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# The demographic investigation of 700 cases with severe odontogenic abscess in the maxillofacial region: A 6-year retrospective study

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## Abstract

**Aim:** The aim of this retrospective study was to retrospectively analyze the demographic distribution and treatment methods of patients with odontogenic abscess who applied to Dicle University, Faculty of Dentistry, Department of Oral and Maxillofacial Surgery between 2017 and 2022, and evaluate the findings.

**Methods:** Patient documents of 700 odontogenic abscess cases who applied to the Dicle University, Faculty of Dentistry, Department of Oral and Maxillofacial Surgery clinic were collected and examined. The data obtained were analyzed according to gender, age, time, anatomical localization, and treatment options. All data obtained were evaluated with statistical analysis.

**Results:** As a result of the statistical analysis; a total of 700 patients, including 400 men (57%), and 300 women (43%), were treated. Of the patients with a mean age of 33±18 years, 63% (440) were treated with extraoral drainage and 37% (260) with intraoral drainage. In terms of localization, the most common areas of odontogenic abscess formation were mandibular posterior (54% - 376 cases), maxillary posterior (26% - 184 cases), maxillary anterior (17% - 116 cases), and mandibular anterior (3% - 24 cases). The most common reasons patients came to the clinic were swelling, pain, fever, and trismus. The year 2022 was analyzed as the year with the most intensive patient treatment, and 2017 as the year with the least patient treatment. In the analyses, when looking at the distribution of gender and localization by years, there was no statistically significant difference ($p > 0.05$), but when looking at the distribution of drainage techniques by years, it was determined that there was a statistically significant difference ($p < 0.001$).

**Conclusion:** Demographic characteristics and treatment options of patients with odontogenic abscesses vary depending on the causative tooth area. Odontogenic infections can become life-threatening in a short time if left untreated. Intraoral and extraoral drainage are very important for success in the treatment of common odontogenic abscesses where medical treatment is inadequate.

**Keywords:** Maxillofacial infection, odontogenic infection, abscess, drainage.

# Introduction

Odontogenic infections are common cause of bacterial infections in the maxillofacial region in today's practice. Severe complications, such as endocarditis, mediastinitis, compromised airways, sepsis, tissue necrosis, and deep neck infections, may result from the spread of odontogenic infections. Treatment of odontogenic infections is a typical part of the maxillofacial surgery spectrum. Normally, these infections can be treated simply, but under certain conditions, they can develop serious and complex courses that require interdisciplinary treatment, including intensive care [1-4]. The majority of head and neck infections are of odontogenic origin [3]. When the etiological factors of odontogenic infections are examined in general, they most commonly develop due to decayed or necrotic teeth, trauma, spread of infections in adjacent anatomical structures, postoperative infections, periodontal diseases and inflammation of pericoronal tissues [5]. If left untreated, it usually spreads to adjacent anatomical spaces and can cause serious complications such as airway obstruction, sepsis, endocarditis, pericarditis, necrotizing fasciitis, spondylitis, brain abscess, cavernous sinus thrombosis and pneumothorax [6]. Therefore, early diagnosis and treatment of the infections are very important [7].

In odontogenic infections, the primarily affected areas, depending on their close anatomical neighborhood, are buccal, canine, sublingual, submandibular, submental and vestibular areas. Untreated infections may tend to spread secondarily from these areas to deep neck tissues such as pterygomandibular, infratemporal, masseteric, lateral pharyngeal, superficial and deep temporal areas [8]. The treatment of these infections is generally performed with endodontic treatment, surgical treatment and antibiotic treatment or combinations of these methods [8].

In the pre-antibiotic era, a mortality rate ranging from 10% to 40% was reported after odontogenic infection [2]. The prognosis of odontogenic infections has improved significantly since the introduction of antibiotics. However, immediate or secondary removal of the odontogenic focus together with surgical incision and drainage remains the basis of treatment [9].

The aim of this retrospective study was to retrospectively analyze the demographic distribution and treatment methods of patients with odontogenic abscess who applied to our clinic between 2017 and 2022 and evaluate the findings.

# Materials and Methods

The medical records of a total of 700 cases, who were examined in the Department of Oral and Maxillofacial Surgery at Dicle University Faculty of Dentistry between January 2017 and December 2022, and were diagnosed with odontogenic abscess in the light of clinical and radiological findings and treated surgically (drainage), were retrospectively examined. Patients with non-dental abscess as a result of trauma, pregnant patients, and patients who did not accept treatment were not included in the study. The data obtained were analyzed according to gender, age, time, anatomical localization and treatment options. Odontogenic abscess treatment was basically classified into two groups: intraoral and extraoral drainage. According to the location where the abscesses occurred, they were classified into 4 groups: maxilla anterior, maxilla posterior, mandibular anterior and mandibular posterior. Additionally, patients were further classified according to gender, drainage technique, and localization on a yearly basis. The study was conducted in accordance with the Declaration of Helsinki and was approved by the Dicle University, Faculty of Dentistry Ethics Committee (Protocol Number: 2023-49).

## Treatment Protocol

Informed consent was obtained from all patients before the procedure and the same treatment protocol was applied. Before the procedure, patients were subjected to detailed systemic and dental anamnesis and radiological examination with appropriate imaging techniques. As preoperative imaging methods, periapical and panoramic x-rays, as well as dental volumetric computed tomographies were taken when necessary. After all preparations were made, the patient was prepared for surgery as soon as possible. After ensuring a safe airway, the skin and mucosa were cleaned with antiseptic solution and made ready for drainage. Drainage was applied to the anatomical fascial areas where the abscess was located. Blunt dissection scissors were used to reach the anatomical sites. Then, an elastic soft drain was placed in the drainage area and fixed with sutures. Except for patients with a history of antibiotic allergy, all patients were treated with antibiotics in addition to medical treatment after drainage.

## Statistical analysis

The data were analyzed using IBM SPSS 25.0 software (IBM, Armonk, New York, USA).

The Pearson Chi-square test was used as a statistical test. In all analyses, a statistical significance value of $p < 0.05$ was considered significant.

# Results

Medical records of 700 patients diagnosed with abscess treated in our Oral and Maxillofacial Surgery clinic between January 2017 and December 2022 were examined. Patients were classified and analyzed according to gender, age, time, anatomical location and treatment options. 400 of the patients were male (57%) and 300 were female (43%) (Table 1). The average age of

the patients was 33±18 years old, the youngest was 10 years old and the oldest was 67 years old. 63% (440) of the patients were treated with extraoral drainage and 37% (260) with intraoral drainage (Table 2).

**Table 1.** Distribution of 700 cases with odontogenic abscess by gender

| Gender | Frequency (n) | Percentage (%) |
|---|---|---|
| Male | 400 | 57 |
| Female | 300 | 43 |
| Total | 700 | 100 |

**Table 2.** Distribution of 700 cases with odontogenic abscess according to drainage method

| Drainage | Frequency (n) | Percentage (%) |
|---|---|---|
| Extraoral Drainage | 440 | 63 |
| Intraoral Drainage | 260 | 37 |
| Total | 700 | 100 |

The most common odontogenic abscess formation sites were mandible posterior (54% - 376 cases), maxillary posterior (26% - 184 cases), maxillary anterior (17% - 116 cases) and mandible anterior (3% - 24% cases) (Fig. 1).

The most common reasons for patients to come to the clinic were swelling, pain, fever and trismus. When we analyzed the cases by years, 2022 was analyzed as the year in which the most intensive patient treatment was given, and 2017 was the year in which the least patient treatment was given (Fig. 2).

Considering the frequency of damage to anatomical spaces due to odontogenic infection, respectively; submandibular lodge was 32%, buccal lodge was 24%, fossa canina abscess was 22%, submental lodge was 10%, sublingual lodge was 8%, pterygomandibular lodge was 4%.

In the analyses, when looking at the distribution of gender and localization by years, there was no statistically significant difference ($p > 0.05$), but when looking at the distribution of drainage techniques by years, a statistically significant difference was found ($p < 0.001$) (Table 3).

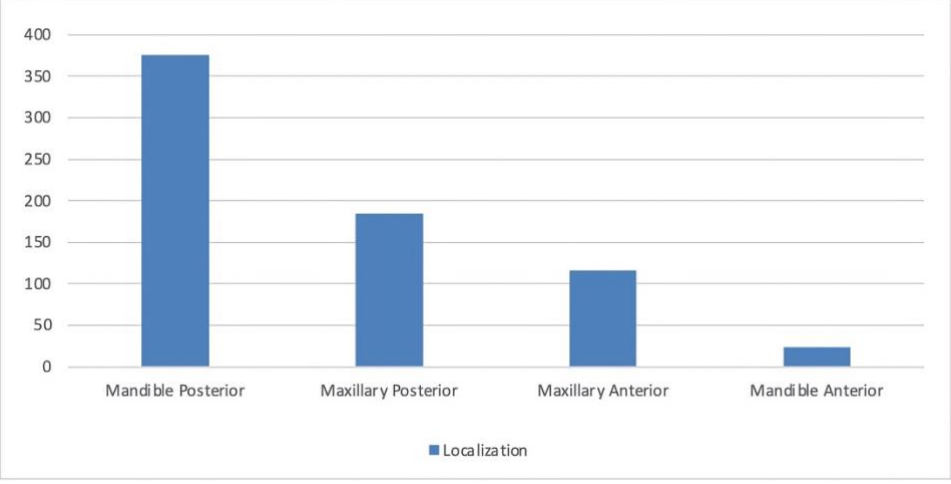


**Figure 1.** Distribution of 700 cases with odontogenic abscess according to their localization.

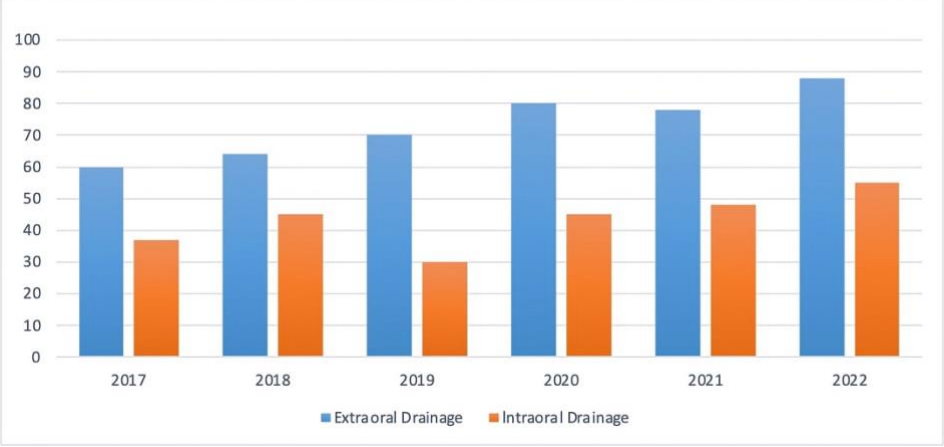


**Figure 2.** Distribution of treatment methods of 700 cases with odontogenic abscess by years.

**Table 3.** Analysis of 700 cases with different parameters (gender, drainage technique, localization) according to years

| Parameter | Year | | | | | | |
|---|---|---|---|---|---|---|---|
| **Gender** | **2017** | **2018** | **2019** | **2020** | **2021** | **2022** | **p** |
| Male (n=400) | 52 | 60 | 58 | 72 | 75 | 83 | p=0.957 |
| Female (n=300) | 45 | 49 | 42 | 53 | 51 | 60 | $x^2$=1.070 |
| **Drainage Technique** | | | | | | | |
| Intraoral Drainage (n=260) | 37 | 45 | 30 | 45 | 48 | 55 | **p=0.0001** |
| Extraoral Drainage (n=440) | 60 | 64 | 70 | 80 | 78 | 88 | $x^2$=170.8 |
| **Localization** | | | | | | | |
| Maxillary Anterior (n=116) | 10 | 17 | 12 | 31 | 19 | 27 | |
| Maxillary Posterior (n=184) | 23 | 22 | 30 | 29 | 39 | 41 | p=0.228 |
| Mandible Anterior (n=24) | 4 | 5 | 2 | 3 | 4 | 6 | $x^2$=18.68 |
| Mandible Posterior (n=376) | 60 | 65 | 56 | 62 | 64 | 69 | |

## Discussion

Severe odontogenic infections form a significant part of maxillofacial surgeons clinical work and can be life-threatening if these infections are not adequately treated [10, 11]. However, potentially fatal complications such as sepsis, airway obstruction, cavernous sinus thrombosis, necrotizing fasciitis and mediastinitis may occur [12]. Although there are various treatment protocols for the treatment of odontogenic infections, there is no consensus on the use of antibiotics [13, 14]. Different countries and even different hospitals prescribe different antibiotics, but the most commonly used antibiotic treatments are intravenous penicillin G, metronidazole, clindamycin, amoxicillin-clavulanic acid or amoxicillin-sulbactam [10, 15, 16]. It is important to remember that frequent use of antibiotics can lead to antibiotic resistance, which can lead to treatment problems in the future. In addition to antibiotics, treatment of purulent infections with drainage is very important for success in the emergency treatment of these infections. Most patients recover completely after adequate surgical treatment with appropriate antibiotics and elimination of the odontogenic focus [17]. In order to carry out the treatment steps at an optimal level, the infection agent must be clearly identified.

Mandibular molars are a well-known focal tooth for odontogenic infections. The predominance of lower molars in maxillofacial infections is explained by inadequate oral hygiene and the technical difficulty of restorative treatments in these posterior areas [10]. In the study by Huang et al. [18], 50% of 185 cases of deep neck infection; in the study by Bridgeman et al. [19], 53% of 107 cases; in the study conducted by Juang et al. [20], it was reported that 86% of Ludwing angina was of odontogenic origin [2]. The root tips of the second and third mandibular molars correspond to the starting point of the mylohyoid muscle. Therefore, periapical infections may spread to the submandibular or adjacent parapharyngeal space [21, 22]. Other factors affecting the spread of odontogenic infections are the presence of an infected cystic lesion, systemic disease, degree of pericoronitis, presence of periodontal lesion, trauma, localization of muscles and attachments adjacent to the alveolar bone, and the presence of dentoalveolar surgery performed on the patient.

It has been reported that the pathogenesis of odontogenic infections depends on the synergy between aerobic and anaerobic bacteria [23]. However, many studies report that anaerobic microorganisms play an important role in the etiology of odontogenic infections [23, 24]. The antibiogram test should be used to detect the infectious agent. In the study conducted by Heim et al., they reported that the most frequently isolated microorganisms in odontogenic infections were *Staphylococcus, Streptococcus and Prevotella species* [25]. In their study, Siqueira et al. [26] found that the most common gram-negative bacteria in odontogenic infections were *Bacteroidesa, Prevotella spp., P. ntermedia, P. nigrescens, P. Baroniae spp.*; while the most common gram-positive bacteria were *Firmicutes, Streptococcus spp.* Facultative bacteria, another group of microorganisms frequently detected in odontogenic infections, are *S. viridans, Actinomyces and Lactobacilli.*

In their study examining odontogenic infections arising from posterior teeth, Bertossi et al. [27] found that although more infections were observed in the mandible than in the maxilla, the hospitalization rate for infections occurring in the maxilla was lower than in the mandible. Many studies have reported that men are more affected by maxillofacial infections than women [12, 15,

28, 29]. We think that this may be due to the fact that men attach less importance to their oral health than women and the possibility of smoking is higher in men than in women. In our study, 400 of the patients were analyzed as men (57%) and 300 as women (43%). This is parallel with the literature. Studies have reported that the average age of patients with odontogenic infection is 31-47 years [10, 12, 29, 30]. In our study, the average age of patients with odontogenic infection is 33±18 years, which is consistent with the literature.

According to their study, Walia et al. found the frequency of involvement of anatomical spaces due to odontogenic infection as submandibular space 28.57%, buccal space 21.42%, fossa canina abscess 17.85%, submental space 7.14%, pterygomandibular space 7.14% [31]. Mathew et al. [12] reported that 66.4% of 137 patients were male and the average patient age was 40 years. They reported that the most common origin was the pulp (70.8%) and the most frequently affected area was the submandibular space. In our study, consistent with the literature, it was determined that the infection was mostly localized in the submandibular space (32%).

The drainage area in the treatment of odontogenic infections varies depending on where the inflammatory exudate is most prominent. However, regardless of the drainage area, some rules must be followed in the incision made. First of all, drainage should be done as early as possible and the incision should be made sharply, either intraorally or extraorally [32]. The incision should be parallel to the skin lines and in as aesthetically acceptable a place as possible. The incision needs to be supported by healthy underlying dermis and subcutaneous tissue [33]. The incision should not be made diagonally to the frenulum attachments and care should be taken not to cut perpendicularly to the mental nerve area [33]. In their 10-year retrospective study, Ünlü et al. [34] examined 549 patients and reported that 67% (368) of them were treated with extraoral drainage and 33% (181) with intraoral drainage. In our study, 700 patient data were examined and 63% (440) of the patients were treated with extraoral drainage and 37% (260) with intraoral drainage.

## Conclusion

Demographic characteristics and treatment options of patients with odontogenic abscesses vary depending on the causative tooth area. Odontogenic infections can become life-threatening in a short time if left untreated. Intraoral and extraoral drainage are very important for success in the treatment of common odontogenic abscesses where medical treatment is inadequate. Regular dental examinations of patients can increase the early detection and treatment of dental problems, thus preventing the development of facial abscess or cellulitis.

We think that multi-center studies, in which fields with geographical, social and economic variables will participate, will contribute greatly to both the treatment of patients and the literature by providing a more detailed understanding of the differences between regions.

## Disclosures

**Ethics Committee Approval:** Ethics committee approval was received for this study from Dicle University, Faculty of Dentistry Ethics Committee, in accordance with the World Medical Association Declaration of Helsinki, with the approval number: 2023-49.

**Peer-review:** Externally peer-reviewed.

**Author Contributions:** Concept – R.G.; Design – R.G.; Supervision – R.G.; Materials – R.G.; Data collection &/or processing – R.G.; Analysis and/or interpretation – R.G.; Literature search – R.G.; Writing – R.G.; Critical review – R.G.

**Conflict of Interest:** There is no any conflict of interest.

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