Ewing sarcoma in childhood
Radiological approach and localisation

M. Mearadji
International Foundation for Pediatric Imaging Aid
Introduction

- Ewing sarcoma is the second most common malignant bone tumor in children.
- There are no known causative factors for this malignancy.
- Recently a chromosome rearrangement between chrom. # 11 and # 22 is found.
- Some authors classify Ewing sarcoma as a primitive neuroectodermal tumor (PNET).
Introduction

- Overall incidence is about 1.7 per 1,000,000.
- Ewing sarcoma is rare in black and Chinese children.
- The male to female ratio is 1.5 : 1.
- Commonly occurs in children and adolescents aged 4–15 years.
Clinical features

Symptoms:

- Pain around the site of the tumor
- Swelling and/or redness around the site of the tumor
- Fever
- Weight loss, decreased appetite
- Fatigue
- Elevated ESR and white blood cell count
Diagnostic modalities

- Plain film radiograph
- Technetium 99 in MDP
- CT
- MRI
- Biopsy of the tumor or bone marrow puncture
Patient material

The patient material includes 40 cases of Ewing sarcoma in children.

The anatomic location, the value and the limitation of performed different modalities were retrospectively analyzed.
Age distribution (n=40)

- M=23
- F=17
- Mean age 9 yrs
### Imaging studies (n=40)

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plain film radiographs</td>
<td>40</td>
</tr>
<tr>
<td>CT only</td>
<td>14</td>
</tr>
<tr>
<td>MRI only</td>
<td>16</td>
</tr>
<tr>
<td>MRI + CT</td>
<td>6</td>
</tr>
<tr>
<td>Ultrasound</td>
<td>13</td>
</tr>
<tr>
<td>Techneticum 99 MDP</td>
<td>3</td>
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## Anatomic localization

<table>
<thead>
<tr>
<th>Localization</th>
<th>Number</th>
<th>%</th>
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<tbody>
<tr>
<td>Rib</td>
<td>11</td>
<td>27.5</td>
</tr>
<tr>
<td>Spine</td>
<td>6</td>
<td>15</td>
</tr>
<tr>
<td>Pelvis</td>
<td>5</td>
<td>12.5</td>
</tr>
<tr>
<td>Tibia</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>Femur</td>
<td>3</td>
<td>7.5</td>
</tr>
<tr>
<td>Soft tissue</td>
<td>3</td>
<td>7.5</td>
</tr>
<tr>
<td>Scapula</td>
<td>3</td>
<td>7.5</td>
</tr>
<tr>
<td>Radius</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Fibula</td>
<td>1</td>
<td>2.5</td>
</tr>
<tr>
<td>Orbita</td>
<td>1</td>
<td>2.5</td>
</tr>
<tr>
<td>Skull</td>
<td>1</td>
<td>2.5</td>
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</table>
# Radiographic appearance of Ewing sarcoma

<table>
<thead>
<tr>
<th>Osteolytic</th>
<th>Most frequent</th>
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</thead>
<tbody>
<tr>
<td>Irregular destruction of cortical bone</td>
<td>Frequent</td>
</tr>
<tr>
<td>Soft tissue mass</td>
<td>Frequent</td>
</tr>
<tr>
<td>Osteolytic and sclerotic</td>
<td>Less frequent</td>
</tr>
<tr>
<td>Sclerotic</td>
<td>Rare</td>
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</table>
Differential diagnosis

- Osteosarcoma
- Osteomyelitis/actinomycosis
- Non-Hodgkin lymphoma
- Fibrosarcoma
- Langerhans cell histiocytosis
- Neuroblastoma
Ewing sarcoma 8th rib right-sided (plainfilm, CT and ultrasound)

Ewing sarcoma 8th rib left (MRI and CT)
DIFFERENTIAL DIAGNOSIS

Actinomycosis with destruction of the left rib

Osteosarcoma of 3rd rib left
Ewing sarcoma L2/L3 with epidural infiltration
DIFFERENTIAL DIAGNOSIS

Tuberculosis Th8
Ewing sarcoma iliac bone right
DIFFERENTIAL DIAGNOSIS:

Osteomyelitis of left iliac bone
Ewing sarcoma right tibia
DIFFERENTIAL DIAGNOSIS

Osteosarcoma left tibia
Ewing sarcoma right femur
DIFFERENTIAL DIAGNOSIS

Osteomyelitis right femor
Ewing sarcoma right fibula
DIFFERENTIAL DIAGNOSIS

Osteosarcoma right fibula
Ewing sarcoma right radius
DIFFERENTIAL DIAGNOSIS

Langerhans cell histiocytosis
right radius
Ewing sarcoma left scapula
Extra-osseous Ewing sarcoma left scapula
Ewing sarcoma of left orbita
DIFFERENTIAL DIAGNOSIS

Left frontal craniofasciïtis
Conclusions

- Localized swelling with unknown cause in children and adolescents are indication to look for skeletal malignancy.
- Plain film radiograph is the first step in diagnosis of bone tumors.
- Ultrasonography could be used to visualize the soft tissue as well as bone destruction in suspected cases.
Conclusions

- CT contributes largely in differentiation of Ewing sarcoma and other skeletal changes.
- Chest CT should be performed in all cases with Ewing sarcoma to exclude lung metastasis.
- MRI is absolutely indicated for accurate definition of the soft tissue and bone marrow extent of the tumor.
- In cases of Ewing sarcoma of rib, MRI is not indicated, in contrast to other body parts.