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Cystic lesions of the jaws: a literature review

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Abstract

Different types of cysts may appear in the maxillofacial region. The cysts in which their lining was originated from the remnants of tissues that were used to form the tooth, were labeled as odontogenic and later on were subdivided as inflammatory or developmental. The cysts in which their lining was not originated from the remnants of the tooth, were labeled as non-odontogenic. The odontogenic cyst is described as a hollow pathological cavity of the jawbone or the soft tissues which has an outer wall made of connective tissue and an inner wall made of epithelial cells. Inside the cavity, there are solids, liquids or even gas particles. In addition, the odontogenic cysts are characterized by very slow growth, expansion and without any clinical symptoms. In case of an unusual cyst with large size or related infection, various complications such as the expansion of the bone, asymmetry of the face, impaction of teeth, root resorption, movement or loosening of the teeth, occlusal disbalance and even obliteration of the maxillary sinus, nasal cavity and orbital cavity may develop. The most common odontogenic cysts are the radicular cysts, dentigerous cysts, residual cysts and odontogenic keratocyst (OKC). Those cysts have been reported by a variety of countries worldwide such as Spain, Brazil, Israel, Mexico, France, Canada, Italy, Greece, Thailand, Nigeria and Lithuania. One study which was conducted in Canada has shown the most common odontogenic cysts with 65.15% was the radicular cyst, followed by dentigerous cyst with 24.08% and lastly OKC with 4.88%

Keywords: odontogenic cysts, Cystic lesions, Classification, Dentigerous cyst, Diagnostic techniques.

Abbreviations

Odontogenic Keratocyst (OKC), United States of America (USA), Orthopantomogram (OPG), Computed Tomography (CT), Magnetic Resonance Imaging (MRI), Ultrasound (US), Cone-Beam Computed Tomography (CBCT), Multidetector CT (MDCT), Inferior Alveolar Nerve Canal (IANC).

Introduction

An odontogenic cyst is described as a hollow pathological cavity of the jawbone or the soft tissues which has an outer wall made of connective tissue and an inner wall made of epithelial cells. This pathological cavity may contain solids, liquids, gas or the various combinations of those three [1, 10]. The cyst together with its contents is slowly growing and expanding to various directions due to the increase of osmotic pressure on the surrounding and the secretion of growth factors and prostaglandins. As this process continues, the expansion will lead to the resorption of the surrounding bone and other vital structures [1, 3].

Odontogenic cysts considered as one of the most prevalent pathologic lesions in the maxillofacial region [7] and have been found as accountable for 0.8% to 45.9% of all the lesions which are routinely diagnosed in the oral cavity [9]. Those lesions have been reported by a variety of countries worldwide such as Spain, Brazil, Israel, Mexico, France, Canada, Italy, Greece, Thailand, Nigeria and Lithuania [9]. The most common odontogenic cysts are the radicular cysts, dentigerous cysts, residual cysts and odontogenic keratocyst (OKC) even though their ranking was different in every region. According to a study which was conducted in a dental academy in the United States of America

(USA), the frequency of cysts, in general, was 10.7%. According to another study from Brazil, the overall prevalence of odontogenic cysts was 13.9%, while the most common of them was the radicular cysts. Another study that was conducted in Canada has shown the most common odontogenic cysts with 65.15% was the radicular cyst, followed by dentigerous cyst with 24.08% and lastly OKC with 4.88% [2].

The purpose of this article is to present a general review of the literature regarding odontogenic cysts for the general population.

Classification

The classification is based on the most updated information which will assist to determine the specific type of cyst and designed to be simple. The information includes the origin of the epithelial lining and the estimated pathogenesis of the cyst. The cysts in which their lining was originated from the remnants of tissues that were used to form the tooth, were labeled as odontogenic and later on were subdivided as inflammatory or developmental. The cysts in which their lining was not originated from the remnants of the tooth, were labeled as non-odontogenic but still have been included in the classification due to their clinical resembling [1].

Table. The Classification of Odontogenic Cysts [1].

Odontogenic cysts of inflammatory origin
Radicular cyst <ul style="list-style-type: none"> • Residual cyst Inflammatory collateral cysts <ul style="list-style-type: none"> • Paradental cyst • Mandibular buccal bifurcation cyst
Odontogenic & non-odontogenic developmental cysts
Dentigerous cyst <ul style="list-style-type: none"> • Eruption cyst Odontogenic keratocyst Lateral periodontal cyst <ul style="list-style-type: none"> • Botryoid odontogenic cyst Gingival cysts <ul style="list-style-type: none"> • Gingival cysts of adults • Gingival of infants (alveolar cyst) Glandular odontogenic cyst Calcifying odontogenic cyst Orthokeratinised odontogenic cyst

Most common odontogenic cyst of inflammatory origin

Those cysts arise from the proliferation of epithelial cells as a result of local inflammation. The most common cyst of this group is the radicular cyst which is also responsible for 60% of all the odontogenic cysts. The radicular cyst usually develops after a long-term inflammation at the periapical region of the tooth, also known as apical periodontitis. This inflammation will give

rise to a periapical granuloma and the proliferation of epithelial cells. This proliferation will lead to the death of the pulp and the formation of an apical cavity with an epithelium lining. As times go by, this cavity will expand due to the constant and increasing hydrostatic pressure [1]. The clinical features of the radicular cyst are various and depend on the level of inflammation. In general, dental pain or inconvenience may occur in case of a rapid worsening of the inflammation process. Tooth displacement may be visible in the case of a

very large cyst although it rarely happens. Swelling may be palpated in case of an expansion of the cortical plate. The expansion is usually unicortical and will appear at the buccal or palatal plate [2]. The accurate diagnosis methods of radicular cysts may require the vitality test of the pulp, radiography, histological and pathological evaluation and the clinical evaluation of the specific case. The most common radiographic signs will be a well-defined, round and unilocular radiolucency which is located under the apex of the involved tooth [2]. The treatment of most of the radicular cysts includes root canal treatment together with an apicoectomy. In severe cases, the preferable way of treatment will be the extraction of the tooth together with curettage [2].

Most common odontogenic cyst of developmental origin

Unlike the cysts of inflammatory origin, the developmental origin cysts do not have a clear clinical cause. Furthermore, many of them present similar histological and pathological features that may be correctly diagnosed only after an accurate clinical and radiographic evaluation [1]. The most common cyst of this group is the dentigerous cyst which is responsible for 60% of the developmental odontogenic cysts and also for 20% of all the odontogenic cysts. The dentigerous cyst tends to surround the crown of an unerupted or impacted wisdom tooth with an epithelium lining that was originated from the reduced enamel epithelium [1]. Most of the dentigerous cysts do not present any clinical features and been discovered accidentally during the routine radiographic examinations.

Clinical features such as pain, swelling and cortical plate expansion may appear in case of a very large cyst. The expansion will lead to an extensive and hollow unilocular radiolucency which may easily crack during palpation and eventually leads to bony fractures [2]. The diagnostic methods of dentigerous cysts may be radiography, histological and pathological evaluations. The most common radiographic signs will be a well-defined radiolucent cavity, around the crown of the tooth with a surrounding radiopaque border. In addition, the roots of the teeth in the area may be resorbed or displaced [2]. The treatment of the dentigerous cysts is usually the enucleation of cyst and extraction of the related tooth. In the case of a large cyst, the most suitable way of treatment will be marsupialization [2].

IMAGING TECHNIQUES

Various techniques such as intraoral radiography, orthopantomogram (OPG), computed tomography (CT), magnetic resonance imaging (MRI), ultrasound (US) and cone-beam computed tomography (CBCT) have been used to evaluate the cystic lesions of the jaws. CBCT is a relatively new imaging technique that presents a three-dimensional (3D) image in a single rotation, emits a lower dose of radiation and is much simpler to operate compared to multidetector CT (MDCT) [5]. Despite those clear benefits, CT should be used only on special occasions such as the assessment of a large and extensive cyst that had invaded into the nasal cavity, maxillary sinus or even the orbit cavity [8]. CBCT is also been used before oral and/or maxillofacial surgery to provide the required information regarding the exact state and

location of the cyst relative to the surrounding anatomic structures. Overall, imaging techniques such as CBCT and others such as CT and MRI have been very beneficial to properly evaluate the inner structure of the cysts, the bony margins, specific anatomical location, proximity to other anatomical structures and the effect on them in case of a displacement or compression [5]. However, it is important to note that even when those imaging techniques are being evaluated together with the initial clinical findings, the differential diagnosis of cystic lesions may occur and therefore, the best way to diagnose is by histological methods [6].

Treatment

Cystic lesions of the jaws have been mentioned for hundreds of years since the 1600s. Two hundred years later in the 1800s, The German surgeon Carl Partsch has presented cystostomy as one of the treatment methods that will decompress and change the form of the cyst. The term decompression is defined as the reduction of the pressure inside the cyst. This reduction may occur by the placement of a hollow object such as a tube, which will keep a direct and clear opening between the inner cavity of the cyst and the outer environment such as mouth, nose or maxillary sinus. This opening will ensure continuous drainage of the liquids inside the cyst and the avoidance of its growth [3]. However, to properly treat cystic lesions of the jaws, various factors such as the age of the patient, specific location, size of the lesion, expansion into the cortical bone and the effect on the surrounding anatomical structures such as IANC, maxillary sinus and teeth must be taking into an account [5]. For an instant, teeth with

a proximity to the cystic lesion will be recommended for extraction as part of the treatment to remove the cyst. In many cases, teeth which their roots have invaded into the cavity of the cyst and prevent its complete removal will be extracted as well. However, there is no absolute agreement whether those teeth should be extracted or treated endodontically by a root canal treatment and apicoectomy [5].

Complications

Odontogenic cysts are usually characterized by very slow growth and expansion without any symptoms unless there is an unusually large size or related infection. The uninterrupted growth of the cystic lesions of the jaws may lead to various complications such as expansion of the bone, asymmetry of the face, impaction of teeth, root resorption, movement or loosening of the teeth, occlusal disbalance and may even obliterate the maxillary sinus, nasal cavity and orbital cavity [5]. In addition, the growth of odontogenic cysts such as radicular cysts, dentigerous cysts, and odontogenic keratocysts are known as one of the cystic lesions of the jaws which may lead to the inferior displacement of inferior alveolar nerve canal (IANC) [4]. Cysts that are involved with an infection will most likely to present a faster and more painful expansion. This expansion may result in the development of pathological fractures at various locations along the mandible and extensive damage to the surrounding structures [5]. In any case, the surgeons must make every possible effort to avoid damage to the IANC or damage to the surrounding anatomical structures during the surgical removal of the cyst [4].

Conclusion

The scientific literature contains an enormous number of researches regarding the pathogenesis, methods of diagnosis and treatment of the cystic lesions of the jaws. However, scientific literature did not provide a solution to the high prevalence of those cystic lesions worldwide and therefore, additional research regarding the ways of prevention should be made.

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Conflict of interest statement

The authors declare that they have no conflicts of interests.

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