

REVIEW ARTICLE

Unicyclic Jaw Lesions: A Radiographic Guideline

¹Giju George, ²Sheeba Padiyath

¹Professor and Head, Department of Oral Medicine and Radiology, Mar Baselios Dental College, Kothamangalam, Ernakulam, Kerala, India

²Reader, Department of Oral Medicine and Radiology, Mar Baselios Dental College, Kothamangalam, Ernakulam, Kerala, India

Correspondence: Giju George, Professor and Head, Department of Oral Medicine and Radiology, Mar Baselios Dental College, Kothamangalam, Ernakulam, Kerala, India, e-mail: giju02@yahoo.co.in

ABSTRACT

The unilocular radiolucencies remain the topic of much interest for the clinicians and histopathologists for decades. Adequate use of diagnostic aids and careful observation will clinically help the dentist to arrive at a proper diagnosis and renders quality treatment to patients. Despite of the development of various cross-sectional imaging modalities, the radiograph still remains as the first and most important investigation. Jaw bone lesions, especially unilocular ones, are difficult to diagnose radiologically because of their similar radiographic appearance. It is, thus, very important for the clinician to have a sound knowledge of various radiographic features of the tooth and its supporting structures.

Keywords: Unilocular radiolucency, Radiograph, Corticated margin, Diagnosis.

INTRODUCTION

I treat and he cures—the common saying is true. But his curing and our treatment undoubtedly depend on one factor and that is proper diagnosis. For proper diagnosis of any case in dentistry, radiographs play a very important role.

Radiographs have been regarded as an invaluable boon to mankind giving him a 6th sense. It forms a necessary component of comprehensive patient care.⁵

Radiographs enable the dental professional to identify many conditions that may otherwise go undetected and to see conditions that cannot be identified clinically. An oral examination without dental radiographs limits the practitioner to what is seen clinically, the teeth and soft tissues. With the use of dental radiographs, the dental radiographer can obtain a wealth of information about the teeth and supporting bone.⁷

Adequate use of diagnostic aids and careful observation will clinically help the dentist to arrive at a proper diagnosis and render quality treatment to patients.⁹

Many lesions that occur in the jaw have a similar radiographical appearance and it is often difficult to differentiate among them. Despite development of various cross-sectional imaging modalities, the radiograph still remains the first and the most important investigation. Radiographic evaluation of jaw lesion characteristics, which includes location, margin, density, relation to tooth along with knowledge of clinical data, generally helps in narrowing the differential diagnosis. Jaw bone lesions especially unilocular ones, are difficult to diagnose because of their similar radiographic appearance.¹

Any jaw lesion should be evaluated taking into consideration the following radiological features.²

1. *Density of lesions, Margin, and locularity:* Majority (>80%) of jaw lesions are radiolucent. Unilocular radiolucent lesions with well-defined borders usually indicate a slow proliferating benign process.
2. *Anatomical location, relation to dentition:* Certain lesions have a predilection for a particular site, whereas others can occur anywhere in the jaw. Nonodontogenic lesions usually have no specific relationship to the dentition or can involve the

bone around two or more teeth whereas odontogenic lesions typically involve only one tooth or a specific part of the tooth.

3. *Cortical integrity, periosteal reaction and soft tissue:* Slow growing lesions often cause expansion with cortical bowing while cortical destruction denotes aggressive inflammatory or neoplastic lesions.

4. *Effect on surrounding structures:* Evaluating the effect of a lesion on the surrounding structures help in inferring behavior of the lesions. If a lesion involves only one tooth, it is important to note the degree of tooth development, relationship of the lesion with portion of tooth. (Crown vs root vs entire tooth) and any signs of tooth resorption.

The term 'space occupying' is used to describe a lesion that slowly creates its own space by displacing teeth and other surrounding structures.

Resorption of teeth usually occurs with a more chronic or slowly growing process. The presence of reactive bone at the periphery of a lesion, whether corticated or sclerotic, usually signifies slow, benign growth and possibly the ability to stimulate osteoblastic activity in the surrounding bone.

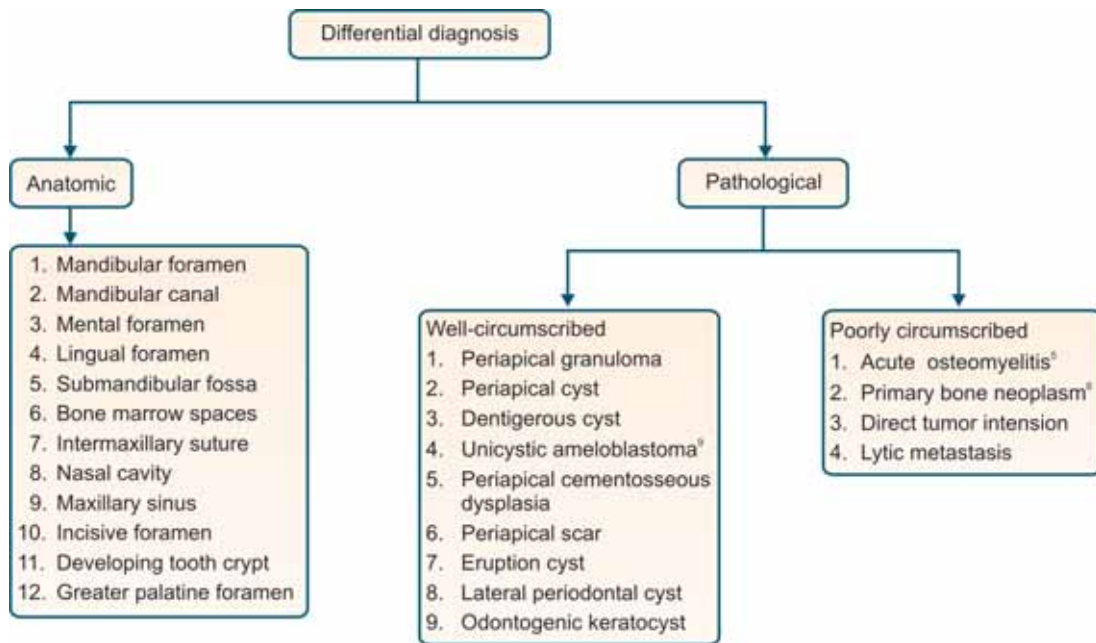
Differential Diagnosis

DD is illustrated in Flow Chart 1.

IDENTIFICATION OF UNILOCLAR RADIOLUCENT JAW LESION BY LOCATION

1. Midline of maxilla superior to central incisors→incisive canal cyst
2. Between maxillary lateral incisor and cuspid→globulo maxillary cyst
3. Mid palatal area→mid palatal fissure cyst
4. Apex of nonvital teeth→periapical granuloma, periapical cyst
5. Apex of vital teeth→immature cementoma
6. Crown of impacted teeth→dentigerous cyst
7. Overlying mandibular canal→neurofibromatosis, neurilemoma
8. Inferior to mandibular canal in 2nd molar area→stafne cyst
9. Focal or noncontiguous multiple→myeloma, LCH, metastasis.

Flow Chart 1: Differential diagnosis of jaw lesions based on radiographic appearance^{1,7,10}



PATHOPHYSIOLOGY⁵

Cysts are the most common cause of chronic swellings of the jaws. They are most common in the jaws than in any other bone because of many rests of odontogenic epithelium remaining in the tissues.

KEY FEATURES OF JAW CYSTS⁵

They form sharply defined radiolucencies with smooth borders. Fluid may be aspirated and then walled cyst may be transilluminated.

They grow slowly displacing rather than resorbing the teeth. Symptomless unless infected and are frequently noticed on radiographic findings. Rarely large enough to cause pathological fracture. Form compressible and fluctuant swellings, if extending into soft tissues. Appear bluish when close to the mucosal surface.

PERIAPICAL GRANULOMA (FIG. 1)

Represent the most common type of pathologic radiolucency. It is the result of unsuccessful attempt by the periapical tissues to neutralize and confine the irritating toxic product that are escaping from the root canal. The pulp of offending tooth tests nonvital swelling of cortical plates over the area of apex is unusual. Ordinary cases are treated by nonsurgical endodontics. In suspicious case, root canal therapy with apicectomy and microscopic examination of the specimen.³

PERIAPICAL CYST (FIG. 2)

Is the second most common pulpoperiapical lesion. It is the most common of all odontogenic cysts. Usually originates in pre-existing periapical granulomas. Involves the apices of permanent teeth, mostly lateral incisor. Untreated cyst causes expansion of cortical plate with a donor like swelling on the alveolus over the periapical region of the involved tooth. Management is similar to that of periapical granuloma.³



Fig. 1: Intraoral periapical radiograph showing periapical granuloma



Fig. 2: Intraoral periapical radiograph showing radicular cyst

DENTIGEROUS CYST (FIGS 3 AND 4)

It is the second most common type of odontogenic cyst and the most common developmental cyst of jaw. Cyst is attached to the tooth cervix and encloses the crown of unerupted tooth. Most commonly seen in association with 3rd molars and maxillary canines. Slowly expanding cyst may markedly thin the cortical plates. When cortical plates are eroded, palpation reveals a rubbery, fluctuant nonimitable mass. Pain indicates presence of infection. Appears as well-defined unilocular radiolucency with corticated margins in association with the crown of an unerupted tooth. Management includes removal of associated tooth and enucleation of soft tissue component (enucleation or marsupialization).

ODONTOGENIC KERATOCYST (FIG. 5)

Is uncommon but important because of its strong tendency – unlike most other cysts to recur after removal. Mandible is usually affected. Symptomless until bone is expanded or becomes affected. Radiographically, they are well-defined radiolucent areas, either more or less rounded with a scalloped margin. Roots of adjacent teeth may be displaced. Aggressive treatment, including

enucleation, curettage or even resection for large cysts with or without loss of continuity of the jaw.⁴ Adjacent mucosa should be removed in some cases.

UNICYSTIC AMELOBLASTOMA (FIG. 6)

Is the second most frequently occurring pathologic pericoronal radiolucency. Occurs mostly in mandibular 3rd molar region. Asymptomatic and remains undetected until pericoronal radiolucency is seen on a radiograph. On palpation, it is hard and bony. A localized thinning and haziness of the hyperplastic radiopaque rim of the pericoronal radiolucency indicates a mural ameloblastoma.⁹ Cyst should be indicated and if a rural mass is discovered, the surgeon should flag it with sutures to enable the pathologist to concentrate on it as the area of greatest concern.

ERUPTION CYST (FIG. 7)

It is a soft tissue cyst and can be considered as a superficial dentigerous cyst. Lies superficially in the gingiva overlying the unerupted tooth. Appears as a soft rounded bluish swelling. The cyst roof may be removed to allow the tooth to erupt. But most eruption cysts probably burst spontaneously and do not require surgery.⁵



Fig. 3: Maxillary cross-sectional occlusal radiograph showing dentigerous cyst



Fig. 5: Cropped panoramic radiograph showing odontogenic keratocyst



Fig. 4: Intraoral periapical radiograph showing dentigerous cyst



Fig. 6: Cropped panoramic radiograph showing unicyclic ameloblastoma

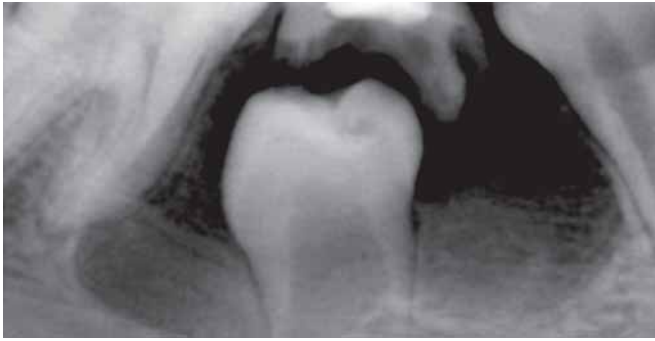


Fig. 7: Cropped intraoral periapical radiograph showing eruption cyst

PERIAPICAL CEMENTO-OSSEOUS DYSPLASIA (INITIAL LESIONS) (FIGS 8 AND 9)

Represents a reactive or dysplastic process rather than a neoplastic one. It is due to an unusual response of periapical bone and cementum to some undetermined local factor occurring at the apex of vital teeth. Continuous to PDL space initially. As the condition progresses or matures, the lucent lesion develops into a mixed and then solid opaque mass.⁶ No treatment required.



Fig. 8: Cropped panoramic radiograph periapical cementosseous dysplasia (initial-lesion)

PERIAPICAL SCAR (FIG. 10)

Situated unusually at the periapex of a pulpless tooth in which usually the root canals have been successfully filled. It represents a previous periapical granuloma, cyst or abscess whose healing has terminated in the formation of dense scar tissue.¹¹ When the periapical scar is associated with an asymptomatic root canal filled tooth, it requires no treatment.



Fig.10: Intraoral periapical radiograph showing periapical scar

LATERAL PERIODONTAL CYST (FIG. 11)

Uncommon cyst located along the lateral surface of root of a vital tooth. Mandibular premolar area and maxillary anterior region are commonly involved³. Radiographically, it is round or oval well-circumscribed radiolucent area with a sclerotic margin. Cysts lie between the apex and cervical margins of tooth and are less than 1 cm in diameter. Conservative surgical enucleation with an attempt not to extract the associated tooth.



Fig. 9: (A) Intraoral periapical radiograph, (B) shows mixed lesion, (C) shows opaque lesion

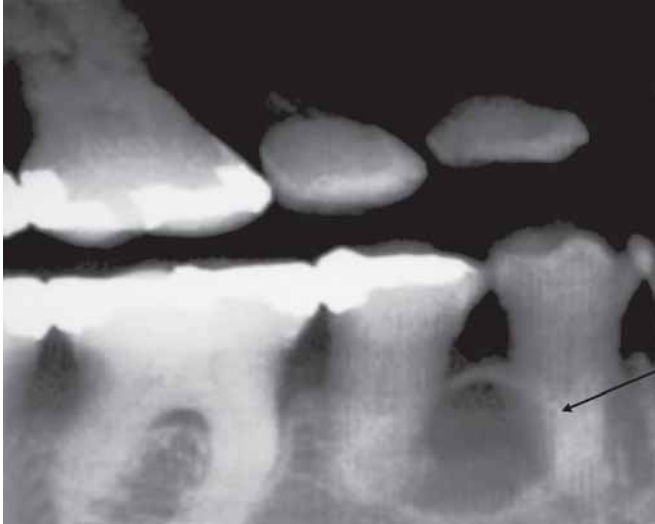


Fig.11: Bitewing radiograph showing lateral periodontal cyst



Fig. 12: Cropped panoramic radiograph showing ameloblastic fibroma

AMELOBLASTIC FIBROMA (FIG. 12)

It is a true mixed odontogenic lesion.¹³ Mandibular premolar region is more affected. Tumor grows by expansion of the cortex and does not invade the bone.¹⁰ Radiographically, it appears as unilocular (or multilocular) radiolucency in the posterior body of mandible, not associated with an erupted tooth. Management involves enucleation.⁸

NASOPALATINE DUCT CYST (FIG. 13)

Most common nonodontogenic cyst is the midline of anterior Maxilla,¹² slowly growing and resembles other cysts of the jaw. Radiographically, it is rounded radiolucent area with a well-defined and sclerotic margin in the anterior part of the midline of maxilla. May appear heart shaped because of radiographic super imposition of nasal spine.

DISCUSSION

<i>Lesions</i>	<i>Predominant age</i>	<i>Predominant sex</i>	<i>Common site</i>	<i>Signs and symptoms associated, if any</i>
Periapical granuloma			At the apex of affected tooth	Affected tooth asymptomatic
Radicular cyst			At the apex of lateral incisors	If untreated form a dome like swelling on the alveolus over the periapical region of the involved tooth.
Dentigerous cyst	Second and third decades	Males	Third molars, maxillary canine	When cortical plates are eroded, palpation reveals a rubbery, fluctuant mass.
Odontogenic keratocyst	Second and third decades	Males	Mandible	Symptomless until bone is expanded or become infected.
Unicyclic ameloblastoma	Younger age group affected	Male and female	Mandibular third molar region	Asymptomatic
Eruption cyst			Gingiva overlying unerupted tooth	Soft rounded bluish, swelling
Periapical cemento-osseous dysplasia	Middle aged	Female	Anterior mandible at the apex of vital tooth	Asymptomatic
Lateral periodontal cyst	Fifth and seventh decades		Mandibular premolar area	Gingival swelling in rare cases, rarely pain and tenderness on palpation.
Ameloblastic fibroma	15 years		Mandibular premolar area	Tumor grows slowly by expansion of cortex and does not invade bone.
Nasopalatine duct cyst	42.5 years	Male	Midline of anterior region	Slow growing and resemble other cyst of jaw.

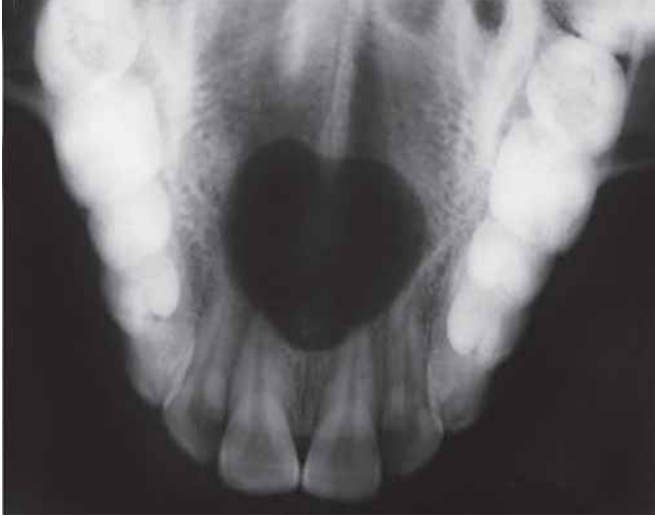


Fig. 13: Maxillary cross-sectional occlusal radiograph showing nasopalatine duct cyst

CONCLUSION

The unilocular radiolucencies still remain the topic of much interest for clinicians and histopathologists for decades. These conditions cannot be diagnosed by clinical appearance alone. Periapical radiolucencies may represent anatomic variations, benign conditions, systemic conditions and also malignancies. Diagnosis should be based on clinical, radiological as well as microbiological features.⁴ In spite of the giant strides taken in the field of imaging, there still remains the possibility that an inexperienced clinician may often misdiagnose a serious pathology. It is thus very important for the clinician to have a sound knowledge of various radiographic features of the tooth and its supporting structures. Adequate use of diagnostic aids and careful observation will certainly help dentist to arrive at a proper diagnosis and render quality treatment to patients. Some of these periapical radiolucencies represent innocent normal anatomic landmarks/variations whereas others are caused

by pathologic conditions.² Still others represent systemic disease conditions that many times become the responsibility and obligation of the dental clinician to recognize and bring to the attention of patient's physician. Malignancies represent a very small group these periapical shadows and early detection, recognition and treatment represent the only hope to the patient. The high incidence and broad spectrum of conditions accusing periapical radiolucencies make all dental clinicians acquire a broad and comprehensive working knowledge of the conditions. Therefore, it is mandatory that all the dental clinicians should follow thorough systematic approaches to evaluate the complex anatomic relationships displayed on the various types of radiographs for the evidence of abnormalities.

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