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Efficacy of 1% versus 0.2% Chlorhexidine Gel in Reducing the Frequency of Alveolar Osteitis following Mandibular Third Molar Surgery: Randomized Clinical Trial

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Abstract: *Alveolar osteitis (AO) is a common phenomenon in the extraction of impacted third molars. As it causes discomfort and affects the patient's quality of life, it is necessary to reduce the risk of AO. The aim of the present study was to evaluate the efficacy of two CHX gel concentrations on the frequency of AO. The inclusion criteria were being 18-30 years old and having bilateral impacted mandibular third molars with moderate difficulty level based on Pederson scale. Both teeth extracted at the same session and one socket randomly received 1% chlorhexidine (CHX) and the other 0.2% CHX gel. The outcome variable was frequency of AO. Data were collected in SPSS software and analyzed using t-test and chi-square tests. 40 patients with mean age of 21 years completed the study period. 9 (11.25%) sockets developed AO. No significant difference was found between the frequency of AO in applying 1% gel (10%) and 0.2% gel (12.5%) based on chi-square test (P-value > 0.05). Although no side effect was observed in applying 1% CHX gel, no additional benefit was also obtained.*

Keywords – *Alveolar Osteitis, Chlorhexidine Gel, Mandibular Third Molar, Split mouth*.

I. Introduction

Alveolar osteitis (AO) is among the most common complications after impacted tooth extraction. While the incidence of AO in routine extractions is 1% to 4%, the frequency of AO increases to 5-30% in surgical removal of impacted mandibular third molars [1-3].

AO is marked by progressive severe pain, halitosis, foul taste, and also regional lymphadenitis. AO is usually develops within 24 to 72 hours after the surgery or extraction [2]. Although AO is self-limited and resolves after 5 to 10 days after its initiation, it causes discomfort for patients and attenuates their quality of life. Considering the point that the main goal of healthcare providers is not only to provide favorable treatment but also to relief the pain, finding a measure to reduce the risk of development of AO is favorable [1-4].

Chlorhexidine (CHX) is an effective antiseptic agent which is effective on aerobic and anaerobic bacteria [5, 6]. While the efficacy of CHX mouthwash in reducing the incidence of AO has been repeatedly investigated, the bioadhesive gel is a relatively new version with longer bioavailability which has shown promising results in intra-socket applications [7-9]. Hence the aim of the present study was to investigate the efficacy of two concentrations of CHX gel in reducing the frequency of AO following mandibular third molar extraction.

II. Materials and Methods

The current research was performed at the Oral and Maxillofacial Clinic (Mashhad Dental School). All patients signed the detailed informed consent and the protocol approved by the Ethical Board of Mashhad University of Medical Sciences.

2.1 Patients Population:

41 patients with bilaterial impacted mandibular third molars participated in this study between June 2012 and August 2013. To be included in this study patients had to be 18 to 35 years old, be American Society of Anesthesiologists physical status score of I or II, have two impacted mandibular third molars with moderate surgery difficulty according to Pederson scale [10].

The exclusion criteria were smoking habits, pregnancy or lactating, contraceptive taking, receiving systemic antibiotics two weeks before surgery, having periapical lesion, receiving more than two anesthetic cartridges in each side.

2.2 Surgery Procedure and Side Allocation:

Surgeries were performed under local anesthesia by a single surgeon. Both impacted teeth were extracted at the same session using identical protocol: povidone iodine solution applied periorally, 2% lidocaine + 1:80,000 epinephrine cartridge injected to block inferior alveolar nerve, mucoperiosteal envelop flap created for access, bone removed and tooth sectioned with handpiece under sufficient irrigation, sockets irrigated with 60 ml of sterile normal saline. The next step was to apply the CHX gel in each socket; based on the flip of a coin one socket received 1% CHX gel (Mashhad Pharmacology faculty) and the other received 0.2% CHX gel (Mashhad Pharmacology faculty). Then flaps were sutured with 3–0 silk sutures. A regimen of anesthetic (Acetaminophen, 500 mg, every 8 h, in case of pain) was prescribed after each surgery.

2.3 Data Collection:

The predictor variable was the gel concentration and the outcome variable was the frequency of AO. Criteria to record a socket as having AO were progressive severe pain starting 1-3 days after surgery in addition to clot loss, halitosis, foul taste, or regional lymphadenitis.

During the first postoperative week, two follow-up appointments (2nd and 7th days after surgery) were held by another surgeon unaware of the allocation in order to evaluate the healing of socket. In addition, patients were instructed to inform the researchers in case of persistent progressive pain.

Patients facing AO were treatment with the same protocol: socket irrigation with sterile normal saline, intra-alveolar dressing of alvogyl iodoform (Septodont, Cambridge, Canada), and also systemic analgesic prescription. In some cases systemic antibiotics were also prescribed.

2.4 Statistical Analysis:

Data were reported descriptively and analyzed using t-test and chi-square tests with 95% confidence interval in SPSS version 11.0 software.

III. Results

40 patients including 28 females and 12 males completed the study with the mean age of 21.12 ± 3.15 years old. One patient was excluded from the study due to consumption of emergency oral contraceptives during the study period.

Out of 80 extracted third molars, 9 (13.75%) developed AO. Based on the chi-square test, no significant association was found between gender and the development of AO (Table 1). In addition, there was no significant difference between the mean age of patients with AO and the other ones based on t-test (Table 1).

When comparing the difference in the frequency of AO based on CHX gel concentration, no significant difference was found between 1% and 0.2% (Table 2).

IV. Discussion

The aim of the present study was to evaluate the effectiveness of two CHX concentrations in reducing the incidence of AO following mandibular third molar surgery. We observed no significant difference between 1% and 0.2% concentrations.

The effectiveness of CHX gels could be attributed to its antibacaterial activity. It has been observed that fibrinolytic activity of extraction socket increases with bacterial infection and their byproducts. This would cause clot loss due to reduced integrity; the final result would be AO [10, 11]. Hence elimination of bacterial activity in socket is an effective measure to reduce the risk of AO [12].

While numerous studies have reported the benefits of CHX mouthwash, the gel form increases the bioavailability of CHX and enhances its effectiveness in the extraction socket [8]. Although no side effects observed in applying higher concentration, we found no further benefits in increasing the concentration of CHX in gel form. Consistent with our results, Rodríguez-Pérez et al [12] reported no significant difference between 1% and 0.2% concentration of CHX gel regarding AO prevention. It could be assumed that the higher concentration may have been oversaturated in the gel form and the release time has not been longer than the 0.2% concentration [13].

One of the factors influencing the incidence of AO is the amount of trauma during surgery. Hence higher rate of AO would be found in the extraction of teeth with higher difficulty level. Moreover, the surgeon experience affects the amount of trauma [14, 15]. In the present study both confounding factors were eliminated as included teeth had same difficulty level in panoramic radiographs and also a single surgeon performed all of the surgeries.

One of the other factors influencing the frequency of AO is age; it has been reported that highest rate of AO occurs in the age range of 20 to 40 years old [10, 16]. Based on the design of the current study (split mouth), the age of patients was eliminated as a confounding factor. Moreover, no significant difference was found between the mean age of cases with AO and others.

The epinephrine in local anesthesia cartridges attenuates both bleeding and oxygen tension in the socket. The result is higher fibrinolysis activity in the extraction socket which would further increase the risk of developing AO [2]. It has been reported that injecting more than two cartridges increase the frequency of AO significantly. This variable was also eliminated by having the exclusion criteria of receiving more than two anesthetic cartridges.

While the study design enabled us to effectively manage background and confounding variables, there were some limitations in the present study including the sample size. In addition, further researches to evaluate the efficacy of two CHX concentrations in management of other complications after third molar surgery (including pain, swelling, trismus, and quality of life).

V. Conclusion

Considering the results of the present study, both concentrations of CHX gel are effective in reducing the frequency of AO. However, no significant difference was found between them. It could be concluded that 0.2% CHX gel is a favorable concentration and higher concentrations have no additional benefits in reducing the risk of AO following impacted mandibular third molar surgery.

VI. Figures and Tables

Table 1: Distribution of AO based on demographic variables

Variable	AO		P-value
	Yes	No	
Number	9 (11.25%)	71 (88.75%)	-
Gender	Male: 3 Female: 6	Male: 23 Female: 48	0.867
Age	22.28 ± 2.89	20.75 ± 3.05	0.412

Table 2: AO frequency according to CHX gel concentration

CHX concentration	AO		Total
	Yes	No	
1% gel*	4	36	40
0.2% gel*	5	35	40
Total	9	71	80

*Based on chi-square test, no significant association was found between the incidence of AO and the concentration of CHX gel (P-value = 0.723)

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References

[1] T.P. Osborn, G. Frederickson, I.A. Small, T.S. Torgerson, A prospective study of complications related to mandibular third molar surgery, J Oral Maxillofac Surg, 43, 1985, 767-72.

[2] A.R. Noroozi, R.F. Philbert, Modern concepts in understanding and management of the ‘‘dry socket’’ syndrome: Comprehensive review of the literature, Oral Surg Oral Med Oral Pathol Oral Radiol Endod, 107, 2009, 30-6.

[3] M. Eshghpour, N.M. Rezaei, A. Nejat, Effect of menstrual cycle on frequency of alveolar osteitis in women undergoing surgical removal of mandibular third molar: a single blind randomized clinical trial, J Oral Maxillofac Surg, 71, 2013, 1484–9.

[4] J.R. Ragno, A.J. Szkutnik, Evaluation of 0.12% chlorhexidine rinse on the prevention of alveolar osteitis, Oral Surg Oral Med Oral Pathol, 72, 1991, 524-6.

[5] C, Delilbasi, U. Saracoglu, A. Keskin, Effects of 0.2% chlorhexidine gluconate and amoxicillin plus clavulanic acid on the prevention of alveolar osteitis following mandibular third molar extractions, Oral Surg Oral Med Oral Pathol Oral Radiol Endod, 94, 2002, 301-4.

[6] C.B. Hermesch, T.J. Hilton, A.R. Biesbrock, R.A. Baker, J. Cain-Hamlin, S.F. McClanahan SF, Perioperative use of 0.12% chlorhexidine gluconate for the prevention of alveolar osteitis: efficacy and risk factor analysis, Oral Surg Oral Med Oral Pathol Oral Radiol Endod, 85, 1998, 381-7.

[7] V. Yengopal, S. Mickenautsch, Chlorhexidine for the prevention of alveolar osteitis, Int J Oral Maxillofac Surg, 41, 2012, 1253-64.

[8] P. Hita-Iglesias, D. Torres-Lagares, R. Flores-Ruiz, N. Magallanes-Abad, M. Basallote-Gonzalez, J.L. Gutierrez-Perez, Effectiveness of chlorhexidine gel versus chlorhexidine rinse in reducing alveolar osteitis in mandibular third molar surgery, J Oral Maxillofac Surg, 66, 2008, 441-5.

[9] B. Shaban, H.R. Azimi, H. Naderi, A. Janani, M.J. Zarrabi, A. Nejat, Effect of 0.2% Chlorhexidine Gel on Frequency of Dry Socket Following Mandibular Third Molar Surgery: A Double-Blind Clinical Trial, Journal of Dental Materials and Techniques, 3, 2014, 175-9.

[10] M. Eshghpour, P. Dastmalchi, A.H. Nekooei, A. Nejat, Effect of platelet-rich fibrin on frequency of alveolar osteitis following mandibular third molar surgery: a double-blinded randomized clinical trial, J Oral Maxillofac Surg, 72, 2014, 1463-7.

[11] H. Birn, Etiology and pathogenesis of fibrinolytic alveolitis (dry socket), Int J Oral Surg, 2, 1973, 215-63.

[12] M. Rodríguez-Pérez, M. Bravo-Pérez, J.D. Sánchez-López, E. Muñoz-Soto, M.N. Romero-Olid, P. Baca-García, Effectiveness of 1% versus 0.2% chlorhexidine gels in reducing alveolar osteitis from mandibular third molar surgery: a randomized, double-blind clinical trial, Med Oral Patol Oral Cir Bucal, 18, 2013, e693-700.
[13] M.R. Carrilho, R.M. Carvalho, E.N. Sousa, J. Nicolau, L. Breschi, A. Mazzoni, Substantivity of chlorhexidine to human dentin, Dent Mater, 26, 2010, 779-85.
[14] M. Eshghpour, A.H. Nejat, Dry socket following surgical removal of impacted third molar in an Iranian population: incidence and risk factors, Niger J Clin Pract, 16, 2013, 496-500.
[15] A.L. Sisk, W.B. Hammer, D.W. Shelton, Complication following removal of impacted third molars: The role of the experience of the surgeon, J Oral Maxillofac Surg, 44, 1986, 855-9.
[16] A.J. MacGregor, Aetiology of dry socket: a clinical investigation, Br J Oral Surg, 6, 1968, 49-58.