

# Importance Of Radiographic Patterns In Dentistry

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## **ABSTRACT**

*It is difficult to distinguish certain lesions radiographically because of the similarity of radiographical appearance. Since some specific radiographical findings are present for some specific diseases, radiographs are important in the clinical practice for investigating most important lesions. This review article describes various radiographic patterns of lesions present intraorally and extra orally.*

**Key words:** *Honey comb appearance, Tennis racket appearance, Driven snow appearance.*

## **INTRODUCTION**

Understanding the association of radiographic signs with certain specific diseases is very important in dental practice. Knowledge of such radiographic signs helps in solving some diagnostic problems and hence treatment can be planned accordingly. This review discusses about the various radiographic patterns of oral lesion which will be helpful in clinical practice.

## **RADIOGRAPHIC PATTERNS**

<b>EXTRAORAL</b>	<b>INTRAORAL</b>
<p>Codman's triangle</p> <ul style="list-style-type: none"> <li>➤ Copper beaten skull/beaten silver /thumb print appearance</li> <li>➤ Sun ray/sunburst appearance</li> <li>➤ Onion skin appearance</li> <li>➤ Punched out radiolucency</li> <li>➤ Hair on end appearance</li> </ul>	<ul style="list-style-type: none"> <li>✓ Honey comb pattern</li> <li>✓ Balloon like or peripheral egg shell appearance</li> <li>✓ Ground glass appearance</li> <li>✓ Driven snow appearance</li> <li>✓ Downward bowing</li> <li>✓ Moth eaten appearance</li> <li>✓ Floating teeth</li> <li>✓ Ghost teeth</li> <li>✓ Heart shaped radiolucency</li> <li>✓ Mottled appearance</li> <li>✓ Step ladder appearance</li> <li>✓ Soap bubble appearance</li> <li>✓ Tennis racket</li> </ul>

## EXTRAORAL RADIOGRAPHIC PATTERNS

### Codman's triangle

- A triangular area of new subperiosteal bone which is formed when a tumour raises the periosteum away from the bone.
- A Codman triangle is found as a pseudo triangle on radiograph of normal bone.
- A two-sided appearance of the triangle is due to a tumour which is growing at a faster rate than the normal growth of the periosteum hence tearing of periosteum occurs which in turn provides ossification on the second edge of the triangle.
- Codman's triangle is evident in alveolar bone carcinoma, osteogenic sarcoma, Ewing's sarcoma, etc.,<sup>1</sup>

FIGURE 1: CODMAN'S TRIANGLE



### Copper beaten skull/beaten silver /thumb print appearance

- Copper-beaten skull appearance is nothing but the convoluted marks on skull due to the pulsatile pressure exerted by the brain.
- It can be seen in Crouzon syndrome, hypophosphatasia, craniosynostosis, and obstructive hydrocephalus on the lateral cephalogram and also in postero-anterior view
- During the development of brain the markings are more prominent between age 2–3 years and 5–7 years and less prominent after 8 years of age<sup>2</sup>.

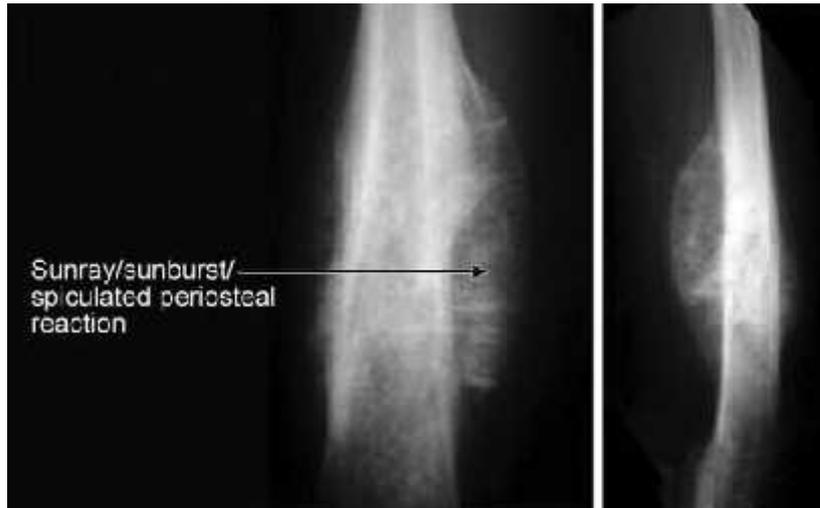


FIGURE 2: COPPER BEATEN SKULL APPEARANCE

### Sun ray/sunburst appearance

- Due to rapid progression of lesion, the periosteum will not have proper time to lay down thin shell of bone. In such cases small fibres (small fibres) connecting periosteum to the bone stretches perpendicular to the bone.
- Ossification of these fibres leads to a “sunburst” periosteal reaction
- It is observed in osteosarcoma, hemangioma, and osteoblastoma<sup>3</sup>.

FIGURE 3: SUNRAY APPEARANCE



### Onion skin appearance

- Onion skin appearance is due to lamellated periosteal reaction where multiple concentric layers of new bone are laid down.
- Evident in acute osteomyelitis, osteosarcoma, Ewing's tumor, and eosinophilic granuloma.<sup>4</sup>

FIGURE 3: ONION SKIN APPEARANCE



### Punched out radiolucency

- It is because of local disappearance of normal bone due to resorption giving a punched out pattern.
- It is commonly seen in multiple myeloma and langerhans cell histiocytosis cases<sup>5</sup>

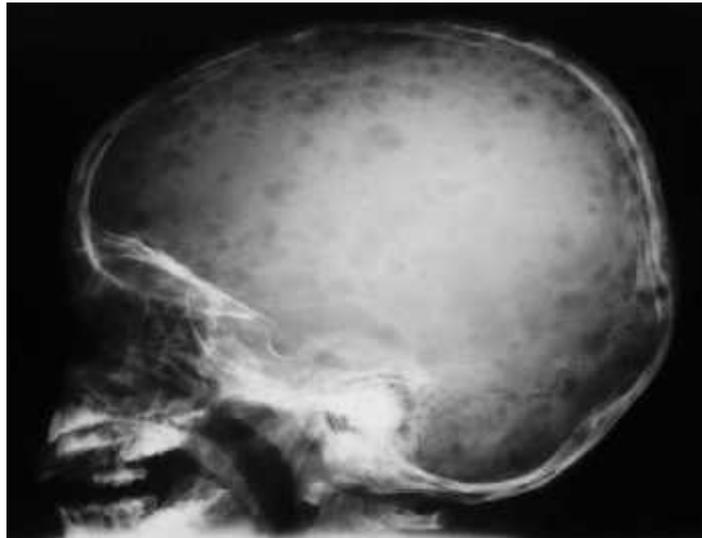
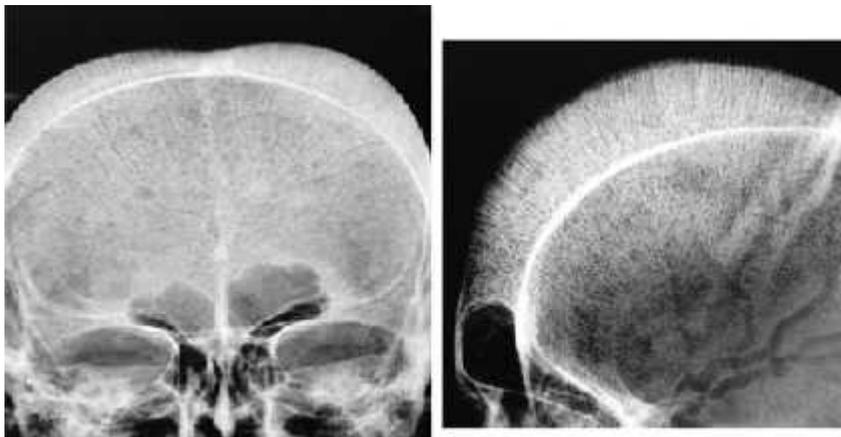


FIGURE 4: PUNCHED OUT RADIOLUCENCY

### Hair on end appearance

- It is due to the periosteal reaction which appears as a perpendicular trabeculations along the skull vault by marrow hyperplasia.
- According to the degree of hyperplasia the bone changes.
- Evident in sickle cell anemia and thalassemia.<sup>6</sup>

FIGURE 5: HAIR END APPEARANCE



### INTRAORAL RADIOGRAPHIC PATTERNS

#### Honey comb pattern

- A radiographic appearance present in radiolucent multilocular lesions where small compartments tend to be uniform in size like honey bees comb.
- It can be seen in cases of CEOC, hemangioma, central giant cell granuloma, keratocystic odontogenic tumor, and ameloblastoma.<sup>7</sup>

FIGURE 6: HONEY COMB PATTERN



#### Balloon like or peripheral egg shell appearance

- Radiopacity is most commonly seen on the periphery of the expanded cortex than inside of the expanded border. Xray beam is more attenuated in the cortical bone which is not thicker on the cortex than rest of the area because of the longer path length of photons through the bony cortex on the periphery. In radiograph, these circular, fluid-filled shaped structure gives a balloon like appearance.
- This type of balloon like appearance is most commonly seen in follicular cysts.<sup>8</sup>

FIGURE 7: BALLOON LIKE APPEARANCE



#### Ground glass appearance

- Ground glass is a glass whose surface has been ground to produce rough finish.
- Radiographically the matrix of lucency is smooth and relatively homogeneous and it has a thick sclerotic border.
- It is most commonly seen in fibrous dysplasia, paget's disease, hyperparathyroidism, and ossifying fibroma<sup>9</sup>.

FIGURE 8: GROUND GLASS APPEARANCE



#### Driven snow appearance

- Driven snow appearance is due to the mixed radiolucent and radiopaque lesion.
- It is seen in Calcifying epithelial odontogenic cyst (CEOC)<sup>10</sup>

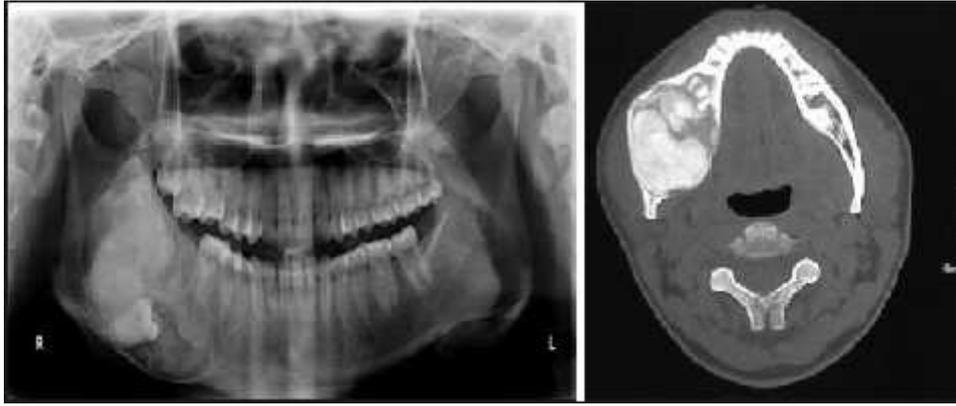
FIGURE 9: DRIVEN SNOW APPEARANCE



#### Downward bowing

- This radiographic pattern is due to the lesion that invades to the inferior border of the mandible when their size reaches a limit.
- It appears as a round tumour mass due to the centrifugal growth pattern and thus equal expansion can be observed in all directions.
- Downward bowing appearance is commonly seen in cemento-ossifying fibroma and ameloblastoma[5]

FIGURE 10: DOWNWARD BOWING



### Moth eaten appearance

- This appearance is because of the noncorticated radiolucency with ragged borders
- Most commonly observed in early stages of osteosarcoma, squamous cell carcinoma, osteomyelitis, osteoradionecrosis, leukemia, malignant lymphoma, etc.,<sup>11</sup>

**FIGURE 11:** MOTH EATEN APPEARANCE



### Floating teeth

- Floating teeth appearance can be appreciated in case of destruction of alveolar bone surrounding the tooth root.
- It can be observed in histiocytosis X, severe periodontitis, malignant lymphoma, and other malignant diseases<sup>12</sup>

**FIGURE 12: FLOATING TEETH**



### Ghost teeth

- Ghost teeth is seen in case of regional odontodysplasia where thinning out of enamel and dentin and wide pulp chambers can be noticed
- A typical ghost teeth appearance is due to absence of contrast between enamel and dentin where both are less radiopaque when compared with unaffected counterparts.
- Here teeth appears more radiolucent radiographically.<sup>13</sup>

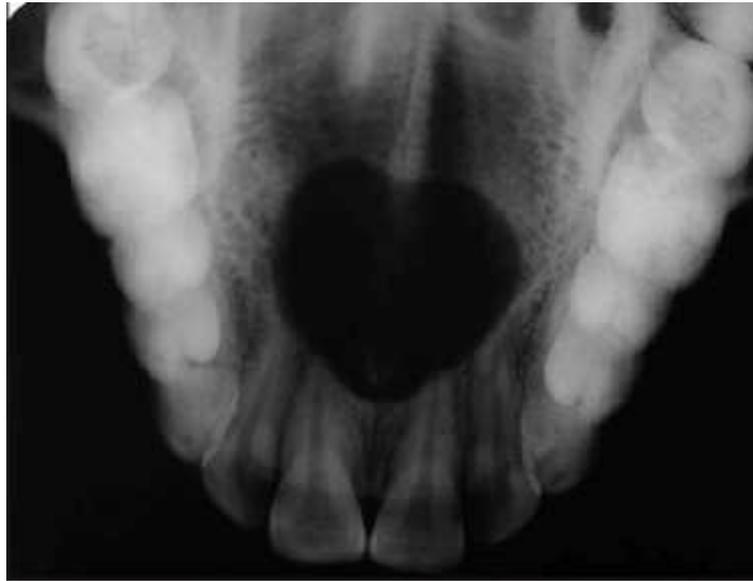
**FIGURE 13: GHOST TEETH**



### Heart shaped radiolucency

- Anterior nasal spine overlaps cystic radiolucency in the maxillary central incisor region thus giving a heart shaped radiographic pattern.
- It is a characteristic sign for nasopalatine cyst<sup>14</sup>.

**FIGURE 14:** HEART SHAPED RADIOUCENCY



#### **Mottled appearance**

- Due to uneven spots it is named as mottled appearance.
- Radiographically it appears as a mixed lesion with patchy radiolucency and radiopacities are found interspersing between lucent areas.
- Evident in fibrous dysplasia, ossifying fibroma, Paget's disease, etc.<sup>15</sup>

**FIGURE 15:** MOTTLED APPEARANCE



#### **Step ladder appearance**

- The step ladder appearance occurs due to the horizontal trabeculations of medullary bone of jaws.
- Most commonly observed in sickle cell anemia and also in normal mandibular alveolar bone.<sup>16</sup>

**FIGURE 16:** STEP LADDER APPEARANCE



#### Soap bubble appearance

- Soap bubble appearance is present in radiolucent multilocular lesions which is due to circular compartments of varying size which appears to overlap to a lesser extent.
- Observed in ameloblastoma, aneurysmal bone cyst, and central hemangioma<sup>17</sup>.

**FIGURE 17:** SOAP BUBBLE APPEARANCE



#### Tennis racket appearance

- It is a radiographic appearance present in radiolucent multilocular lesions comprising of angular compartments which results from the development of straight septa
- Tennis racket appearance is the characteristic sign of odontogenic myxoma.<sup>18</sup>

FIGURE18:TENNISRACKETAPPEARANCE



## CONCLUSION

Some radiographic patterns are characteristic signs of certain diseases. Knowledge about the different radiographic patterns is necessary for every dentist and thus it helps the budding dentists for radiodiagnosis.

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