

Dry Socket following Tooth Extraction in an Iranian Dental Center: Incidence and Risk Factors

Majid Eshghpour¹, Amir Moradi², Amir Hossein Nejat³

¹ Department of Oral and Maxillofacial Surgery, Dental Research Center, Faculty of Dentistry, Mashhad University of Medical Sciences, Mashhad, Iran

² Department of Orthodontics, Faculty of Dentistry, Mashhad University of Medical Sciences, Mashhad, Iran

³ Student Research Committee, Faculty of Dentistry, Mashhad University of Medical Sciences, Mashhad, Iran

Received 14 March 2013 and Accepted 24 June 2013

Abstract

Introduction: Dry Socket (DS) is a common post-surgical complication following extraction of permanent teeth. Various risk factors has been mentioned for this complication including gender, age, amount of trauma during extraction, difficulty of extraction, inappropriate irrigation, infection, smoking, and oral contraceptive use. The aim of this study was to evaluate the incidence of DS among permanent teeth extraction in an Iranian Oral and Maxillofacial clinic and also to identify risk factors. **Methods:** This cross-sectional study performed at Mashhad Faculty of Dentistry between January 2009 and June 2009. Total of 785 patients who underwent non-surgical extraction of permanent teeth included in this study. A questionnaire with two sections designed to collect demographic, medical, and extraction-related data along with data regarding cases returning with DS. Data were reported descriptively and analyzed using Chi-square test with 95% confidence interval. **Results:** Total of 1073 teeth included in this study. 46.11% of patients were male and 53.89% were female. The mean age of participants was 32.68 ± 17.63 years. Total of 31 patients (2.89%) were diagnosed with dry socket. Smoking and oral contraceptives intake had significant association with incidence of DS. In contrast, age, gender, medical status, tooth location, number of anesthetic carpules, anesthetic technique, pre-extraction antibiotic consumption, and academic year of students had no significant association with the incidence of DS. All cases with DS treated and were followed until resolution of DS. **Conclusion:** it is recommended to identify high risk groups (smokers and oral contraceptive takers) when performing extraction and to

perform preventive measures in these group of patients to attenuate postoperative complications.

Key Words: Alveolar osteitis, dry socket, extraction, permanent tooth, risk factors.

Eshghpour M, Moradi A, Nejat AH. Dry Socket following Tooth Extraction in an Iranian Dental Center: Incidence and Risk Factors. J Dent Mater Tech 2013; 2(3): 86-91.

Introduction

One of the most important and common complications following tooth extraction is dry socket (DS). This phenomenon occurs when a blood clot dissolves and consequently, the exposure of alveolar bone happens. DS is marked by severe and progressive pain, halitosis, regional lymphadenitis, and activity reduction (1). It is mostly prevalent in surgical extraction of mandibular third molar (2-8).

Based on the experience of surgeon, amount of trauma during extraction, site of extraction, local anesthesia, smoking status, inappropriate irrigation during surgery, oral contraceptive, and preoperative infection the incidence of DS differs (1,9-17). Various studies had reported different incidence of DS in surgical removal of impacted mandibular third molar between 5% and 30% and in simple extraction of permanent teeth between 1% and 4% (18,19).

Although DS is a self limited complication, various methods have been proposed for treatment of this phenomenon (19). However, prevention is more

effective in DS. Some studies reported that identification of risk factors and their elimination as much as possible while using pharmacological prophylaxis had resulted in significant decrease in the incidence of DS (20-25).

The aim of this study was to determine the incidence of DS following extraction of permanent teeth in along with determining the potential risk factors in Mashhad Faculty of Dentistry.

Materials and Methods

This cross-sectional study was performed in Department of Oral and Maxillofacial Surgery of Mashhad Faculty of Dentistry during January to June 2009. Patients who had their permanent teeth removed with non-surgical technique during study period included in this study. Deciduous teeth and surgical extractions did not include in this study.

A questionnaire containing two sections was designed. In the first section, demographic information of patients along with smoking status, systemic diseases, oral contraceptives intake, and antibiotic consumption prior to extraction were recorded. In the second part of the questionnaire, a chart was designed to include number of carpules used for anesthesia; anesthesia technique; academic year of students performing extraction and location of tooth or teeth extracted.

According to the collected data, patients were divided into 4 age groups: <18 years, 18-29, 30-49, \geq 50. The location of teeth divided into upper anterior (UA), upper posterior (UP), lower anterior (LA), and lower posterior (LP). Local anesthesia techniques were divided into field blocking and regional block. Amount of anesthesia used classified as <2 carpules and \geq 2 carpules. Based on systemic disorders, patients were

divided into medically fit and with systemic disorder. In addition, smoking status classified as currently smoker (cigarette or Shisha) or non-smoker.

Patients were informed to come back if they faced persistent or increasing pain during first week of extraction. At these occasions, patients were examined clinically for signs of DS by a calibrated operator. Empty extraction socket with no blood clot was the sign lead to diagnosis of DS. Cases of DS treated with this protocol: irrigation with normal saline, intra alveolar dressing with Alvogyl iodoform (Septodont, Cambridge, Canada), systemic analgesic prescription, and systemic antibiotic in some cases.

Collected data were reported descriptively and analyzed using Chi-square and Fisher's exact test. SPSS software version 11.5 was used with the confidence interval of 95%.

Results

Total of 1073 teeth in 785 patients included in this study. 362 of patients were male (46.11%) and 423 (53.89%) were female. The age of participants was between 10 and 73 years old with the mean age of 32.68 ± 17.63 .

Total of 31 patients (2.89%) were diagnosed with dry socket. Distribution of DS according to the study variables is presented in Tables 1-10. According to the chi-square test, smoking and oral contraceptives intake had significant association with incidence of DS ($P < 0.05$). In contrast, age, gender, medical status, tooth location, number of anesthetic carpules, anesthetic technique, pre-extraction antibiotic consumption, and academic year of students had no significant association with the incidence of DS ($P > 0.05$).

All cases with DS treated with the above-mentioned protocol and were followed up until resolution of DS.

Table 1. Association between age groups and incidence of DS

Age group	Without DS	With DS	P-value
< 18	76	2	0.815
18 - 29	398	14	
30 - 49	374	11	
\geq 50	194	4	

Table 2. Association between gender and incidence of DS

Gender	Without DS	With DS	P-value
Male	453	17	0.209
Female	589	14	

Table 3. Association between medical status and incidence of DS

Systemic Status	Without DS	With DS	P-value
Medically fit	94	4	0.460
Systemic disease	948	27	

Table 4. Association between oral contraceptive intake and incidence of DS

OCP intake	Without DS	With DS	P-value
Taker	172	18	0.024
Non-taker	417	13	

Table 5. Association between smoking status and incidence of DS

Smoking status	Without DS	With DS	P-value
Smoker	193	11	0.018
Non-smoker	849	20	

Table 6. Association between tooth location and incidence of DS

Tooth Location	Without DS	With DS	P-value
UA	197	3	0.57
UP	304	9	
LA	132	4	
LP	409	15	

Table 7. Association between number of anesthetic carpules and incidence of DS

N of carpules	Without DS	With DS	P-value
< 2	692	17	0.180
≥ 2	350	14	

Table 8. Association between anesthetic technique and incidence of DS

Anesthesia Technique	Without DS	With DS	P-value
Field blockion	633	16	0.305
Block	409	15	

Table 9. Association between pre-extraction antibiotic consumption and incidence of DS

Antibiotic consumption	Without DS	With DS	P-value
Yes	277	5	0.193
No	765	26	

Table 10. Association between academic year of students and incidence of DS

Academic Year	Without DS	With DS	P-value
4	534	17	0.477
5	570	14	

Discussion

The result of the current study revealed that incidence rate of DS following non-surgical extraction of permanent teeth was 2.89%. This finding is in compliance with the incidence rate between 1 to 4% reported in some previous studies (18,19).

After one to three days of extraction, DS starts with severe pain, halitosis, foul taste, and regional lymphadenitis (1,18). In the clinical examination, there exists no blood clot in the extraction socket and the alveolar bone is exposed (20). Birn (16) found higher fibrinolysis and increased plasmin activity along with higher amount of tissue activators in extraction socket of cases with DS.

Incidence of DS varies among different age groups. The peak age in the incidence has been reported 20 to 40 years old in some studies (18). In the current study there were no statistical differences in incidence of DS in age groups. However, third and fourth decades of life had the highest incidence which was in consistence with the results of previous studies. Although the exact reason is unknown, fewer periodontal diseases and higher compaction of alveolar bone in this age group could lead to higher trauma during extraction and higher incidence of DS (1,18,19).

There exists conflicting reports regarding the effect of gender on DS. Amaratunga and Senaratne (26) found that incidence of DS in women was 2.4 times of those in men. In addition, Tjernberg (27) found the proportion of female to male 5 to 1. However, some other studies revealed that gender is not an effective factor in incidence of DS (17,28,29). The findings of the current study are in accordance with the results of later reports as no association observed between DS and gender observed.

Oral contraceptives increase the circulatory concentration of estrogen. On the other hand, estrogen enhances fibrinolytic activity of human body. Lilly reported that the incidence of DS among OCP takers is triple of non-taker (2). Garcia et al. (30) also found that oral contraceptives play an important role in the incidence of DS in women. The result of the current study is in accordance with aforementioned studies as we found that there was a significant association between DS and oral contraceptive intake.

In addition to oral contraceptives, smoking has also known as a risk factor in incidence of DS (11,12). Larsen reported that smoking was one of the most effective factors in DS incidence (10). It has been observed that filling of extraction socket is significantly lower in smokers when compared to non-smokers (12). In contrast, Hermesch et al. (31) reported that smoking has no influence on the incidence of DS. In the current study, smokers had significantly higher incidence of DS when compared to non-smokers. The higher incidence

of DS among smokers could be related to suction and heat production during smoking (18).

Although some studies have reported relationship between some medical diseases and incidence of DS, the results of the current study did not support this association; which was in agreement with the study Nusair and Younes (19,29).

As the infection leads to release of tissue activators from extraction socket, bacterial infection could lead to higher fibrinolysis and also blood clot loss. In addition, in different studies the effect of antibacterial treatment on reducing dry socket has been reported (22-25). However, we did not observe any association between antibiotic intake before extraction and incidence of DS. This could be related to the antibiotics resistance and irregular use without physician prescription.

The surgeon experience affects the amount of trauma during tooth extraction. Sisk et al. observed that incidence of DS increased when the extractions performed by residents rather than oral and maxillofacial surgeons (9). In addition, Larsen reported similar results according to surgeon experience. However, we found no relation between academic year of students and DS incidence. This could be due to scarce difference regarding students' experience in these two academic years; which was in accordance with the results of Field et al and Nusair and Younis studies (5,29).

Local anesthesia is also another risk factor has been mentioned for DS. In contrast to some reports that observed no association between DS and local anesthesia, Meechan et al. (12) reported that two carpules injection caused higher incidence of DS in comparison to one carpule. This association could be related to attenuation of blood and oxygen supply along with increase in fibrinolytic activity (19). However, we did not observe a statistically significant association between number of local anesthetics or technique of anesthesia and DS incidence; which was in accordance with the results of Nusair and Younis (29).

Khorasani and Razavi (32) and also Oginni (33) reported that incidence of DS in mandible extractions is 2.5-3 times more than maxilla. However, we did not observe a significant association between DS and tooth location which was in compliance with the results of Nusair and Younis (29). However, in the current study the incidence of DS following mandibular extractions was higher than maxillary ones.

As DS is self limited condition, the primary aim is pain management. All cases with DS treated with standard protocol: irrigation with normal saline, placing Alvogyl iodoform (Septodont, Cambridge, Canada), and prescription of systemic analgesics or in some cases systemic antibiotics. All patients were treated and followed until complete resolution.

Conclusion

The results of the current study revealed that smokers and oral contraceptive takers are high risk groups regarding DS following non-surgical extraction of permanent teeth. It is recommended to use preventive measures in these groups of patient.

Acknowledgment

Authors would like to thank staff of the Department of Oral and Maxillofacial Surgery of Mashhad Faculty of Dentistry and Dental Research Center for their help.

References

1. Osborn TP, Frederickson G, Small IA, Torgerson TS. A prospective study of complications related to mandibular third molar surgery. *J Oral Maxillofac Surg* 1985;43:767-72.
2. Lilly GE, Osborn DB, Rael EM, Samuels HS, Jones JC. Alveolar osteitis associated with mandibular third molar extractions. *J Am Dent Assoc* 1974;88:802-6.
3. Alexander RE. Dental extraction wound management: a case against medicating post-extraction sockets. *J Oral Maxillofac Surg* 2000;58:538-51.
4. Houston JP, McCollum J, Pietz D, Schneck D. Alveolar osteitis: a review of its etiology, prevention, and treatment modalities. *Gen Dent* 2002;50:457-63.
5. Field EA, Speechley JA, Rotter E, Scott J. Dry socket incidence compared after a 12-year interval. *Br J Oral Maxillofac Surg* 1985;23:419-27.
6. Jaffar N, Nor GM. The prevalence of post-extraction complications in an outpatient dental clinic in Kuala Lumpur, Malaysia- a retrospective survey. *Singapore Dent J* 2000;23:24-8.
7. Oginni FO, Fatusi OA, Algabe AO. A clinical evaluation of dry socket in a Nigerian teaching hospital. *J Oral Maxillofac Surg* 2003;61:871-6.
8. Bloomer CR. Alveolar osteitis prevention by immediate placement of medicated packing. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2000;90:282-4.
9. Sisk AL, Hammer WB, Shelton DW. Complication following removal of impacted third molars: The role of the experience of the surgeon. *J Oral Maxillofac Surg* 1986;44:855-9.
10. Heasman PA, Jacobs DJ. A clinical investigation into the incidence of dry socket. *Br J Oral Maxillofac Surg* 1984;22:115-22.
11. Sweet JB, Butler DP. The relationship of smoking to localized osteitis. *J Oral Surg* 1979;37:732-5.
12. Meechan JG, Macgregor ID, Rogers SN, Hobson RS, Bate JP, Dennison M. The effect of smoking on immediate post-extraction socket filling with blood and on the incidence of painful socket. *Br J Oral Maxillofac Surg* 1988;26:402-9.
13. Sweet JB, Butler DP. Predisposing and operative factors: Effect on the incidence of localized osteitis in mandibular third molar surgery. *Oral Surg* 1978;46:206-9.
14. Catellani JE, Harvey S, Erickson SH, Cherkink D. Effect of oral contraceptive cycle on dry socket (localized alveolar osteitis). *J Am Dent Assoc* 1980;101:777-80.
15. Gersel-Pedersen N. Blood fibrinolytic activity before and after oral surgery. *Int J Oral Surg* 1977;6:42-7.
16. Birn H. Etiology and pathogenesis of fibrinolytic alveolitis (dry socket). *Int J Oral Surg* 1973;2:215-63.
17. Al- Khateeb TL, El-Marsafi AI, Butler NP. The relationship between the indications for the surgical removal of impacted third molars and the incidence of alveolar osteitis. *J Oral Maxillofac Surg* 1991;49:141-5.
18. Blum IR. Contemporary views on dry socket (alveolar osteitis): a clinical appraisal of standardization, aetiopathogenesis and management: a critical review. *Int J Oral Maxillofac Surg* 2002;31:309-17.
19. Noroozi AR, Philbert RF. 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 2009;107:30-5.
20. Fazakerley M, Field EA. Dry socket: a painful post-extraction complication (a review). *Dent Update* 1991;18:31-4.
 21. Yengopal V, Mickenautsch S. Chlorhexidine for the prevention of alveolar osteitis. *Int J Oral Maxillofac Surg* 2012;41:1253-64.
 22. Hita-Iglesias P, Torres-Lagares D, Flores-Ruiz R, Magallanes-Abad N, Basallote-Gonzalez M, Gutierrez-Perez JL. Effectiveness of chlorhexidine gel versus chlorhexidine rinse in reducing alveolar osteitis in mandibular third molar surgery. *J Oral Maxillofac Surg* 2008;66:441-5.
 23. Hall HD, Bildman BS, Hand CD. Prevention of dry socket with local application of tetracycline. *J Oral Surg* 1971;29:35-7.
 24. Goldman DR, Kilgore DS, Panzer JD, Atkinson WH. Prevention of dry socket by local application of lincomycin in Gelfoam. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 1973;35:472-4.
 25. Rood JP, Murgatroyd J. Metronidazole in the prevention of "Dry socket." *Br J Oral Maxillofac Surg* 1979;17:62-70.
 26. Amaratunga NA, Senaratne CM. A clinical study of dry socket in Sri Lanka. *Br J Oral Maxillofac Surg* 1988;26:410-8.
 27. Tjernberg A. Influence of oral hygiene measures on the development of alveolitis sicca dolorosa after surgical removal of mandibular third molars. *Int J Oral Surg* 1979;8:430-4.
 28. Momeni H, Shahnasari S, Hamzeheil Z. Evaluation of relative distribution and risk factors in patients with dry socket referring to Yazd dental clinics. *Dent Res J* 2011;8:S84-7.
 29. Nusair YM, Younis MH. Prevalence, clinical picture, and risk factors of dry socket in a Jordanian dental teaching center. *J Contemp Dent Pract* 2007;8:53-63.
 30. Garcia AG, Grana PM, Sampedro FG, Diago MP, Rey JM. Does oral contraceptive use affect the incidence of complications after extraction of a mandibular third molar? *Br Dent J* 2003;194:453-5.
 31. Hermes CB, Hilton TJ, Biesbrock AR, et al. 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* 1998;85:381-7.
 32. Khorasani M, Razavi F. The prevalence and risk factors of dry socket in dental surgery clients following tooth extraction at Qazvin Faculty of Dentistry. *JQUMS* 2006;10:29-35.
 33. Oginni FO. Dry socket: A prospective study of prevalent risk factors in a Nigerian population. *J Oral Maxillofac Surg* 2008;66:2290-5.

Corresponding Author:

Amir Hossein Nejat
 Faculty of Dentistry
 Vakilabad Blvd, Mashhad, Iran
 Tel: +98-9153148853
 Fax: +98-511-8829500
 E-mail: a_68_n@yahoo.com & Nejata861@mums.ac.ir