

Risk Factors Assessment for Dry Socket: A Focus on Antimicrobial Associations

Keita Kano^{1,2}

*1 Department of Preventive and Community Dentistry, Osaka Dental University, Osaka, Japan.
2 Department of Dentistry and Oral Surgery, Uji Takeda Hospital, Kyoto, Japan.*



Introduction

- Dry socket (DS), also known as alveolar or fibrinolytic osteitis, is a relatively common complication of dental extraction, particularly of the mandibular molars. It is associated with severe pain that develops 2–3 days postoperatively, with or without halitosis and partial or total disappearance of the blood clot in the socket. The pain associated with DS is self-limiting but intense, and additional postoperative visits are required for management. Despite its clinical importance, the pathogenesis of DS is unknown and is probably multifactorial. Nonetheless, several risk factors for DS have been reported, including age, sex, systemic diseases, smoking, difficulty level of surgery, oral hygiene status, and operator skill.
- The use of antibiotics to reduce postoperative complications, particularly in cases of surgical extraction of the third molars, is frequently discussed in the dental literature. However, few studies have examined the relationship between DS and antibiotics. Therefore, this study aimed to clarify the effect of antibiotic administration on DS and factors affecting the incidence of DS.

Material and Methods

–Diagnosis of DS

- DS was defined as postoperative pain within and around the extraction site, with increasing severity between the first and third days after extraction, accompanied by partially or completely disintegrated clots in the alveolar socket and the presence of halitosis.
- Based on the diagnosis of DS, patients were classified into the DS and non-DS group. The following characteristics were compared between the two groups: age, sex, history of systemic diseases, body mass index (BMI), smoking status, difficulty level of extraction, type of intravenous antibiotic, and duration of antibiotic prescription.
- In addition, the Pell and Gregory classification was used to determine the difficulty level of extraction. In this system, impacted third molars are categorized into Classes I, II, and III based on the horizontal positional relationship between the anterior margin of the mandibular ramus and the third-molar crown in increasing order of difficulty. Furthermore, they are classified into Positions A, B, and C based on the vertical positional relationship between the second molar and the third-molar crown in increasing order of difficulty.

Results (number of DSs reported for each variable)

Variable		Total	DS	Non-DS	p-value
Teeth (n, %)		3271 (100%)	222 (6.8%)	3049 (93.2%)	
Age (y)		33.1±15.2	34.2±12.6	33.0±15.4	0.261
BMI (kg/m²)		21.6±3.5	22.1±3.9	21.6±3.4	0.031
SEX					0.38
	Female (n, %)	2145 (65.6%)	152 (7.1%)	1993 (92.9%)	
	Male (n, %)	1126 (34.4%)	70 (6.2%)	1056 (93.8%)	
Systemic Disease					0.433
	None (n, %)	2622 (80.2%)	183 (7.0%)	2439 (93.0%)	
	Presence (n, %)	649 (19.8%)	39 (6.0%)	610 (94.0%)	
Smoking (n, %)					0.081
	None	3133 (95.8%)	218 (7.0%)	2915 (93.0%)	
	Presence	138 (4.2%)	4 (2.9%)	134 (97.1%)	

DS, dry socket; BMI, body mass index.

Results (logistic regression analysis)

Variable	Category	Odds ratio (95%CI)	p-value
Age		1.01 (1.00–1.02)	0.056
BMI		1.05 (1.01–1.09)	0.024
Sex	Male	0.81 (0.6–1.09)	0.158
Systemic Disease	None	1.44 (0.95–2.18)	0.087
Smoking	None	2.39 (0.87–6.6)	0.093
Pell and Gregory`s Classification Class	I	Reference	
	II	0.76 (0.24–2.4)	0.636
	III	1.21 (0.38–3.9)	0.749
Pell and Gregory`s Classification Position	A	Reference	
	B	4.69 (0.52–42.3)	0.168
	C	3.56 (0.38–33.1)	0.265
Type of antimicrobial	Penicillin	1.03 (0.74–1.45)	0.85
Duration of antimicrobial prescription	24–48 h	Reference	
	≤24 h	1.01 (0.58–1.76)	0.967
	≥48 h	0.51 (0.12–2.27)	0.377

CI, confidence interval; BMI, body mass index.

Material and Methods

–Patients and Data Collection

- This study adhered to the tenets of the Declaration of Helsinki. The Institutional Review Board (IRB) of Uji Takeda Hospital examined and approved the study protocol (IRB approval no. R07–01).
- This single-center retrospective study included patients who underwent third-molar extraction surgery between January 2014 and December 2023 at the study hospital. Data were extracted from the patients’ medical records. Patients who underwent maxillary third-molar extraction were excluded because no cases of DS after maxillary third-molar extraction were reported during the study period.
- All surgeries were performed by a single board-certified oral surgeon using a standardized technique (bone reduction and tooth segmentation, depending on the condition of the third molar).

Material and Methods

–Statistical analysis

- The chi-square (χ^2) test or Fisher’s exact test was used to compare categorical variables between the groups. For continuous variables, numerical data were analyzed using Student’s t-test and Mann–Whitney U test.
- Multivariate logistic regression analysis was performed with DS as the dependent variable and risk factors for DS as independent variables. Odds ratios (ORs) and 95% confidence intervals (CIs) were calculated to assess the strength of the associations between the variables and outcome.
- Statistical analyses were performed using SPSS software (v26; IBM Corp., Armonk, NY, USA), and statistical significance was set at $p<0.05$.

Results (number of DSs reported for each variable)

Variable	Total	DS	Non-DS	p-value
Pell and Gregory`s Classification (n, %)				
Class (n, %)	I	91 (2.8%)	4 (4.4%)	0.013
	II	1724 (52.7%)	98 (5.7%)	
	III	1456 (44.5%)	120 (8.2%)	
Position (n,%)	A	59 (1.8%)	1 (1.7%)	0.3
	B	2593 (79.3%)	181 (7.0%)	
	C	619 (18.9%)	40 (6.5%)	
Type of intravenous antimicrobial (n, %)				0.177
Cephem	1291 (39.5%)	78 (6.0%)	1213 (94.0%)	
Penicillin	1980 (60.5%)	144 (7.3%)	1836 (92.7%)	
Duration of antimicrobial prescription (n, %)				0.703
≤24 h	2930 (89.6%)	201 (6.9%)	2729 (93.1%)	
24-48 h	283 (8.7%)	19 (6.7%)	264 (93.3%)	
≥48 h	58 (1.8%)	2 (3.4%)	56 (96.6%)	

DS, dry socket.

Limitations

- The advantage of this study is the reliability of the results because all surgeries were performed by a single surgeon at a single hospital. Therefore, the surgeon’s experience and approach to the surgical procedure did not affect the results of this clinical study. However, this is also a disadvantage as it may limit the generalizability of the results. Prospective studies with larger sample sizes and longer follow-up periods are required to validate our results. In addition, a multicenter study with diverse populations might provide more representative and reliable results.

Conclusion

- The prevalence of DS in this study was 6.8%, and BMI was significantly associated with DS. However, other factors such as age, sex, smoking status, history of systemic disease, tooth position, type of antibiotic, and duration of prescription were not associated with DS. Considering the current global need for the judicious use of antibiotics, the use of antibiotics for DS prophylaxis is not recommended.