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To Identify The Incidence And Risk Factors Of Dry Socket: A Prospective Study

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Abstract:
Objectives: To identify the incidence and risk factors of dry socket after tooth extraction.
Material and methods: Patients who underwent extractions during the 6-month period in the department of oral & maxillofacial surgery and fulfilled the inclusion criteria were included in the study. All the patients who came back with the complaint of persistent or increasing pain during the first week of extraction were examined clinically for the possible diagnosis of dry socket. Pain and empty extraction socket with no blood clots was diagnosed as a dry socket. The data regarding demographic information of patients, smoking habits, medical history, medications, tooth extraction, indication for extraction, post operative medications, patient compliance, number of extractions, type of extraction (intra-alveolar or trans-alveolar), use of oral contraceptives was collected.
Results: Only 6 patients, (3 males and 3 females) out of the total of 2458 adult patients (3552 extractions) included in the study were diagnosed as having dry socket. The incidence of dry sockets in this study was found to be 0.24 %
Conclusions: Extraction site, surgical trauma, and poor patient compliance were the main reasons for dry socket in our study.

Keywords: Dry socket, alveolar osteitis, risk factors, incidence

Introduction

In oral surgery, extraction is one of the most often performed procedures, and when it comes to permanent teeth, dry socket is one of the most common post-extraction complications. The term "dry socket" has been used in literature since 1896.[1] Acute alveolar bone inflammation surrounding the extracted tooth creates dry socket, which is quite painful. A blank socket that is frequently packed with debris is left after the clot that had formed in the socket dissolves.[2] Although many different causes have been linked to dry socket, its exact mechanism and etiology are still not well known, Several factors have been found to increase the incidence of dry socket, including oral contraceptives, smoking, and fibrinolytic activity in extraction sockets. although the actual pathophysiological process behind this condition is yet unknown.[3-4] Following dental extractions, 1% to 4% of cases of AO have been recorded.[5]

Material and methods

The current inquiry was conducted at the Dr. Harvansh Singh Judge Institute of Dental Sciences and Hospital, Panjab University, Chandigarh. It was intended as a prospective study and included patients who were seeking therapy. The Chandigarh-based Panjab University Institutional Ethics Committee (PUIEC) approved the current study. (No. PUIEC/2019/150/A/-1/03). All of the involved subjects provided written informed consent before the procedure started. A total of 2458 adult patients underwent 3552 extractions as part of the study, and data on their demographics, smoking habits, medical histories, extracted teeth, reasons for extraction, patient compliance, type of extraction (intra alveolar or trans alveolar), intraoperative complications (tooth fracture or alveolar bone fracture), and use of oral contraceptives were gathered. Patients with Paget's disease, osteopetrosis, generalized vascular or hematological disorders, radiotherapy-induced osteonecrosis, and cemento-osseous dysplasia were excluded from the current study. All patients who complained

of continuing or getting worse within the first week following an extraction were evaluated clinically for the potential presence of a dry socket. Pain and empty extraction sockets with no blood clots were diagnosed as dry sockets.

Results

Sample characteristics:

Gender: The sample comprised of 1247(50.7%) male and 1211(49.3%) female patients.

Indications for extractions: The number and frequency of indications of extractions are presented in (Table 1).

Patients with systemic conditions*:* Out of the total 2458 patients who reported for extractions, 351(14.3%) patients had some or the other systemic condition. The number and frequency of patients with hypertension was highest (53.3%), followed by diabetic patients (21.7%) and patients suffering from epilepsy or kidney diseases were the least (1.1%). The number and frequency of patients with systemic conditions indicated for extractions are presented in (Table 2).

Type of extractions: intra-alveolar extractions were (77.7 %) as compared to (22.3%) trans-alveolar extractions.

Site of extractions: The number and frequency of mandibular posterior teeth was maximum (41.8%) followed by maxillary posteriors (28.6%) and the least frequency was for maxillary anterior teeth (8.5%). (Table 3)

Alveolar osteitis (AO)/Dry Socket Incidence: In the current study, 2458 adult patients had 3552 extractions performed; however, only 6 patients (3 males and 3 females) had dry sockets, making the incidence of dry socket in this study 0.24%. Only two patients with dry socket were younger than 24 years old, while the other four were older than 40. Six patients were present, but only one had diabetes. None of the dry socket patients smoked, and no female patients were using oral contraceptives. Four out of the six patients were found to have improperly followed the post-extraction recommendations. With 5 cases of molar extractions and just 1 case of maxillary molar extraction, dry socket was more frequently observed in the mandibular posterior region. Out of the five mandibular molars, three were surgically removed because they were impacted and had pericoronitis. A maxillary molar that was severely decaying was surgically removed. Therefore, in our study, the site and the surgical trauma, along with poor patient compliance, may be the causes of dry socket.

Discussion

Following tooth extractions, a dry socket, also known as alveolar osteitis (AO), is a common consequence. The dry socket's etiology, which is thought to be complex, is still unknown.
The following are the most often cited etiological, aggravating, and triggering factors in the literature:

Gender: According to the literature, women are more frequently affected by AO/dry socket (5 females to 1 male).[6-7]Since endogenous estrogen levels fluctuate during the menstrual cycle and estrogens indirectly trigger the fibrinolytic system in females, females probably experience this condition more frequently than males.[8] According to Sweet and Butler, there were 4.1% more female cases of dry socket than male cases.[9] According to our data, there were equally as many males as girls among the six patients who had dry sockets

The type and timing of extractions, intraoperative complications, and trauma have all been linked to the development of dry socket and AO, according to numerous publications. [10–13] It has also been noted that tooth sectioning and some degree of bone removal are more likely to result in AO in surgical extractions requiring flap retraction.[14] Excessive trauma causes wounds to heal more slowly.[11] This might be as a result of the socket's lining bone being compressed, which hinders vascular entry. The underlying vessels may clot as a result of excessive trauma. Trauma may reduce tissue resistance, which then leads to wound infection. [15-16] A major role in the pathogenesis of AO, according to Birn's theory, is played by the damage to the alveolar bone cells that occurs during extraction. This damage results in inflammation of the alveolar bone marrow and the release of direct tissue activators into the alveolus, where they may trigger fibrinolytic activity.[11]
Out of the 6 participants in the current study, 4 underwent surgical extractions (3 impacted mandibular molars and 1 severely decaying maxillary molar).

Age: According to the literature, there is limited consensus about the link between growing older and an increased risk of alveolar osteitis. The surgical removal of impacted mandibular third molars should, according to Blondeau et al., be performed before the patient is 24 years old due to the higher risk of postoperative problems in older patients. Older people's bones have a significant likelihood of having less vascularity, and extractions are challenging in dense bone with higher surgical stress. [17]

In our study, 2 of the patients with dry sockets were under the age of 24, while the remaining 4 patients were over the age of 40.

Smoking: According to published research, smoking is a significant risk factor for the development of dry socket. The prevalence of dry socket is not statistically different between smokers and non-smokers, according to Johnson & Blanton [18]; nonetheless, several writers have argued that the incidence of dry socket is directly proportional to the amount of smoking. [19-21] Some writers claim that smoking decreases neutrophil chemotaxis and phagocytosis, which affects the generation of immunoglobulin.[22] The main ingredient in tobacco, nicotine, is absorbed through the mouth mucosa and raises the risk of peripheral ischemia and microvascular thrombosis by increasing platelet aggregation.

Additionally, suppressed is the proliferation of fibroblasts and macrophages.[23] According to a 1978 study by Sweet & Butler, smokers are 4–5 times more likely to develop AO than non-smokers among individuals who had their mandibular third molars surgically removed. Smoking on the day of operation or the first day following surgery increased the risk of AO by 40% and was found to be more common in persons who smoke more than a pack per day[24]. None of the six patients in our study had a history of smoking.

Microorganisms/Indication for Extraction: Specific bacteria have been linked to the etiology of dry sockets and are thought to be contributory causes. Delay in healing may result from the presence of bacteria such Enterococcus, Streptococcus viridians, Citrobacter freundii, Escherichia coli, Bacillus coryneform, Pseudomonas aeruginosa, and Proteus vulgaris. Numerous writers also put forth Treponema denticola, an anaerobic bacteria, as a potential cause by virtue of its fibrinolytic activity that resembles that of plasminogen.[25-26] A higher prevalence of AO has been seen in patients with poor oral hygiene, pre-existing local infections such pericoronitis, and severe periodontal disease.[27] In the current investigation, 3 impacted mandibular molars with pericoronitis were extracted, and the dry socket subsequently formed.

Oral Contraceptives: According to Lily et al., women who use oral contraceptives experience dry socket three times more commonly than women who do not. Oral contraceptives increase plasma fibrinolytic activity, which in turn influences the stability of the clot that forms following extraction. Additionally, raised are factors II, VII, VIII, X, and plasminogen, which increases the breakdown of blood clots. [28-29] According to Catellani et al., fibrinolytic activity was shown to be at its lowest on days 23 through 28 of the menstrual cycle, and the likelihood of AO increased with greater doses of estrogen in oral contraceptives.[30] Three ladies in the current study experienced dry socket following extraction, although none of them were taking oral contraceptives.

Patient compliance: According to Blum, physical manipulation that dislodges the blood clot or the negative pressure produced by sucking on a straw are main causes of AO.3 In their study, Babatunde et al. discovered that only 36.8% of people with dry sockets disregarded oral hygiene recommendations.[31] Four out of the six patients in this study disobeyed the post-extraction recommendations. The primary issue was with maintaining good oral hygiene or applying negative pressure.

Site: According to various studies, the incidence of alveolar osteitis in the mandible is ten times higher than in the maxilla, with extraction rates ranging from 1 to 4% for third molars in the mandible. [22,32] In research by Babatunde et al., mandibular teeth (68.4%) were more likely than maxillary teeth to develop a dry socket problem.[31] The site specificity may be caused by increased bone density, a decreased ability to produce granulation tissue, and decreased vascularity.[33] When compared to maxillary extraction sockets, mandibular extraction sockets perform worse in debris removal, which may play a role in the development of a dry socket.[31] In our investigation, all occurrences of dry socket occurred following molar extractions; 5 patients had mandibular molars removed, and 1 patient had his maxillary molars removed.

Systemic problems: Only one patient in this study who acquired dry socket had diabetes as an underlying medical disease, but current thinking in the literature suggests that systemic disorders are not a factor in the development of dry socket.[4]

Dry socket incidence:

Different studies show that the probability of dry socket should be between 1% and 4%.[5]

According to Mudali et al. 1.8% of people have dry sockets.[34] Different evaluations and different diagnoses may have an impact on the prevalence of dry socket. The incidence in this investigation was discovered to be 0.24%. Our sample size is larger and our study shows a lower incidence compared to previous studies in the literature, perhaps due to the importance of proper extraction
in most patients and compliance with postextraction instructions.

Studies have shown that factors associated with dry socket include damage to the lower teeth (especially molars), infection during tooth extraction, and poor oral hygiene of the patient.

Conclusion

The mandibular teeth are most frequently affected by the painful dry socket complication following tooth extraction. The most frequent risk factors for dry sockets in this study were trauma during the extraction, poor patient compliance with maintaining oral hygiene, and location. These underlying risk factors must be identified, and patients must be appropriately counseled.

Table 1. Number and frequency of Indications for extraction* (original)

Indication for extraction	Number and Frequency (%)
Pulpitis	810 (0.22%)
Retained roots	583 (0.16%)
Pericoronitis	207 (0.05%)
Orthodontic therapeutic extractions	52 (0.015%)
Prosthodontics reasons	900 (0.25%)
Failed Root Canal Treatment (RCT)	337 (0.09%)
Miscellaneous (retained deciduous teeth, fractured teeth etc.)	663 (0.19%)

*Total number of patients: 2458; Total number of extractions: 3552 extractions

Table 2. Number and frequency of patients with systemic conditions* (original)

Systemic condition	Number and Frequency (%)
Diabetes	76 (21.7 %)
Hypertension	187 (53.3%)
Thyroid disorder	32 (9.1%)
Asthma	9 (2.6 %)
Allergy	8 (2.3%)
Rheumatoid arthritis	7 (2.0 %)
Heart disease	11 (3.1%)
Liver disease	5 (1.4%)
Kidney disorder	4 (1.1%)
Epilepsy	4 (1.1%)
Tuberculosis	8 (2.3%)

*Total number of patients with systemic conditions: 351

Table 3. Number and frequency of site of extraction* (original)

Site of extraction	Number and Frequency (%)
Maxillary anterior	301 (8.5%)
Maxillary posteriors	1016 (28.6%)
Mandibular anterior	749 (21.1%)
Mandibular posteriors	1486 (41.8%)

*Total number of extractions: 3552 extractions

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No Conflict of Interest

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