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Unilocular Radiolucencies – A Review Literature

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ABSTRACT:

Clinicians have been interested in unilocular radiolucencies for decades. Clinical and radiological features are used to diagnose these disorders since clinical presentation alone is insufficient. Despite the enormous advancements in imaging, there is still a chance that a novice clinician may frequently misdiagnose this entity. Therefore, having a solid understanding of the different unilocular radiolucencies is crucial for the physician. In these situations, making good use of diagnostic tools and paying close attention can undoubtedly benefit in making an accurate diagnosis and providing high-quality care.

KEYWORDS: Unilocular, impacted teeth, Odontogenic.

INTRODUCTION:

Usually, a benign, slowly developing, non-aggressive disease is indicated by a unilocular look [1]. Equally significant radiographic findings include corticated/non-corticated borders, regular/irregular borders, root displacement, root resorption, mandibular canal displacement, and lingual cortex enlargement. In addition to lingual cortex growth, resorption of surrounding tooth roots, erosion of the mandibular canal, and irregular and non-corticated boundaries, aggressive benign or malignant lesions are more prone to cause paresthesia.

A patient's history and a detailed examination of the lesion's location, borders, internal structure, and impact on surrounding tissues can help narrow down potential diagnoses. However, many jaw lesions have similar symptoms and radiographic appearances, making them challenging to distinguish. As a result, single-chambered osteolytic radiolucencies remain a diagnostic challenge for clinicians[2].

CLASSIFICATION OF UNILOCULAR LESIONS:

Developmental Lesions

1. Dentigerous cyst
2. Odontogenic keratocyst
3. Calcifying epithelial odontogenic tumor (CEOT)
4. Gingival cyst of the newborn
5. Odontogenic cysts (e.g., lateral periodontal cyst, botryoid odontogenic cyst)

Inflammatory Lesions

1. Radicular cyst
2. Periapical granuloma
3. Periapical cyst
4. Residual cyst

Neoplastic Lesions

1. Ameloblastoma
2. Odontogenic myxoma
3. Central giant cell granuloma
4. Keratocystic odontogenic tumor (KCOT)
5. Calcifying epithelial odontogenic tumor (CEOT)

Bone-Related Lesions

1. Simple bone cyst
2. Traumatic bone cyst
3. Aneurysmal bone cyst
4. Stafne bone cavity

Other Lesions

1. Nasopalatine duct cyst
2. Median palatal cyst
3. Globulomaxillary cyst
4. Mandibular infected buccal cyst

DENTIGEROUS CYST:

The most common cause of large unilocular lytic lesions of the jaws is an odontogenic cyst, which, when seen in association with an impacted tooth, is probably a dentigerous cyst[3]. The dentigerous cyst which is the second most common developmental odontogenic cyst forms around the crowns of teeth that haven't erupted or are impacted, including permanent teeth, extra teeth, or odontomas, typically at the cementoenamel junction[4].

Dentigerous cysts can be classified into two types based on their origin:

1. Developmental: Forms around impacted, mature teeth.

2. Inflammatory: Develops in immature teeth due to infection from a non-vital deciduous tooth follicle[5].

Clinical features:

A clinical exam typically shows a missing tooth or teeth, possibly accompanied by a painless, hard swelling that can cause facial asymmetry. The dentigerous cyst grows slowly, often expanding the jaw's outer cortical boundary without eroding it. A key diagnostic feature is that the cyst attaches to the tooth at the cementoenamel junction (CEJ) [4,6]. On rare occasions, the cyst wall's epithelium may give rise to ameloblastoma or SCC (see "Pitfalls") [7-9].

Radiological features:

A well-defined unilocular radiolucency can be appreciated in the corticating borders in association with the crown of unerupted tooth.

Treatment:

Options for treatment include marsupialization for bigger cysts and enucleation for minor lesions.

RADICULAR CYST:

Odontogenic cysts are true cysts that arise from the epithelium that persists after teeth are formed. The most prevalent odontogenic cysts are radicular cysts, also known as periapical cysts or apical periodontal cysts [10,11].

Clinical features:

Necrosis of the pulp cavity and subsequent formation of a periapical granuloma or periapical abscess can result from tooth infections. A radicular cyst may then develop from the latter. The inflammatory chemicals activate the periodontal ligament's epithelial cell rests, which give birth to radicular cysts. Radicular cysts are typically asymptomatic. Although they can occur in any age group, they are most frequently observed in people between the ages of 30 and 60 and are usually connected to a non-vital tooth.

Radiological features:

Radicular cyst comprises a unilocular periapical lesion with well-defined sclerotic margins in close proximity to the apical portion of the root of a nonvital tooth.

Treatment:

Treatment options include apical surgery, endodontic treatment and extraction.

RESIDUAL CYST:

Residual cysts are periapical cysts which remains after surgical removal of a non-vital tooth [10,12]. Residual cysts are common and have similar clinical and radiological features to radicular cysts, but always involve tooth loss. Residual cysts are usually less than 1 cm in size. Enlarging cysts may cause adjacent teeth to shift or bone to expand.

Treatment:

Surgical curettage.

KERATOCYSTS:

Keratocysts are benign intraosseous tumors that originate from the dental lamina. They are also known as primordial cysts, keratinizing cysts, or keratocystic odontogenic tumors (KCOTs) [13]. Stratified keratinizing epithelium lines them. They can be aggressive and infiltrative, which makes them prone to recurrence up to 60% following surgery [10,14,15].

Clinical features:

Approximately one-tenth of all jaw cysts are caused by KCOT. Although they can arise at any age, the majority of them develop in the second and third decades, with a small male preponderance. Men are more commonly affected than women. Occurs in ramus of mandible and body of the mandible. Cysts can occasionally develop around an immature tooth. Despite the possibility of modest edema, they are typically asymptomatic. They have the ability to resorb and move teeth [16]. Its tendency to expand along the interior aspect of the jaws, resulting in minimum extension, is an essential trait. On aspiration a yellow cheesy white material can be obtained.

Multiple KCOTs are found to be associated with the nevoid basal cell carcinoma (Gorlin-Goltz syndrome), Ehler-Danlos syndrome and the Noonan syndrome.

Radiographic features:

On radiographs, a well-defined round or oval radiolucent area with a scalloped contour may be observed. The internal composition is typically radiolucent [17]. In certain instances, curved internal septa may be evident, resulting in a multilocular look for the lesion [6].

Treatment:

Surgical removal of the complete lesion along with the involved teeth. Regular follow-up is essential for eliminating the chances of recurrence.

CALCIFING ODONTOGENIC CYST (GORLIN CYST):

Calcifying odontogenic cysts are developmental odontogenic cysts occurring both intra-osseously and extra-osseously accounting for 2% of all odontogenic lesions. It arises from the odontogenic epithelium resembling follicular ameloblastoma containing ghost cells and spherical calcifications

Clinical features:

Calcifying odontogenic cysts most often appear in the second or third decade of life. Usually, the upper and lower jaws are affected equally, especially in the incisor and canine areas.

Radiographic features:

Radiologically, they appear as well-defined single- or multi-locular radiolucent lesions, and in approximately one-third of cases, radiopaque structures are present within the lesion [17].

UNICYSTIC AMELOBLASTOMA:

Unicystic ameloblastoma which is a variant of ameloblastoma that resembles an odontogenic cyst clinically and radiographically. It arises from the remnants of dental lamina and epithelial lining of odontogenic cysts. It accounts for 10% of all the odontogenic cysts

Clinical features:

It generally occurs in younger individuals, with an average age of about 21.8 years, and shows no preference for either sex. The most common location for this condition is the region of the mandibular third molars. Typically, it is an asymptomatic lesion that goes unnoticed until a radiolucent area is observed on a standard radiograph. As the lesion gradually increases in size, a slight, non-tender hard swelling can be detected during a clinical examination. Often, there is bulging, thinning, and destruction of the cortical plates surrounding the lesion [17].

Radiographic features:

Radiographically, it appears as a well-defined unilocular radiolucency, but when associated with an unerupted tooth it is difficult to distinguish it from an odontogenic cyst. Unicystic ameloblastoma was excluded as there was only expansion of the oral cortex and no resorption of the adjacent teeth [17].

Treatment:

Surgical excision along with regular follow-up.

ADENOMATOID ODONTOGENIC TUMOURS:

Adenomatoid odontogenic tumors are benign lesions that accounts for approximately nearly 3% of all odontogenic tumors and 0.1% of jaw tumors [18].

Clinical features:

Adenomatoid odontogenic tumors occur almost twice as often in women as in men and usually occur in the second decade of life, with a mean age of 17 years [5]. The female predilection is even more pronounced in Asian populations[19]. Approximately 90% of cases arise in the anterior part of the jaw. More than 60% of odontogenic adenomatoid tumors are found in the maxilla and 35% in the mandible. Of the maxillary lesions, 80% occur in the anterior region, 14% in the premolar region, and 6% in the molar region, whereas 70% of the mandibular lesions are in the anterior segment. It emerges as a slow growing lesion which is often painless resulting in the asymmetry of the region involved [6].

Radiographic features:

Routine radiographic images show well-defined radiolucencies with corticated or sclerotic borders. Intra lesional calcifications produce faint radiopacities in approximately two-thirds of cases. Large radiolucent lesions may displace adjacent teeth, but rarely cause root resorption. These lesions prevent the eruption of the affected tooth as it surrounds its crown and the tooth. In these lesions, signs of internal radiopaque structures should be looked for. The single-cavity lesion had no internal radiopacity radiolucency extended only to the cervical region, thus ruling out AOT [17].

Treatment:

Conservative surgical excision and recurrence is rare.

CALCIFYING EPITHELIAL ODONTOGENIC TUMOUR:

CEOT or Pindborg tumour is a rare and benign epithelial tumour accounting for less than 1% of the benign odontogenic tumours.

Clinical features:

It has a female predilection of 1.5:1. It can affect any age group from8 to 92 years with the mean age of 37 years. Mandible is more commonly affected that maxilla and is frequent in the premolar and molar region, with a 52% association with an impacted or unerupted teeth. Painless cortical expansion is the typical sign. The most pathognomic feature is the presence of radiopacities in close proximity to the unerupted tooth. Occasionally, many small thin opaque trabeculae may be seen crossing the radiolucency [20].

Radiographic features:

Radiographs reveal a unilocular or multilocular cystic lesion with numerous scattered, radiopaque foci of variable size and density. It may be associated with the crown of an unerupted tooth, normally displacing it out of the eruption path. Expansion of the related jaw can also occur while maintaining the cortical border. Early lesions can imitate dentigerous cysts or even ameloblastoma. Due to the age of onset (>42 years) and the absence of internal radiopacities, CEOT was a remote possibility [17].

Treatment:

Small, intrabony lesions with well-defined borders can be treated with enucleation or curettage 5followed by judicious removal of a thin layer of bone adjacent to the tumor. But some pathologists suggest that maxillary tumors should be treated more aggressively than a similar-sized lesion in the mandible.

AMELOBLASTIC FIBROMA:

It is a rare, benign and mixed odontogenic tumours which accounts for 0.9% to 2.4% of the odontogenic tumours [21].

Clinical features:

It occurs during the stage of tooth formation and in the age group ranging from 6 to 51 years with the average age of 15 years. It has slight male predilection. It occurs more commonly in the mandible with frequency in the premolar and molar region [5]. Ameloblastic fibroma is found along with the impacted tooth. It appears as a painless slow-growing expansile lesion with the displacement of involved tooth.

Radiographic features:

Radiographically it can be visualized as a well-defined, pericoronal radiolucency with potentially corticating border as that of a cyst.

SIMPLE BONE CYSTS:

Simple bone cysts (SBCs), also known as solitary bone cysts, traumatic bone cysts, hemorrhagic cysts, or idiopathic bone cavities, are characterized by being filled with serous or hemorrhagic fluid and lacking an epithelial lining.

Clinical features:

Thus, SBCs are not true cysts, but rather pseudocysts. SBC of the mandible usually occurs secondary to trauma, typically resulting in intrapulp hemorrhage following tooth extraction. SBCs have female predilection and found below 20 years of age.

Up to 75 % of all SBC cases are observed in the bone marrow of the mandible. Most lesions are asymptomatic and are accidentally seen on the radiographs. SBC is found in the immediate vicinity of a vital tooth and is not associated with bone edema, if there is no associated infection [22].

Radiographic features:

Radiographically SBCs appear as a well-defined unilocular radiolucency of varying size. Spread to cortical bone is rare and tooth displacement usually does not occur [23].

Treatment:

Bone curettage, leading to bleeding with subsequent scar formation.

GIANT CELL GRANULOMA:

Giant cell granuloma (GCG) is a benign but sometimes aggressive proliferative intraosseous lesion with fibrous tissue, hemorrhages, and hemosiderin deposits, as well as characteristic osteoclast-like giant cells.

Clinical features:

GCG is a rare lesion that occurs preferentially in young girls or women. The most common clinical signs are pain, swelling, facial asymmetry, and paresthesia.

Differential diagnosis:

Differential diagnosis includes giant cell tumor, radicular cyst, ameloblastoma, odontogenic tumor, and fibrous dysplasia.

Radiological features:

The typical radiological appearance is a well-defined multi locular (rarely unilocular) radiolucent lesion. Sometimes ill-defined radiolucency can also be appreciated.

Treatment:

Enucleation and curettage for well-defined GCG or en bloc resection for aggressive GCG and drug therapy (intralesional injections of corticosteroids or calcitonin) [24]. Recurs in 15% of the cases.

AMELOBLASTIC FIBRO-ODONTOMAS:

Ameloblastic fibroodontomas, benign mixed odontogenic tumors represent 0.3% to 1.7% of all odontogenic tumors, but represent 4.6% of odontogenic tumors in children.

Clinical features:

Ameloblastic fibroodontomas commonly occur in individuals under the age of 20, so age is an important factor in the differential diagnosis [25]. Even though it has no gender predilection, male or mostly affected. Ameloblastic fibroodontomas are usually slow-growing, asymptomatic tumors that occur with equal frequency in the maxilla and mandible (mainly in the molar region). They are usually associated with unerupted or

impacted teeth. The affected tooth is often displaced apically, indicating that the origin of the lesion is above the tooth [20].

Radiographic features:

Radiologically, ameloblastic fibroodontoma appears as a well-circumscribed unilocular or rarely multilocular radiolucent lesion containing variable amounts of radiopaque material of irregular size and shape, although in approximately 5% of cases, minimal opacifying foci are present and the lesion appears completely radiolucent [20].

Malignant transformation of ameloblastic fibroodontoma to ameloblastic fibrosarcoma has been reported, which may alter the clinical and radiological features of this entity [20].

ODONTOMA:

It refers to tumour of odontogenic origin but specifically it denotes growth in noth epithelial and mesenchymal cells exhibiting differentiation. It comprises of 22% all the odontogenic tumours of the jaw.

Clinical features:

It occurs at any age but most common during the second decade of life. It has no gender predilection. About 67% of the odontomas occur in maxillary while 37% occur in mandible. 61% of compound odontomas and 34% of complex odontomas occur in anterior maxilla. Interestingly both compound and complex odontomas occur in the right side of the jaw.

Radiographic features:

On radiographs, odontoma shows three stages of development. Radiolucency due to lack of calcification in the first stage, partial calcification in the intermediate stage and radiopaque masses surrounded by radiolucency in the third stage.

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