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GUEST APPEARANCES IN HEAD AND NECK REGION: RADIOGRAPHIC APPRAISAL

Dental Science

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ABSTRACT

There are several lesions in the orofacial region that shows similar radiographical appearances. Sometimes it is often difficult to differentiate between different lesions. Even though many cross- sectional imaging modalities have been developed, still radiographs remains an important source of preliminary investigations. It has also been observed that some diseases have a unique and typical radiographical sign which when correlated clinically and histopathologically can aid in diagnosis. The main aim of this paper is to discuss collective knowledge, about various radiographic signs associated with lesions in the head and neck region.

KEYWORDS

Classic appearances, diagnostic imaging, Oral radiology

INTRODUCTION

Over the years, radiologists have established many imaging signs to attribute meaning to disease- or anatomy-specific imaging patterns encountered in the clinical setting. Oral and maxillofacial imaging is no exception. As a specialty that deals with uncommon lesions and complex anatomy, both students and practicing dental clinicians may benefit from this simplistic, pattern-based approach. This review describes a compendium of the classic signs in oral and maxillofacial radiology and discusses their use in differential diagnoses.

Beaten copper/Beaten silver or beaten brass/Thumb print appearance

It refers to the prominent convolutional markings/gyral impressions on the inner table of skull, over the more anterior aspect seen throughout the skull vault. It is mainly due to raised intracranial pressure. It can be seen in normal children during periods of rapid brain growth between 2-3 and 5-7 years. Seen in Crouzon syndrome, Craniosynostosis, Obstructive hydrocephalus, Hypophosphotasia and Intracranial masses[1].

Bull's eye

Dilaceration is a tooth developmental defect causing a sharp bend or curve in the crown or root. When the dilacerations is toward the labial/buccal or palatal/lingual, the central X-ray beam passes almost parallel to the deviating part of the root. The deviating root portion appears at the end of the non deviating portion as a circular radiopaque region with a dark central radiolucent spot, which represents the apical foramen and is a part of the root canal as well. This radiographic image is known as a Bull's Eye or a target. The periodontal ligament around the deviating part of the root appears as a black region (radiolucent halo)[2].

Bird's beak

It is oval, diamond and crooked shape morphology of the condyle resembling a bird's beak. Degenerative joint disease is thought to occur when the ability of the joint to adapt to excessive forces, through remodeling, is exceeded. Degenerative changes of the joint include flattening and irregularities of the articular surfaces, osteophytosis (projections of bone formation at the periphery of the articulating surfaces), and subchondral degeneration. Flattening and osteophyte formation results in "beaking" at the anterior aspect of the condyle.

Balloon like/Peripheral egg shell

Periphery of the expanded cortex is more opaque than the region inside the expanded border. The cortical bone is not thicker on the cortex than over the rest of the lesion, but rather the X-ray beam is more attenuated in this region because of the longer and tangential path length of photons through the bony cortex on the periphery. Circular, fluid-filled shaped structure appears much like inflated balloon. Most commonly seen in ABC, ameloblastoma, CGCG, dentigerous cyst[3].

Cookie Bite

They are characterised by small focal eccentric saucerized osteolytic external cortical destruction in long tubular bones. It shows bone destruction area with presence of sequestrum, and a faint periosteal reaction along the involved bone. This type of destruction is typically described for metastases from lung cancer, however, they can also occur with other tumours[4].

Cotton wool/ cotton ball

The **cotton wool appearance** is a plain film sign of Paget disease and results from thickened, disorganised trabeculae which lead to areas of sclerosis in a previously lucent area of bone, typically the skull. These sclerotic patches are poorly defined and fluffy[5]. Seen in florid cement osseous dysplasia and Paget disease.

Codman's triangle

Codman triangle is a radiologic sign seen most commonly on musculoskeletal plain films. It is the name given to a periosteal reaction that occurs when bone lesions grow so aggressively that they lift the periosteum off the bone and do not allow the periosteum to lay down new bone. It is a pattern of interrupted periosteal reaction where the periosteum gets lifted at either end of the aggressive lesion, and the central aspect of the lesion does not have any overlying ossification. This state gives the appearance on plain films of a raised triangle of periosteum along the edges of the lesion. In this reaction, the periosteum may become lifted by the leading edge of the tumor, pus, or hemorrhage his radiologic sign classically presents with aggressive primary bone tumors, including osteosarcoma (most common), Ewing sarcoma, chondrosarcoma, metastasis, undifferentiated pleomorphic sarcoma, and malignant giant cell tumor. It may rarely appear with non-malignant lesions such as osteomyelitis, active aneurysmal bone cysts, trauma, and hematoma[6].

Downward bowing

Downward bowing refers to a characteristic, smooth, downward expansion or curvature of the inferior cortex of the jawbone, usually indicating a slow-growing, benign, or tumor-like lesion. This appearance is caused by centrifugal expansion (growth in all directions) that puts pressure on the mandibular cortex. Seen in cement-ossifying fibroma and ameloblastoma[7].

Doughnut

Osteoma cutis is a rare soft tissue calcification in the skin. It is usually associated with chronic acne scars. Radiographically, osteoma cutis most commonly appears in the cheek as multiple, "doughnut", or "washer-shaped" or ring like, radiopacities with radiolucent centers representing central marrow cavities. Seen in ABC,button sequestration, avascular necrosis and Giant cell tumor[8].

Floating teeth

It is a result of alveolar bone destruction around the root of the teeth giving the impression that a segment of the alveolar process has been scooped out. In some cases, destruction of the supporting alveolar bone is so severe that the teeth appear to be floating in air. Seen in cases of histiocytosis X, severe periodontitis, malignant lymphoma and cherubism[9].

Ground glass

It is a hazy uniform increased radiopacity with ill defined blending borders. In fibrous dysplasia, the medullary bone is replaced by fibrous tissue, which appears radiolucent on radiographs, and is classically

described as ground-glass appearance. Fibrous dysplasia is a skeletal developmental anomaly of the bone-forming mesenchyme that manifests as a defect in osteoblastic differentiation and maturation[10]. Also seen in cement-osseous dyaplasia and hyperparathyroidism.

Ghost teeth
Regional odontodysplasia (RO), popularly known as "ghost teeth" is a sporadic developmental aberration affecting the ectodermal and mesodermal tooth forming components with thin and poorly mineralized enamel and dentin. The earliest documentation of the condition was provided by Hitchin in 1934. Radiograph is hazy and faint with thin enamel and dentin and enlarged pulp chambers and shortened roots giving a ghost like appearance[11].

Garrington's sign
It is thickening of the periodontal ligament/membrane space of involved teeth in the setting of gnathic osteosarcoma. Symmetrical widening of the space can be seen early in the disease process due to infiltration of tumour cells[12].

Hanging drop
The blowout orbital wall fracture results from a direct blow to the orbit and the floor is most susceptible. The classic "hanging drop" appearance of the herniated orbital content is clearly seen on a radiographic Waters' view or on a coronal computed tomographic image, as is the "trapdoor" appearance of the displaced orbital floor. It can lead to diplopia and enophthalmos. These signs are accompanied by an air–fluid level in the subjacent maxillary sinus. Inferior rectus muscle and orbital contents herniate into the maxillary sinus[13].

Hair on end
Hair on end appearance of the skull is a characteristic feature of chronic haemolysis usually seen in patients with thalassaemia and sickle cell anaemia. It results from accentuated vertical trabeculae between the inner and outer tables of the skull because of excessive bone marrow hyperplasia. Seen in iron deficiency anaemia and cyanotic congenital heart disease[14].

Heart shaped radiolucency
It is a charactertistic feature of nasopalatine cyst with well circumscribed, corticated, symmetrical rounded or heart shaped radiolucency within the anterior maxilla between the roots of central incisors. Radiographic superimposition of the anterior nasal spine often produces a characteristic heart or pear shaped radiolucency. It is also seen in globulomaxillary cyst[15].

Honeycomb/ Soap bubble
The internal structure of solid/multicystic ameloblastoma is typically mixed, with the presence of bony septa creating multiple internal compartments, or loculations. This pattern reflects the presence of cystic formations within the tumor. These cystic regions remodel the trapped bone into curved shapes, providing a "soap bubble" pattern (large radiolucent compartments of variable size) or a "honeycomb" pattern (numerous small compartments). Generally, the compartments are large in the posterior mandible and small in the anterior mandible[16]. Seen in ABC, CGCG, OKC, Haemangioma and ameloblastoma.

Mottled
Mottle or mottling is the appearance of uneven spots. In radiology, it is a mixed lesion with patchy radiolucency and interspersed opacities in it. Seen in cases of fibrous dysplasia, ossifying fibroma, Paget's disease[17].

Moth eaten
The "moth-eaten" pattern consists of multiple radiolucent holes with a poor zone of transition. Radiograph shows multiple, small, ill-defined, and scattered radiolucent lesions, indicating rapid bone destruction with non corticated edges and potential involvement of surrounding bone. It is commonly seen in osteomyelitis, malignancies (metastatic disease, osteosarcoma), and conditions like eosinophilic granuloma or lymphoma[18].

Onion peel/Onion skin
It refers to a lamellated periosteal reaction in bone imaging, where multiple thin concentric layers of new bone form due to rapid, cyclical irritation mimicking the layers of an onion. It is seen in aggressive bone tumors, **Ewing sarcoma,** eosinophilic granuloma, osteosarcoma, and chronic pyogenic osteomyelitis. Also known as combo sign when seen in pulmonary hydrated cyst[19].

Pear shaped/ Tear drop shaped
It is well-defined, radiolucent (dark) lesion that narrows at one end. It is generally associated with slow-growing, benign lesions that can cause expansion of the cortical bone. Seen in CGCG, lateral periodontal cyst, intraosseous schwannoma, squamous odontogenic tumor, traumatic bone cyst and nasopalatine duct cyst[20].

Punched out
A "punched-out" border is one that has a sharp boundary with no peripheral bone reaction. Its appearance is similar to that of a hole in a radiograph created with a paper punch. The border of the resulting hole is well-defined, osteolytic and the surrounding bone has a normal appearance till the edge of the hole. Seen in multiple myeloma or Langerhans cell histiocytosis[21].

Sunburst /Sunray
If the lesion grows rapidly but steadily, the periosteum will not have enough time to lay down thin shell of bone, and in such cases, the tiny fibers mainly sharpey's fibres that connect the periosteum to the bone become stretched out perpendicular to the bone. When these fibers ossify, they produce a pattern sometimes called "sunburst" periosteal reaction. Seen in osteosarcoma, chondrosarcoma,fibrosarcoma, haemangioma,osteoblastoma[22].

Spike root
Benign tumors tend to resorb adjacent root surfaces in a smooth fashion. The resorption often occurs in smaller quantities, causing thinning of the root into a "spiked" shape". In the absence of generalized periodontitis, widening of the periodontal ligament space that involves one or several adjacent teeth (characteristically limited to one side of the root) could be an early sign of malignancy[3].

Sharpened pencil
It is a characteristic, advanced, and often bilateral radiographic sign resulting from severe, active erosive destruction. This sign signifies the loss of the condylar head, leaving only the neck, which is often described as resembling a pencil or the mouthpiece of a flute. There is extensive erosion of the anterior and posterior condylar surfaces at the attachment of the synovial lining, often termed "scooped-out" erosion. Seen in rheumatoid arthritis of TMJ[23].

Spoke wheel
It refers to the pattern of vessels coursing through meningiomas or haemangiomas, when seen in cross-section. The trabeculae may be arranged as a hub or in a spoke-of-a-wheel or honeycomb pattern. Although the honeycomb appears to be nonspecific, the "spoke-of-a-wheel" appearance is strongly suggestive of a central hemangioma[24].

Step ladder
It is specific, often normal, horizontal or oblique arrangement of trabecular bone in the posterior mandible, sometimes mistaken for, conditions like sickle cell anemia. It appears as horizontal trabeculations within the medullary bone. The step ladder pattern may reflect variations in bone density or trabecular arrangement[3].

Snow driven/Sausage string
An irregular unilocular or multilocular radiolucent region with radiopaque masses of different sizes and opacities is the hallmark radiographic appearance seen in CEOT, This is described as "driven snow" appearance. It appears as a mixed radiolucent (dark) and radiopaque (light) lesion, typically caused by calcified structures (Liesegang rings) scattered within the tumor, often associated with an impacted tooth[25].

Tennis racket
It is a multilocular, soap bubble or honey comb radiolucent lesion with straight line, thin perpendicular bony septa resembling a tennis racket. It is typically seen in odontogenic myxoma. Also seen in birbeck granules in langerhans cell histiocytosis under electron microscope[26].

Tram track/pipestem
Monckeberg's medial vascular calcification (arteriosclerosis) is characterized by degeneration and subsequent deposition of calcium in the medial coating of the artery. These deposits, however, do not narrow the vessel lumen or interfere with blood flow. Radiographically, the calcified vessel appears as a parallel pair of thin,

gyriform, curvilinear radiopaque lines that outline the affected vessel. Seen in diabetes mellitus, sturge weber syndrome and chronic renal failure[27].

CONCLUSION

Radiographic patterns are pathogonomic and characteristic to a specific disease and thus can be used for narrowing the differential diagnosis. Radiology students as well as practicing dental clinicians may benefit from becoming familiar with the classic signs observed during oral and maxillofacial imaging.

REFERENCES

1. Desai Vela, Smita RP, Rajeev S. Copper Beaten Skull! Can it be a usual apperance? Int J Clin Pediatr Dent. 2014;7:47–9.
2. Prabhakar AR, Reddy VV, Bassappa N. Duplication and dilaceration of a crown with hypercementosis of the rootfollowingtrauma:acasereport. Quintessence Int 1998 Oct;29(10):655-657
3. White SC, Pharoah MJ. Imaging principles and techniques Oral Radiology - Principles and Interpretation. 20116th Ch. 4. Indian Reprint ISBN: 978-81-312-1977-5: Projection Geometry Mosby Elsevier; 2011:51-2
4. Galal Omami. Cookie bite lesion of the mandible. JADA,2017:148(7);530-34
5. Tara horino, Osamu ichii, Yoshio tarada. Intern Med. 2019 Feb 25;58(12):1809–1810
6. Wenaden AE, Szyszko TA, Saifuddin A. Imaging of periosteal reactions associated with focal lesions of bone. Clin Radiol. 2005 Apr;60(4):439-56
7. Neyaz Z, Gadodia A, Gamanagatti S, Mukhopadhyay S. Radiographical approach to jaw lesions Singapore Med J. 2008;49:165–76
8. Seven B, Varoglu E, Alper F, Keles M, Koplay M. Aneurysmal Bone Cyst of the Second Metatarsal: Three-Phase Bone Scan Findings and Radiological Assessment. Hell J Nucl Med. 2008;11(3):189-90.
9. Dagenais M, Pharoah MJ, Sikorski PA. The radiographic characteristics of histiocytosis X: a study of 29 cases that involve the jaws. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 1992;74:230–6.
10. Chapurlat R D, Orcel P . Fibrous dysplasia of bone and McCune-Albright syndrome. *Best* Pract Res Clin Rheumatol 2008; 22: 55–69.
11. Zegarelli EV, Kutscher AH, Applebaum E, Archard HO. Odontodysplasia. Oral Surg Oral Med Oral Pathol. 1963;16:187–93
12. Khorate MM, Goel S, Singh MP, Ahmed J. Osteosarcoma of mandible: a case report and review of literature. J Cancer Sci Ther. 2010; 2:122–125.
13. Lee HJ, Jilani M, Frohman L, Baker S. CT of orbital trauma. Emerg Radiol. 2004;10:168–72.
14. Walor D M, Berdon W E, Westra S J. 'Hair on end' skull changes resembling thalassemia caused by marrow expansion in uncorrected complex cyanotic heart disease. Pediatr Radiol 200535698–701.
15. Kumar NC, Shashikiran ND, Subbareddy VV. Nasopalatine cyst : A case report, Indian J Dent Res. 2003 Apr-Jun;14(2):121-3.
16. Kim SG, Jang HS. Ameloblastoma: A clinical, radiographic, and histopathologic analysis of 71 cases. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2001;91(6):649-653.
17. Araki M, Matsumoto K, Matsumoto N, Honda K, Ohki H, Komiyama K. Unusual radiographic appearance of ossifying fibroma in the left mandibular angle Dentomaxillofac Radiol. 2010;39:314–9.
18. Suei Y, Taguchi A, Tanimoto K. Radiographic evaluation of possible etiology of diffuse sclerosing osteomyelitis of the mandible. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 1997 Nov;84(5):571-7.
19. Rana, Rich S.; Wu, Jim S.; Eisenberg, Ronald L. (1 October 2009). American Journal of Roentgenology. 193 (4): 259–272.
20. Siriwardena, B.S.M.S. · Crane, H. O'Neill, N. Odontogenic tumors and lesions treated in a single specialist oral and maxillofacial pathology unit in the United Kingdom in 1992-2016 Oral Surg Oral Med Oral Pathol Oral Radiol. 2019; **127**:151-166.
21. Ludwig H, Miguel J, Dimopoulos M, Palumbo A, Sanz R, Powles R. International Myeloma Working Group recommendations for global myeloma care. *Leukemia*. 2014;28(5):981-92
22. Eldaya R, Eissa O, Herrmann S, Pham J, Calle S, Ribe T. Mandibular lesions: a practical approach for diagnosis based on multimodality imaging findings. Contemp Diagnost Radiol 2017;40(06):1–8.
23. Kretapirom K, Okochi K, Nakamura S, Tetsumura A, Ohbayashi N, Yoshino N, et al. MRI characteristics of rheumatoid arthritis in the temporomandibular joint. Dentomaxillofac Radiol. 2013;42:31627230.
24. Sadowsky D, Rosenberg RD, Kaufmen J, Levine BC, Friedman JM Central hemangioma of the mandible. Literature review, case report, and discussion. Oral Surg Oral Med Oral Pathol, 1981:52:471-7.
25. Caliaperoumal S, Gowri S, Dinakar J. Pindborg tumor. *Contemp Clin Dent*. 2016;7(1):95-7.
26. Wang K, Guo W, You M, Liu L, Tang B, Zheng G. Characteristic features ofthe odontogenic myxoma on cone beam computed tomography. Dentomaxillofac Radiol 2017;46:20160232.
27. Omami G Twenty classic signs in oral and maxillofacial radiology . Oral Radiology teeth 2019 35:3-10.