Osteogenic Sarcoma

- Second most common primary malignant bone tumor
- Variable in its radiologic and morphologic presentation
- OGS may cause diagnostic confusion or mistaking it for a benign tumor
OSTEOSARCOMA
2525 cases

M : F = 1.5 : 1

% 100

% 80

% 60

% 40

% 20

% 0

AGE IN YEARS (BY DECADE)

FIG. 7-99. OSTEOSARCOMA: INCIDENCE DATA.
# Osteogenic Sarcoma

## Capsule Summary

<table>
<thead>
<tr>
<th>Incidence</th>
<th>15% of primary bone tumors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>15-25 Y/O (85%&lt;30Yrs)</td>
</tr>
<tr>
<td>Signs</td>
<td>pain, swelling, pathologic fracture</td>
</tr>
<tr>
<td>Skeletal distribution</td>
<td>- 54% knee rarely in spine, ribs and phalanges</td>
</tr>
<tr>
<td></td>
<td>- 90% metaphyseal</td>
</tr>
<tr>
<td></td>
<td>- 9% diaphyseal</td>
</tr>
</tbody>
</table>

## Radiologic features

## Gross pathology

## Histology
# Osteogenic Sarcoma

**Modern Classification**

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Primary, high-grade, intramedullary OGS</td>
<td>75%</td>
</tr>
<tr>
<td>II</td>
<td>Multifocal OGS</td>
<td>1-2%</td>
</tr>
<tr>
<td>III</td>
<td>Secondary intramedullary OGS</td>
<td>5-7%</td>
</tr>
<tr>
<td>IV</td>
<td>Solitary, low-grade, Intramedullary</td>
<td>4-5%</td>
</tr>
<tr>
<td>V</td>
<td>Intracortical OGS</td>
<td>0.2%</td>
</tr>
<tr>
<td>VI</td>
<td>OGS of the bones of the jaw</td>
<td>6%</td>
</tr>
<tr>
<td>VII</td>
<td>Juxtacortical OGS</td>
<td>7-10%</td>
</tr>
</tbody>
</table>

*J.M. Mirra 1989*
Osteogenic Sarcoma

Serologic Findings: Alk-P

- Alk-P (<50%) Initial
- After treatment
- prognostic indicators
Osteogenic Sarcoma

Differential Diagnosis

- Callus
- Osteoblastoma
- Pseudomalignant osteoblastoma
- Aneurysmal bone cyst
- Chondroblastoma
- Giant cell tumor
- Ewing’s sarcoma
- Chondrosarcoma
- Mesenchymal chondrosarcoma
- Fibrosarcoma
Osteogenic Sarcoma

Clinical work-up and management

- Systemic approach
- Pre-op bone scan
- Pre-op CT scan or MRI
- Biopsy
- Pre-op chemotherapy
- Radical surgery
- Post-op chemotherapy
Principle of OGS Treatment

- Pre-op evaluation
  - Plain X-ray: local + chest
  - Chest CT
  - Local: CT scan or MRI
  - Bone scan

- Biopsy

- Neoadjuvant chemotherapy

- Radical surgery
  - Amputation or Limb-salvage surgery

- Post-operative chemotherapy

- Other treatment
Osteogenic Sarcoma

Clinical Course

- High-grade biologic malignancy
- 85% lung metastasis (diagnosis ± surgical intervention)
- Die within 2 yrs without chemotherapy (± Radiotherapy)
Osteogenic Sarcoma
Consideration of Limb Salvage

- Age
- Staging
- Location
- Sizing

- Grading
- Biopsy wound
- Pathologic fracture
- Reconstructive material

* Technique Demand
Orthopedic Oncology

- Local control of non-metastatic
- Classic high-grade osteosarcoma

Local therapy: 20%
+ chemotherapy: 70-90%
disease-free survival > 5 yrs: 50-70%

1970-1990 Rosen G.
Orthopedic Oncology

Limb-salvage vs. Amputation
Osteosarcoma N=227, distal femur

- Local recurrence: Similarity
- Survival rates: No difference
- Indications

MA SIMON, HJ MANKIN 1986, JBJS
Resection Arthrodesis of the Knee for Osteosarcoma: An Alternative When Mobile Joint Reconstruction Is Not Feasible

Hsin-Nung Shih, MD; Lih-Yuann Shih, MD


Background:
Wide resection and mobile joint reconstruction are preferable for treating an osteosarcoma around the knee. In certain situations, resection arthrodesis or an amputation is suggested.

Methods:
The past decade, 86 patients with an osteosarcoma around the knee were treated surgically in our institution. Wide resection and endoprosthetic reconstruction were performed in 35 patients, resection arthrodesis was performed in 36 patients, and an amputation was performed in 15 patients. The oncological and functional results were compared. Special attention was paid to the indications, techniques, and complications of patients receiving resection arthrodesis.
Results:
Extensive tumor involvement was the main reason, followed by inappropriate previous treatment, for precluding mobile joint reconstruction. The local recurrence rates were similar among the 3 groups (11.4% for the endoprosthetic group, 11.1% for the arthrodesis group, and 6.7% for the amputation group). The 5-year survival rate was 39% for the arthrodesis group, which was significantly lower than that of the endoprosthetic group (60%, p =0.040), although it was higher than that of the amputation group (13%, p =0.056). Major complications were found in 7 patients receiving resection arthrodesis (7/24, 29%), and these included nonunion, infection, and allograft fracture. Functional results for the arthrodesis patients were inferior to those of the endoprosthetic patients, but most patients were grateful for preservation of the limb despite certain handicaps.

Conclusions:
The importance of early and proper planning of treatment cannot be overstressed when treating osteosarcomas. Resection arthrodesis offers a durable reconstruction alternative to amputation in a special group of patients when extensive resection precludes mobile joint reconstruction.
Transient neurological disturbances induced by the chemotherapy of high-dose methotrexate for osteogenic sarcoma

Klu, Mee-Chou; Liaw, Chuang-Chi; Yang, Tsai-Shen; Lai, Gi-Ming; Hsi, Shin-Nun; Lu, Chin-Song

Anti-Cancer Drugs 1994, 5, p.480-482

Temporary neurologic abnormalities were observed in one out of 23 patients undergoing chemotherapy with high-dose methotrexate (HD-MTX) for osteogenic sarcoma. This patient developed sequential symptoms including alternative hemiparesis, dysarthria and altered consciousness 5 days after the second course of HD-MTX (8 gm/m² by 6 h continuous infusion) with leucov-orin rescue. Laboratory evaluations disclosed normal electrolytes, hemograms and non-toxic serum MTX levels at the onset of the symptoms. Computed tomography of the brain was normal but electroencephalography showed focal theta and delta slow waves over the right temporal-parietal-occipital area. The neurological symptoms resolved completely within 72 h.
Synchronous multifocal osteosarcoma: report of one case.


Tsai MH, Yang CP, Jaing TH, Shih HN.

Synchronous multifocal osteosarcoma (SMOS), defined as more than one bone lesion at presentation, is a rare variant form of osteosarcoma. The onset is usually in childhood or early adolescence without pulmonary metastasis. The prognosis has been dismal. Whether SMOS represents a true multicentric origin or merely bone-to-bone metastases remains controversial. Here, we report a case of SMOS in a 10-year-old girl, with the dominant primary sclerotic tumor arising from the right distal femur. Despite aggressive chemotherapy and limb salvage surgery, she died of progressive multiple axial skeletal and symmetrical metaphyseal long bone diseases within one year after diagnosis. No pulmonary metastasis was found before she died.
## Biochemical Marker of Bone Metabolism

<table>
<thead>
<tr>
<th>Markers of bone formation</th>
<th>Markers of bone resorption</th>
</tr>
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<tbody>
<tr>
<td><strong>Serum</strong></td>
<td><strong>Urine</strong></td>
</tr>
<tr>
<td>Alkaline phosphatase (ALP)</td>
<td>Calcium</td>
</tr>
<tr>
<td>Bone-specific alkaline phosphatase</td>
<td>Hydroxyproline</td>
</tr>
<tr>
<td>Osteocalcin</td>
<td>Pyridinoline and Deoxypyridinoline</td>
</tr>
<tr>
<td>Procollagen I C-terminal extension peptide (PICP)</td>
<td>Cross-linked aminoterminal telopeptide type I collagen (INTP)</td>
</tr>
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</table>
Osteogenic Sarcoma

Treatment

A Team Work
CHANG-GUNG MEMORIAL HOSPITAL
LINKOU MEDICAL CENTER
TAIWAN

THANK YOU !!