Surgical management strategies for malignant thoracic wall tumors in children

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Background

- Rare tumor entity in children
- Mesenchymal origin
- Varying response to chemotherapy and radiotherapy

Background

- Ewing sarcoma
- PNET
- RMS
- Other sarcomas
- Others

Treatment principles

- Biopsy (histology, cytogenetics)
- Induction chemotherapy
- Surgical resection and / or radiotherapy
- Adjuvant chemotherapy

Principles of surgery

- **Indication:** Well delineated tumor
- Wide excision of all involved structures
- Complete resection of involved rib
- Adjacent ribs, muscles and pleura

Additional surgical treatment

- Lung resection
- Partial resection of diaphragm
- Replacement of diaphragm
Principles of reconstruction

Non rigid techniques:

• Autologous: Fascia lata / omentum / rib grafts / muscle flaps

• Prosthetic materials (Marlex, Gortex, Prolene, Dexon, ...)

• Bioresorbable materials (LactoSorb, Permacol, ...)

Principles of reconstruction

Rigid techniques:

• Sandwich technique (methylmethacrylate cement)

• STRATOS / VEPTR system

Image: Medexpert Germany
Principles of reconstruction

Flap techniques

Latissimus dorsi flap

Treatment problems

- Histological analysis
- Local control
- Scoliosis
- Chest wall deformity
- Restrictive lung disease
- Soft tissue hypoplasia

Aim

To analyze our own series of malignant thoracic wall tumors regarding treatment, outcome and reconstruction technique
Patients (n = 8)

Study period: 2002 – 2010

Median age [yrs]: 11 ± 3.2

Mean follow up [M]: 33 ± 9.9

Histology: Ewing sarcoma n = 4
PNET n = 2
Osteosarcoma n = 1
Myofibroblastic tumor n = 1

Primary tumor localization: Ribs n = 7
Diffuse n = 1

Tumor recurrence of other primary: n = 2
Ewing sarcoma

Before chemotherapy

After chemotherapy

Follow up
Myofibroblastic tumor
<table>
<thead>
<tr>
<th>Age / Gender</th>
<th>Diagnosis</th>
<th>Localisation</th>
<th>Resection</th>
<th>RT</th>
<th>Relapse</th>
<th>Outcome</th>
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</thead>
<tbody>
<tr>
<td>11, male</td>
<td>PNET</td>
<td>Thoracic wall</td>
<td>Costa 7/8, diaphragm, lower lobe</td>
<td>Yes</td>
<td>LR</td>
<td>Dead</td>
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<tr>
<td>10, male</td>
<td>Ewing</td>
<td>Rib / pleura</td>
<td>Costa 7, lower lobe (partial), diaphragm</td>
<td>No</td>
<td>MR</td>
<td>Dead</td>
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<td>Ewing</td>
<td>Rib</td>
<td>Costa 5, segment 3/6</td>
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<td>MR</td>
<td>Dead</td>
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<tr>
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<td>PNET</td>
<td>Rib</td>
<td>Costa 3/4, pericardium, segment 3</td>
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<td>ALIVE</td>
<td>Alive</td>
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<td>Ewing</td>
<td>Rib</td>
<td>Costa 9/10</td>
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<td>-</td>
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<tr>
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<td>Thoracic wall</td>
<td>Costa 3</td>
<td>No (2. tumor)</td>
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<tr>
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<td>Osteosarcoma</td>
<td>Rib</td>
<td>Costa 6</td>
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<td>Inflammatory</td>
<td>Lung, thoracic wall</td>
<td>Pneumectomy, pericardium, costa 2/3</td>
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<td>-</td>
<td>Alive</td>
</tr>
</tbody>
</table>

LR: Local relapse, MR: Metastatic relapse
Results

Reconstruction thoracic wall [n]:

Primary reconstruction: 4
Muscle flap technique: 4

Median hospital stay [d]: $13 \pm 1$
Median duration CT [d]: $8.5 \pm 1.4$
Complications (n = 1)
Paraplegia after thoracotomy

• ~ 50 patients
• Bleeding costovertebral joint
• Hypoperfusion spinal cord
• Thrombosis anterior spinal artery
• Epidural hematoma
• Epidural anaesthesia

Outcome

Conclusion

• Complete surgical resection essential
• Adjuvant radiotherapy in selected cases
• Sufficient plastic covering of large defects
• Different methods
• Autologous procedures
4th International Tübingen-Symposium on Pediatric Solid Tumors

February 16th-18th, 2012
Tübingen
Germany

From bench to bedside in Neuroblastoma

www.neuroblastoma2012.com
Radiotherapy in Ewing sarcoma