

Retrospective Evaluation of Odontogenic and Nonodontogenic Cysts in the Jaws in the Series of 147 Cases

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ABSTRACT

Objective: The aim of this study is to find the incidence of all jaw cysts diagnosed histologically; to evaluate age, localization and gender distribution and compare the results with the data of previously published studies. It is considered that knowing the distribution of cysts is useful in achieving the correct diagnosis and appropriate treatment planning.

Material and Method: In our study, a total of 147 patients who were histopathologically diagnosed with a jaw cyst between April 2017 and December 2019 were retrospectively evaluated. Biopsies taken by two surgeons were sent for pathological examination. In this study, records of patients from the Pathology Departments at Antalya Training and Research Hospital, Alanya Training and Research Hospital, and Training and Research Hospital of Kutahya Health Sciences University were used. Jaw cysts were evaluated in terms of incidence, age, gender, and localization.

Results: In this study, radicular cyst (65.98%) was found to be the most observed cyst. The radicular cyst was followed by dentigerous cyst (20.40%), keratocyst (8.16%), residual cyst (3.40%), nasolabial cyst (0.68%), dermoid cyst (0.68%), and epidermoid cyst (0.68%). Of the cysts, 57.82% were in the mandible, and 42.18% were in the maxilla. The mean age of the patients was 38.34. The ratio of men to women was found to be 1.67/1.

Conclusion: Preoperative evaluation in jaw cysts, complete removal of lesions and radiographic follow-up are important for success in treatment. In jaw cysts, knowledge of the diagnosis and distribution contributes to appropriate treatment planning and prevention of possible complications.

Keywords

Odontogenic cyst, Nonodontogenic cyst, Incidence, Retrospective analysis.

Introduction

Jaw cysts are pathological structures characterized by a partially or completely coated cavity with epithelial tissue [1]. The bones of the jaws, the mandible and maxilla, are the bones with the highest prevalence of cysts in the human body. This is due to the abundant amount of epithelial remnants that can be left in the bones of the jaws [2]. Epithelial odontogenic

cysts are divided into 2 categories according to their origins: developmental origin and inflammatory origin. Developmental cysts are classified odontogenic cysts originating from odontogenic tissues (Malassez epithelial residues, dental lamina and enamel residues) and nonodontogenic groups which originate from ectoderm that plays a role in the development of facial tissues [3]. Inflammatory cysts are considered to result from epithelial proliferation due to inflammation followed by central liquefaction. The etiology of developmental cysts is not yet clearly known [4].

In the 4th edition of the World Health Organization's Classification of Head and Neck Tumors published in 2017, inflammatory odontogenic cysts include radicular cysts and inflammatory collateral cysts. The developmental odontogenic and nonodontogenic cysts are dentigerous cysts, odontogenic keratocysts, lateral periodontal cysts, botryoid odontogenic cysts, gingival cysts, glandular odontogenic cysts, calcifying odontogenic cysts, orthogenic odontogenic cysts, and nasopalatine duct cysts.

The most remarkable change in the recent classification is that keratocystic odontogenic tumor and calcifying epithelial odontogenic tumor of 2005 WHO classification are now classified under cysts and renamed as odontogenic keratocyst and calcifying odontogenic cyst, respectively.

In the current classification, lesions such as "residual", "apical" and lateral cysts are not included as separate subsets of radicular cysts; eruption cyst is indicated only as a variant of the dentigerous cyst. Although this simplifies the classification, it can lead to confusion among clinicians.

While as a nonodontogenic developmental cyst, nasopalatine duct cysts listed in the 2017 WHO classification, nonodontogenic developmental cysts such as median palatal or newborn palatal cysts are not included in the classification and no explanation is made. Including the gingival cyst, a soft tissue cyst, in the current cyst classification and not including the nasolabial cyst as a soft tissue cyst raised questions. Moreover, developmental intraosseous nonodontogenic cysts, extraosseous cysts and most nonodontogenic cysts (thyroglossal duct cyst, oral lymphoepithelial cyst, epidermoid and dermoid cysts, salivary gland cysts, parasitic cysts) are not included in the current classification [5]. Except from these cysts, there are cysts without epithelial lining, known as pseudocysts. These are aneurysmal bone cyst, traumatic bone cyst, Stafne bone cyst, and focal osteoporotic bone marrow defect [6]. The table regarding the classification of cysts is given below [6,7]:

Odontogenic Cysts (WHO-2017 Classification)	
Inflammatory Odontogenic Cysts	Developmental Odontogenic Cysts
<ul style="list-style-type: none"> • Radicular cyst-Residual cyst • Inflammatory collateral cyst • Parodontal cyst • Mandibular buccal bifurcation cyst 	<ul style="list-style-type: none"> • Dentigerous cyst-Eruption cyst • Lateral periodontal cyst and botryoid odontogenic cyst • Glandular odontogenic cyst • Gingival cysts • Odontogenic keratocyst • Orthokeratinized odontogenic cyst • Calcifying odontogenic cyst

Nonodontogenic Jaw and Soft Tissue Cysts
<ul style="list-style-type: none"> • Incisive canal cyst (nasopalatine cyst); median palatal cyst • Nasolabial Cyst • Lymphoepithelial cyst • Branchial cleft cyst • Thyroglossal duct cyst • Epidermoid and dermoid cysts

Pseudocysts of the Jaw
<ul style="list-style-type: none"> • Aneurysmal bone cyst • Traumatic bone cyst • Stafne bone cavity • Focal osteoporotic bone marrow defect

The diagnosis of odontogenic and nonodontogenic cysts is based on different clinical and radiological features. However, definitive diagnosis is established according to the histopathologic examination of the lesion. It is important to diagnose the lesions correctly. Because some cysts exhibit aggressive behavior with a significant tendency to recur [3]. Cysts rarely cause any symptoms, unless they become secondarily infected [2]. They are usually asymptomatic; however, dental and/or gingival problems, discharge into the mouth, unpleasant taste, and painless swelling are reported as common complaints. In severe cases, it may lead to trismus, loss of sensation, and pathological fractures. Pain is more commonly observed in infected cases [8]. Cysts are usually treated with enucleation, curettage, and marsupialization [9].

The aim of this study is to retrospectively evaluate the age, localization, and gender distribution of a total of 147 patients histologically diagnosed jaw cysts. In jaw cysts, knowledge of the diagnosis and distribution contributes to appropriate treatment planning and prevention of possible complications.

Material and Method

In this study, 147 patients, who presented to our clinics between April 2017 and December 2019, who were histopathologically diagnosed with a jaw cyst and received treatment, were evaluated retrospectively. Records of Pathology Departments at Antalya Training and Research Hospital, Alanya Training and Research Hospital and Kütahya Health Sciences University Training and Research Hospital are used as data in the study. Jaw cysts were evaluated in terms of frequency, age, gender and localization (Tables 1 and table 2).

The demographic characteristics (age and gender) of the patients included in the study and the location of the lesions were recorded. The involved area is classified into three main groups as follows: anterior region, premolar region, and molar region (Table 3).

Results

A total of 147 patients with a jaw cyst underwent surgery. The age of the patients varied between 6 and 68 and the mean age was 38.34. A total of 147 cases, 55 women (37.41%) and 92 men (62.59%), were included in the study. The male/female ratio in the study population was found to be 1.67/1. The relative frequency of different types of odontogenic and nonodontogenic cysts is shown in Table 1.

In the study, radicular cysts (97 cases, 65.98%) were the most common cysts in the jaw region. Radicular cysts were followed by dentigerous cyst (30 cases, 20.40%), keratocyst (12 cases, 8.16%), residual cyst (5 cases, 3.40%), and nasolabial cyst, dermoid cyst and epidermoid cyst (0.68%), each one having single case (Figure 1).

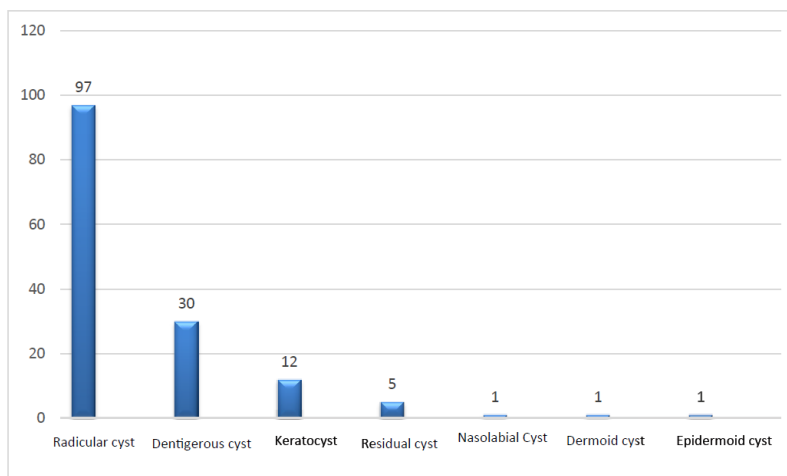


Figure 1: Distribution of cysts by numbers.

Radicular cyst, which is the most common cyst in our study, was observed in 97 cases (65.98%). The male/female ratio was 1.85/1. The average age of the patients having lesion was 37.969 ± 12.26 and it occurs more frequently in the 3rd decade (31-40 age range - 35 cases). In our study, the age range of the radicular cyst was between 6-67 years of age. The maxillary anterior region as the most common cyst region (35 cases), and it was followed by the mandible molar region (25 cases) (Picture 1).

Dentigerous cyst, the second most common cyst type diagnosed, was seen in 30 patients (20.40%). The male/female ratio was 1/1. The mean age of the patients was 31.70 ± 13.993 and most of the patients were aged between 21 and 30 (40%). The mandible molar region was the most affected area (Picture 2).

Keratocysts were the third most common cyst with 12 cases (8.16%). 9 lesions (75%) were noted in men, 3 lesions (25%) in women, and the male/female ratio was 3/1. We detected that they most frequently arise in the molar region of the mandible and they develop on the mandible among the jawbones. It was most frequently observed in the age group of 41-50 (Picture 3).

Residual cyst was detected in 5 cases (3.40%). It was more common in men. It was mostly seen in people over 50 years old. It

was most observed in the anterior part of the maxilla (Picture 4).

The nasolabial cyst was observed in one case. This lesion was noted in a male patient of 61 years old and it was located in the maxillary anterior region (Picture 5).

One case had dermoid cyst. This cyst, located in the right lower jaw, showed the symptoms of dentigerous cyst when radiographically viewed. The patient was a woman and 23 years old. After the histopathologic examination, it was detected that there was a dermoid cyst in the mandible with an intraosseous location. The pre-operative panoramic view of the patient is shown below (Picture 6).

Epidermoid cyst was detected in one case. Located in the toothless region of the right mandible, this cyst had the characteristics of residual cyst in radiological examination. The patient was male and 53 years old. According to anamnesis, the patient had a history of lung cancer and received treatment. The patient, who feared of metastasis, underwent surgery. After histopathologic examination, it was detected that there was an epidermoid cyst in the mandible with an intraosseous location. The pre-operative panoramic view of the patient is shown below (Picture 7).

Group	Male	Female	Mandible	Maxilla	Gender ratio (male / female)	Average age	Total
Radicular cyst	63 64.95%	34 35.05%	46 47.42%	51 52.58%	1.85	37.969 ± 12.260	97 65.98%
Dentigerous cyst	15 50%	15 50%	25 83.33%	5 16.67%	1	31.70 ± 13.993	30 20.40%
Keratocysts	9 75%	3 25%	10 83.33%	2 16.67%	3	47.08 ± 13.228	12 8.16%
Residual cyst	3 60%	2 40%	2 40%	3 60%	1.5	60.0 ± 5.831	5 3.40%
Nasolabial Cyst	1 100%	-	-	1 100%	-	61.0	1 0.68%
Dermoid cyst	-	1 100%	1 100%	-	-	23.0	1 0.68%
Epidermoid cyst	1 100%	-	1 100%	-	-	53.0	1 0.68%
Total	92 62.59%	55 37.41%	85 57.82%	62 42.18%	1.67	38.34	147 100%

Table 1: Distribution of cysts according to gender, age and localization.

Group	≤10	11-20	21-30	31-40	41-50	51-60	≥61	Total
Radicular cyst	2	5	18	35	19	14	4	97
Dentigerous cyst	-	6	12	4	3	4	1	30
Keratocysts	-	-	1	2	4	3	2	12
Residual cyst	-	-	-	-	-	3	2	5
Nasolabial Cyst	-	-	-	-	-	-	1	1
Dermoid cyst	-	-	1	-	-	-	-	1
Epidermoid cyst	-	-	-	-	-	1	-	1
Total	2	11	32	41	26	25	10	147

Table 2: Distribution of cysts by age.

Group	Maxilla Anterior	Maxilla Premolar	Maxilla Molar	Mandible Anterior	Mandible Premolar	Mandible Molar	Total
Radicular cyst	35	6	10	7	14	25	97
Dentigerous cyst	4	-	1	1	1	23	30
Keratocysts	-	-	2	2	1	7	12
Residual cyst	3	-	-	-	1	1	5
Nasolabial Cyst	1	-	-	-	-	-	1
Dermoid cyst	-	-	-	-	-	1	1
Epidermoid cyst	-	-	-	-	-	1	1
Total	43	6	13	10	17	58	147

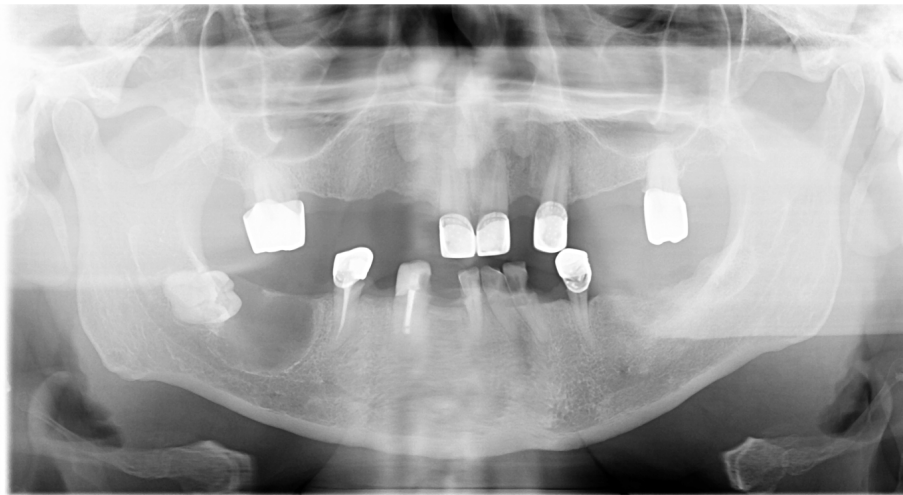
Table 3: Distribution of cysts according to their specific localization.



Picture 1: Radicular cyst originating from the root of the upper left lateral tooth



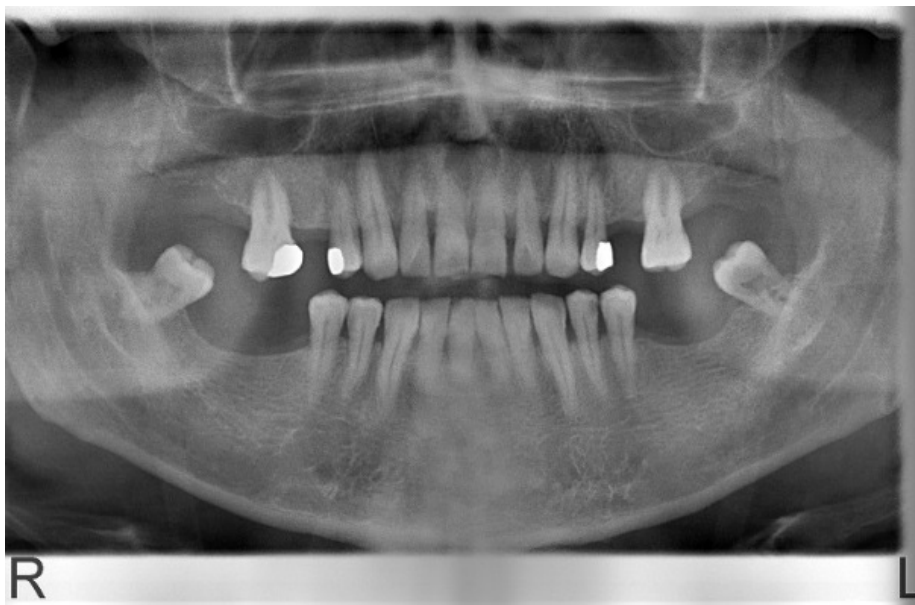
Picture 2: Dentigerous cyst arising from the impacted lower left wisdom tooth



Picture 3: This cyst, which is associated with impacted lower right wisdom tooth, first suggests a dentigerous cyst. After histopathologic examination, it was understood that it was a keratocyst.



Picture 4: Residual cyst which was in the toothless region of the anterior maxillary crest.



Picture 5: The cyst that does not lead to destruction in the adjacent bones, and that is not clearly observed on the panoramic image, was diagnosed as a nasolabial cyst after a histopathologic examination.



Picture 6: This cyst located in the right mandible shows the findings of dentigerous cyst when it is viewed radiographically. After the histopathologic examination, it was detected that there was a dermoid cyst in the mandible with an intraosseous location.



Picture 7: This cyst located in the right mandible shows the findings of residual cyst when it is viewed radiographically. After the histopathologic examination, it was detected that there was an epidermoid cyst in the mandible with an intraosseous location.

Discussion

Odontogenic and non-odontogenic cysts have an important place in the differential diagnosis of other primary and secondary benign and malignant tumors of the jaws due to their clinical and radiological features. The late diagnosis and inadequate treatment may lead to a high morbidity rate [8].

In our study, 147 patients who were admitted to our clinics between April 2017 and December 2019, and diagnosed with histopathologic jaw cyst and treated, were evaluated retrospectively. The most frequent cyst was found to be radicular cyst (65.98%). The radicular cyst was followed by dentigerous cyst (20.40%), keratocyst (8.16%), residual cyst (3.40%), nasolabial cyst (0.68%), dermoid cyst (0.68%), and epidermoid cyst (0.68%).

Radicular cysts develop due to the proliferation of Malessez epithelial residues (residual epithelial cells in the periodontal ligament) due to the long-standing inflammatory process in the bone surrounding the tooth root apex [10]. Considering that poor oral hygiene increases the tendency to dental infection, it may be suggested that radicular cyst may develop at a younger age in

Turkey in comparison with the age shown in studies in the literature and that it may differ from European data in various aspects [8]. In their study on the distribution of jaw cysts, Tamiolakis et al. found the percentage of radicular cyst as 57,3% [11]. Tortorici et al. found the prevalence rate of the radicular cyst as 84.5% in the case study conducted on 1310 patients [12]. Núñez-Urrutia et al. found the percentage of radicular cyst as 50.2% in the series of 418 cases in which they included the odontogenic cysts [13]. Kammer et al. found the prevalence rate of the radicular cyst as 46.06% [14]. Kilinc et al. found the percentage of radicular cysts as 66.4% [15]. In our study, this rate was found to be 65.98%. In their study conducted on 2030 cases of jaw cysts, Lo Muzio et al. found that the incidence male/female ratio in radicular cysts is 1.77/1, the mean age of patients who have radicular cysts is 38.17 (between the ages of 10 and 92) and the most common localization is the maxilla (65.66%) [16]. In their study on odontogenic and nonodontogenic jaw lesions, Johnson et al. detected that the incidence of male/female ratio in the radicular cysts was 1.2/1 and it was more commonly observed in the maxilla than in the mandible (maxilla/mandible: 1.2/1) [17]. Kilinc et al. stated that the rate of male/female incidences in radicular cysts is 1.4/1,

the average age of patients with radicular cyst is 31.4, and the radicular cysts are mostly in the maxilla and in the anterior maxilla as specific localization [15]. Tortorici et al. stated that the mean age of radicular cysts was 35.6, the male/female ratio was 1.15 / 1 and it was seen in the maxilla more often. Kambalimath et al., in their study, stated that radicular cysts are mostly seen in the anterior maxilla (50.68%) for those between the ages of 11-30 and, the male/female ratio was 1.35/1 [18]. In our study, it was found that radicular cysts are observed 1.85 times higher in males than females, mostly develop in the 3rd decade (6-67 age range), and often in the maxilla, more specifically in the anterior maxilla. These results are consistent with the literature.

Dentigerous cysts are developmental epithelial cavities that develop at the cement-enamel junction of an impacted tooth and surrounding the crown of the tooth. Dentigerous cysts are the most observed odontogenic cysts after radicular cysts and they account for approximately 24% of all jaw cysts [19]. Del Corso et al. found that dentigerous cysts are the most common developmental cysts, and that the mean age of incidence is 39 (age range 4-72 years), and that they are 65% more common in male patients and are usually located in the mandible [20]. In a study, including odontogenic and nonodontogenic cysts, conducted by Butt et al. found that dentigerous cysts were the most common developmental cysts (31%), the incidence of male/female ratio was 1.44/1, and the average age was 22.7 (age range 4-60 years) [21]. Acikgoz et al. found that the incidence rate of dentigerous cysts was 26.6%, more common in males (54.1%) than females (45.9%), at the third decade most often, and the most common location was in the mandibular molar region [22]. In this study, we observed that the incidence of dentigerous cysts was 20.40%, that the number of cases was the same in men and women, that they most commonly develop during the 2nd decade of life, and that they are located in the mandible, specifically in the molar region.

Odontogenic keratocyst is a benign cystic lesion that mainly appears in the posterior mandible, has a local aggressive behavior and has a high risk of recurrence [23]. Two of the most important changes in 2017 WHO histological classification are that calcified cystic odontogenic tumor and keratocystic odontogenic tumor were moved from the neoplastic category (2005) to the cyst category (2017). Calcified cystic odontogenic tumor is now referred as 'calcified odontogenic cyst', and the keratocystic odontogenic tumor is referred as 'odontogenic keratocyst' in the 2017 WHO classification of developmental odontogenic cysts [3]. Grossman et al. reported that the incidence of odontogenic keratocysts was 7.2%, that they are most observed in men, that they arise in the 2nd and 3rd decade of life, and on the posterior mandible [24]. Jones et al. reported that the incidence of odontogenic keratocysts was 11.6%, the male/female ratio was 1.27/1, the average age was 41, and that they were most common in the molar region [25]. Kahraman et al. showed that the average age of keratocysts was 46.6, that they were observed in 55.5% of men and 44.5% of women, and that they were mostly located in the posterior mandible [26]. In their study, Tekkesin et al. reported the incidence of odontogenic keratocysts as 20.6%, the incidence of male/

female ratio as 1.53/1, the average age as 40.5, and the most common localization is the molar region of the mandible [3]. In our study, keratocysts were the third most common cyst with 12 cases (8.16%). 9 lesions (75%) were observed in men, 3 lesions (25%) in women, and the male/female ratio was 3/1. The mandible was the region where the lesion was most observed. It was most frequently observed in the age group of 41-50. In literature, there are many cases of odontogenic keratocyst that may be associated with Gorlin syndrome. In this study, odontogenic keratocyst cases were evaluated as separate lesions that are not associated with other diseases.

Residual cysts develop from epithelial remnants which are stimulated to proliferate by the inflammatory response originating from the necrotic pulp of previously extracted non-vital teeth [27]. In their study, Demirkol et al. reported that the incidence of residual cysts was 3.4%, male/female ratio was 4/1, the average age was 60.2 and that they were usually observed on the anterior region of the maxilla [28]. Del Corso et al. reported that residual cysts were more common in men than women, the average age was 52, and the most localization was in the mandible [20]. Acikgoz et al. reported that the incidence of residual cysts was 13.7%, more common in males, that they develop more frequently in the 6th decade of life and the premolar region of the maxilla [22]. Selvamani et al. reported that the incidence of residual cysts was 3.3%, male/female incidence was 4/1 and it was most common in the maxilla [29]. In our study residual cyst was detected in 5 cases (3.40%). It was detected more frequently in men (1.5/1). It was mostly seen in people over 50 years old. Maxilla anterior was the region where the lesion was most observed.

Nasolabial cysts are very rare nonodontogenic soft tissue lesions of the nasal vestibule, fossa canine and sublabial region. The lesions cause painless swelling and nasal congestion in the sublabial fold, lips, and face. Pain may occur if the cyst is infected. In jaw cysts, the incidence of nasolabial cyst is 0.7% [30]. The typical histological finding is the content of respiratory epithelium, goblet cells and ciliated pseudostratified columnar epithelia. Sheikh et al. reported that the average age of patients with nasolabial cysts was 41.8, the incidence of female/male was 3.6/1 and that they were most common in the anterior region of the left maxilla [31]. Almutairi et al. stated that nasolabial cysts are observed usually in black women, and in the 4th and 5th decades of life [32]. Grosman et al. found out that the incidence of nasolabial cysts was 1% and the incidence of male/female ratio was 6.3/1 (24). There are studies in the literature showing that nasolabial cysts are mostly seen in women, and the 4th and 5th decades of life. In our study nasolabial cyst was observed in one case. This lesion in the male patient, was located in the anterior region of maxilla and the patient was 61 years old.

A dermoid cyst is a rare clinicopathological lesion that is developmental of origin. The term dermoid cyst is used to describe 3 histologically closely related cysts: dermoid cyst, epidermoid cyst, and teratoma. Epidermoid and dermoid cysts can develop anywhere in the body, but most commonly occur in the ovaries

and scrotum. It is seen in only about 7% cases in the head and neck region. The development of such cysts in the oral cavity is extremely rare, and about 1.6% of cysts are located in this area. The floor of the mouth is one of the most affected areas, but these cysts can also be found in the tongue, lips, buccal mucosa, and jaw bones [33]. Dermoid and epidermoid cysts in the mouth are rare and count for less than 0.01% of all oral cysts [34]. Dermoid cysts are developmental cysts covered with an epidermis-like epithelium and contain dermal adnexal structures such as sebaceous glands, hair follicles, or sweat glands in the cyst wall. They can generally be classified as a benign cystic form of a teratoma, but they do not contain tissue from all three germ layers and therefore are not true teratomas [35]. Epidermoid cysts developed out of ectodermal tissue and represent the simplest expression of the teratoma spectrum [36]. The dermoid cysts are common affecting people between the ages of 15 and 35 years and there is no sex predilection [37]. Epidermoid cysts may be found in any age group but are more common between 10 and 35 years of age with no gender predilection, while others have found predominance of women [38].

In our study, the dermoid cyst was observed in one case. This cyst developed on the impacted 3rd molar tooth in the right lower jaw and had the features of dentigerous cyst in X-ray. It was observed in a 23-year-old female patient. After the histopathologic examination, it was detected that it was a dermoid cyst located in the mandible. The epidermoid cyst was detected in one patient. This cyst was located in the right lower jaw and toothless region, showed the characteristics of residual cyst findings when viewed radiographically. It was a 53-year-old male patient. According to anamnesis, the patient had a history of lung cancer and received treatment. The patient, who feared of metastasis, underwent surgery. After histopathologic examination, it was understood that there was an epidermoid cyst in the mandible with an intraosseous location.

Conclusion

The findings of this research generally show compatibility with the literature. In this study, the incidence of cysts observed was as follows; radicular cyst (65.98%), dentigerous cyst (20.40%), keratocyst (8.16%), residual cyst (3.40%), nasolabial cyst (0.68%), dermoid cyst (0.68%), and epidermoid cyst (0.68%). Information about the distribution of cysts would be beneficial for establishing a diagnosis of cysts and their possible complications and for the appropriate treatment planning. Detailed preliminary evaluation, surgical planning, aggressive surgical treatment and frequent follow-up for cysts with the tendency to recur, help reduce the possibility of recurrence and morbidity.

The definitive diagnosis of cysts should be made upon histological examination. Knowing the incidence and distribution of the cyst according to localization will be useful in terms of providing insight during the diagnosis.

Based on our findings, the distribution of jaw cysts seen in Turkey was relatively similar to studies conducted in other parts of the

world. In our study, the importance of evaluating the lesions clinically, radiologically, and histopathologically was emphasized for definitive diagnosis.

As a result, routine dental follow-ups, radiographic examination before tooth extraction, and curettage of the apical lesion after extraction are important, especially to reduce the frequency of radicular cysts and to treat the cysts before reaching large sizes or damaging the surrounding anatomical structures.

References

1. Prockt AP, Schebela CR, Maito FD, et al. Odontogenic cysts: analysis of 680 cases in Brazil. *Head Neck Pathol.* 2008; 2: 150-156.
2. Hupp JR, Ellis E, Tucker MR. *Contemporary oral and maxillofacial surgery* (5th ed.). St. Louis, Mo.: Mosby Elsevier. 2008; 450-456.
3. Tekkesin MS, Olgac V, Aksakalli N, et al. Odontogenic and nonodontogenic cysts in Istanbul: analysis of 5088 cases. *Head Neck.* 2012; 34: 852-855.
4. Slootweg PJ. Lesions of the jaws. *Histopathology.* 2009; 54: 401-418.
5. *J Oral Maxillofac Pathol.* 2019; 23: 178-186.
6. Kramer IR, Pindborg JJ, Shear M. *The WHO Histological Typing of Odontogenic Tumours. A commentary on the Second Edition.* *Cancer.* 1992; 70: 2988-2994.
7. Menditti D, Laino L, Domenico M DI, et al. Cysts and Pseudocysts of the Oral Cavity: Revision of the Literature and a New Proposed Classification. *In Vivo.* 2018; 32: 999-1007.
8. Agir H, Sen C, Isil E, Unal C, Ustundag E, Keskin G. Odontogenic and nonodontogenic jaw cysts: experience in 25 cases. *Kulak Burun Bogaz Ihtis Derg.* May-Jun 2008;18(3):157-65.
9. Marino MJ, Luong A, Yao WC, et al. Management of odontogenic cysts by endonasal endoscopic techniques: A systematic review and case series. *Am J Rhinol Allergy.* 2018; 32: 40-45.
10. Scholl RJ, Kellet HM, Neumann DP, et al. Cysts and cystic lesions of the mandible: clinical and radiologic-histopathologic review. *Radiographics.* 1999; 19: 1107-1124.
11. Tamiolakis P, Thermos G, Tosios KI, Sklavounou-Andrikopoulou A. Demographic and Clinical Characteristics of 5294 Jaw Cysts: A Retrospective Study of 38 Years. *Head Neck Pathol.* 2019 Dec; 13(4): 587-596. doi: 10.1007/s12105-019-01011-7.
12. Tortorici S, Amodio E, Massenti MF, et al. Prevalence and distribution of odontogenic cysts in Sicily: 1986-2005. *J Oral Sci.* 2008; 50: 15-18.
13. Nuñez-Urrutia S, Figueiredo R, Gay-Escoda C. Retrospective clinicopathological study of 418 odontogenic cysts. *Med Oral Patol Oral Cir Bucal.* 2010; 15: e767-773.
14. Kammer PV, Mello FW, Rivero ERC. Comparative analysis between developmental and inflammatory odontogenic cysts: retrospective study and literature review. *Oral Maxillofac Surg.* 2020; 24: 73-84.

15. Kilinc A, Gundogdu B, Saruhan N, et al. Odontogenic and nonodontogenic cysts: An analysis of 526 cases in Turkey. *Niger J Clin Pract.* 2017; 20: 879-883.
16. Lo Muzio L, Mascitti M, Santarelli A, et al. Cystic lesions of the jaws: a retrospective clinicopathologic study of 2030 cases. *Oral Surg Oral Med Oral Pathol Oral Radiol.* 2017; 124: 128-138.
17. Johnson NR, Savage NW, Kazoullis S, et al. A prospective epidemiological study for odontogenic and non-odontogenic lesions of the maxilla and mandible in Queensland. *Oral Surg Oral Med Oral Pathol Oral Radiol.* 2013; 115: 515-522.
18. Kambalimath DH, Kambalimath HV, Agrawal SM, Singh M, Jain N, Anurag B, Michael P. Prevalence and Distribution of Odontogenic Cyst in Indian Population: A 10 Year Retrospective Study. *J Maxillofac Oral Surg.* 2014; 13: 10-15. doi: 10.1007/s12663-012-0450-y.
19. Tamgadge A, Tamgadge S, Bhatt D, et al. Bilateral dentigerous cyst in a non-syndromic patient: Report of an unusual case with review of the literature. *J Oral Maxillofac Pathol.* 2011; 15: 91-95.
20. Del Corso G, Righi A, Bombardi M, et al. Jaw cysts diagnosed in an Italian population over a 20-year period. *Int J Surg Pathol.* 2014; 22: 699-706.
21. Butt FM, Ogeng'o J, Bahra J, et al. Pattern of odontogenic and nonodontogenic cysts. *J Craniofac Surg.* 2011; 22: 2160-2162.
22. Acikgoz A, Uzun-Bulut E, Ozden B, et al. Prevalence and distribution of odontogenic and nonodontogenic cysts in a Turkish population. *Med Oral Patol Oral Cir Bucal.* 2012; 17: e108-115.
23. Duarte-Andrade FF, Vitorio JG, Pereira TDSF, et al. A review of the molecular profile of benign and malignant odontogenic lesions. *Oral Surg Oral Med Oral Pathol Oral Radiol.* 2020; 129: 357-368.
24. Grossmann SM, Machado VC, Xavier GM, et al. Demographic profile of odontogenic and selected nonodontogenic cysts in a Brazilian population. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 2007;104: e35-41.
25. Jones AV, Craig GT, Franklin CD. Range and demographics of odontogenic cysts diagnosed in a UK population over a 30-year period. *J Oral Pathol Med.* 2006; 35: 500-507.
26. Kahraman D, Gunhan O, Celasun B. A series of 240 odontogenic keratocysts: Should we continue to use the terminology of 'keratocystic odontogenic tumour' for the solid variant of odontogenic keratocyst? *J Craniofac Surg.* 2018; 46: 942-946.
27. Perjuci F, Ademi-Abdyli R, Abdyli Y, Morina E, Gashi A, Agani Z, Ahmedi J. Evaluation of Spontaneous Bone Healing After Enucleation of Large Residual Cyst in Maxilla without Graft Material Utilization: Case Report. *Acta Stomatol Croat.* 2018 Mar; 52(1): 53-60. doi: 10.15644/asc52/1/8.
28. Demirkol M, Ege B, Yanik S, et al. Clinicopathological study of jaw cysts in southeast region of Turkey. *Eur J Dent.* 2014; 8: 107-111.
29. Selvamani M, Donoghue M, Basandi PS. Analysis of 153 cases of odontogenic cysts in a South Indian sample population: a retrospective study over a decade. *Braz Oral Res.* Jul-Aug 2012; 26: 330-334. doi: 10.1590/s1806-83242012005000007.
30. Sahin C. Nasolabial cyst. *Case Rep Med.* 2009; 2.
31. Sheikh AB, Chin OY, Fang CH, et al. Nasolabial cysts: A systematic review of 311 cases. *Laryngoscope.* 2016; 126: 60-66.
32. Almutairi A, Alaglan A, Alenezi M, et al. Nasolabial cyst: case report and review of management options. *BMC Surg.* 2020; 20: 10.
33. Sahoo NK, Choudhary AK, Srinivas V, et al. Dermoid cysts of maxillofacial region. *Med J Armed Forces India.* 2015; 71: S389-394.
34. Janarthanam J, Mahadevan S. Epidermoid cyst of submandibular region. *J Oral Maxillofac Pathol.* 2012; 16: 435-437. doi: 10.4103/0973-029X.102511. PubMed PMID: 23248482; PubMed Central PMCID: PMC3519225.
35. Dillon JR, Avillo AJ, Nelson BL. Dermoid Cyst of the Floor of the Mouth. *Head Neck Pathol.* 2015 Sep;9(3):376-8. doi: 10.1007/s12105-014-0576-y. Epub 2014 Oct 29. PubMed PMID: 25351706; PubMed Central PMCID: PMC4542791.
36. Loxha MP, Salihu S, Kryeziu K, Loxha S, Agani Z, Hamiti V, Rexhepi A. Epidermoid Cyst of Mandible Ramus: Case Report. *Med Arch.* 2016; 70: 238-40. doi:10.5455/medarch.2016.70.238-240. Epub 2016 May 31. PubMed PMID: 27594757; PubMed Central PMCID: PMC5010063
37. Vieira EMM, Borges AH, Volpato LER, Porto AN, Carvalhosa AA, Botelho GA, Bandeca MC. Unusual Dermoid Cyst in Oral Cavity. *Case Rep Pathol.* 2014; 2014: 389752. doi: 10.1155/2014/389752
38. Koca H, Seckin T, Sipahi A, Kaznac A. Epidermoid cyst in the floor of the mouth: Report of a case. *Quintessence Int* 2007; 38: 473-7.