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الفريق العلمي

# PATHOLOGY

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قسمت المقارنات لكل مجموعة أمراض على أكتر من جدول لأنه كان صعب أ شملهم كلهم بجدول واحد بتطلع المعلومات مو مرتبة ولا مترابطة يعني ها د كان أفضل حل..

Bone forming tumors:

| Tumor | Type | Age | Common location | Histology | IMP. Notes |
|---|---|---|---|---|---|
| Osteoma | Benign | 40-50y | Head, neck,the paranasal sinuses.<br>on the bone surface | bland mixture of woven & lamellar bone | --- |
| Osteoid Osteoma | Benign | 10-20y | Metaphysis of femur & tibia<br>**less than 2 cm**<br>**usually involving the cortex & rarely the medullary cavity** | **Interlacing trabeculae of woven bone surrounded by osteoblasts** | **Universal complaint: Localized pain usually relieved by aspirin.**<br>**M/F ratio 2:1** |
| Osteoblastoma | Benign | 10-20y | vertebral column<br>**more than 2 cm**<br>**usually involving the cortex & rarely the medullary cavity** | **Interlacing trabeculae of woven bone surrounded by osteoblasts** | **cause pain but is difficult to localize, is NOT responsive to aspirin** |
| Osteosarcoma (OS) | Malignant | Primary : 10-20 y<br>**75% of cases are < 20**<br>secondary : > 40 y | **Metaphyseal** region of the **long bones** of the extremities: **60% knee**, **15% hip**, **10% shoulder, 8% jaw. Infrequently** penetrating the epiphyseal plate ,joint space | malignant mesenchymal cells forming **osteoid ==> Essential for diagnosis of osteosarcoma .** Pleomorphic malignant osteoblasts | **most common** primary malignant tumor of bone , **20%** of **primary** bone cancers<br>**M/F ratio is → 1.6:1** |

| Tumor | Morphology | Histology cont. | IMP. Notes |
|---|---|---|---|
| Osteoma | Usually **solitary**==> localized, slowly growing, hard ,exophytic masses on the bone surface<br>**Multiple** osteomas are a feature of hereditary **Gardner syndrome .** | --- | may cause: (1) cosmetic deformities;<br>(2) local mechanical problems ( e.g., obstruction of a sinus cavity or ear channal)<br>do not undergo malignant transformation |
| Osteoid Osteoma | Oval or round lesion (**hemorrhagic gritty** tan tissue) , with reddish-yellow central (**nidus** : radiolucent but may become mineralized & sclerotic ), surrounded by a rim of dense white **sclerotic bone** | --- | **Local excision** is the treatment of choice.<br>Incompletely resected lesions can recur<br>Malignant transformation is **rare unless** the lesion is treated with **radiation** |
| Osteoblastoma | Same as Osteoid Osteoma . | --- | Same as Osteoid Osteoma |
| Osteosarcoma (OS) | Turnip like T, often exhibiting hemorrhage & cystic degeneration.<br>Cartilage & fibrous tissue can also be present , **When malignant cartilage is abundant, the T is called a chondroblastic osteosarcoma** | Pleomorphic malignant **osteoblasts**, numerous abnormal **mitotic figures** , tumor **giant cells .** | **The most common type of OS** is primary, solitary, intramedullary, poorly differentiated bony matrix producing T.<br>**secondary OS** is a complication of polyostotic Paget disease, bone infarcts, & prior irradiation |

| Tumor | pathogenrsis | clinically | X-ray | ttt |
|---|---|---|---|---|
| Osteosarcoma (OS) | **RB gene** mutations occur in up to **70%** of sporadic T.<br>**Hereditary retinoblastomas** have X1000 greater risk of developing OS.<br>Mutations in : p53, cyclins, cyclin-dependent kinases, & kinase inhibitors. | **(1) painful enlarging masse, or as a (2) pathologic fracture** | **destructive, mixed lytic & blastic mass with indistinct infiltrating margins.**<br>**'Sun-burst' appearance** **(**reactive periosteal bone formation due to breaking through the cortex & lifting the periosteum )<br>**Codman triangle** **(**between the cortex & raised periosteum **)** | chemotherapy & limb-salvage therapy currently yields long-term survivals of **60% to 70%.**<br>**Secondary OS** are highly **aggressive T** that **do not respond** well to therapy.<br>**OS** typically **spread hematogenously** ; at the time of diagnosis, up to **20%** of patients have demonstrable **pulmonary secondaries.** |

## Cartilage-Forming Tumors

| Tumor | Type | Age | Location | Grossly |
|---|---|---|---|---|
| Osteochondro-ma (exostoses) | Benign<br>**cartilage-capped outgrowth** | **Solitary osteochondro-mas** are diagnosed in late adolescence & early adulthood<br>**Multiple exostoses** become apparent during **childhood** , occurring as multiple **hereditary** exostoses, an **autosomal dominant** disorder | only in bones of **endochondral origin**, arising at the **metaphysis** near the growth plate of long tubular bones , especially **about the knee** .<br>**Rarely**, they involve bones of hands & feet.<br>**Occasionally** they develop as a **sessile** tumors from bones of the pelvis, scapula, & ribs. | 1 to 20 cm in Ø, with a cap of benign hyaline cartilage,The newly formed bone forms the inner portion of the head & stalk, with the stalk cortex merging with the cortex of the host bone. |
| Chondroma<br>(within the bone medulla are termed **enchondromas** on the bone surface they are called **juxtacortical chondromas** ) | Benign<br>T of hyaline cartilage, developing from slowly growth plate cartilage | **Enchondroma s** affect **20 to 50y** | typically solitary in the metaphyseal region of tubular bones, specially of the short tubular bones of the **hands & feet.** | Enchondromas are gray - blue, translucent nodules usually smaller than 3 cm. |
| Chondrosarco-ma (ChS) | Malignant | most patients are age 40 or older | commonly arise in the pelvis, shoulder, & ribs ; in contrast to enchondromas, ChSs rarely involve the distal extremities. | **Conventional ChS** arise within the **medullary cavity** of the bone to form an expansile **glistening mass** that often erodes the cortex. They exhibit **malignant hyaline & myxoid cartilage.** |

| | | | | |
|---|---|---|---|---|
| | | | ( intramedullary or juxtacortical ) | **The myxoid ChS** is **viscous & gelatinous**, & the matrix oozes from the cut surface. **Spotty calcifications** are typically present, & **central necrosis** can create cystic spaces. The adjacent cortex is thickened or eroded, & the T grows with broad pushing fronts into marrow spaces & the surrounding soft tissue. |

| Tumor | Clinically | Pathogenesis | IMP. Notes |
|---|---|---|---|
| Osteochondroma | **slow - growing masses** , **asymptomatic** & detected **incidentally** , **painful** when they impinge on a **nerve** or if the **stalk** is **fractured**. | Inactivation of both copies of the **EXT tumor suppressor gene** in chondrocytes is implicated in both sporadic & hereditary osteochondromas . | **M/F ratio is 3/1**<br>**they tend to stop growing once the normal growth of the skeleton is completed..** patients **with the hereditary exostoses syndrome are at ↑ risk of malignant transformation.** |
| Chondroma | Asymptomatic ; and some are detected incidentally,<br>occasionally they are painful or cause pathologic fractures<br>On **X-ray**, the unmineralized nodules of cartilage produce well-circumscribed **oval lucencies** surrounded by thin rims of<br>**radiodense bone = (O - ring** | --- | **Ollier disease** is multiple chondromas involving one side of the body<br>**Maffucci syndrome** is characterized by multiple chondromas associated with benign soft tissue angiomas.<br>**Solitary chondromas rarely undergo** |

| | | | |
|---|---|---|---|
| | **sign).** | | **malignant transformation**, but those associated with **enchondromatoses are at ↑ risk**.<br><br>**Maffucci syndrom**e is associated with an ↑risk of **developing other types of malignancies**, like ovarian ca & brain gliomas. |
| Chondrosarcoma (ChS) | --- | --- | occur roughly **half** as frequently as OS<br><br>M/F ratio of 2 / 1<br><br>ChSs metastasize hematogenously, preferentially to the lungs & skeleton.<br><br>**histologic variants are clear-cell & mesenchymal ChSs** |

**: Notes for chondrosarcoma**

+T grade is determined by cellularity, cytologic atypia, & mitotic activity

+the more radiolucent the T is, the greater the likelihood that it is high grade

+Low-grade T resemble normal cartilage

Higher grade T contain pleomorphic chondrocytes with frequent mitotic figures. Multinucleate cells are present with lacunae containing two or more chondrocytes

About 10% of conventional low-grade ChS have areas of, second high-grade poorly differentiated components (dedifferentiated ChS) that include foci of fibro- or osteosarcomas (so - called, tumor heterogeneity )

There is also a direct correlation between grade & biologic behavior of the tumor

Fortunately, most conventional ChSs are low-grade, & indolent with a 5-year survival rate of 80% to 90% (vs 43% for grade 3 tumors) , grade 1 tumors rarely metastasize, whereas 70% of the grade 3 tumors disseminate

The size is another prognostic feature , with tumors larger than 10 cm being significantly more aggressive than smaller tumors

Conventional ChSs are treated with wide surgical excision; chemotherapy is added for the mesenchymal & dedifferentiated variants because of their aggressive clinical course

## Fibrous Cortical Defect & Nonossifying Fibroma

| TUMOR | Age | Location | Morphology | Histo | Clinical Features |
|---|---|---|---|---|---|
| Fibrous Cortical Defect & Nonossifying Fibroma | 30% to 50% of all children **older** than age **2** | metaphysis of the distal femur or proximal tibia | **vast majority are smaller than 0.5 cm**<br>**50% are bilateral or multiple.**<br>Larger lesions (5-6 cm) develop into **nonossifying fibromas**<br>**Sharply demarcated radiolucencies** | benign fibroblasts<br>**{classically exhibit a storiform or pinwheel pattern**} & activated macrophages, including multinucleated forms<br>**Grossly, they are gray to yellow-brown** | **asymptomatic** & usually<br>**detected as incidental** radiographic lesions |

Most undergo spontaneous differentiation into normal cortical bone within few years & **do not** require a biopsy

**Few enlarge into nonossifying fibromas** can present with pathologic fracture ; in such cases **biopsy is necessary** to rule out other T

## Fibrous Dysplasia

**All components of normal bone are present, but they fail to differentiate into mature structures**

| | Monostotic<br>70% | Polyostotic<br>27% | McCune-Albright syndrome 3% |
|---|---|---|---|
| Age | early adolescence | slightly earlier age than the monostotic | --- |
| Location | In order of frequency, **ribs**<br>/femur /tibia / jawbones /calvaria /humerus | femur, skull, tibia, & humerus | **unilateral, & the skin** macules are classically pigmented, ( **café au lait** )<br>**usually limited to the same side of the body** |
| Clinically | **Asymptomatic , disfigurement of face or skull** | **Polyostotic** disease tends to involve the shoulder & pelvic girdles, resulting in → **severe deformities & spontaneous pathological fractures** | **fractures deformities** of long bone, & **craniofacial distortion**<br>can transform into **osteosarcoma** , especially following radiotherapy. |
| Notes | X-ray shows characteristic ground-glass appearance.<br>cured by surgical curetting | **Craniofacial involvement** is present in **50%** of patients with moderate skeletal involvement, & in all **100%** of patients with extensive skeletal disease | include sexual precocity (**girls more often than boys**), hyperthyroidism, GH-secreting pituitary adenomas, & primary adrenal hyperplasia |

**Grossly, fibrous dysplasia** characterized by well-circumscribed, intramedullary tan-white & gritty masses**.** Larger lesions expand & distort the bone

**Histology, it exhibits curved trabeculae of woven bone (mimicking Chinese characters ), without osteoblastic rimming**

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**BEST OF LUCK**