

Incidence of fibrinolytic alveolitis, acute infection, edema, and pain longer than two days after dental extraction

Incidência de alveolite fibrinolítica, infecção aguda, edema e dor por mais de dois dias após extração dentária

Abstract

Purpose: This is a prospective, observational, and descriptive study on the incidence of fibrinolytic alveolitis (FA), acute infection (AI), edema, and pain longer than two days (P2D) after dental extraction surgery.

Methods: The sample comprised 80 surgical cases of dental extraction performed by dental students of the University of Oeste de Santa Catarina. The following complications were recorded: 2 cases of FA (2.5%), 2 cases of AI (2.5%), 8 cases of relevant edema (10%), and 8 cases of pain that persisted longer than 2 days after surgery (10%).

Results: A Chi-square test showed significant association between osteotomy and FA development ($P=0.001$), and between P2D ($P=0.02$) and edema ($P=0.01$). The report of difficult or traumatic tooth removal was related with FA development ($P=0.01$), P2D ($P<0.001$), and edema ($P<0.001$).

Conclusion: The results suggest that FA, edema, and P2D were related with more traumatic or difficult tooth removal and performance of osteotomy in this sample.

Key words: Fibrinolytic alveolitis; dry socket; *alveolitis sicca*; dental surgery; dental infection; pain

Resumo

Objetivo: Este é um estudo prospectivo, observacional e descritivo sobre a incidência de alveolite fibrinolítica (FA), infecção aguda (AI), edema e dor por mais de dois dias (P2D) após cirurgia de extração dentária.

Metodologia: A amostra foi constituída por 80 casos cirúrgicos de extração dentária realizados por alunos de odontologia da Universidade do Oeste de Santa Catarina. As seguintes complicações foram registradas: 2 casos de FA (2,5%), 2 casos de AI (2,5%), 8 casos de edema significativo (10%) e 8 casos de dor com duração por mais de dois dias após a cirurgia (10%).

Resultados: O teste do qui-quadrado mostrou associação significativa entre osteotomia e desenvolvimento de FA ($P=0,001$), e entre P2D ($P=0,02$) e edema ($P=0,01$). O relato de extração dentária difícil ou traumática foi relacionado com desenvolvimento de FA ($P=0,01$), P2D ($P<0,001$) e maior edema ($P<0,001$).

Conclusão: Os resultados sugerem que FA, edema e P2D estavam relacionados com extração dentária mais traumática e realização de osteotomia nesta amostra.

Palavras-chave: Alveolite fibrinolítica; alveolite seca; cirurgia dental; infecção dentária; dor

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Received: May 18, 2007
Accepted: January 15, 2008

Introduction

Fibrinolytic alveolitis (FA) is a common surgical complication in which the dental postextraction blood clot is partial or totally lost resulting in severe pain usually 1 to 3 days postoperative, associated with exposed bone, necrotic debris, and halitosis (1-3). Several other terms have been used to describe this complication such as alveolar osteitis, dry socket, localized osteomyelitis, postoperative alveolitis, and *alveolitis sicca* (2,4).

The etiology of FA still is unclear, and the most widely accepted theory involves blood clot dissolution by increased fibrinolytic activity. Many risk factors for FA have been suggested such as age, gender, oral contraceptives, smoking habit, surgery duration, tooth eruption status, difficult or traumatic extractions, previous infection or pericoronitis, excessive socket irrigation or curettage after extraction, operator inexperience, mandibular teeth, use of excessive amounts of local anesthetic solution with vasopressor, and menstrual cycle (3,5-7). The reported incidence of FA ranges from 1% to 45%, and its high frequency is mainly related to mandibular third molars (2,6-9).

Although the incidence of odontogenic infections has decreased in recent years as a result of improved dental-facial and general health care, scarce data are available from specific surgical settings and populations (10,11). Oral surgery is performed in a contaminated environment because of the facultative pathogenic microorganisms in the oral cavity, and the infection rates range from 2.7% to 4.4% (12-14).

The aim of this study was to evaluate the incidence of FA, acute infection (AI), edema (E), and pain that persists for more than two days (P2D) after routine dental extractions performed by dental students. A second purpose was to test possible etiological and/or risk factors for these surgical complications.

Methods

This study was approved by the Ethical Committee for Human Research of the Universidade do Oeste de Santa Catarina (UNOESC) in Joaçaba, SC, Brazil. This is a prospective, observational and descriptive study on the incidence of FA, AI, E, and P2D, with analytical design when these postoperative outcomes were tested for assumed predictive variables. The selected predictive variables included patient – and surgical procedure-related factors: age, sex, ethnic group, malnutrition/anemia, oral hygiene, surgery duration, acute local infection, quantity of anesthetic solution, anxiety level, tobacco daily use, “Mate” tea (*illex paraguariensis* – a South Brazilian habit) daily intake, osteotomy, and difficult/traumatic surgery. Exclusion criteria included deciduous teeth and any contraindication for dental surgery.

All surgical procedures were performed by dental students in the multidisciplinary dental clinics of the UNOESC School of Dentistry, and data were collected during the year of 2006. A structured questionnaire was answered by all subjects before the surgery to collect demographic data and specific information on the chosen variables for this research. Data regarding the surgical procedure and follow-ups were collected immediately after the surgery and at days 3 and 7 postoperatively.

All clinical procedures were performed under strict biosafety control. Before the surgery the patients performed a mouthwash with chlorhexidine gluconate 0.12%. Sterile saline solution was used for lavage of the alveolus socket and bur refrigeration when necessary. All patients received injection of the same anesthetic solution and vasopressor (2% mepivacaine with 1:100.000 epinephrine).

The clinical diagnostic criteria for dry socket were constant radiating pain not relieved by analgesics, combined with denuded socket or necrotic clot and fetid odor. The clinical criteria for infection were purulent discharge or serosanguineous drainage associated with local pain or tenderness. Presence of pain that persisted longer than 2 days after surgery and significant edema was self-reported. Data were analyzed by descriptive statistics and chi-square test at the significance level of 0.05.

Results

The 80 subjects evaluated in the present study were 38 males and 42 females with ages ranging from 12 to 73 years old (mean 35 ± 15 years old). The most prevalent extracted teeth were maxillary (30%) and mandibular (13%) third molars, followed by maxillary and mandibular first molars. Erupted teeth comprised 97.5% of the cases. Regarding the amount of anesthetic solution per surgical procedure, 76.3% of the cases used up to 3.6 mL of mepivacaine solution and 23.7% used more than 3.6 mL. The duration of the surgical procedure ranged from 10 to 85 minutes (35 ± 14 minutes). At the time of the surgery all patients had normal blood pressure, normal body temperature and the heart pulse frequency ranged from 69 to 88 (81 ± 3 pulse rate). None of the subjects were addicted to alcohol or illicit drugs. Prophylactic antibiotic therapy was recommended for one patient.

Description of the selected predictive factors for FA, AI, E, and P2D is displayed in Table 1. The following complications were recorded: 2 cases of FA (2.5%), 2 cases of AI (2.5%), 8 cases of significant edema (10%), and 8 cases of pain longer than 2 days (10%). There was significant association between osteotomy procedure and development of FA ($P=0.001$), P2D ($P=0.02$), and edema ($P=0.01$). The report of difficult or traumatic tooth removal was related with the development of FA ($P=0.01$), P2D ($P<0.001$), and edema ($P<0.001$).

Table 1. Frequency of fibrinolytic alveolitis (FA), acute infection (AI), edema (E), and pain longer than two days (P2D) after dental extraction as a function of selected factors (total sample size=80).

Variable	Category	Absolute Frequency					P-value *			
		n	FA	AI	P2D	E	FA	AI	P2D	E
Age	0-31 yrs old	40	1	2	5	5	1.0	0.49	0.70	0.70
	> 31 yrs old	40	1	0	3	3				
Sex	Male	38	1	0	2	1	1.0	0.49	0.27	0.06
	Female	42	1	2	6	7				
Ethnic group	White	77	2	2	8	8	1.0	1.0	1.0	1.0
	Others	3	0	0	0	0				
Malnutrition/Anemia	Yes	3	0	0	0	0	1.0	1.0	1.0	1.0
	No	77	2	2	8	8				
Oral hygiene	Good/Regular	33	2	1	4	6	0.16	1.0	0.70	0.06
	Bad/Very bad	47	0	1	4	2				
Surgery duration	0-35 min	49	1	0	3	3	1.0	0.15	0.25	0.25
	> 35 min	31	1	2	5	5				
Acute local infection	Present	6	0	0	2	3	1.0	1.0	0.10	0.01
	Absent	74	2	2	6	5				
Anesthetic solution	0-3,6 mL	61	1	2	4	3	0.42	0.42	0.08	0.02
	> 3,6 mL	19	1	0	4	5				
Anxiety level	Low/Light	50	1	2	6	6	1.0	0.52	0.70	0.70
	Mild/Severe	30	1	0	2	2				
Tobacco daily use	Yes	13	0	1	1	0	1.0	0.3	1.0	0.34
	No	67	2	1	7	8				
"Mate" tea daily intake	Yes	5	0	0	0	0	1.0	1.0	1.0	1.0
	No	75	2	2	8	8				
Osteotomy	Yes	3	2	0	2	3	0.001	1.0	0.02	0.01
	No	77	0	2	6	5				
Difficult/traumatic surgery	Yes	9	2	1	7	8	0.01	0.21	<0.001	<0.001
	No	71	0	1	1	0				

* Chi-square test with Monte Carlo correction (95% confidence interval).

Discussion

This prospective study recorded the incidence of FA, AI, E, and P2D development after dental extraction and tested the association of possible predictive factors for these outcomes. Although FA, AI, E, and P2D are common complications after dental surgery, prospective data and controlled studies are scarce (15,16). The findings of the present study are in accordance with the available literature on incidence of FA (2,6-9,17,21) and AI (18-20).

The study design aimed to eliminate some confounding variables by standardizing the use of anesthetics and vasopressor, pre-operative mouthwash with chlorhexidine gluconate (0.12%), sterilization protocol and asepsis control. The study included the variable "mate" (*Ilex paraguariensis* - a regional habit in the South of Brazil) tea drink, which was investigated as a possible risk factor for oral surgery postoperative complications. However, none of the selected predictive factors were associated with incidence of FA and AI in this sample. The low incidence of complication cases and the heterogeneous distribution between categories of each predictive variable possibly explain these negative results.

The two cases of FA in this study occurred in a 46 year-old male and in a 29 year-old female, non-smokers, with good

or regular oral hygiene, and with no previous acute infection at the surgery site. However, surgical releasing incision and osteotomy were necessary in both cases. The male patient had good general health and extracted the erupted left first premolar using 1.8 mL of anesthetic solution. The female patient removed the impacted right third molar, had controlled hyperthyroidism, was subjected to antibiotic prophylaxis with amoxicillin, and used 7.2 mL of anesthetic solution. Additionally, the two patients with postoperative acute infection were female, with no systemic disease, and had their mandibular teeth extracted (first and third molars). These case descriptions suggest a complex interaction of different factors that can be associated with the development of dental surgical complications. A single variable could not predict the outcomes in this study.

Osteotomy procedure and traumatic/difficult surgery were both statistically significant for FA and P2D occurrence because of increased trauma and tissue damage. The routine pain control of this study protocol was based on acetaminophen prescription, but the findings indicated that stronger medication might be necessary after traumatic dental surgery.

The results of the present study are limited because of sample size and very small number of cases per predictive variable category. Another limitation to generalize the

results is that all surgical procedures were performed by dental students with different levels of surgical training. It is important to compare the incidence of dental surgical complications in different settings, *e.g.* dental schools, specialty training courses, and private practice of general dentists or certified dental surgeons. Understanding the risk factors for dental surgical complications is the key for prevention.

Conclusions

The incidence of postoperative complications was low for fibrinolytic alveolitis and acute infection after routine dental extraction by dental students in this sample. Edema and pain longer than two days were reported more frequently. In general, postoperative complications were not associated with any patient-related variable but showed positive relation with osteotomy and traumatic/difficult surgery.

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