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Classifications of odontogenic Cystic lesion of the jaw (clinical and radiographical Review)

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By

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

اقْرَأْ بِاسْمِ رَبِّكَ الَّذِي خَلَقَ (1) خَلَقَ الْإِنْسَانَ مِنْ عَلَقٍ (2) اقْرَأْ
وَرَبُّكَ الْأَكْرَمُ (3) الَّذِي عَلَّمَ بِالْقَلَمِ (4) عَلَّمَ الْإِنْسَانَ مَا لَمْ يَعْلَمْ (5)

العلق

Certification of the Supervisor

I certify that this project entitled "Classifications of odontogenic Cystic lesion of the jaw (clinical and radiographical Review)" was prepared by the fifth-year student Saja Fuoad Nsaif under my supervision at the College of Dentistry/University of Baghdad in partial fulfilment of the graduation requirements for the Bachelor Degree in Dentistry.

Dedication

This work is dedicated to my support in this life whoever is Allah and AL-Imam Al-mahdi ,to my beloved parents who have been my source of inspiration and gave us strength when we thought of giving up, who continually provide moral, spiritual and emotional support. To my brothers and my husband who always gave me the words of advice and encouragement to finish this work.

Acknowledgment

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Introduction

Cyst: A pathologic cavity, lined by epithelium, containing fluid or semisolid material. A cyst is composed of three basic structures:

(1) A central cavity (lumen), (2) an epithelial lining, and (3) an outer wall (capsule). The cystic cavity usually contains fluid or semisolid material such as cellular debris, keratin, or mucus. The epithelial lining differs among cyst types and may be keratinized or non-keratinized stratified squamous, pseudostratified, columnar, or cuboidal. The cyst wall is composed of connective tissue containing fibroblasts and blood vessels. **(Daley and Wysocki, 1997).**

The jaw cysts are mainly either Odontogenic cyst or non Odontogenic cyst. Odontogenic cysts are a group of jaw cysts that are formed from tissues involved in odontogenesis (tooth development). Odontogenic cysts constitute an important aspect of oral and maxillofacial pathology. Odontogenic cysts are encountered relatively commonly in dental practice. Odontogenic cysts are closed sacs, and have a distinct membrane derived from rests of odontogenic epithelium. Intra-bony cysts are most common in the jaws, because the mandible and maxilla are the only bones with epithelial components. That odontogenic epithelium is critical in normal tooth development. However, epithelial rests may be the origin for the cyst lining later. **(Zadik et al, 2012).**

Aim of the study

The aim of this review study is to explain the basic classification of odontogenic cysts based on their distinct clinical and radiological features which an attempt to make the diagnostic process a simple algorithmic steps to narrow down the differential diagnoses of this group of lesions and ensuring appropriate management and follow-up.

Classification of the cysts in the oral region

In addition to The true cysts of the oral region, there are several conditions with so called (radiographic) 'pseudocystic appearance' in jaws; ranging from anatomic variants such as Stafne static bone cyst, to the aggressive aneurysmal bone cyst.

The true cysts of the oral region can be divided into those of odontogenic origin and nonodonto-genic origin. Odontogenic cyst which the lining of the lumen is derived from epithelium involved in tooth development Classified into

A- Developmental

- Dentigerous cyst

- Eruption cyst
- Odontogenic keratocyst
- Orthokeratinized odontogenic cyst
- Gingival (alveolar) cyst of the newborn
- Gingival cyst of the adult
- Lateral periodontal cyst
- Calcifying odontogenic cyst†
- Glandular odontogenic cyst

B- Inflammatory

- Buccal bifurcation cyst

- Periapical (radicular) cyst

- Residual cyst

(Barnes et al, 2005)

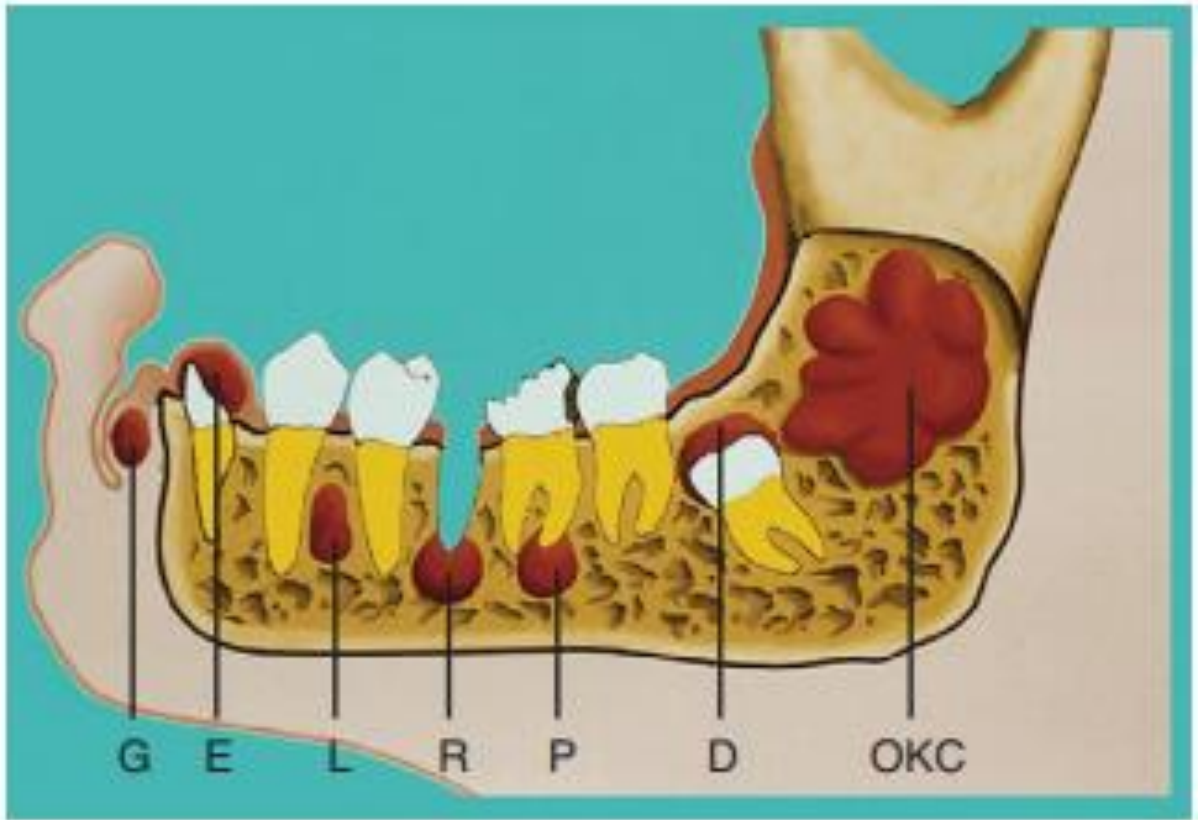


FIG (1): Odontogenic cysts based on typical clinical and radiographic features. Left to right: G, gingival; E, eruption; L, lateral periodontal; R, residual; P, periapical; D, dentigerous; OKC, odontogenic keratocyst. (McClatchey, 1979)

Pathophysiology of odontogenic cysts

The pathophysiology of odontogenic cysts depends on the type of cyst.

- Periapical cysts occur through an inflammatory process from non-vital teeth. Apical inflammation occurs due to a bacterial infection and/or pulpal necrosis and will form granulation tissue. The inflamed granulation tissue causes increased osmotic pressure that leads to the proliferation of the residual rest of Malassezia.
- Residual cysts are remnants of periapical cysts. They occur due to incomplete removal of periapical cysts during a previous tooth extraction.
- Paradental cysts are inflammatory in origin and arise from the junctional epithelium of the gingival sulcus or at the cemento-enamel junction of the lateral erupted side of the tooth, often near the root furcation
- Dentigerous cysts are developmental in origin and associated with an impacted tooth, which has failed to erupt. A dentigerous cyst develops as fluid accumulates between the enamel epithelium and dental enamel; the fluid dilates the dental follicles and ultimately prevents eruption.
- Eruption cysts are developmental in origin and occur due to the buildup of blood or fluid within expanding dental follicular space. The space develops due to the separation of dental follicles from the enamel of the erupting tooth.
- Lateral periodontal cysts are developmental in origin and arise from rests of the dental lamina at the lateral aspect of the root surface.

- Odontogenic keratocysts are developmental in origin and arise from the rests of the dental lamina.
- Orthokeratinizing odontogenic cysts are developmental in origin and arise from the rests of the dental lamina.
- Glandular odontogenic cysts are developmental in origin. (**Bilodeau and Collins 2017 ; Rioux-Forker, et al 2019**)

A- Developmental cysts:

1-Dentigerous cyst

Dentigerous cyst is the most common type of developmental odontogenic cyst making about 20% of all epitheliumlined cysts of jaw. Mostly, it encloses the crown of an unerupted or supernumerary tooth. It develops as the fluid accumulates between the layers of reduced enamel epithelium and enamel surface of crown of the tooth. It is also called as follicular cyst or pericoronal cyst. (**Mourshed,1964**)

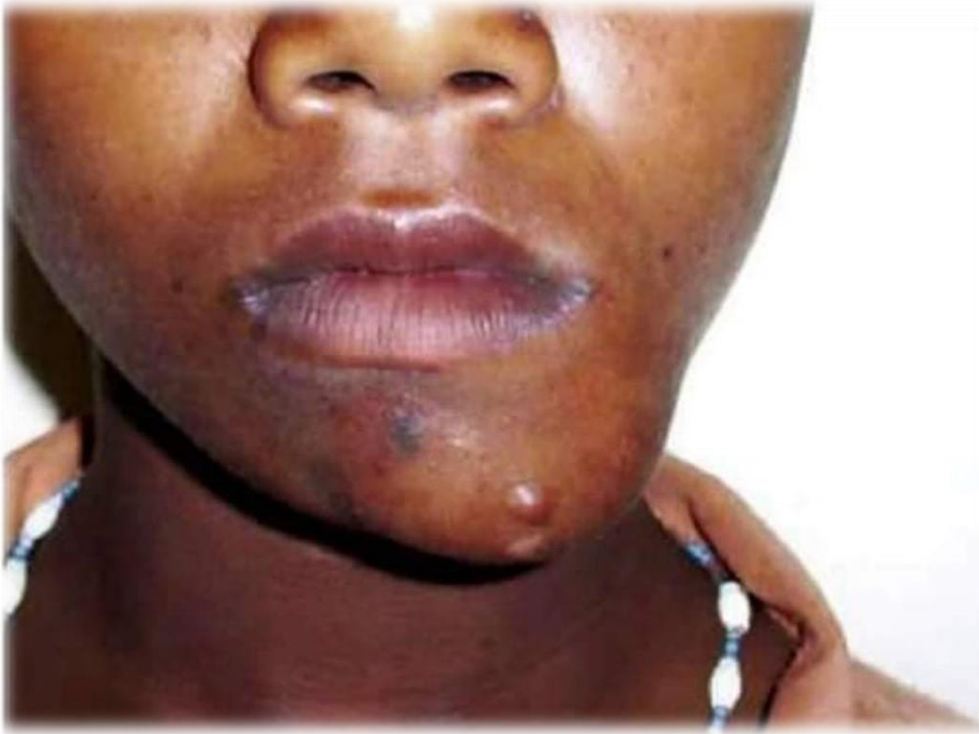


FIG. (2): Dentigerous cyst showing expansion of the jaw (**Anil and Savita, 2016**)

Clinical Features

Dentigerous cysts develop around the crown of an impacted or embedded unerupted or supernumerary tooth or in association with odontomas. They are frequently associated with mandibular third molar followed by maxillary canines, maxillary third molar and mandibular second molar. They are seen at 10–30 years of age with male predilection. They are asymptomatic and often discovered only on a routine radiographic examination. Clinically, they reveal missing tooth and may appear as painless expansion of involved bone; sometimes, large lesions may cause facial asymmetry. They may get infected, causing pain and swelling. Cysts may undergo neoplastic transformation to an ameloblastoma called mural ameloblastoma and mucoepidermoid carcinoma. Rarely, squamous cell carcinoma may arise in the lining of a dentigerous cyst. **(Ghom, 2004)**

Radiographic Features

Dentigerous cyst appears as well defined radiolucency with sclerotic borders seen at the cemento-enamel (CE) junction of unerupted tooth. The sclerotic border is absent in case of infected cyst. It may be solitary or multiple. Size of cyst varies from small to large lesion confined in the jawbones. The cyst is commonly related to single tooth but may enlarge to envelop the adjacent tooth. The teeth are usually greatly displaced from their original position and are found lying on floor of cavity. In mandible, tooth is seen at inferior border of mandible or ramus while in maxilla, it may get displaced into nasal cavity or antrum. Radiographically, dentigerous cyst can be central (cyst enclosing the crown of tooth symmetrically), lateral (cyst arising laterally from one side of crown) and circumferential (when whole tooth lies within the cystic cavity). **(White and Pharoah's, 2004)**



FIG. (3): Panoramic radiograph showing DENTIGEROUS CYST associated with impacted lower premolar tooth. (Anil and Savita, 2016)

2-Eruption cyst (eruption hematoma)

The eruption cyst is the soft tissue analogue of the dentigerous cyst. The cyst develops as a result of separation of the dental follicle from around the crown of an erupting tooth that is within the soft tissues overlying the alveolar bone. One example of eruption cysts developing in a child who was taking cyclosporin A has been described. Presumably the cysts developed because of collagen deposition in the gingival connective tissue that resulted in a thicker, less penetrable pericoronal roof. (Kuczek et al, 2003)



FIG.(4): Eruption cyst (Neville, 2009)

Clinical features

The eruption cyst appears as a soft, often translucent swelling in the gingival mucosa overlying the crown of an erupting deciduous or permanent tooth. Most examples are seen in children younger than age 10. Although the cyst may occur with any erupting tooth, the lesion is most commonly associated with the deciduous mandibular central incisors, the first permanent molars, and the deciduous maxillary incisors. Surface trauma may result in a considerable amount of blood in the cystic fluid, which imparts a blue to purple brown color. Such lesions sometimes are referred to as eruption hematomas. (**Seward, 1973**)

Radiographic Features

In most of the cases no radiographic changes are seen. However, in some cases follicular space over the occlusal portion of the erupting tooth is increased than the normal size Saucer shaped excavation of bone projecting into the oral cavity may be seen radio graphically. (**Shear, 1992**)

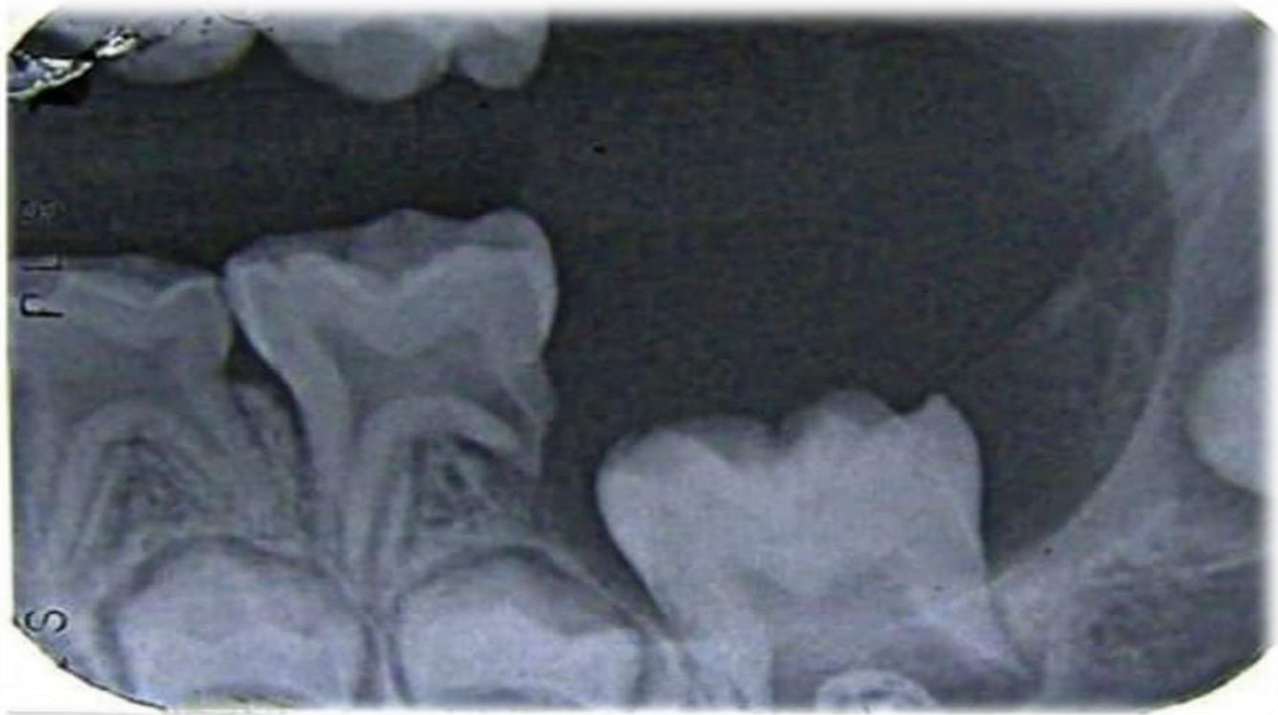


FIG. (5): Panoramic radiograph showing eruption cyst associated with unerupted tooth. (Anil and Savita, 2016)

3-Odontogenic Keratocyst

Odontogenic Keratocyst: A cyst derived from the remnants (rests) of the dental lamina, with a biologic behavior similar to a benign neoplasm, with a distinctive lining of six to ten cells in thickness, and that exhibits a basal cell layer of palisaded cells and a surface of corrugated parakeratin. (Stoelinga, 2001)

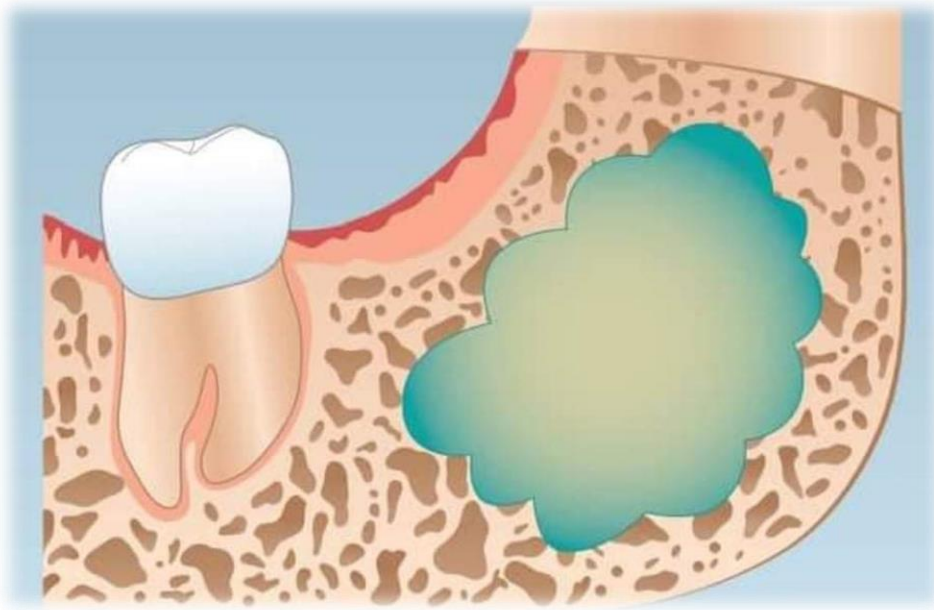


FIG. (6): Odontogenic keratocyst. (Chehade et al, 1994)

Clinical features

Odontogenic keratocysts may be found in patients who range in age from infancy to old age, but about 60% of all cases are diagnosed in people between 10 and 40 years of age. There is a slight male predilection. The mandible is involved in 60% to 80% of cases, with a marked tendency to involve the posterior body and ascending ramus. Small odontogenic keratocysts are usually asymptomatic and discovered only during the course of a radiographic examination. Larger odontogenic keratocysts may be associated with pain, swelling, or drainage. **(Barnes et al, 2005)**

Radiographic features

Odontogenic keratocysts demonstrate a well defined radiolucent area with smooth and often corticated margins. Large lesions, particularly in the posterior body and ascending ramus of the mandible, may appear multilocular. An unerupted tooth is involved in the lesion in 25% to 40% of cases. Some extremely large cysts, however, may cause no symptoms. Odontogenic keratocysts tend to grow in an antero posterior direction within the medullary cavity of the bone without causing obvious bone expansion. This feature may be useful in differential clinical and radiographic diagnosis because dentigerous and radicular cysts of comparable size are usually associated with bony expansion. Multiple odontogenic keratocysts may be present, and such patients should be evaluated for other manifestations of the nevoid basal cell carcinoma (Gorlin) syndrome. **(Li et al, 1998)**



FIG. (7):Periapical radio graph showing Odontogenic keratocyst. . (**Ahlfors et al, 1984**)

4-Orthokeratinized

ODONTOGENIC CYST The designation orthokeratinized odontogenic cyst does not denote a specific clinical type of odontogenic cyst but refers only to an odontogenic cyst that microscopically has an orthokeratinized epithelial lining. Although such lesions were originally called the orthokeratinized variant of odontogenic keratocyst, it is generally accepted that they are clinicopathologically different from the more common para keratinized odontogenic keratocyst and should be placed into a different category. Orthokeratinized odontogenic cysts represent 7% to 17% of all keratinizing jaw cysts. (**Vuhahula et al, 1993**)

Clinical features

Orthokeratinized odontogenic cysts occur predominantly in young adults and show a 2:1 male to female ratio. The lesion occurs twice as frequently in the mandible than the maxilla, with a tendency to involve the posterior areas of the jaws. They have no clinical features that differentiate them from other inflammatory or developmental odontogenic cysts. (**Crowley et al, 1992**)

Radiographic features

The lesion usually appears as a unilocular radiolucency, but occasional examples have been multilocular. About two thirds of orthokeratinized odontogenic cysts are encountered in a lesion that appears clinically and radiographically to represent a dentigerous cyst; they most often involve an unerupted mandibular third molar tooth the size can vary from less than 1 cm to large lesions greater than 7 cm in diameter. (**Li et al, 1998**)

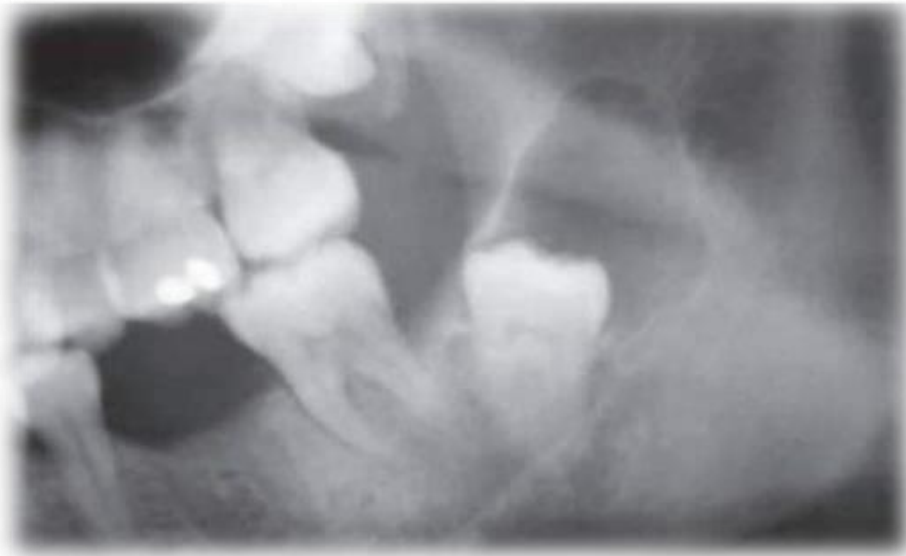


FIG. (8): Panoramic view showing Orthokeratinized odontogenic cyst. Small unilocular radiolucency associated with the impacted mandibular left third molar. **(Neville, 2009)**



FIG. (9): Panoramic view showing Orthokeratinized odontogenic cyst. A large cyst involving a horizontally impacted lower third molar. **(Neville, 2009)**

5-Gingival Cyst of Adult

A small developmental odontogenic cyst of the gingival soft tissue derived from the rests of the dental lamina, exhibiting a lining of squamous to cuboidal epithelium with occasional distinctive focal thickenings similar to those seen in the lateral periodontal cyst. **(Bell et al, 1997)**

Clinical features

The gingival cyst of the adult occurs as a firm but compressible, fluid-filled swelling on the mandibular or maxillary facial gingiva in the premolar, cuspid, and incisor region. The clinical distribution, clinical size, age of occurrence, and histologic features of the gingival cyst of the adult are strikingly similar to those of the lateral periodontal cyst. For these reasons it has been concluded that these two cysts represent the extraosseous and intraosseous manifestations of the same entity. **(Nxumalo and shear, 1992)**



FIG. (10): Gingival cyst of the adult. Lesion of the gingiva in the premolar cuspid area. **(Philip, 2004)**

Radiographic features

Most gingival cysts of the adult are confined to the gingival soft tissues and are therefore not apparent on radiographs. Occasionally, however, they will cause a pressure induced depression (saucerization) in the underlying alveolar bone that is sometimes apparent on radiographic examination. **(Bell et al, 1997)**

6-Gingival (alveolar) cyst of the newborn

Gingival cysts of the newborn are small, superficial, keratin-filled cysts that are found on the alveolar mucosa of infants. These cysts arise from remnants of the dental lamina. They are common lesions, having been reported in up to half of all newborns. However, because they disappear spontaneously by rupture into the oral cavity, the lesions seldom are noticed or sampled for biopsy. Similar inclusion cysts (e.g., Epstein's pearls and Bohn's nodules) are also found in the midline of the palate or laterally on the hard and soft palate. **(Paula et al, 2006)**

Clinical features

Gingival cysts of the newborn appear as small, usually multiple whitish papules on the mucosa overlying the alveolar processes of neonates. The individual cysts are usually no more than 2 to 3 mm in diameter in patients in the fifth and sixth decades of life. They are almost invariably located on the facial gingiva or alveolar mucosa. Maxillary gingival cysts are usually found in the incisor, canine, and premolar areas. Clinically, the cysts appear as painless, dome-like swellings, usually less than 0.5 cm in diameter, although rarely they may be somewhat larger. They are often bluish or blue-gray. In some instances, the cyst may cause a superficial "cupping out" of the alveolar bone, which is usually not detected on a radiograph but is apparent when the cyst is excised. **(Donley and Nelson, 2000)**



FIG. (11): Gingival cyst of the newborn. Multiple whitish papules on the alveolar ridge of a newborn infant . (**Jorgenson et al, 1982**)

7-Lateral periodontal cyst

Lateral periodontal cyst or botryoid odontogenic cyst is uncommon type of cyst occurring along the lateral surface of tooth root. It is thought to be arising from rests of dental lamina. It accounts for less than 20% of all epithelial-lined cysts. **(Larheim and Westlesson, 2005)**

Clinical Features

It is usually asymptomatic and often discovered during normal radiographic examination. It is usually seen in fifth or sixth decade of life with slight male predilection. Eighty percent of the cases are reported in mandibular premolar canine and lateral incisor areas. **(Larheim and Westlesson, 2005)**

Radiographic Features

As the name suggests this cyst appears as a radiolucent area situated laterally at middle third of the affected tooth between the apex and the alveolar crest of tooth. It is oval or round in shape .with the size as small as less than 1 cm in diameter to large lesions seen in botryoid type. The associated tooth is vital. The borders are sclerotic, well-defined surrounding the radiolucency, which is often missing in case of infected cyst. **(Kruger, 1979)**



FIG.(12): Periapical radiograph showing Lateral periodontal cyst. Radiolucent lesion between the roots of a vital mandibular canine and first premolar . **(Philip, 2004)**

8-Calcifying odontogenic cyst

The calcifying odontogenic cyst is an uncommon lesion that demonstrates considerable histopathologic diversity and variable clinical behavior. Although it is widely considered to represent a cyst, some investigators prefer to classify it as a neoplasm. Some calcifying odontogenic cysts appear to represent non neoplastic cysts; other members of this group, variously designated as dentinogenic ghost cell

tumors or epithelial odontogenic ghost cell tumors, have no cystic features, may be infiltrative or even malignant, and are regarded as neoplasms. **(Iida et al, 2006)**

Clinical features

The calcifying odontogenic cyst is predominantly an intraosseous lesion, although 13% to 30% of cases in reported series have appeared as peripheral (extraosseous) lesions. Both the intraosseous and extraosseous forms occur with about equal frequency in the maxilla and mandible. About 65% of cases are found in the incisor and canine areas. Patients may range in age from infant to elder. The mean age is 33 years, and most cases are diagnosed in the second and third decades of life. Calcifying odontogenic cysts that are associated with odontomas tend to occur in younger patients, with a mean age of 17 years. The rare neoplastic variants of the calcifying odontogenic cyst appear to occur in older patients; because of the paucity of reported cases, however, this may not be significant. **(Goldenberg et al, 2004)**



FIG.(13): Peripheral calcifying odontogenic cyst Nodular mass of the mandibular facial gingiva. **(Johnson et al, 1997)**

Radiographic features

The central calcifying odontogenic cyst is usually a unilocular, well defined radiolucency, although the lesion may occasionally appear multilocular. Radiopaque structures within the lesion, either irregular calcifications or tooth like densities, are present in about one third to one half of cases. In approximately one third of cases, the radiolucent lesion is associated with an unerupted tooth, most often a canine. Most calcifying odontogenic cysts are between 2.0 and 4.0 cm in greatest diameter, but lesions as large as 12.0 cm have been noted. Root resorption or divergence of adjacent teeth is seen with some frequency. **(Fregnani et al, 2003)**



FIG. (14): Calcifying odontogenic cyst. Maxillary radiolucent lesion containing calcified structures. (Neville, 2009)

9-Glandular odontogenic cyst

The glandular odontogenic cyst is also known as sialodontogenic cyst. It is intrabony, multilocular cyst with many features similar to lateral periodontal cyst along with mucous-secreting cells histologically and potentially aggressive nature if not adequately excised. (Koppang et al, 1998)

Clinical Features

It is relatively rare cystic lesion that occurs over a wide age range from the second to ninth decades, with a peak frequency in the sixth decade, more frequently in males than in females with a predilection for anterior mandible. The lesion shows slow, progressive, locally destructive, painless growth. The cyst has a strong predilection for the anterior region of the jaws, and many mandibular lesions will cross the midline. The size of the cyst can vary from small lesions less than 1 cm in diameter to large destructive lesions that may involve most of the jaw. (Koppang, et al 1998)



FIG. (15): Glandular odontogenic cyst, Expansile lesion of the anterior mandible. (Philip, 2004)

Radiological Features

The lesion appears as multilocular, occasionally unilocular radiolucency with sclerotic or scalloped borders. Root resorption of associated teeth and tooth displacement is noted. The margins of the radiolucency are usually well defined with a sclerotic rim. **(Rajendran and Sivapather, 2012)**



FIG.(16): The panoramic radiograph shows a large multilocular radiolucency. **(Philip, 2004)**

B- Inflammatory cysts:

1-Buccal bifurcation cyst

The buccal bifurcation cyst is an uncommon inflammatory odontogenic cyst that characteristically develops on the buccal aspect of the mandibular first permanent molar. The pathogenesis of this cyst is uncertain. Some of these lesions have been associated with teeth that demonstrate buccal enamel extensions into the bifurcation area . Such extensions may predispose these teeth to buccal pocket formation, which could then enlarge to form a cyst in response to pericoronitis. It has been speculated that when the tooth erupts, an inflammatory response may occur in the surrounding follicular tissues that stimulates cyst formation. The term paradental cyst sometimes has been used synonymously for the buccal bifurcation cyst. Such lesions typically occur distal or buccal of partially erupted mandibular third molars with a history of pericoronitis. **(Shohat et al, 2003)**

Clinical features

The buccal bifurcation cyst typically occurs in children from 5 to 13 years of age. The patient has slight-to-moderate tenderness on the buccal aspect of the mandibular first molar, which may be in the process of erupting. The patient often notes associated clinical swelling and a foul-tasting discharge. Periodontal probing usually reveals pocket formation on the buccal aspect of the involved tooth. Around one third of patients have been reported to have bilateral involvement of the first molars. **(Golgan et al, 2002)**

Radiographic features

Radiographs typically show a well circumscribed unilocular radiolucency involving the buccal bifurcation and root area of the involved tooth. The average size of the lucent defect is 1.2 cm, but the lesion may be as large as 2.5 cm in diameter. An occlusal radiograph is most helpful in demonstrating the buccal location of the lesion. The root apices of the molar are characteristically tipped toward the lingual mandibular cortex. Many cases are associated with proliferative periostitis of the overlying buccal cortex, which is characterized by a single or multiple layers of reactive bone. **(David et al, 1998)**



FIG.(17): Panoramic view showing Buccal bifurcation cyst. Well-circumscribed unilocular radiolucency superimposed on the roots of the mandibular first permanent molar. **(Philip, 2004)**



FIG.(18): Occlusal radiographic view showing Buccal bifurcation cyst. (**Philip, 2004**)

2-Periapical (radicular) cyst

periapical cyst: An odontogenic cyst derived from rests of Malassez that proliferate in response to inflammation. The periapical cyst, also termed radicular cyst and apical periodontal cyst, is by far the most common type of odontogenic cyst, representing over one half of all oral cysts. It develops at the root apex of an erupted tooth with pulp that has been devitalized by dental caries or trauma. (**Antoh et al, 1993**)

Clinical features

Most periapical cysts develop at the apex of a root adjacent to the pulp canal opening. Occasionally they can also develop at the openings of large accessory pulp canals on the lateral aspect of the roots of teeth through which pulpal inflammation and products of pulpal necrosis exit to form granulomas and stimulate the rests of Malassez. These laterally positioned inflammatory cysts have been termed lateral periapical(radicular) cysts. The size of periapical cysts is variable, but generally measure less than 1 cm in diameter. Occasionally the cyst can become much larger, especially in areas where several adjacent teeth of the anterior mandible or maxilla have been devitalized because of facial trauma, commonly the result of an automobile accident. (**Antoh et al, 1993**)

Radiographic features

The periapical cyst appears as a rounded, well-circumscribed, often corticated radiolucency at the apex of a nonvital tooth. Cysts that develop on the lateral aspect of the root appear as semicircular radiolucencies against the root surface.

Occasionally a periapical cyst that develops in the anterior maxilla in the apical region of a lateral incisor tooth will appear as a globule maxillary radiolucency that may result in divergence of the roots of the lateral incisor and the adjacent cuspid. Histopathologic studies of globule maxillary radio lucencies indicate that approximately 50% of these radiolucencies are periapical (radicular) cysts. (**Antoh et al, 1993**)

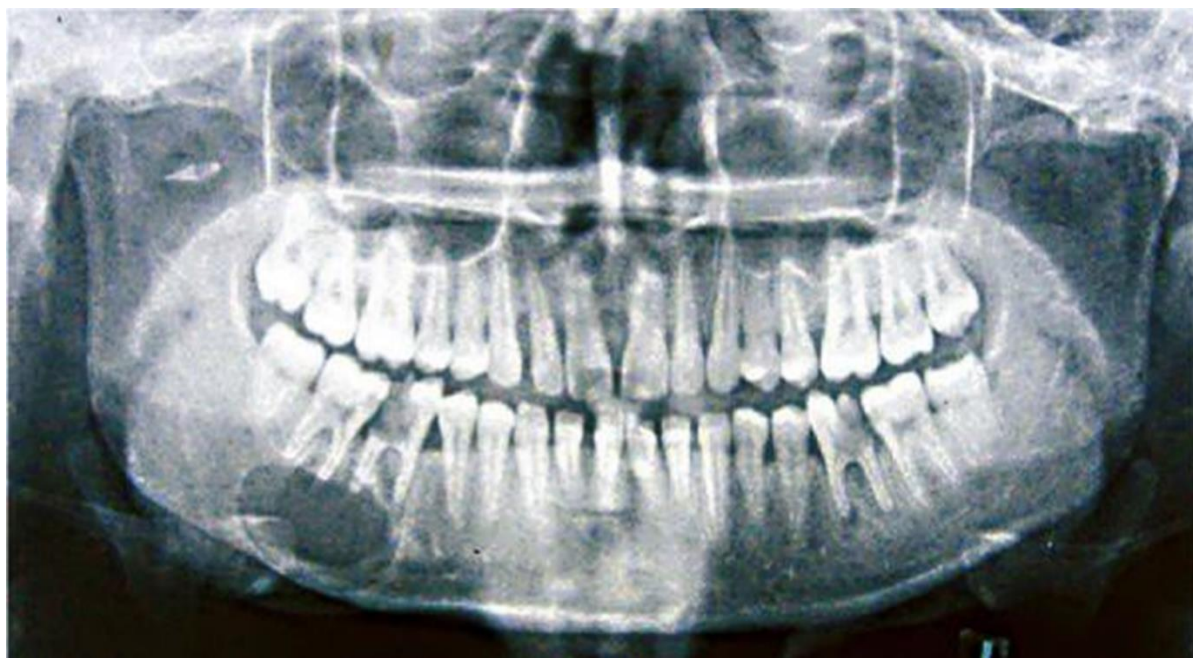


FIG.(19):Panoramic view showing Radicular cyst with right first molar tooth. (**Anil and Savita, 2016**)

3-Residual cyst

Residual cysts most commonly are the retained periapical cysts from teeth that have been removed. They could also develop in a periapical granuloma that is possibly left after an extraction. **(Worth, 1988)**

Clinical Features

Residual cyst can be found in any of the tooth-bearing area of the maxilla or mandible. Size may range from a few millimetres to several centimetres. Clinically, these cysts are usually found on routine radiographic examination of patients. Usually they are painless unless secondarily infected. They do not show expansion of cortical plates. **(Shear, 1992)**

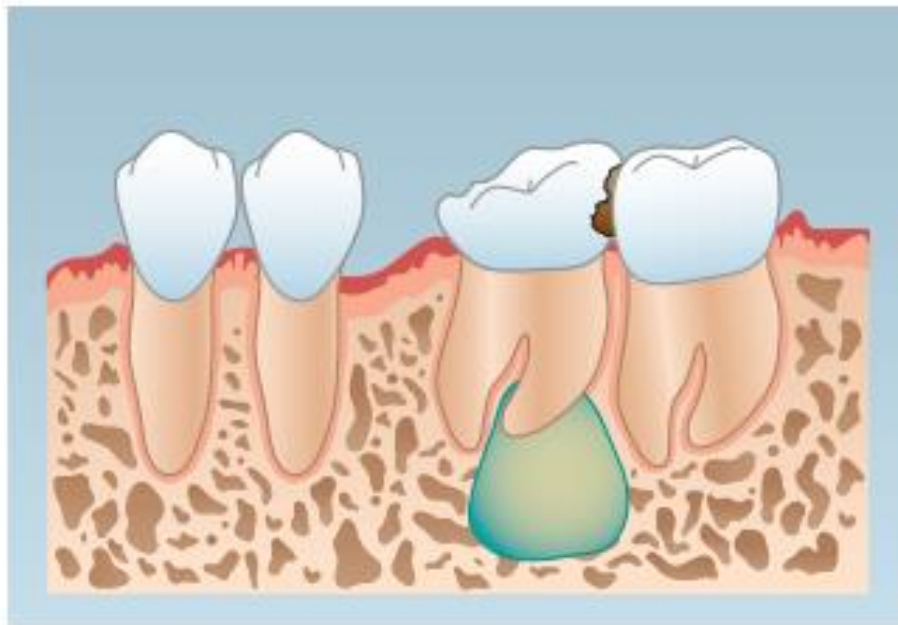


FIG.(20): Residual cyst. **(Philip, 2004)**

Radiographic Features

There is well-defined unilocular radiolucency in the periapical area of extracted tooth. If the cyst is secondarily infected, the hyperostotic border may be absent. Cyst may displace mandibular canal and adjacent teeth. (**Miles et al, 1991**)



FIG.(21): Panoramic Radiograph Showing Residual cyst.(**Namita et al,2015**)

Table (1): Summary of odontogenic cysts. (Namita et al,2015)

| | Radicular | Residual | Dentigerous | Eruption | Lateral periodontal | Keratocystic odontogenic tumour |
|---------------------|---|--|--|--|--|--|
| Aetiology | Cell rests of Malassez | Cell rests of Malassez | Reduced enamel epithelium | Reduced enamel epithelium | Inconclusive | Inconclusive |
| Clinical | Associated with non-vital teeth | Not associated with a tooth | Associated with crown of unerupted tooth | Painless, soft, fluctuant swelling seen on gingivae overlying erupting tooth that may be blue or purple. | May see blue fluctuant swelling associated with gingivae, adjacent to a vital tooth | May have associated inferior alveolar nerve paraesthesia |
| Peak age | 3rd decade | >30 years | 3rd decade | Most frequent in children | 40–70 years | 2nd and 3rd decades |
| Common sites | Maxilla | Maxilla | Mandibular third molars and maxillary canines | Deciduous and permanent teeth often anterior to first permanent molar | Mandibular premolar and anterior maxilla regions | Angle of mandible |
| Radiology | Round radiolucency with radio-opaque margin extending from lamina dura of non-vital tooth | Similar appearance to radicular cyst but not associated with tooth | Circumscribed, unilocular, well defined, sclerotic margins associated with crown of an unerupted tooth | Radiolucent lesion at alveolar margin and no bony involvement | Between cervical margin and apex of tooth, round or oval shape, less than 1cm diameter, sclerotic margin | May be unilocular or multi-locular. May have defined sclerotic margins but can also be diffuse. May have scalloped margins |

Treatment of odontogenic cyst

The treatment varies depending on the type of odontogenic cyst, Periapical cysts are commonly treated with non-surgical endodontic (root canal) therapy. If the tooth remains symptomatic after endodontic therapy, surgical endodontic therapy or extraction will be required. Surgical endodontic therapy, apicoectomy (removing the root apex), and curettage of the cyst produces reliable bone healing. Extraction with curettage or enucleation of the socket is also effective at eliminating the occurrence of a residual cyst. Overall, surgical endodontic therapy results in 95% bone healing compared to 66% bone healing with non-surgical treatment.

Treatment for residual cysts is enucleation.

Treatment for paradental cysts depends on the location of the cyst and its associated tooth. If associated with a first or second molar, the cyst is typically enucleated and allowed to heal. If associated with a third molar, extraction is the treatment of choice.

Treatment for dentigerous cysts is the extraction of the associated tooth followed by curettage and enucleation.

Eruption cysts are self-limiting and therefore do not require treatment. The cyst will typically rupture on its own as the tooth erupts. If symptomatic, the cyst can be unroofed to reduce any associated inflammatory pressure.

Lateral periodontal cysts are treated with curative enucleation. Curettage in conjunction with enucleation is often necessary for botryoid odontogenic cysts

Odontogenic keratocysts are treated with various modalities, depending on the size and location of the lesion. Smaller OKCs are manageable by enucleation and possible peripheral ostectomy to achieve healthy bony margins. Larger OKCs may

require marsupialization or a resection. With a high recurrence rate, patients are clinical and radiographic followed-up.

Orthokeratinizing odontogenic cysts are treated with surgical excision, which is curative. Unlike OKCs, they have a low recurrence rate.

Glandular odontogenic cysts are treated with enucleation and curettage. Some of the more extensive cases may require resection. Regardless of the treatment option, close follow-up is needed. (**Johnson et al, 2014; Titinchi and Nortje, 2012; Chrcanovic et al, 2011**)

Complications of odontogenic cysts

Complications associated with odontogenic cysts are also contingent on the precise type of cyst:

- Periapical cysts do not typically present with complications after excision. A residual cyst may form due to incomplete curettage during extraction and a periapical scar may develop when a lesion fills with collagenous tissue rather than bone.
- Residual cysts can cause bone destruction if left untreated, which puts the adjacent teeth at risk. In general, these cysts do not present with complications once removed and have a low to no recurrence after excision.
- Paradental cysts are associated with pericoronitis, which is a deep periodontal pocket. This may damage to the local periodontium as a

consequence of the follicular expansion. Typically, they do not present with complications once removed and they do not recur after excision.

- Dentigerous cysts are associated with bony destruction due to the expansion of the cyst. Typically do not present with complications once removed and there is low to no recurrence after excision.
- Eruption cysts are often self-limiting and present without complications.
- Lateral periodontal cysts typically do not present with complications once removed and they do not recur after excision.
- Odontogenic keratocysts have a high recurrence rate; therefore, close follow-up is necessary. If recurrence occurs, the patient will require additional surgical treatment.
- Orthokeratinizing odontogenic cysts have a low recurrence rate and do not present with complications once removed. They do not recur after excision.
- Glandular odontogenic cysts have a high recurrence rate (20 to 30%); consequently, close interval and long-term follow-up is necessary. The potential for multiple recurrences is high. If there is a recurrence, the patient will require additional surgical treatment. (**Johnson et al, 2014; Dhawan, 2012**)

Conclusion

Odontogenic cysts can be inflammatory or developmental in nature. Good oral hygiene and routine dental care can reduce the likelihood of inflammatory odontogenic cysts. In addition, routine clinical and radiographic examinations can aid in detecting asymptomatic inflammatory and developmental odontogenic cysts.

Treatment of these lesions can range from monitoring to surgical treatment. Lesions that have rapid growth, are fixed, and/or appear atypical should be referred immediately to the appropriate healthcare specialist for evaluation, biopsy, diagnosis, and management.

Most dentists will encounter odontogenic cysts in their practice. The majority of the cysts is developmental in nature and possesses low malignant potential. It is important to note, routine and preventive dental care can reduce extensive treatment and result in more favorable outcomes.

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