p=0.472. These results are not in accordance with few other studies like Hermesch[15] and Josep Rubio Palao[16] who found increased frequency of AO in females. This may be because of the fact that in females, use of oral contraceptives is a predisposing factor and we excluded such patients from the study.

Frequency of AO was significantly lower in the group where chlorhexidine gel was used after extraction as compared to control group having relative risk of 0.43. The results of different researches show frequency of AO to be varying from 1–45%.[3] In current study we found it to be 7.7% in group A where 0.2% CHX gel was used and 17.7% in group B where placebo was used after extraction. The results of our study are in compliance with Torres-Lagares *et al*[17,18], Hita-Iglesias[19] *et al* and Baber *et al*[20] who also found significant reduction in frequency of AO following intra alveolar application of 0.2% CHX gel. Mouthwashes have always been beneficial in management of AO.

One of the most widely used mouthwashes is CHX mouthwash which is said to reduce risk of AO but Hita Iglesias *et al*[19] observed that CHX gel has more promising effects than mouthwash. Enhanced effect of gel might be because of the reason that it provides more exposure time and releases medicament slowly in immediate postoperative period, and also eliminates need of patient's cooperation which is very much needed in case of mouthwash. The lower frequency of AO could also be credited to the antibacterial properties of this agent. Literature has reported that by-products of bacterial infection increase antifibrinolytic activity resulting in disintegration and loss of clot which leads to AO. CHX gel inhibits this fibrinolytic activity resulting in prevention of AO.

Torres-Legares *et al*[18] carried out the similar study and the outcome revealed statistically significant reduction in experimental group in comparison to control group. This study showed same results as incidence of AO in experimental group was 7.7% in comparison to control group where it was 17.7%. An overall lower incidence of AO in this study was due to strict inclusion criteria as we excluded smokers, females having oral contraceptives, patients who received antibiotics before surgery, immunocompromised patients and also those who received more than 2 cartridges of local anaesthetic with vasoconstrictor. All of these factors are considered to play a vital role in pathogenesis of AO.

However, recently a systematic review by Yengopal[12] reviewed and found that only two out of six randomized controlled trials showed reduced incidence of AO after application of CHX gel. Previously, Richards[13] also failed to find sufficient evidence supporting the use of CHX gel in reducing frequency of AO. Requena-Calla and Funes-Rumiche[14], in 2016 conducted a pilot study and could not find any relationship between the appearance of dry socket after application of chlorhexidine gel with p=0.311

The sample size was adequate enough to evaluate efficacy of CHX gel in reducing incidence of AO. Haraji[11] studied 160 mandibular third molar extractions in 80 patients. Torres Legares series studied 30, 103 and 38 patients. Hita- Iglesias[19] studied 73 patients, Rodriguez Perez[21] studied 88 patients and Josep Rubio Palao *et al*[16] studied 160

patients while in this study we have evaluated 180 patients.

Risk factors associated with AO like smoking and oral contraceptives did not influence the results of this study because we excluded smokers and patients using oral contraceptives. Torres Legares[17] and Hita-Iglesias[19] failed to find statistically significant association between these factors and presence of AO. Josep Rubio Palao[16] also found no association between AO and these two factors. Hermesch[15] observed no relation between smoking and frequency of AO but incidence of AO was increased in females using oral contraceptives.

Another very important factor affecting the incidence of AO is difficulty of extraction (Pederson difficulty index). There is higher incidence of AO in surgical extractions in comparison to simple extractions. In surgical extractions there is higher incidence of AO in surgeries longer than 10minutes when compared to surgeries which took less than 10 minutes to remove the tooth. In our study there is a statistically significant association between difficulty of extraction and occurrence of AO, i.e., p= 0.038. We have found 78% of AO to be present in extractions with moderate difficulty (Pederson Difficulty Index).

A number of studies and researches support effectiveness of CHX rinses and gel in minimizing chances of AO after extraction of mandibular third molars. In our study, incidence of AO was reduced by 10% after use of 0.2% bio-adhesive CHX gel in comparison to control group showing statistically significant difference, i.e., p= 0.044. Thus, the study concludes that 0.2% bio-adhesive CHX gel should be routinely used after surgical extraction of mandibular third molars to reduce incidence of AO.

CONCLUSION

This randomized controlled trial concludes that there is 2.3 times less chance of developing AO when 0.2% bio-adhesive CHX gel was used after surgical removal of mandibular third molar, so prophylactic use of this gel should be carried out to prevent this complication and to reduce extra monetary burden on the patients.

AUTHORS' CONTRIBUTION

SS: Literature search, data analysis and interpretation. SMHS: Data collection. MWT: References and proof reading. SRRG: Proof reading. SMK: Data Analysis. MMA: Data Analysis and proof reading.

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