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Prevalence of Oral Lesions with Radiographic Changes Diagnosed in Patients from the Stomatology and Radiology Clinics of UNIFAL-MG

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Abstract
Aims: *The objective of this study was to assess the prevalence and classification of oral lesions presenting radiographic alterations, as well as to characterize the epidemiological profile of affected patients treated at the Stomatology and Radiology Clinics of UNIFAL-MG.*
Study Design: *Retrospective cross-sectional study.*
Place and Duration of Study: *Data were collected from panoramic radiographs and dental records of patients of both sexes, all age groups, and ethnic backgrounds, who were treated at the Stomatology and Radiology Clinics of UNIFAL-MG between May 2023 and April 2024.*
Methodology: *A search was conducted for images compatible with radiographic bone alterations from patients undergoing treatment or follow-up at the Stomatology and Radiology Clinics of UNIFAL-MG, whose records were complete.*
Results: *The sample consisted of 20 patients, 55% of whom were female and 45% male. The age range included patients from the second to the eighth decades of life, with a predominance in the fifth decade. Regarding ethnicity, 40% were classified as feoderm, 35% as leucoderma, and 25% as melanoderma. In all cases, panoramic radiography was requested, along with cone beam computed tomography (65%), hematological examinations (60%), biopsy and histopathological analysis (70%), and exploratory biopsy (10%). Of all lesions detected, 10% were located in the anterior maxilla, 5% in the posterior maxilla, 30% in the anterior mandible, 80% in the mandibular body, and 15% in the mandibular ramus. The most prevalent jaw-related oral lesions were radicular cyst (35%), osteonecrosis (15%), and simple bone cyst (15%). In most cases, there was agreement between the definitive diagnosis and the initial diagnostic hypothesis.*
Conclusion: *The findings highlight the importance of the dental surgeon in diagnosing and providing appropriate treatment aimed at restoring patients health.*
Keywords: *Cross-sectional studies; pathology, oral; radiography, panoramic; diagnosis, oral.*

1. Introduction

Epidemiological studies in Dentistry allow for the identification of the prevalence and incidence of oral diseases, as well as the profile of affected patients, thereby assisting in the formulation of diagnostic hypotheses and consequently contributing to prevention programs and the determination of the population's therapeutic needs (Carvalho et al., 2023).

In the diagnostic process of oral lesions, the stomatologist relies on anamnesis, general and locoregional physical examination, and, in most cases, complementary tests (imaging, histopathological, laboratory, among others) (Guimarães Júnior, 2005).

The wide variety of pathological conditions affecting the craniofacial complex presents distinct characteristics in terms of behavior, duration of progression, preferred location, gender, and age group, among other factors (Oenning et al., 2019).

The jawbones house the teeth, support the alveolar bone, and interact with specialized tissues involved in the formation, eruption, and maintenance of teeth in the maxilla and mandible. Due to this histological, anatomical, and functional complexity, the jawbones are predisposed to various diseases. In such cases, imaging examinations are essential for diagnosis (Sugaya & Silva, 2005).

The systematic description of maxillomandibular lesions in radiographic examinations allows all characteristics to be considered in the formulation of the diagnostic hypothesis. Radiographic density, shape, periphery, location, size, and the effect of the lesion on adjacent structures are evaluated (Oenning et al., 2019).

The objective of this study was to conduct a retrospective analysis of the prevalence and typology of oral lesions with radiographic changes diagnosed at the Stomatology Clinic of UNIFAL, as well as to identify the epidemiological profile of the affected patients.

2. Methods

The study sample was selected from patients' digital radiographic examinations (panoramic radiographs) by analyzing the database of the Radiology Clinic at the Dentistry Program of the Federal University of Alfenas-MG (UNIFAL-MG). For examinations showing radiographic changes, we subsequently searched and collected information from dental records at the Stomatology Clinic of UNIFAL-MG's Dentistry Program, identifying patients diagnosed with oral lesions associated with radiographic abnormalities.

Patient records of individuals from all genders, age groups, and ethnicities, treated at the Stomatology and Radiology Clinics of UNIFAL-MG, were included. These patients presented with oral lesions associated with radiographic changes and were seen over a one-year period, from May 2023 to April 2024.

Patient records that were incomplete or lacked the necessary information for this research were excluded.

The following information was collected from the patient records of those treated (under treatment and clinical and radiographic observation) at the Stomatology Clinic: personal data (gender, age, and ethnicity), diagnostic hypotheses, requested complementary exams, and final diagnosis.

The classification of oral lesions used in this study was based on the World Health Organization (2017) guidelines.

The following information regarding radiographic alterations due to oral lesions was evaluated on the panoramic radiographs of the same patients, taken at the Radiology Clinic: location, size, border shape, internal structure, and effects on adjacent structures.

Regarding anatomical location, the maxilla was divided into two regions: anterior (from the distal of the right canine to the distal of the left canine) and posterior (from the distal of the canine to the tuberosity on both sides). The mandible was divided into three regions: anterior (from the distal of the right canine to the distal of the left canine), body (from the distal of the canine to the third molar region on both sides), and ramus (ramus, coronoid process, and mandibular head on both sides).

The panoramic radiographs were taken using the Veraview X800 (Morita®) and Eagle Edge (Dabi Atlante®) machines. The images were assessed on a 24-inch monitor, and the collected data were recorded in an Excel spreadsheet developed specifically for this study. Descriptive and inferential statistical analyses were performed.

3. Results and Discussion

Over a one-year period, from May 2023 to April 2024, a total of 2,499 panoramic radiographs were performed at the Radiology Clinic of UNIFAL-MG. A search was conducted for images showing radiographic bone alterations in patients undergoing treatment or follow-up at the Stomatology Clinic of UNIFAL-MG, whose records were complete. As a result, 20 patients were selected to compose the sample of the present study.

Regarding the frequency of stomatological lesions involving the jawbones in relation to gender, the present study observed a predominance of female patients (55%), similar to the findings of Silva and Cabral (2022), who reported 55.58%. This gender predominance was also noted in the study by Hoff, Silva, and Carli (2015), which conducted an epidemiological survey of the most frequent oral lesions based on dental records from the School of Dentistry at the University of Passo Fundo, covering the period from 2000 to 2013. According to the authors, this result may be explained by the greater demand for dental healthcare services among women, as well as their higher likelihood of undergoing routine dental examinations, reflecting a greater concern for health.

In the present study, the age range varied from 13 to 77 years, with 15% in the second decade of life, 10% in the third, 10% in the fourth, 30% in the fifth, 10% in the sixth, 15% in the seventh, and 10% in the eighth decade. A higher occurrence of lesions was observed in the fifth decade of life, whereas in the studies by Barros et al. (2019) and Silva and Cabral (2022), the highest frequencies were reported between the second and fourth decades.

In the present study, lesions were more frequent in leucoderma individuals (40%), similar to the findings of Silva et al. (2015). This contrasts with the studies of Barros et al. (2019) on odontogenic cysts and tumors, as well as those of Castro and Camargo (2017) and Carvalho et al. (2023) on oral lesions, which reported a predominance in leucoderma patients.

Among the complementary exams performed, all included panoramic radiography, which served as the starting point for identifying the clinical cases in the present sample. The other exams included cone-beam computed tomography (65%), hematological tests (60%), and histopathological analysis of biopsy samples, either incisional or excisional (70%), as well as exploratory biopsy (10%).

In the study by Araújo (2015), clinical and radiographic evaluations were conducted on 450 patients, of whom nearly one-third required additional imaging exams, with panoramic radiography being the most commonly used for detecting bone lesions.

The importance of radiographic exams in identifying the characteristics of various intraosseous lesions in the maxillae is emphasized, as seen in Silva's (2012) study, which evaluated 623 cases using cone-beam computed

tomography. In the present study, this imaging method was requested for the majority of patients.

Carvalho et al. (2023) conducted a 10-year retrospective study to perform an epidemiological survey of oral lesions at the Stomatology service of Unisagrado in Bauru, SP. The most commonly used complementary exams were panoramic radiographs (91.96%), tomography (31.32%), biopsies (30.12%), and laboratory clinical tests (11.65%). These complementary exams were used in larger proportions in the present study.

Upon evaluating the panoramic radiographs, regarding the anatomical location of the bone alterations in these patients, only 10% of the cases showed maxillary involvement, while 90% of the cases affected the mandible. Of the total lesions detected, 10% were located in the anterior region of the maxilla and 5% in the posterior region of the maxilla. In the mandible, 30% were located in the anterior region, 80% in the body, and 15% in the ramus. Among the total patients evaluated, in 40% of the cases, the lesions involved two regions due to their extent (Fig. 1).

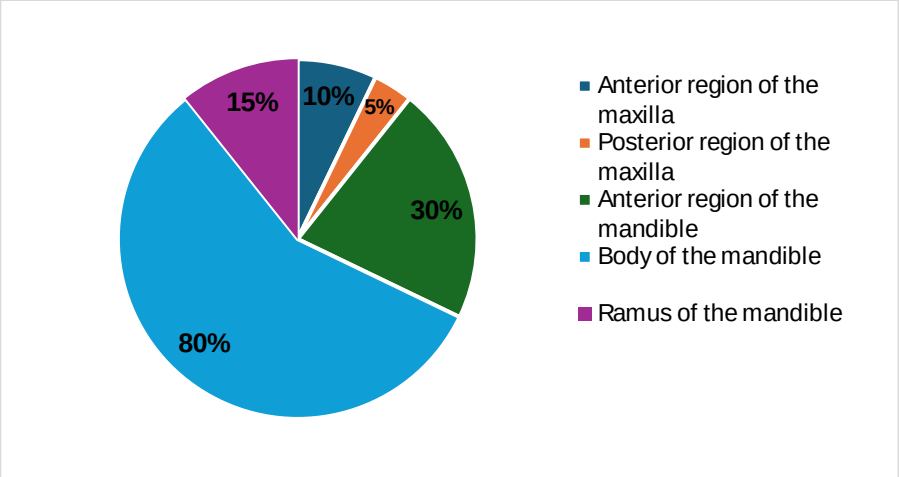

Fig. 1. Location of Bone Alterations in the Maxillary Bones

When analyzing the anatomical location of bone lesions in the maxillary bones, the present study showed a predominance in the mandible (90%), consistent with the findings of the following studies: 71.43% (Araújo, 2015), 71.7% (Silva, 2012), 70.4% (Liposki, 2020), and 57% (Silva & Cabral, 2022). The most affected region was the body of the mandible (80%), in agreement with the studies by Araújo (2015) and Silva (2012).

The diagnosis of the pathological conditions with bone alterations in this sample, as recorded in the patient charts from the Stomatology Clinic, is presented in Table 1, along with the corresponding classification group, the frequency observed in the sample, and gender distribution.

Table 1: Diagnosis of the Pathological Conditions Detected, According to Patient Records

Diagnosis	Group	Frequency/ Percentage	Frequency by gender
Osteonecrosis (2 cases of bisphosphonates; 1 case of radiotherapy)	Osteonecrosis / osteomyelitis	3 (15%)	Masc: 1 Fem: 2
Radicular cyst	Inflammatory odontogenic cyst	7 (35%)	Masc: 4 Fem: 3
Odontogenic keratocyst	Developmental odontogenic cyst	1 (5%)	Masc: 0 Fem: 1
Orthokeratinized odontogenic cyst	Developmental odontogenic cyst	1 (5%)	Masc: 1 Fem: 0
Calcifying odontogenic cyst	Developmental odontogenic cyst	1 (5%)	Masc: 0 Fem: 1
Simple bone cyst	Pseudocyst	3 (15%)	Masc: 0 Fem: 3
Ameloblastoma	Benign odontogenic tumor	1 (5%)	Masc: 1 Fem: 0
Adenomatoid odontogenic tumor	Benign odontogenic tumor	2 (10%)	Masc: 2 Fem: 0
Fibro-osseous lesion	Ossifying fibroma	1 (5%)	Masc: 0 Fem: 1

The most prevalent pathological conditions with alterations in the maxillae in the present study were: radicular cyst (35%), osteonecrosis (15%), and simple bone cyst (15%).

Grandi et al. (2005) conducted a 29-year descriptive and retrospective epidemiological survey of bone lesions in the maxillae, with the most significant values: central giant cell granuloma (30.1%), osteomyelitis (22%), and fibrous dysplasia of the maxillae (10.6%).

Araújo (2015) conducted a descriptive, cross-sectional, and observational study of bone lesions in the maxillae at CDO-FOUSP, presenting the highest values: radicular cyst (27.14%), bone dysplasia (11.42%), dentigerous cyst (8.57%), and simple bone cyst (8.57%).

Barros et al. (2019), in their 12-year retrospective study on odontogenic cysts and tumors, identified the most prevalent diagnoses as: radicular cyst (21.2%), odontogenic keratocyst (16.3%), and ameloblastoma (13.2%).

Neumann et al. (2021), in their 10-year retrospective study on odontogenic cysts and tumors, identified the most prevalent diagnoses as: radicular cyst (32.5%), dentigerous cyst (31.76%), and odontogenic keratocyst (10.98%).

Upon conducting a comparative analysis, it is observed that the radicular cyst was the most common lesion in the present study, as well as in the studies of Araújo (2015), Barros et al. (2019), and Neumann et al. (2021). It is the most common cyst because it develops as a result of pulp necrosis caused by caries or trauma (Marcucci, 2005). According to Regezi, Sciubba, Jordan (2012), most are located in the maxilla, mainly in the anterior region, followed by the posterior region. In the present sample, however, there was a higher prevalence in the mandible.

Osteonecrosis had a significant value in the present study. Neville et al. (2016) described that the most common medications associated with osteonecrosis of the jawbones include aminobisphosphonates, used for the treatment of patients with osteoporosis or various malignant neoplasms involving bone. In the present research, 3 cases of osteonecrosis were observed, 2 of which were related to the use of bisphosphonates, confirming what the literature states. According to Neville et al. (2016), the mandible is more

affected than the maxilla. This finding also aligns with the current study, where all cases occurred in the mandible. Regarding osteoradionecrosis, there was 1 case in the mandible in the present sample. This is a form of osteomyelitis that can occur after therapeutic radiation for malignant neoplasms in the head and neck region, representing one of the most severe complications. The mandible is much more affected, partly because the maxilla has a more diffuse blood supply and a higher proportion of medullary bone (Marcucci, 2005; Neville et al., 2016; Regezi, Sciubba, Jordan, 2012).

The simple bone cyst also had a significant value in the present study, well above the value found in the studies by Araújo (2015) and Grandi et al. (2005). Neville et al. (2016) stated that the simple bone cyst is more common in young patients, with a peak in the second decade of life, with no gender preference and a marked predominance in the mandible. This was observed in this study, where of the 3 cases verified, all involved the mandible, and 2 were in the second decade of life. Marcucci (2005) reported a slight preference for the female gender, which was also observed in the present study, where all cases of this cyst occurred in females.

Some of the pathological conditions detected in this study can be seen in the figures below (Fig. 1 to 6).

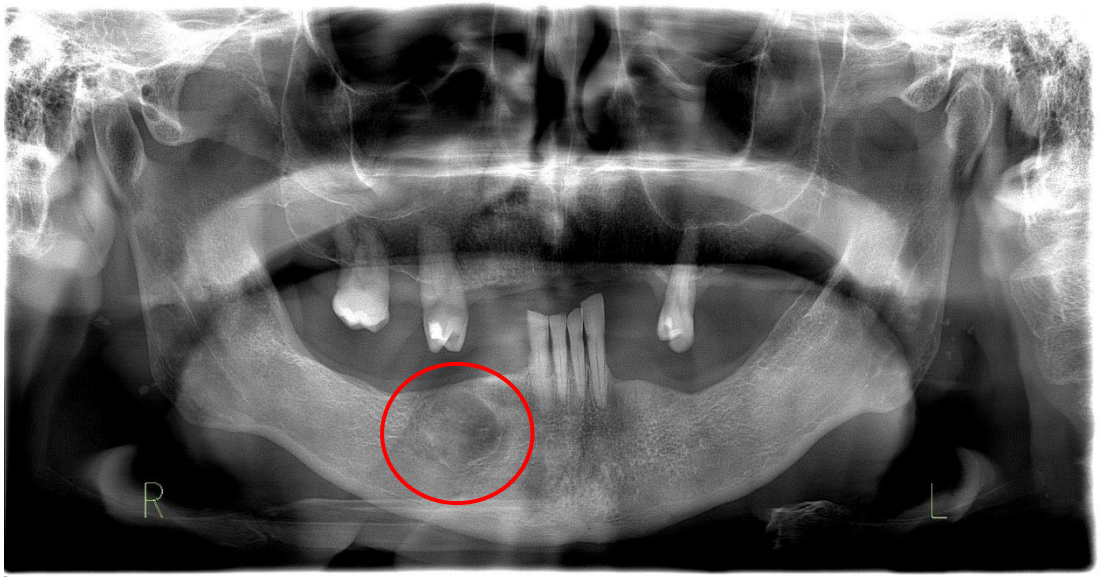

Fig.1. Clinical case with a diagnosis of radicular cyst (residual cyst under observation) - Radiolucent image with radiopaque areas suggestive of bone neoformation, unilocular, rounded, well-defined, corticated, in the region of dental elements 44 and 45.

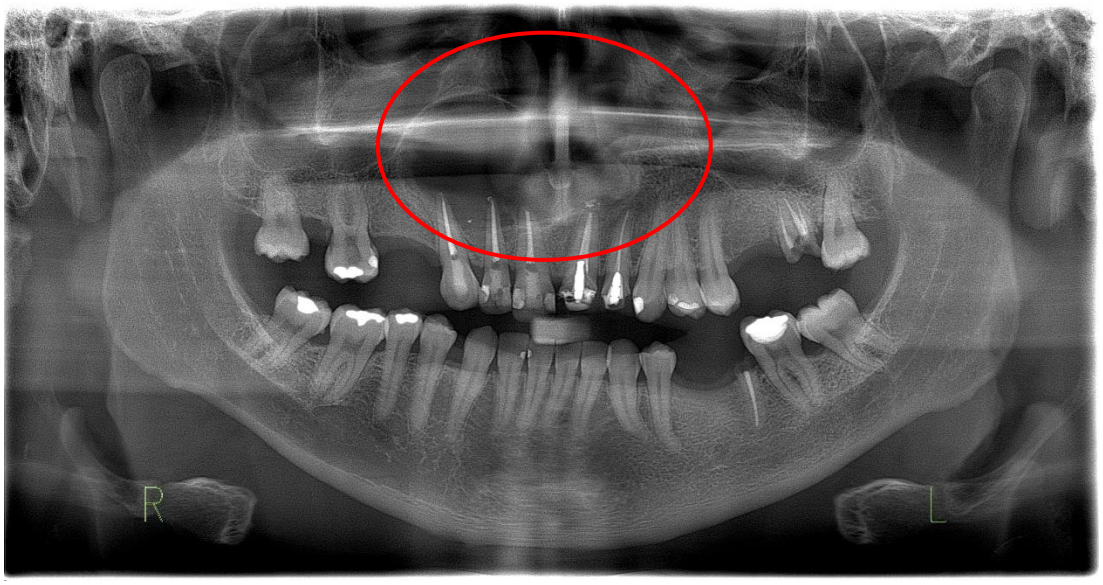

Fig.2. Clinical case with a diagnosis of radicular cyst - Radiolucent image, unilocular, oval, well-defined, corticated, extending from the region of dental element 14 to the distal of 21

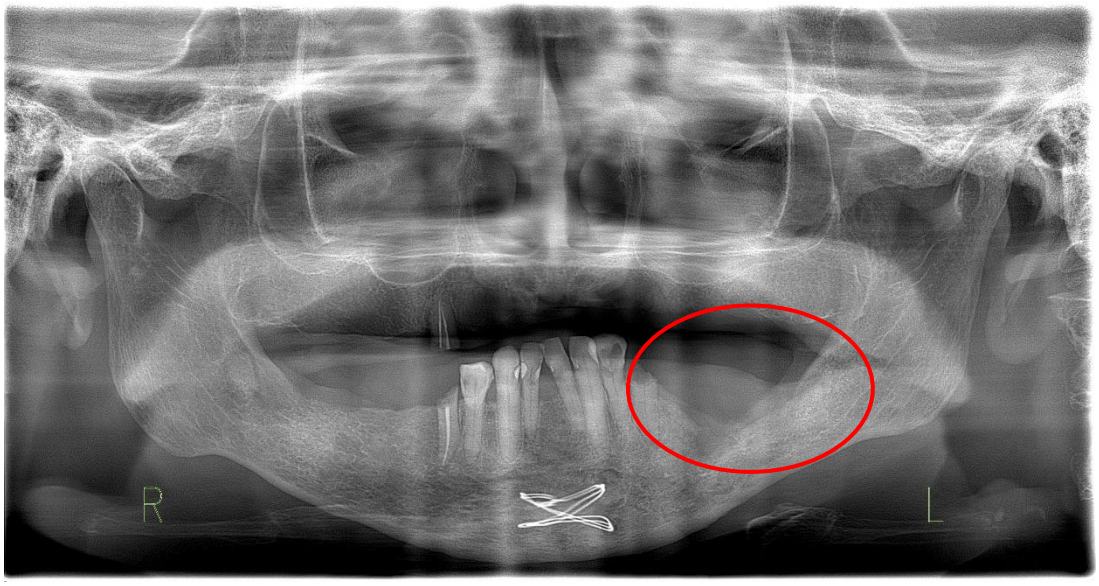

Fig. 3. Clinical case with a diagnosis of osteoradionecrosis - Radiolucent image, irregular, poorly defined, in the region of dental elements 36 and 37.

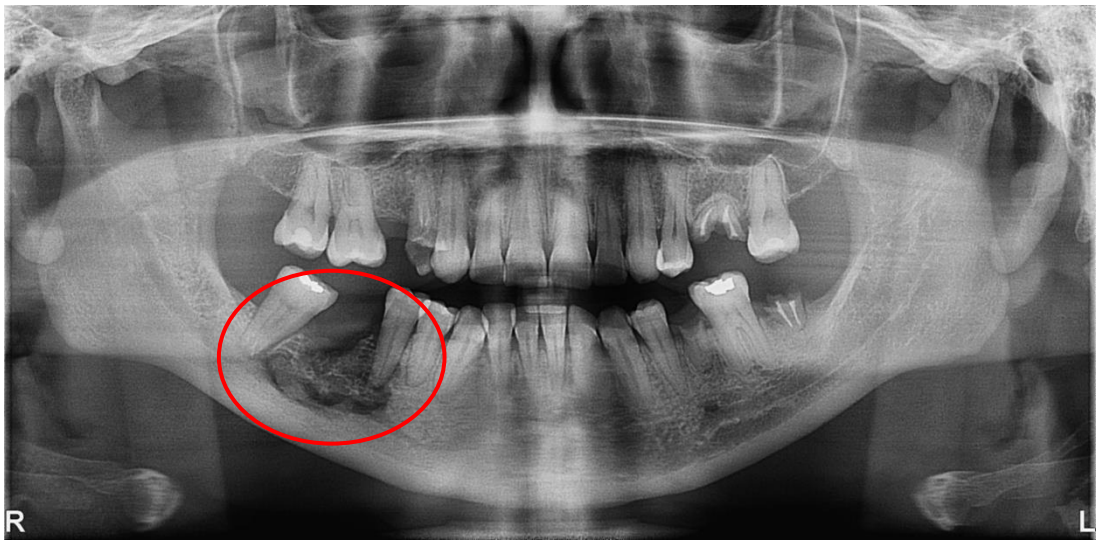

Fig. 4: Clinical case with a diagnosis of bisphosphonate-induced osteonecrosis - Predominantly radiolucent image, irregular, partially defined, extending from the mesial of dental element 45 to the mesial of 47.

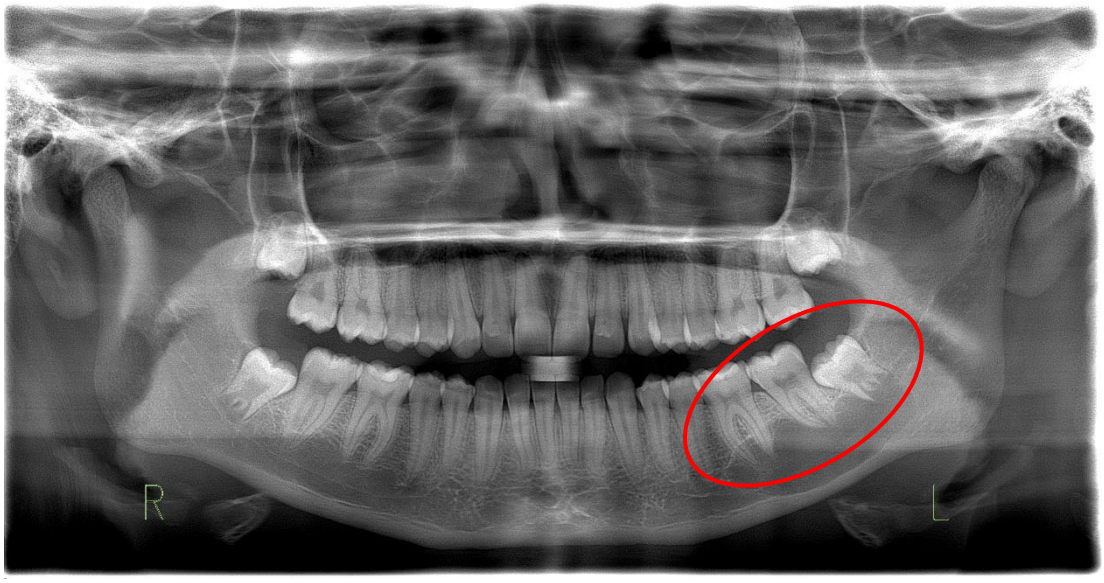

Fig. 5. Clinical case with a diagnosis of simple bone cyst - Radiolucent image, unilocular, oval, well-defined, with sclerotic borders, extending from the mesial of dental element 36 to the distal of 38

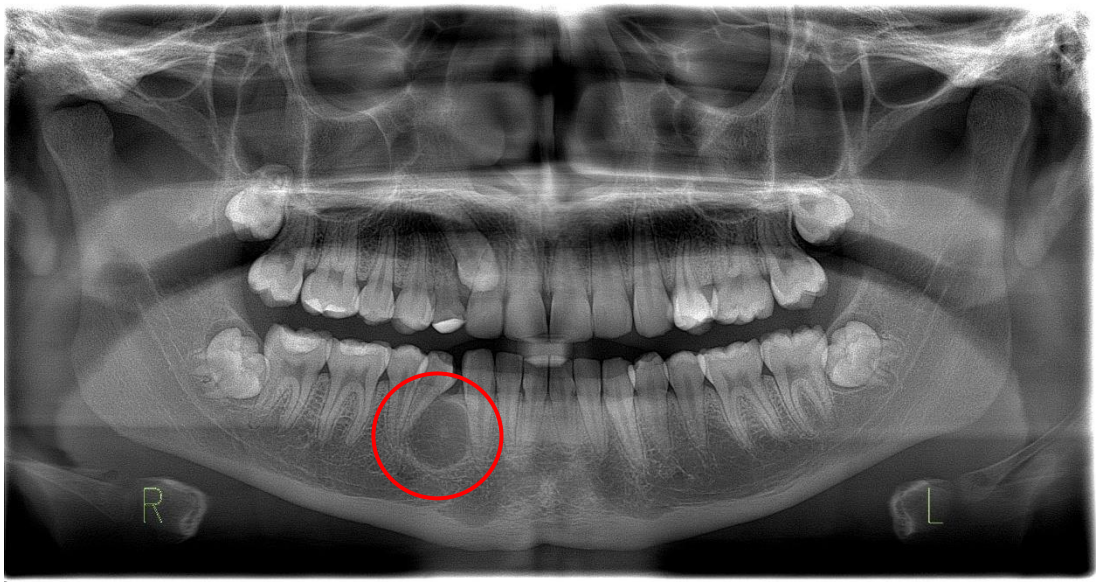

Fig. 6. Clinical case with a diagnosis of extra-follicular adenomatoid odontogenic tumor - Radiolucent image with radiopacity inside, unilocular, rounded, well-defined, partially corticated, between dental elements 43 and 44, causing root displacement of 44

According to the records from the Stomatology Clinic, after evaluating the data collected from the anamnesis, physical examination, and radiographic exam, diagnostic hypotheses were formulated. Among the 20 clinical cases, 15 showed agreement between the diagnosis and the diagnostic hypothesis.

A high accuracy rate was observed between the diagnostic hypothesis and the final diagnosis in the present research, with values similar to those found in the study by Araújo (2015). According to Souza, Soares, and Moreira (2014), this fact in a University Clinic can be explained by the existence of courses related to the area, prior to the clinical period, which allows students to acquire the necessary knowledge. Furthermore, the presence of specialist professors in the relevant fields may contribute to this agreement, due to their clinical experience and their assistance to the students.

4. Conclusion

After analyzing the information collected from the examined sample, a predominance was observed in the female gender (55%), in the fifth decade of life (30%), and in individuals feoderm (40%). Regarding anatomical location, the highest prevalence was found in the mandible (90%), specifically in the mandibular body (80%). The most prevalent lesions were the radicular cyst (35%), osteonecrosis (15%), and simple bone cyst (15%).

The detailed analysis of the maxillomandibular lesions on the radiographic exams likely contributed to the formulation of the diagnostic hypotheses made at the Stomatology Clinic, as well as the clinical experience of the faculty, resulting in a high percentage of agreement between the diagnostic hypotheses and the final diagnoses.

Studies evaluating the clinical features and frequencies of oral lesions enable a more precise definition of their occurrence in specific populations and across different healthcare settings, facilitating the identification of the most common demographic characteristics associated with their development.

The study highlights the important role of dentists in conducting thorough examinations of the oral cavity and associated anatomical structures, enabling the recognition, identification, diagnosis,

and appropriate treatment of conditions to restore patients health.

Disclaimer (Artificial Intelligence)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of this manuscript.

Competing Interests

The authors declare no financial, commercial, political, or personal conflicts of interest related to the conduct of this study.

Consent (where ever applicable)

It is not applicable.

Ethical approval

This study was submitted to the Research Ethics Committee of the Federal University of Alfenas-MG (UNIFAL-MG) and was approved on July 9, 2024, under CAE number 80669324.4.0000.5142.

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