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CYSTIC LESIONS OF THE MANDIBLE AND IMAGING ALGORITHM TO THE FINAL DIAGNOSIS

Radiodiagnosis

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ABSTRACT

The mandible is a physiologically complex bone that plays a role in phonation, mastication, and jaw stability. It is a strong flat bone that serves as an anchor for the lower dentition and an attachment site for masticator muscles and facial muscles. Mandibular lesions are myriad and common. The presence of teeth results in lesions that are specific to the mandible (and maxilla) and a useful classification that defines them as odontogenic or non-odontogenic. Many lesions that occur in the jaw have a similar appearance and it is often difficult to differentiate among them .Radiographic evaluation of the jaw lesion characteristic ,which include location , margin , density ,relation to the tooth ,along with the knowledge of the clinical data helps in narrowing the diagnosis .

Objectives :- This study has been conducted for a period of three months form January 2019 to March 2019 in New civil hospital ,Surat .The study has been conducted on the routine patient that has presented with jaw swelling to either ENT , Surgery or Dental Opd .The patient has been explained about the study and the consent has been taken .Objective is to analye various benign cystic lesions of the mandible and alogorithm to reach to the final diagnosis.

KEYWORDS

INTRODUCTION

Mandibular lesions are myriad and common. The presence of teeth results in lesions that are specific to the mandible (and maxilla) and a useful classification that defines them as odontogenic or non-odontogenic. A variety of benign and malignant conditions can affect the jaws, the maxilla and mandible. The similar image appearance of many pathologies can make achieving a single diagnosis difficult in many situations. The age of the patient, location of the lesion, relationship to the tooth and adjacent structures, margins of the lesion, internal characteristics such as the pattern of mineralization, periosteal reaction, associated soft tissue changes and relevant clinical details, all help to narrow the differential diagnosis. Plain radiography retains its role as the initial mode of evaluation of these lesions. Cross-sectional imaging, such as CT and MRI, are useful in tissue characterization, assessing extent of extra-osseous soft tissue and bony involvement in terms of cortical expansion, resorption or destruction, osteosclerosis, and calcification; thus, they help in preoperative evaluation. MRI is superior to CT in differentiating cystic from solid lesions, and in defining the extent of soft tissue and bone marrow infiltration in aggressive jaw lesions.

All the tumours of the mandible have 2 components parenchyma and supporting stroma .
Benign jaw tumours are of 2 types :-
Odontogenic and Non odontogenic

Odontogenic tumours include :-
Ameloblastoma
Adenomatoid odontogenic tumour
Calcifying epithelial odontogenic tumour (Pindborg Tumour)
Keratinising and calcifying odontogenic cyst
Odontogenic myxoma
Ameloblastic fibroma
Cememtoblastoma

Non odontogenic tumours :-
Bone tissue
Benign
Osteoma
Osteoid osteoma
Benign osteoblastoma
Malignant
Osteosarcoma

Muscle tissue
Benign
Leiomyoma
Rhabdomyoma
Malignant
Leomyosarcoma
Rhabdomyosarcoma

Lymphoid tissue
Malignant
Malignant lymphoma
NHL
Reticular cell lymphoma
Burkitt lymphoma
Erwing sarcoma
Cystic lesions of the mandible

The cystic lesions of the mandible can be divided as of odotogenic or non odontogenic origin . we will be dealing with the odontogeic originated cystic lesions of the mandible and an alogorithm to reach to final diagnosis .

Odontogenic cystic lesions of the mandible are
Periapial cyst
Dentigerous cyst
Kerotogenic odontogenic tumour
Ameloblastoma

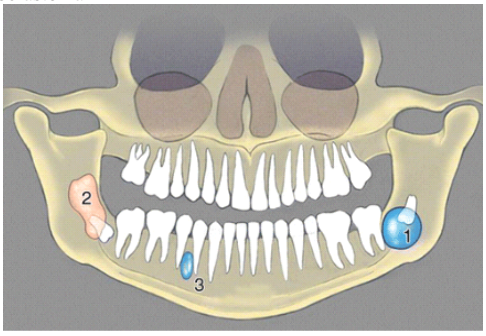

Figure1 -1. Follicular cyst 2. Keratocyst 3. Lateral periodontal cyst

1. Periapical cyst :- also called as Radicular cyst . The periapical (radicular) cyst is the most common type of odontogenic cyst. These lesions have a slight male predominance and peak incidence between the ages of 30 and 50 years [1]. Periapical cysts generally originate

after trauma or dental caries. Dental caries cause inflammation of the pulp cavity leading to pulp necrosis [2]. The infection then spreads to the tooth apex of the root causing periapical periodontitis, which leads to either an acute abscess or a chronic granuloma. Persistent chronic infection can lead to formation of a periapical cyst.

Intially radiographic finding
CT scan finding should include extent of the cyst , adjacent tooth involvement . MRI scan is normally not required in routine scan but is used to differentiate it from ameloblastoma .

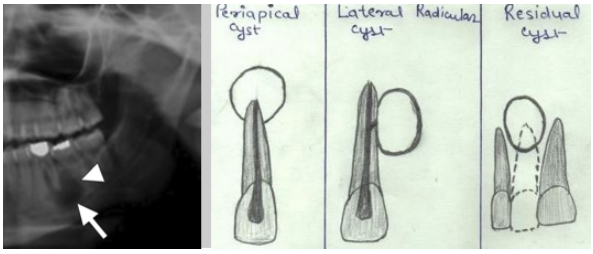

Figure2 . Right – Xray shows cystic lesion in relation to the root of the cyst .
Left - Variations in the cyst related to the root of the teeth.

2. Dentigerous cyst :- The dentigerous cyst is the second most common odontogenic cyst occurring in the mandible and is typically discovered in adults in the third and fourth decades of life [2]. The cyst forms around the crown of an unerupted tooth as fluid collects between layers of epithelium or between the epithelium and enamel. The size of a typical follicle space is 2–3 mm; the presence of a dentigerous cyst should be suspected if the follicle space is greater than 5 mm [1]. Dentigerous cysts can vary in size but have the potential to grow large enough to cause significant expansion of the jaw and displacement of adjacent teeth; however, resorption of the root apex is uncommon. Radiographically, a dentigerous cyst appears as a well-circumscribed unilocular radiolucent lesion adjacent to the crown of an unerupted tooth [3], most commonly the third molar tooth. CT is useful to evaluate large lesions and can show the origin, size, and internal contents of the cyst and evaluate the integrity of the cortical plate and its relationship to the adjacent anatomic structures [3]. Significant cortical expansion or thinning of the buccal and lingual cortical plates may be seen with larger lesions [4]. The roots of the affected tooth are typically outside the lesion. Large lesions can develop undulating borders due to uneven expansion rates and may mimic ameloblastomas and keratocystic odontogenic tumors [1]. MRI is not required for diagnosis in most cases; however, it may aid in the characterization of large lesions. MRI will typically show high T2 and low to intermediate T1 signal within the cyst, whereas the tooth will appear as a signal void. Contrast-enhanced images may show enhancement of the thin cyst wall. The presence of a thick irregular wall or a solid component raises the possibility of ameloblastoma

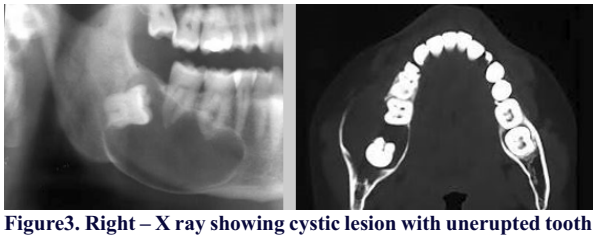

Figure3. Right – X ray showing cystic lesion with unerupted tooth embedded in it
Left – CT scan showing the same findings

3. Kerotogenic odontogenic tumour aka OKC Odontogenic keratocyst . Keratocystic odontogenic tumor was formally known as "odontogenic keratocyst" but recently was categorized as an odontogenic tumor rather than a cyst [5]. A keratocystic odontogenic tumor is a benign but locally aggressive developmental odontogenic tumor that is most commonly located in the mandibular ramus and body [6]. These lesions are typically found in adults in the second to fourth decades of life and represent 5–17% of all jaw cyst. They can expand the cortical bone and erode the cortex. Keratocystic odontogenic tumors have a high postoperative recurrence rate.

The presence of multiple keratocystic odontogenic tumors should raise the possibility of basal cell nevus syndrome (i.e., Gorlin-Goltz syndrome) [6]. Findings associated with this autosomal-dominant disorder include midface hypoplasia, frontal bossing and prognathism, mental retardation, calcification of the falx cerebri and dura, bifid ribs, and multiple basal cell carcinomas of the skin. CT shows a unilocular or multilocular cyst with corticated margins. Keratocystic odontogenic tumors typically occur in the body and ramus of the mandible in association with an impacted tooth.

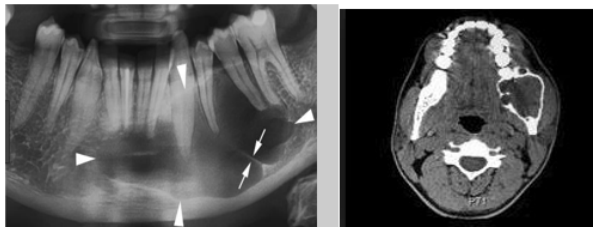

Figure 4. Xray and CT scan showing well defined expansile lesion involving left ramus of mandible with few septations in it

4. Ameloblastoma ABs are also known as adamantinoma and adamantoblastoma. AB is a neoplasm of odontogenic epithelium. It is usually benign but locally aggressive. Malignant forms of AB that can metastasize are very rare. ABs occur mostly in the third-fourth decade and have no sex predominance Malignant ameloblastoma" is a term given to tumors with metastasis, even those with a histologically benign appearance, and "ameloblastic carcinoma" is a term given to tumors that display histologically malignant features with or without metastasis Radiographically, the appearance of ameloblastomas is variable and dependent on the histopathology of the lesion .There are multiple classification systems for ameloblastoma. On the basis of its clinical behavior, anatomic location, radiographic appearance, and histologic characteristics, ameloblastoma can be grouped into four main forms: multicystic, unicystic, extraosseous or peripheral, and desmoplastic. Solid or multicystic ameloblastoma is the most common variant, accounting for 85% of all ameloblastomas. This variant is also the most aggressive and has a high recurrence rate compared with the other variants.

Radiographically the multicystic (solid) ameloblastoma variant typically appears multiloculated with internal septations manifested by a honeycomb or soap-bubble appearance. This variant can be confused with large keratocystic odontogenic tumors.The peripheral ameloblastoma variant represents a soft-tissue tumor that is histologically identical to an intraosseous ameloblastoma but occurs over the tooth-bearing parts of the jaw. These lesions appear solid on imaging, have a benign clinical course, and can be treated with local excision The hallmark of ameloblastoma is extensive tooth root absorption. CT evaluation is useful to access the extent of the lesion, cortical perforation, and adjacent soft-tissue involvement.

Figure 5a

Figure 5b

Figure 5c

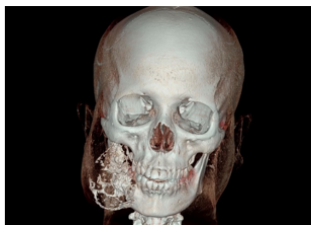

Figure 5d

Figure5a Xray showing lytic lesion noted involving ramus and part of body of mandible on right side . Figure 5b,c CT scan coronal and saggital sections showing well defined lytic lesion with destruction of ramus and part of body of ramus with few foci of calcifcation in it .

Figure5d 3D rendered image showing lytic lesion noted involving right ramus of the mandible ./

CONCLUSION :-

Most of the Cystc lesions of the jaw are mostly diagnosed on Xray . For the extension of the lesion Ct scan is beng done . Mri is mostly used to differnetiate all the lesion s mentioned above from the ameloblastoma . Most of thelesions of the mandible can be differnetiated from each other based on clinical history , age and presentation of the patient .

Specific findings as a clue to the diagnosis

Periapical cyst :- Age 30 to 50 years . Positive history of trauma of dental caries .

Dentigerous cyst :- a dentigerous cyst appears as a well-circumscribed unilocular radiolucent lesion adjacent to the crown of an unerupted tooth , most commonly the third molar tooth.

Keratogenic odontogenic tumour :- Expansile lesion of the mandible . When present in young age and multiple cysts are present they are indicative of Gorlin goltz syndrome .

Ameloblastoma :- ABs are mostly located in the molar-ramus region of the mandible (81% in the molar region). They can also be found in the molar-bearing portion of the maxilla and often involve the maxillary sinus. Lesions can be located in the pericoronal region with an unerupted tooth. ABs usually have well-corticated margins, with no associated periosteal reaction. Internally, they may be radiolucent and unilocular (more common in maxillary lesions) or more characteristically have multiple, thick, curved septations

This article has reviewed a selection of cystic jaw lesions and described a systematic approach to their radiologic evaluation.

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