

Efficacy of Intra-Alveolar Chlorhexidine Gel in Reducing Frequency of Alveolar Osteitis in Mandibular Third Molar Surgery

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ABSTRACT

Objective: To determine the efficacy of intra-alveolar administration of chlorhexidine (CHX) gel in reducing the frequency of alveolar osteitis (AO) after impacted mandibular third molar surgery.

Study Design: A randomized control trial study.

Place and Duration of Study: Department of Oral and Maxillofacial Surgery, Armed Forces Institute of Dentistry, Rawalpindi, Pakistan, from January to December 2007.

Methodology: One hundred patients including 65 males and 35 females with the age range 18-40 years were divided in two equal groups (50 each in the CHX and the control groups). Surgical removal of impacted mandibular third molar was carried out and after surgery CHX gel was placed into the alveolus of CHX group. Patients were followed at the first, second and third postoperative days. A proforma indicating presence or absence of pain, blood clot disintegration, halitosis and AO was filled for each patient. Frequencies and percentages were calculated for qualitative data. Chi-square test was applied to compare both subgroups.

Results: Eighteen patients (18%) were diagnosed with AO (11 males and 7 females). Out of these 18 cases, 14 (28%) were found in control group (9 males and 5 females), while 4 cases (8%) in the CHX group (2 males and 2 females). This was statistically significant $p=0.017$.

Conclusion: Single application of CHX gel was effective in reducing frequency of AO following mandibular third molar surgery.

Key words: Alveolar osteitis. Chlorhexidine. Mandibular third molar.

INTRODUCTION

Third molars are the teeth that are most commonly impacted. They are present in 90% of the population, with 33% having at least 1 impacted third molar. The surgical removal of impacted third molars is one of the most commonly performed dentoalveolar procedure in oral and maxillofacial surgery, and is associated with various postoperative sequel.¹ Among the postoperative complications the most commonly encountered complication is a condition known as Alveolar Osteitis (AO).

AO, which is also commonly known as "dry socket"² is defined as "postoperative pain in and around the extraction site, which increases in severity at any time between 1 and 3 days after the extraction accompanied by a partially or totally disintegrated blood clot within the alveolar socket with or without halitosis".³ AO is a

common postextraction complication.⁴ Its incidence following removal of impacted third molars is around 25-30%.^{3,5} There are different etiopathological theories regarding the development of AO, fibrinolytic and bacterial being the main ones. There are various predisposing factors as well, like difficulty and trauma during surgery, roots or bone fragments remaining in the wound, vasoconstrictors in local anaesthetic solutions, oral contraceptives, smoking, experience of the surgeon and poor oral hygiene.⁶⁻⁸ Depending on different aspects of these theories/factors numerous medications have been used in its prevention including saline rinses, topical antiseptic rinses, antibiotics, and antifibrinolytic agents.² Because, the primary role of bacteria in this process has been reported, the most effective method for reducing AO has been the use of agents that systematically or topically reduce the oral microbes within the wound.⁸ Antiseptics and antibiotics have been demonstrated to be the most effective, but the latter are expensive, have significant side effects and may create resistance. Among the antiseptics, chlorhexidine (CHX) mouthwash has proved to be a good prophylactic agent for AO. CHX is a bisbiguanide antiseptic and is effective against both aerobic and anaerobic organisms and yeast.^{3,9} Since, rinsing with CHX is known to reduce oral microbe population,¹⁰ its effectiveness in reducing the

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incidence of AO has generated wide spread interest. The introduction of 0.2% CHX into the market in the form of a bio-adhesive gel to deliver the active substance has opened up new lines of investigation,² as its intra-alveolar placement allows a more direct and prolonged therapeutic effect of CHX, which is useful in the prevention of AO after extraction of impacted third molars.¹¹

The aim of this study was to assess the frequency of AO in patients who underwent surgical extraction of impacted third molars and received single application of CHX gel postoperatively in extraction socket.

METHODOLOGY

This comparative study was carried out at the Oral and Maxillofacial Surgery (OMFS) Department of Armed Forces Institute of Dentistry (AFID), Rawalpindi, Pakistan from 1st January to 31st December 2007.

A total of 100 patients who reported to OMFS department of AFID for the removal of impacted mandibular third molar during the study period were examined clinically and radiologically, and then divided randomly into two equal groups of 50 patients (CHX group, and control group). Patients with acute pericoronitis, taking antibiotics for other infections, with history of smoking, pregnancy, any other bone pathology or immunosuppression were excluded from study.

An informed written consent was taken from each patient after explaining risks and benefits of therapy to include them in the study. All patients were operated by one surgeon under local anaesthesia with the same standard surgical procedure with precaution not to introduce infection from outside. After completion of surgical procedure and achieving haemostasis, 0.2% CHX gel was placed into the alveolus of the CHX group patients but not in control group. All patients received same group of analgesic drug (Ibuprofen 400 mg) for postoperative pain management. A proforma was filled for each patient and patients were followed for the presence or absence of pain, blood clot disintegration, halitosis and AO at first, second and third postoperative days, and on the basis of these findings, diagnosis of AO was made. The data was entered into Statistical Package for Social Sciences (SPSS-10). Frequencies and percentages were calculated for qualitative data. Chi-square test was applied to compare both groups and a p-value < 0.05 was considered significant.

Table I: Alveolar osteitis in chlorhexidine and control group.

Alveolar osteitis	Chlorhexidine group (n = 50)			Control group (n = 50)			Total
	Males	Females	Total	Males	Females	Total	
Present	2 (4%)	2 (4%)	4 (8%)	9 (18%)	5 (10%)	14 (28%)	18 (18%)
Absent	36 (72%)	10 (20%)	46 (92%)	18 (36%)	18 (36%)	36 (72%)	82 (82%)
Total	38 (78%)	12 (24%)	50 (100%)	27 (54%)	23 (46%)	50 (100%)	100 (100%)

p-value 0.017

RESULTS

A total of one hundred patients between the age range of 18 to 40 years (mean age 29 ± 6 years) were divided in two equal groups of 50 patients in each CHX and control groups respectively. Out of a total 100 patients, 65 patients were males and 35 were females. A total of 100 impacted third molars, 54 left and 46 right sided were operated on and patients were evaluated for presence or absence of AO.

Out of 100 patients, 18 patients were diagnosed with developing AO following third molar surgery, out of these 11 were males and 7 were females. Fourteen cases (28%) of AO were found in control group (9 males and 5 females) and 4 cases (8%) in the CHX group (2 males and 2 females) (Table I); the difference was significant statistically (p=0.017). There were no adverse effects and patients adequately tolerated the treatment carried out.

DISCUSSION

Contemporary medical and dental practices demand evidence based decision-making, and the surgeon is called on more and more frequently to justify surgical procedures, including the removal of third molars. The removal of impacted mandibular third molars is often advocated for a variety of reasons; however, absolute indications and contraindications for the removal of these teeth have not been established.^{12,13}

AO is considered as one of the most common postoperative inflammatory complication after surgical removal of mandibular third molar.¹⁴ While the reported frequency of AO varies considerably, with estimates ranging from 0.5% to 68.4%,¹⁴ most studies^{3,5} have reported frequency of AO between 25-30% after the removal of impacted mandibular third molar. In this study the overall frequency of AO was found 18%, this is consistent with the study by Delilbasi *et al.*,⁹ who reported incidence of AO upto 20%.

Exact pathogenesis of AO is not well understood. Birn suggested that the etiology of AO is an increased local fibrinolysis leading to disintegration of the clot.¹⁵ This fibrinolysis is the result of plasminogen pathway activation, which can be accomplished via direct (physiologic) or indirect (nonphysiologic) activator substances.¹⁵ Direct activators are released after trauma to the alveolar bone cells and indirect activators are elaborated by bacteria.¹⁵

There are several contributing or risk factors for development of AO including surgical trauma and difficulty of surgery,^{15,16} lack of surgical experience,¹⁶ mandibular third molars, oral contraceptives, female gender, smoking,⁷ physical dislodgement of clot, bacterial infection, excessive irrigation or curettage of alveolus, older age, local anaesthetic with vasoconstrictor, and bone/root fragments remaining in the wound.⁶

Since AO is the most common postoperative complication after extraction, numerous methods and techniques are proposed throughout the literature to assist with its prevention. Although no single method has gained universal acceptance, the most popular methods and technique for prevention of AO include use of topical and systemic antibiotics,¹⁷ topical use of para-hydroxybenzoic acid as an antifibrinolytic agent in extraction wounds,¹⁸ topical use of tranexamic acid in the extraction socket,¹⁹ use of a clot supporting agent poly(lactic acid), topical application of an emulsion of hydrocortisone and oxytetracycline,²⁰ use of eugenol containing dressings, and pre- or perioperative use of 0.12% CHX solution.

Chlorhexidine is used as an antimicrobial agent for the prevention of dental caries, periodontal diseases, and AO.²¹ CHX is a good prophylactic agent for AO,⁵ and all related published studies have confirmed the suitability of CHX rinses;^{9,11,21,22} although there were differences in protocol like rinsing with CHX only on the day of surgery and using multiple rinses with CHX. A double-blind study carried out by Torres-Lagares *et al.* described the use of topical (intra-alveolar) administration of CHX in a gel form to see its effectiveness in reducing incidence of AO after lower third molar surgery.⁵ They found 30% of AO in control group (group who received placebo gel) and 11% in experimental group (group who received CHX gel), which was significant statistically. In this study, a reduction in the frequency of AO was observed in the CHX (experimental) group, being significant in respect to the control group (p value .017). We observed 28% AO in control group and 8% in CHX group which is almost consistent with the results of Torres-Lagares *et al.*⁵

The application of intra-alveolar CHX gel could explain the reduction found in the frequency of AO. No adverse reactions to CHX were observed in our study, as opposed to the study of Delilbasi *et al.* who reported allergy, staining of teeth, mucosal irritation, alteration in taste, bad taste of the solution, and gastrointestinal complaints as adverse reactions of CHX.⁹ One of the reasons of not observing any of this adverse affect in the present patients could be that CHX bio-adhesive gel was used as single application, while Delilbasi *et al.* used CHX solution before, during and after surgical procedure.⁹

Several studies have diagnosed AO between 2nd and 4th postoperative days when patients complained of a painful extraction socket, and by clinically examining extraction sockets which revealed empty socket or disintegrated clot with denuded bone and fetid smell.^{5,22}

In this study, AO was diagnosed in all the patients on 2nd postoperative day by history of painful extraction socket, and by clinically examining the socket having disintegrated blood clot on 2nd postoperative day along with pain and halitosis as complained by patients.

Management of AO is aimed in controlling pain until commencement of normal healing and in the majority of cases local measures are satisfactory, however in some cases systemic analgesics or antibiotics may be necessary or indicated. Different medicaments and carrier systems are available and the most widely used preparation is Alvogyl (Septodont; Int, Wilmington, DE), which contains Butamben (anaesthetic), Iodophorm (antimicrobial) and Eugenol (analgesic).²³

Further, well controlled studies and investigations using standard definition for AO, stratification of patients by gender, difficulty of extraction, smoking etc are needed to determine the best use of CHX in patients having mandibular third molar surgery.

CONCLUSION

The data presented indicates that the bio-adhesive gel containing 0.2% CHX, applied only once in the alveolus, decreases AO following removal of impacted mandibular third molars. Intra alveolar CHX gel may thus prove to be a good prophylactic agent for this condition.

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