BONE TUMORS

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OSTEOMA

- Benign neoplasm characterized by a proliferation of either compact or cancellous bone, usually in an endosteal or periosteal location.
- Exostoses may produce a similar clinical, radiographic and histologic picture.

Clinical features

- Osteoma is not a common oral lesion.
- More common in the young adult.
- Slow-growing tumor.
- There is seldom any pain associated with this tumor.

GARDNER SYNDROME

- Multiple osteomas of the jaws, as well as of long bones & skull, are a characteristic manifestation of Gardner syndrome.

Radiographic features

Occurs within the jaw as a well-circumscribed radiopaque mass.

Histologic features-

- Composed either of extremely dense, compact bone or of coarse cancellous bone.
- The bone formed appears normal.

Treatment

- Surgical removal.

OSTEOID OSTEOMA

- Benign tumor of bone which has seldom been described in the jaws.
- It is a true neoplasm of osteoblastic derivation. May occur as a result of trauma or inflammation.

CLINICAL FEATURES

- Usually occurs in young persons.
- Young children under the age of 10 years or even 5 years are frequently affected.
- Males predominate over females by a ratio of at least 2 to 1.
- Most frequently in the femur or in the tibia.
- One of the chief symptoms is severe pain out of all proportion to the small size of the lesion.

- The pain of osteoid osteoma is described as unrelenting & sharp, worse at night.
- Classically, the pain is relieved by aspirin.
- Localized swelling of the soft tissue over the involved area of bone may occur & may be tender.

Oral manifestations

- Very rare in the jaws, but can involve mandible as well as maxilla.

Radiographic features

- Pathognomonic picture characterized by a small ovoid or round radiolucent area surrounded by a rim of sclerotic bone. The central radiolucency may exhibit some calcification. The lesion seldom is larger than 1 cm in diameter.

Histologic features

- The microscopic appearance of the osteoid osteoma is characteristic & consists of a central nidus composed of compact osteoid tissue, varying in degree of calcification, interspersed by a vascular connective tissue.
- Formation of definite trabeculae occurs outlined by active osteoblasts.

- Osteoclasts & foci of bone resorption are also usually evident.
- Osteoblasts of a benign osteoblastoma are identical. Thus, osteoid osteoma & osteoblastoma are closely related lesions.

- Unlike in osteoblastoma, neural staining techniques reveal many axons throughout an osteoid osteoma, which probably accounts for the pain (the nidus).
- ***Levels of prostaglandin E2 are markedly elevated in the nidus; this is presumably the cause of pain & vasodilatation.***

Benign osteoblastoma (Giant osteoid osteoma)

- Benign osteoblastoma differs because it does not share the markedly limited growth potential of the average osteoid osteoma.
- Also, the benign osteoblastoma frequently lacks the characteristic pain & the halo of sclerotic bone associated with osteoid osteoma.
- Greater than 1.5 cm in its dimensions.

CLINICAL FEATURES

- This central bone tumor occurs most frequently in young persons, predilection in males.
- The lesion is characterized clinically by pain & swelling at the tumor site, the duration being just a few weeks to a year or more.
- ***Unlike osteoid osteoma, the pain of osteoblastoma is more generalized & less likely to be relieved by salicylates.***

- Most common site of occurrence is the vertebral column; other sites are sacrum, long tubular bones & calvarium.
- Seen in both maxilla & mandible with some frequency.

Radiographic features

- Well-circumscribed. May produce a mottled, mixed radiolucent-radiopaque appearance.

HISTOLOGIC FEATURES

Hallmark features consist of:

1) Vascularity of the lesion with many dilated capillaries scattered throughout the tissue.
2) Moderate numbers of multi-nucleated giant cells scattered throughout the tissue.
3) Actively proliferating osteoblasts which pave the irregular trabeculae of new bone.

Treatment- conservative surgical excision.

TORUS PALATINUS

- It is slowly growing, flat-based bony protuberance or excrescence which occurs in the midline of the hard palate.
- May be hereditary condition; thought to follow a Mendelian dominant pattern.

CLINICAL FEATURES

- Presents itself as an outgrowth in the midline of the palate & may show variety of shapes; classified as flat, spindle-shaped, nodular or lobular.
- The mucosa overlying the torus is intact, but occasionally appears blanched. It may become ulcerated if traumatized.

- The torus itself may be composed either of dense compact bone or of a shell of compact bone with a center of cancellous bone.

Treatment

- Impossible to construct a full or partial denture over the structure.
- In such cases, torus is removed surgically.

TORUS MANDIBULARIS

- It is an exostosis or outgrowth of bone found on the lingual surface of the mandible.

Clinical features

- The growth on the lingual surface of the mandible occurs above the mylohyoid line, usually opposite the bicuspid teeth.
- May vary in size & shape.
- Usually bilateral.

- Bilateral bony growths on the lingual of the mandible may be lobed or multiple.

Treatment

- Surgical removal may be necessary because of difficulties encountered in attempting to construct a denture over the outgrowth.

MALIGNANT TUMORS OF BONE

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OSTEOSARCOMA

- Third most common cancer in adolescence, occurring less frequently than only lymphomas & brain tumors.
- It is thought to arise from a primitive mesenchymal bone-forming cell & is characterised by production of osteoid.

CLINICAL FEATURES

- Most commonly occurs in the long bones of the extremities near metaphyseal growth plates.
- Most common sites are femur, tibia, humerus. Other significant locations are the skull or jaw (8%) and pelvis (8%).
- Males affected more than females.

- Occurs in young persons, the majority b/w 10-25 years with decreasing incidence as age advances; **a more dramatic increase in adolescence corresponds with the growth spurt**.

Risk factors

- Rapid bone growth appears to predispose patients to osteosarcoma, as suggested by the increased incidence during the adolescent growth spurt, & osteosarcoma's typical location near the metaphyseal growth plate of long bones.
- Exposure to radiation is the only known risk factor.

Variants

- Osteoblastic;chondroblastic;fibroblastic; telangiectatic; small cell; giant-cell rich.
- Swelling & pain are early features of the neoplasm.
- Patients may complain of a sprain, arthritis.
- Systemic symptoms, such as fever & night sweats, are rare.

Oral manifestations

- Swelling producing facial deformity & pain, followed by loose teeth, paresthesia, toothache, bleeding, nasal obstruction & a variety of other manifestations.
- In jaws, the mean age of occurrence is 33 years.
- Mandibular tumors are more common than those in the maxilla.

- Osteosarcoma develops with considerable frequency in bone affected by Paget's disease.

Radiographic features

- In those tumors with little tumor bone, the radiographic appearance will be radiolucent; whereas those tumors with much tumor bone will be radiodense.
- Mixed lucent-dense lesions indicate an intermediate degree of tumor bone formation.

- Cumulus cloud densities form within the intramedullary & soft tissue components caused by mineralizing tumor osteoid.

3 classic features of osteosarcoma

1) small streaks of bone radiate outward from approximately 25% of these tumors. This produces a sunray (sunburst) pattern.

2) This tumor may grow within the periodontal membrane space causing resorption of the adjacent bone resulting in uniform widening of the space. Widening of the periodontal membrane space may also be seen in other conditions such as chondrosarcoma & scleroderma, & so it is not pathognomonic.

3)In the long bones affected with osteosarcoma, the periosteum is elevated over the expanding tumor mass in a tent-like fashion. At the point on the bone where the periosteum begins to merge (edge of the tent), an acute angle b/w the bone surface & periosteum is created. This is ***called Codman's triangle & is highly suspicious for osteosarcoma***.

HISTOLOGIC FEATURES

- Characterized by the proliferation of both atypical osteoblasts & their less differentiated precursors.
- ***The characteristic feature of osteosarcoma is the presence of osteoid formed by malignant osteoblasts in the lesion***. Stromal cells may be spindle shaped & atypical with irregularly shaped nuclei. Number of histologic types exist & divided on the basis of the predominant features of the cells(***i.e. osteoblastic, chondroblastic, fbroblastic).***

- In the osteoblastic type of osteosarcoma-atypical, neoplastic osteoblasts exhibit considerable variation in size & shape, show large, deeply staining nuclei & are arranged in a disorderly fashion about trabeculae of bone.
- Also, there is a great deal of new tumor osteoid & bone formation, mostly in an irregular pattern & sometimes in solid sheets.

- When proliferation of anaplastic fibroblasts predominate, the lesion is designated as a fibroblastic type of osteosarcoma.
- Some tumors show occasional areas of neoplastic myxomatous tissue & cartilage.
- Even though a lesion is composed chiefly of malignant cartilage, it should be diagnosed as osteosarcoma if significant malignant osteoblasts & tumor osteoid or bone can be identified since the course of the lesion will probably be that of an osteosarcoma rather than of a chondrosarcoma.

EWING'S SARCOMA

- It is a sarcoma of the bone, classically described under small round cell tumours. There is considerable clinical & histologic overlap b/w this tumour & the primitive neuroectodermal tumour (PNET).
- Both tumours share a common & unique chromosomal translocation.
- Ewing's sarcoma arises within the bone while PNET arises within soft tissues.

CLINICAL FEATURES

- This neoplastic disease occurs predominantly in children & young adults b/w the ages of five & 25 years, the median age of occurrence is 13 years.
- 80% occur within first two decades of life. Twice common in males as in females.
- An episode of trauma often precedes the development of the tumour.

- Pain & swelling of the involved bone are the earliest clinical signs& symptoms of Ewing's sarcoma.
- The bone most commonly affected are the long bones of the extremities, although the skull, clavicle, ribs & shoulder & pelvic girdles may be involved, as well as the maxilla & mandible.

- Facial neuralgia & lip paresthesia have been reported in cases of jaw involvement.
- Jaw swelling appearance is relatively rapid, & the intraoral mass may become ulcerated. The patient may have a low-grade fever & an elevated WBC count.

RADIOGRAPHIC FEATURES

- The lesion is a destructive one & produces an irregular, diffuse radiolucency.
- A common characteristic feature is the formation of layers of new subperiosteal bone producing the so-called " onion skin" appearance on the film.
- This thickened cortex is usually infiltrated by the tumor.

- Osteophyte formation may also be visible on the radiograph, and, in such cases, may be similar to the ‘ sun-ray ‘ appearance of osteosarcoma.

Histologic features

- Ewing's sarcoma is an extremely cellular neoplasm composed of solid sheets or masses of small round cells with very little stroma, although a few connective tissue septa may be present.
- The cells themselves are small & round, with scanty cytoplasm & relatively large round or ovoid nuclei with dispersed chromatin & hyperchromasia.

- The cell borders are indistinct. The sarcoma cells are arranged in Filigree pattern.
- Mitotic figures are common.
- The cells are positive for glycogen.
- Geographic necrosis with perivascular sparing is a common feature.

TREATMENT

- This neoplasm is radiosensitive.
- Radical surgical excision.
- Five-year survival with a combination of surgery & chemotherapy is 74%.

CHONDROSARCOMA

- Chondrosarcoma is the malignant counterpart of the chondroma, and like the benign lesion, may occur in either the maxilla or the mandible, as well as in many other bones in the body.
- Chondrosarcoma is one of the most difficult of the malignant tumors of the bone for the pathologist to diagnose.

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