BENIGN BONE TUMOR

Prevalence of benign bone tumors.

<table>
<thead>
<tr>
<th>Tumor</th>
<th>Prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Osteochondroma</td>
<td>45%</td>
</tr>
<tr>
<td>Osteoid Osteoma</td>
<td>10%</td>
</tr>
<tr>
<td>Enchondroma</td>
<td>10%</td>
</tr>
<tr>
<td>Haemangioma</td>
<td>10%</td>
</tr>
<tr>
<td>Nonossifying fibroma</td>
<td>4%</td>
</tr>
<tr>
<td>Osteoblastoma</td>
<td>2%</td>
</tr>
<tr>
<td>Chondroblastoma</td>
<td>2%</td>
</tr>
<tr>
<td>Chrondromyxoid fibroma</td>
<td>2%</td>
</tr>
</tbody>
</table>

Clinical feature

- Pain: Local, Synovitis, Painful scoliosis
- Mass
- Deformity
- Pathological fracture
- Incidental finding

Enneking System

- I Latent
- II. Active
- III. Aggressive

Stage I

- Discovered incidentally
- Do not progress.
- May spontaneously resolve.
- Need: observation alone.
- When surgery: Intralesional excision

Non Ossifying Fibroma
Enchondroma
Simple bone cyst
Fibrous Dysplasia
Osteochondroma
Eosinophilic granuloma
Stage II

These lesions expand the host bone

They may destroy the cortex

Surgery: intralesional curettage.

<table>
<thead>
<tr>
<th>Simple bone cyst, Enchondroma</th>
</tr>
</thead>
<tbody>
<tr>
<td>Osteoid osteoma</td>
</tr>
<tr>
<td>Chronodromyxoid fibroma</td>
</tr>
<tr>
<td>Osteofibrous dysplasia</td>
</tr>
</tbody>
</table>

Stage III

Benign but aggressive tumor

Soft tissue involvement

Present with pathologic fracture.

Surgery: en bloc resection

<table>
<thead>
<tr>
<th>Giant cell tumor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Osteoblastoma</td>
</tr>
<tr>
<td>Chondroblastoma</td>
</tr>
<tr>
<td>Aneurysmal bone cyst.</td>
</tr>
</tbody>
</table>

X ray

1. Where is the lesion

Epiphyses: Chondroblastoma

Giant cell tumor

Diaphyses: Osteoid Osteoma

Eosinophilic Granuloma

Adamantinoma

Metaphyses: Aneurysmal bone cyst

Simple Bone Cyst

Non ossifying fibroma

Chronodromyxoid fibroma
1. **SIMPLE BONE CYST**

Simple bone cysts occur in young children [6-14 years]

Common site: Proximal humerus and proximal femur

Usually metaphyseal. With age, it can move towards the diaphyses

**Radiological**

| Osteolytic | Metaphyseal | Centric | With or without pathological fracture | No periosteal reaction [when no pathological fracture] | When fractured: fallen leaf sign. |

**Treatment**

1. Proximal humerus: The current standard of care is the injection of corticosteroid

2. For proximal femur: Curettage, bone graft and hip screw and plate

**Companacci:**

Steroid Vs surgery (170 in each group) 42% healed with one injection and 96% with multiple injection. With bone grafting 46% healed.
2. ANEURYSMAL BONE CYST

75% patients are under 20 years. In up to about 50% of cases, a pre-existing lesion can be identified: Giant Cell Tumor, Osteoblastoma, Chondroblastoma

**Presentation**

Pain and swelling which may have been present for years
Around knee, Hip, Vertebra
In the spine, compression may cause radicular symptoms or paraplegia
Patients may present with a pathologic fracture

**Radiography**

Metaphyseal
Osteolytic
Eccentric
Ballooned out appearance
With or without pathological
Periosteal reaction may be present

**MRI**

Increased signal in T2
Classical: “Multiple fluid level”

**TREATMENT**

The recurrence rates after curettage alone have been reported to be from 50%.

Surgical curettage, use of phenol or liquid nitrogen and bone grafting
Recurrence  25% usually graft resorption seen in 6 months.
Selective embolization of feeder vessels is beneficial in reducing bleeding.
III OSTEOCHONDROMA

Bony outgrowth with stalk or without stalk [sessile] with a cartilage cap

Commonest: Around the knee and shoulder

Clinical

Asymptomatic
Clicking: tendon sliding
Pseudo aneurysm
Fracture of Osteochondroma

Radiological

Stalk grows away from the physes
Cortex of the exostosis merges with cortex of the bone
Pedunculated or sessile
Calcification > 10 mm suspect malignancy

Treatment

Asymptomatic: needs only observation
Symptomatic: Needs excision
Secondary sarcoma: usually chondrosarcoma [<1%]. Wide block excision
IV MULTIPLE EXOSTOSES

Is grouped under dysplasia than benign tumor

AD

Incidence of malignancy: 10%

Sites: Around knee > Shoulder

(Scapula & Humerus)

Common Valgus or varus knee deformity:

Madlung deformity (radial bowing)

Valgus knee and ankle

Treatment: observation. Any swelling with a sudden increase in size, suspect a malignant change. It needs, biopsy to rule out sarcoma.

Multiple osteochondroma at metaphyses

Pediculated or sessile

Multiple bone involvement

Evidence of widening of metaphysis
V ENCHONDROMA

In hand and feet
Are always benign
When it occurs in the long bones: Always suspect low grade Chondrosarcoma

Treatment
Long bone: X ray assessment every 3 months.
Any increase in size or lesion becomes painful
CT or MRI assessment is indicated. If any suspicion, to be treated like primary tumor..

If no changes: follow up for a year with X ray:

<table>
<thead>
<tr>
<th>X ray</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lytic, centric, expansible, punctate stippling, pathological fracture</td>
</tr>
<tr>
<td>MR image of the left humerus shows tumor lobules present</td>
</tr>
<tr>
<td>The tumor did not destroy bone and was consistent with an Enchondroma.</td>
</tr>
</tbody>
</table>

In multiple endochondromatosis [Ollier’s] and when associated with multiple Haemangioma [Maffucci’s] there is increase risk of malignancy.
VI HISTIOCYTOSIS

1. Eosinophilic granuloma
   Self-limited disorder of bone seldom involving
   more than two or three osseous sites
   Age: 5-15 Years
   Local pain or pathologic fracture
   Lytic, punched out, irregular defects with
   periosteal reaction.
   Wide transition but still benign
   Spine: vertebra plana (Calvé disease).

2. Hand-Schuller-Christian
   Diabetes insipidus
   Proptosis
   Exophthalmus

3. Letterer-Siwe disease
   Fulminant disease
   Hepatosplenomegaly
   Lymphadenopathy

Treatment

Pathological fracture, Non-operative treatment is indicated. When fracture heals, curettage and
bone graft is indicated.
VII OSTEOID OSTEOMA

Typical: Night pain relieved by Aspirin
Never becomes malignant; recurrence is rare if nidus is removed completely.
Usually in the diaphysis of Femur and tibia
It is most commonly seen in the II & III Decade
When Spine is involved may present with painful scoliosis
Scoliosis disappears if excised within 15 months
Pathology: Vascularized Osteoid tissue surrounded by sclerotic bone
In osteoid osteoma the nidus is less than 1cm and in osteoblastoma lesion is more than 1.5 Cm

Treatment
- Wide en bloc excision of the nidus
- Unroofing of the nidus by gradual removal of the overlying reactive bone and excision with curettes and burrs
- Percutaneous CT guided core-drill excision or destruction of the nidus by radiofrequency or laser
- Radiofrequency Laser coagulation
VIII NONOSSIFYING FIBROMA [NOF] AND FIBROUS CORTICAL DEFECT [FBC]

FBC: When lesions confined to the cortex are called fibrous cortical defects.

Common and asymptomatic and spontaneous disappears

Some become: NOF [>2cm]

NOF: Multilocular, expansile, sclerotic margin, no periosteal reaction.

This extends into the medullary cavity

They are asymptomatic = Do not touch lesion

They eventually disappears and do not diagnose after 30 years

IX FIBROUS DYSPLASIA

Common, Hamartoma

Types

Monostotic 75%

Polyostotic 25%

Mazabraud’s syndrome: Poly Dysplasia and myxomas

Albright Syndrome [3%]

Poly-ostotic (one side of the body)

Precocious puberty

Pigmentation ["coast-of-Maine" [irregular]

Clinical

Asymptomatic

Pain or Pathologic fracture

Treatment

1. Observation and Patient Education

   Avoid contact sports

2. When polyostotic : endocrinologist opinion
3. Bisphosphonates

Pamidronate strengthens the bone

4 Surgical Indications

Corrective deformity + autogenous cancellous bone-grafting and screw and plate fixation

“Ground glass” appearance

Expansile lesion

Metaphseal or diaphyseal

Endosteal scalloping

“Shepherd's crook” deformity of femur

Increased uptake with bone scan

MRI: loss of marrow signal

PATHOLOGY

1. Delicate trabeculae of immature bone
2. With no osteoblast rimming
3. Enmeshed within a bland fibrous stroma of dysplastic spindle-shaped cells
4. The ratio of fibrous tissue to bone ranges from fields that are fibrous to those filled with dysplastic trabeculae.
5. "Alphabet soup." or Chinese letters

**X. GCT [GIANT CELL TUMOR]**

Occurs in skeletally matured (>20 years)

Females 1.5 times more

Commonly around knee [lower femur and upper tibia, lower radius]

Locally aggressive but benign

Clinical: Pain

- Eccentric
- Epiphyseal
- Expansile
- Osteolytic
- No periosteal reaction
- No sclerosis

10% malignancy on irradiation at 10 yr

**Pathology**

Mononuclear with round to ovoid shape, relatively large nuclei with inconspicuous nucleoli

- Multinucleated giant cells

**Giant cells**: is formed from fusion of spindle cells

- Resemble osteoclast in phenotype and function
- 60 u; numerous centrally located nuclei

**Mononuclear cells: 2 different cell lines**

I: Mononuclear round cells are non-neoplastic and express monocyte

- Macrophage markers react to CD13 and 68

II: Mononuclear spindle cells are responsible for neoplastic character for GCT

- Genetically unstable
Treatment

Curettage and Liquid nitrogen, phenol or bone cement

When there is fracture or recurrence: En bloc resection

Rarely lung metastases [2% and usually are benign]

Course

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Benign</td>
<td>80%</td>
</tr>
<tr>
<td>Recurrence</td>
<td>30%</td>
</tr>
<tr>
<td>Malignancy</td>
<td>10%</td>
</tr>
<tr>
<td>Pulmonary metastases</td>
<td>2%</td>
</tr>
</tbody>
</table>