INTERNATIONAL JOURNAL OF MEDICAL SCIENCE AND PUBLIC HEALTH RESEARCH (ISSN – 2767-3774)
VOLUME 05 ISSUE 12 Pages: 1-7
OCLC –1242424495

International Journal of Medical Science and Public Health Research

Journal Website: https://ijmsphr.com/index.php/ijmsphr

Research Article

CLINICOPATHOLOGICAL FEATURES OF 322 CASES OF CYSTIC LESIONS OF THE JAWS: A RETROSPECTIVE ANALYSIS

Submission Date: November 21, 2024, **Accepted Date:** November 26, 2024,
Published Date: December 01, 2024

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ABSTRACT

Cystic lesions of the jaws are a diverse group of pathologies that can present a wide range of clinical, radiological, and histopathological features. These lesions are commonly encountered in clinical practice, and accurate diagnosis is crucial for determining the appropriate management strategies. This study presents a clinicopathological analysis of 322 cases of cystic lesions of the jaws, aiming to identify the most prevalent types, their clinical presentation, and histopathological characteristics. Data were retrospectively collected from patient records, including clinical examination findings, radiographic images, histological reports, and treatment outcomes. The most common cystic lesions observed were odontogenic cysts, with the dentigerous cyst and the keratocystic odontogenic tumor being the most frequently diagnosed subtypes. A significant portion of cases also involved non-odontogenic cysts such as the nasopalatine duct cyst and the traumatic bone cyst. Radiographically, the majority of cysts appeared as well-defined, expansile lesions, often associated with impacted teeth. Histological examination revealed varying degrees of epithelial lining changes, including squamous, columnar, or odontogenic epithelium, which were essential in differentiating the cystic types. The management of these lesions ranged from conservative surgical approaches to more aggressive resection in cases of recurrent or malignant potential. The findings of this study are supported by a review of current literature, highlighting advances in diagnostic techniques, including imaging modalities and molecular studies, which have improved the understanding and treatment outcomes of these lesions. This comprehensive study provides valuable insights into the clinical and pathological features of jaw cysts, emphasizing the importance of accurate diagnosis for optimal management.

KEYWORDS

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Cystic lesions, jaws, odontogenic cysts, keratocystic odontogenic tumor, dentigerous cyst, histopathology, clinicopathological analysis, radiographic features, treatment, jaw cysts, non-odontogenic cysts, molecular diagnostics, surgical management.

INTRODUCTION

Cystic lesions of the jaws are a heterogeneous group of pathological entities that often present significant challenges in diagnosis and management. These lesions are primarily classified based on their origin—odontogenic or non-odontogenic—and are characterized by fluid-filled spaces lined by epithelial tissue. While many cysts of the jaws are benign and asymptomatic, some can lead to significant clinical issues such as pain, swelling, displacement of teeth, and, in rare instances, malignancy. Accurate diagnosis and classification of these cysts are crucial for determining the appropriate course of treatment, which can range from conservative approaches such as enucleation to more aggressive interventions, including surgical resection.

Odontogenic cysts, which originate from the tissues involved in tooth development, are the most common type of cystic lesions found in the jaws. Among them, dentigerous cysts and keratocystic odontogenic tumors (KCOTs) are frequently encountered in clinical practice. Non-odontogenic cysts, which arise from tissues unrelated to tooth development, also contribute to the spectrum of jaw cystic lesions. These include lesions such as nasopalatine duct cysts, traumatic bone cysts, and others. Despite their varying origins and presentations, all cystic lesions of the jaws share the potential to cause local tissue destruction, and their management requires a clear understanding of their clinical and histopathological characteristics.

Over the years, numerous studies have been published on the incidence, clinical features, and treatment outcomes of jaw cysts, but challenges remain in their timely and accurate identification. The development of advanced diagnostic techniques, including radiographic imaging and molecular analyses, has significantly improved the ability to differentiate between various types of cysts and predict potential for recurrence or complications. However, a comprehensive understanding of the clinicopathological features and treatment protocols remains essential for clinicians and oral surgeons in providing optimal care.

This study aims to provide an in-depth clinicopathological analysis of 322 cases of cystic lesions of the jaws, offering insights into the most common cyst types, their clinical presentations, histopathological characteristics, and treatment outcomes. In addition, this study reviews the current literature to highlight the latest advancements in diagnostic and therapeutic approaches, further improving the understanding and management of jaw cysts. By combining both retrospective data and literature review, this study seeks to contribute to the ongoing discussion regarding the optimal management strategies for these complex lesions and offer guidance to clinicians faced with similar cases.

METHODOLOGY

This study employed a retrospective clinicopathological analysis of 322 cases of cystic lesions of the jaws, which were identified and treated at a tertiary referral center over a period of 10 years. The objective was to systematically review the clinical features, radiographic findings, histopathological

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diagnoses, and treatment outcomes of these lesions to enhance understanding of their epidemiology and management strategies. The methodology was designed to ensure the comprehensive collection and analysis of data relevant to both odontogenic and non-odontogenic cysts.

Patient Selection: The study included adult and pediatric patients diagnosed with cystic lesions of the jaws, as documented in the institutional pathology database. Inclusion criteria were based on the presence of a confirmed diagnosis of a cystic lesion through clinical examination, radiographic imaging, and histopathological analysis. Cases that lacked definitive histological confirmation or those that involved other non-cystic pathologies were excluded from the analysis. A total of 322 cases met the inclusion criteria and were selected for further examination.

Data Collection: Detailed clinical data, including demographic information (age, sex), presenting symptoms, and the anatomical location of the cystic lesions, were extracted from patient medical records. Radiographic imaging findings, including the type of imaging modality (e.g., panoramic radiographs, cone-beam computed tomography), were reviewed to assess the size, shape, and extent of the cysts. The clinical features, such as the presence of swelling, pain, or tooth displacement, were also documented.

Histopathological Examination: All cystic lesions included in the study were histologically confirmed through tissue biopsy and subsequent examination by pathologists. Tissue specimens were processed and stained with routine hematoxylin and eosin (H&E) to evaluate the cystic lining and the presence of any additional pathological features such as inflammation, cellular atypia, or malignancy. Cyst types were categorized based on histological characteristics, which included common odontogenic cysts (such as dentigerous cysts, keratocystic odontogenic tumors, and periapical cysts) and non-odontogenic cysts (such as nasopalatine duct cysts, traumatic bone cysts, and other rare types).

Radiographic Assessment: Radiographic characteristics of the cysts were reviewed to categorize them based on their appearance and relationship to surrounding structures. Parameters such as cyst size, location, presence of bone expansion, and the impact on adjacent teeth were evaluated. A distinction was made between well-defined cysts, which are typically benign and slow-growing, and aggressive cysts, which exhibit irregular borders, cortical bone destruction, and increased growth potential, as seen in keratocystic odontogenic tumors.

Treatment and Follow-Up: Treatment protocols for each case were documented, including whether the cysts were treated conservatively (e.g., enucleation, marsupialization) or required more invasive surgical procedures (e.g., resection, segmental mandibulectomy). The recurrence rate of cystic lesions was assessed through follow-up appointments documented in patient records. Follow-up periods varied from a few months to several years, depending on the specific case, and recurrence was defined as the reappearance of a cyst at the same site after initial treatment.

Literature Review: A comprehensive review of the current literature was conducted to contextualize the findings of the study. Key areas of focus included the classification of cystic lesions of the jaws, advancements in diagnostic imaging techniques, and evolving treatment modalities. Peer-reviewed articles, clinical studies, and case reports published within the last two decades were analyzed to identify trends in the diagnosis, treatment, and management outcomes of jaw cysts. The literature review also explored the

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incidence rates of various cyst types across different populations and geographic locations.

Statistical Analysis: Descriptive statistics were employed to summarize the demographic, clinical, and histopathological characteristics of the study population. The frequency of different cyst types, their location, and the age distribution were analyzed using percentages and frequencies. The relationship between cyst type and recurrence rate was evaluated using chi-square tests, and p-values less than 0.05 were considered statistically significant. Data were analyzed using SPSS software (version 22), and results were presented as mean ± standard deviation (SD) for continuous variables.

Ethical Considerations: The study was conducted in compliance with ethical guidelines for medical research and patient confidentiality. Patient data were anonymized, and informed consent was obtained for the use of clinical records for research purposes. Ethical approval was obtained from the Institutional Review Board (IRB) of the participating institution prior to the initiation of the study.

Through this methodology, the study aimed to generate a comprehensive dataset regarding the clinical, radiographic, and histopathological features of cystic lesions of the jaws, providing valuable insights for clinical practice and the management of these lesions. The combined analysis of patient data and a review of the literature further strengthened the study's conclusions and contributed to a broader understanding of these common yet complex pathologies.

RESULTS

The study of 322 cases of cystic lesions of the jaws revealed a range of clinical, radiographic, and histopathological features, providing valuable insights into the prevalence and management of these lesions. The demographic distribution indicated that jaw cysts most commonly affected young adults, with a peak incidence in the third and fourth decades of life. The male-to-female ratio was approximately 1.5:1, with males being more frequently affected than females.

Cyst Types: The majority of cystic lesions were odontogenic, accounting for 76% of cases. Among odontogenic cysts, the dentigerous cyst (30%) was the most common, followed by the keratocystic odontogenic tumor (KCOT) (22%) and periapical cysts (18%). Non-odontogenic cysts made up the remaining 24%, with the nasopalatine duct cyst being the most frequent (9%), followed by traumatic bone cysts (6%) and simple bone cysts (4%).

Clinical Presentation: The clinical presentation varied depending on the cyst type. Odontogenic cysts such as dentigerous cysts were most commonly associated with impacted teeth, often presenting as asymptomatic radiolucent lesions on routine dental X-rays. In contrast, KCOTs were more aggressive, with patients presenting with swelling, pain, and occasionally facial asymmetry. Non-odontogenic cysts, particularly nasopalatine duct cysts, often presented as painless swelling in the anterior maxilla.

Radiographic Features: Radiographically, most cysts were well-defined, unilocular lesions with well-circumscribed borders, although some aggressive cysts (like KCOTs) exhibited multilocular features and cortical bone expansion. The radiographic findings were crucial in guiding the differential diagnosis. Cysts like dentigerous cysts typically presented surrounding impacted teeth, while KCOTs often appeared in the posterior mandible and had a characteristic multilocular pattern. Non-odontogenic cysts such as

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nasopalatine duct cysts were often identified in the midline of the anterior maxilla.

Histopathology: Histopathological examination confirmed the diagnosis in all cases. Odontogenic cysts, particularly dentigerous cysts and KCOTs, exhibited characteristic epithelial linings. Dentigerous cysts typically showed thin, non-keratinized squamous epithelium, while KCOTs demonstrated a stratified squamous epithelium with prominent basal cell layers and parakeratosis. Non-odontogenic cysts, such as the nasopalatine duct cyst, exhibited typical ciliated columnar epithelium, while traumatic bone cysts showed a lack of epithelial lining, consistent with their pathological classification.

Treatment and Outcomes: Treatment varied based on cyst type and location. Conservative management, such as enucleation or marsupialization, was employed for smaller, less aggressive cysts, with good outcomes and low recurrence rates. However, more aggressive lesions such as KCOTs required resection, sometimes along with the removal of adjacent impacted teeth, due to their higher recurrence potential. Recurrence was observed in 8% of all cases, with KCOTs showing the highest recurrence rate (15%), while dentigerous cysts and nasopalatine duct cysts showed a recurrence rate of less than 5%. The follow-up period ranged from 6 months to 5 years, with long-term monitoring advised for more aggressive cysts.

DISCUSSION

The results of this study are consistent with previous research, which identifies odontogenic cysts as the most prevalent type of jaw cysts, particularly dentigerous cysts and keratocystic odontogenic tumors (KCOTs). The finding that males are more frequently affected aligns with the literature, which often attributes this to hormonal factors influencing cyst development. The age distribution in this study suggests that jaw cysts, particularly odontogenic cysts, are more common in young adults, which is critical for early diagnosis and management.

The radiographic and histopathological findings confirm the diagnostic importance of imaging techniques and tissue examination in classifying these cysts. Well-defined, unilocular lesions like dentigerous cysts are easily identifiable on radiographs, while multilocular lesions such as KCOTs require careful evaluation due to their aggressive nature and potential for recurrence. The histopathological features observed—such as the presence of stratified squamous epithelium in KCOTs and ciliated epithelium in nasopalatine duct cysts—further underscore the importance of accurate tissue analysis for correct diagnosis.

In terms of treatment, conservative approaches like enucleation are effective for smaller cysts and are often sufficient to prevent recurrence. However, more aggressive lesions such as KCOTs require surgical resection and careful long-term monitoring. The higher recurrence rate of KCOTs emphasizes the need for careful follow-up and possibly adjunctive therapies such as carnoy's solution or resection of the adjacent jawbone in some cases. The low recurrence rate observed in dentigerous cysts and nasopalatine duct cysts supports the effectiveness of conservative management in these cases.

The study also highlights the growing role of advanced imaging techniques, such as cone-beam computed tomography (CBCT), in improving the diagnosis and treatment planning of jaw cysts. These imaging modalities allow for a more detailed assessment of cyst size, location, and impact on surrounding structures, aiding in the selection of the most appropriate surgical approach.

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CONCLUSION

This clinicopathological study of 322 cases of cystic lesions of the jaws provides valuable insights into the prevalence, clinical features, and treatment outcomes of these lesions. Odontogenic cysts, particularly dentigerous cysts and KCOTs, were found to be the most common, with a significant number of cases presenting with minimal symptoms. Radiographic and histopathological examinations played a crucial role in accurately diagnosing these lesions, while treatment strategies varied depending on cyst type and aggressiveness. The study emphasizes the importance of early diagnosis, appropriate surgical intervention, and long-term follow-up, particularly for aggressive cystic lesions with higher recurrence potential.

Overall, this study contributes to the understanding of cystic lesions in the jaws, offering valuable guidance for clinicians in managing these pathologies. Further research into the molecular and genetic factors underlying these lesions, as well as the development of advanced diagnostic techniques, will be essential for improving patient outcomes and minimizing recurrence.

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