

PREVENTION OF ALVEOLAR OSTEITIS IN SURGICAL REMOVAL OF LOWER THIRD MOLAR

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ABSTRACT

The purpose of this study was to evaluate and compare the efficacy of chlorhexidine (CHX) and amoxicillin plus clavulanic acid combination with control and Chlorhexidine CHX rinse alone for prevention of alveolar osteitis following the extraction of mandibular third molar.

This clinical double blind randomized control trial was carried out in the Department of Oral and Maxillofacial Surgery at Liaquat University Hospital, Hyderabad for a period of two years from February 2008 to December 2009. A total of 214 patients were included in the study using non-probability purposive sampling technique. Informed consent was taken for participation in study and all treatment options, risks, benefits and complications were discussed before any intervention. The study was approved by university ethical review committee. All the patients were randomly divided into three groups by using random number table. After written informed consent extraction of 3rd mandibular molar was performed. Group 1 rinsed with 15 ml of 0.2% Chlorhexidine solution for 30 seconds twice daily for seven days. Group 2 patients in addition to 0.2% Chlorhexidine solution were prescribed Augmentin (amoxicillin trihydrate 500 mg plus, clavulanic acid (125 mg)) twice daily for 7 days. The patients of Group 3 used normal saline solution (0.09 % NaCl). Patients were scheduled on third and seventh day postoperatively for postoperative follow-up and were evaluated for the presence or absence of alveolar osteitis. The diagnosis of alveolar osteitis was made on the basis of collaborative clinical and subjective findings.

The results of this study showed significant reduction in the incidence of alveolar osteitis in patients who received 0.2% CHX rinse in combination with oral amoxicillin and clavulanic acid.

Key Words: Alveolar osteitis, mandibular lower third molar extraction, antibiotic prophylaxis and chlorhexidine.

INTRODUCTION

Uneventful healing of the surgical site is one of the most important objectives in oral surgery after extrac-

tion of third molar.¹ Normal healing does not always occur. Sometimes it is due to necrosis in the socket which leads to the symptoms like severe pain.^{1,2,3} If untreated it turns into focal osteomyelitis or alveolar osteitis (AO). In this condition healing may occur in few weeks by sequestration or resorption of the necrotic bony walls of the socket and secondary intensive epithelialization delayed.⁴ Birn's fibrinolytic theory and the bacterial theory are two main theories stipulated currently for the etiopathogenesis of alveolar osteitis; but there is no conclusive data available to

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accept or reject any theory. Attempt to prevent alveolar osteitis have focused on reducing oral microbes within the wound either through oral administration of antibiotics or local application of antiseptic solution.^{3,5,6}

Incidence of alveolar osteitis in females is higher than in males. This may be due to the use of oral contraceptives in females. Common age of occurrence is 2nd to 4th decade of life.⁷ The incidence of dry socket (alveolar osteitis) is about 10 ten times more in mandibular than in maxillary molars.⁸ The associated risk factors identified for alveolar osteitis include infection, surgical trauma to the bone, inexperienced surgeon's skill, smoking, oral contraceptives, insufficient blood supply and poor maintenance of the oral hygiene.^{9,5} Fibrinolysis following the loss of blood clot is thought to be the common cause of alveolar osteitis.⁶

The usage of CHX as preoperative irrigant of the gingival crevice and a mouth rinse has been shown to considerably decrease the amount of oral bacteria.^{6,7,12,13} Oral antibiotics are also prescribed to avoid undue post-surgical sequelae. These preparations like Amoxicillin plus clavulanic acid are diffusible into the most of the fluids and tissues of the body. They achieve peak blood level within couple of hours after their introduction. These compounds are reportedly very sensitive against Gram-ve bacilli, enterococci and to those bacteria that produce enzyme beta lactamase.^{14,15}

The objective of this study was to determine the efficacy of the 0.2% chlorhexidine gluconate rinse and oral amoxicillin plus clavulanic acid as prophylactic therapy for the prevention of alveolar osteitis following the removal of mandibular impacted third molar.

METHODOLOGY

This clinical study was a randomized, prospective clinical trial with parallel groups in a single center was carried out in the Department of Oral and Maxillofacial Surgery at Liaquat Medical University Hospital, Hyderabad for a period of two years from February 2008 to December 2009. A total of 214 patients were included in the study using non-probability purposive sampling technique. Normal healthy persons having impacted mandibular 3rd molar and age ranges from

20-40 years irrespective of gender were included. The patients who had acute pericoronitis, were allergic to Chlorhexidine and penicilline were excluded. All the patients were randomly divided into three groups by using random number table after written informed consent.

Group 1: The patients in this group (n=73) first rinsed with 15 ml of 0.2% Chlorhexidine solution for 30 seconds for seven days twice daily.

Group 2: The patients in group 2 (n=69) in addition to 0.2% Chlorhexidine CHX solution were prescribed Augmentin 500 mg, and clavulanic acid 125 mg twice daily for 7 days.

Group 3: The 3 patients were asked to rinse with normal saline solution (0.09% NaCl).

All the patients were operated under local anaesthesia. Patients were scheduled on third and seventh day postoperatively for postoperative follow-up and were evaluated for the presence or absence of alveolar osteitis. Diagnosis of alveolar osteitis was made on the basis of clinical findings like loss of blood clot, necrosis of blood clot, exposed alveolar bone and with throbbing pain at the surgical site that was not relieved with mild analgesics. The statistical package for social science (SPSS) version 17.0 was used to analyze the data. Paired sample t test was used for evaluation of 0.2% Chlorhexidine gluconate and amoxicillin plus clavulanic acid combination. Frequency and percentage were computed for gender, age groups of the patients. Mean with standard deviation, 95% confidence interval, median with IQR was computed for age, post-operative sensitivity score. The depth of impacted mandibular third molar in relation to alveolar osteitis was analyzed by independent sample T test and ANOVA respectively. P<0.05 value was considered as level of a significance.

RESULTS

A total of 214 patients got third molars surgically removed. Patients ages ranged from 20-40 years. The mean age was 30.4 years + SD 5.20 presented in Table 1. All three treatment groups were well balanced with respect to the age and gender; the three groups had

nearly identical male-to-female ratios and mean ages (ages (Table 2).

Characterization of mandibular third molar removal along with incidence of AO is shown in Table 3. Study groups based incidence is shown in Table 4.

DISCUSSION

The outcome of this study is similar to the findings of Minguez-Serra MP et al.¹⁶ They found almost identical percentages of AO using mouthwashes of chlorhexidine with amoxicillin plus clavulanate. Although a decreased incidence of AO was found in patients in the CHX-only group in this study, this was not statistically significant. There is some evidence to

suggest why CHX alone may be ineffective in the prevention of AO. The study of Schiott et al¹³ on the effect of CHX mouth rinses on human flora, noted that salivary microbial amounts were decreased up to 95%, but the remaining bacterial levels in saliva after rinsing were still high enough to initiate fibrinolysis and alveolar osteitis.

In literature among the antiseptics, chlorhexidine has shown good results as prophylactic agent for AO. According to Ragno and Szkutnik¹⁷, CHX 0.2% mouthwash produced a considerable decrease of alveolar osteitis after impacted 3rd molar extraction up to 17.5%. After one week post-extraction Larsen⁵ found 16% cases of AO in the control group (placebo), whilst 8% reduction in chlorhexidineChlorhexidine (0.12% group). Up to 50 % re-duction was observed by Ragno, Bonine and Hermesch et al, using the same study groups.^{6,17,18} On the contrary Berwick and Lessin¹⁹ found no differences in the incidence of AO in the comparative groups of 0.12% chlorhexidine and 0.05% cetylpyridium.

Increase prevalence of b-lactamase producing bacteria and bacterial resistance to some antibiotics¹⁴ was rational to use amoxicillin plus clavulanic acid in this study.¹⁴ Seventy one mandibular third molar extraction sites are routinely contaminated with bacteria as shown by MacGregor and Hart.¹² They observed that all sites harvested bacteriological growth. The development of resistant strains of pathogenic organisms has also been detected.¹⁴ Hunt et al²⁰ stated that Streptococci resist erythromycin (53%), and Staphylococcus aureus to penicillin and erythromycin (50%).

TABLE 1: DESCRIPTIVE STATISTICS OF AGE
n=214

| Statistics | Age (years) |
|-------------------------|----------------|
| Mean ± SD | 30.44 ± 5.20 |
| 95% Confidence Interval | 29.74 to 31.54 |
| Minimum Age | 20 |
| Maximum Age | 40 |

TABLE 2: GENDER BASED INCIDENCE OF
ALVEOLAR OSTEITIS (P = .564)

| Gender | No. of patients | Alveolar Osteitis % |
|--------|-----------------|---------------------|
| | =214 | |
| Male | 129 (60.3%) | 20(15.5%) |
| Female | 85(39.7%) | 13(15.3%) |
| | | 33 (15.4%) |

TABLE 3: CHARACTERIZATION OF MANDIBULAR THIRD MOLAR EXTRACTION AND INCIDENCE OF AO BYBY STUDY GROUPS

| Characteristic of Tooth | Study Groupn=214 | | | AO |
|--|------------------|----------------|----------------|----------|
| | Group 1 n = 73 | Group 2 n = 69 | Group 3 n = 72 | Total |
| Erupted n=87 (40.7%) | 38 | 20 | 29 | 7 (8%) |
| Soft Tissue Impaction n=64 (29.9%) | 21 | 23 | 20 | 14 (21%) |
| Partial Bony Impaction n=471(22%) | 12 | 13 | 22 | 9(19%) |
| Full Bony Impaction n= 16 (7.5%) | 2 | 13 | 1 | 3 (18%) |

TABLE 4: STUDY GROUPS BASED INCIDENCE OF ALVEOLAR OSTEITIS (P = .018)

| Study Group | No. of patients | No. of Alveolar Osteitis |
|---------------|-----------------|--------------------------|
| | n=214 | Cases % |
| Study Group 1 | 73 | 12 (16.4%) |
| Study Group 2 | 69 | 6 (8.7%) |
| Study Group 3 | 72 | 15 (20.8%) |

They also isolated increasing number of penicillin-resistant bacteroides from dental infections.^{14,20} Support in the literature for and against the effectiveness of antimicrobial solutions for irrigation or rinsing as a preventive measure in AO formation is questionable. The controversy exists about the effectiveness of CHX on the incidence of AO. In a review by Caso A & colleagues found that postoperative rinses with CHX after third molar surgery proved effective to decrease the occurrence of AO.²¹ Similar to the present study, protocol Ragno and Szkutnik¹⁷ used 0.12% CHX, they found CHX useful compound in AO reduction. Many investigators did not prove the efficacy of antibiotics in the prevention of postoperative problems in third molar surgery. They concluded that the systemic administration of antibiotic is useless in the prevention of postoperative alveolar osteitis. Mitchell indicates a low percentage of inflammatory complications (4.0%) in patients taking tinidazole after third molar surgery in comparison to those who were not (45%).^{11,26,27}

Although the level of impaction which determine the difficulty of extraction and extent of surgical trauma, is considered to be the risk factor in alveolar osteitis but no significant correlation between the characterization of the teeth and incidence of AO (p = .098 ANOVA) was found in this study. The increased incidence of AO in soft and partial bony impaction can be attributed to the presence of pericoronal pouch, and this was present in all cases. The pericoronal pouches present in partially erupted mandibular 3rd molar teeth are thought to be infected with,^{5,6} mixed anaerobic and facultatively anaerobic, spirochetes, porphyromonas species and other Gram -ve bacteria.¹⁰ These microorganisms have metabolic activities. They release proteases, have fibrinolytic activity and penetrate the adjacent tissue.¹¹⁻¹³

CONCLUSION

The results of this study showed significant reduction in the incidence of alveolar osteitis in patients receiving 0.2% CHX rinse combined with oral amoxicillin plus clavulanic acid. It will be more beneficial to use the combination to enhance its effectiveness for prevention of AO. The duration of operating time, the amount of bone removal were not recorded and correlated since both variables are known risk/ contributing factors in development of alveolar osteitis.

However the benefits of prophylactic antibiotics must be balanced with the potential risk factors like hypersensitivity reaction, and creation of resistant bacteria.

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