**Pediatric Osteosarcoma (High Grade)**

Disclaimer: This algorithm has been developed for MD Anderson using a multidisciplinary approach considering circumstances particular to MD Anderson’s specific patient population, services and structure, and clinical information. This is not intended to replace the independent medical or professional judgment of physicians or other health care providers in the context of individual clinical circumstances to determine a patient’s care. This algorithm should not be used to treat pregnant women.

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**Note:** Consider Clinical Trials as treatment options for eligible patients. Referral to a center with both pediatric oncology and orthopedic surgery is essential.

### CLINICAL EVALUATION

- History and physical
- CBC with differential, sodium, potassium, chloride, carbon dioxide, BUN, creatinine, phosphorus, magnesium, total protein, albumin, calcium, total bilirubin, alkaline phosphatase, LDH, AST, PT/INR, and PTT
- Plain films of primary
- MRI of primary with and without contrast
- Bone scan
- Chest x-ray
- CT chest with contrast
- Consider PET scan
- Biopsy (open vs. needle)
- Histology review by Bone Tumor Pathologist
- EKG/ECHO
- CVAD
- Urine pregnancy test if clinically indicated
- Discuss fertility
- Audiogram
- Consult Physical Therapy/Occupational Therapy and Childlife

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### NEOADJUVANT TREATMENT

1. See Page 3

   - Metastasis present?
     - Yes: Neoadjuvant chemotherapy\(^1\) for 2 cycles
     - No: Assess treatment response:
       - Clinical exam of primary tumor
       - Reimage:
         - X-ray of primary
         - CT chest with contrast
         - Bone scan
         - MRI of primary with and without contrast

2. See Page 2

   - Progressive disease of primary site?
     - Yes: Surgery; limb salvage\(^2\) or amputation
     - No: Is primary tumor resectable?
       - Yes: Consider definitive radiation therapy
       - No: Continue adjuvant chemotherapy and consider high-dose ifosfamide with or without etoposide

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**CVAD** = central venous access device

1. Doxorubicin and dexrazoxane for cardioprotection plus cisplatin and high-dose methotrexate
2. Consider leg length x-ray scanogram pre-operatively of bilateral lower extremities for skeletally immature-limb salvage patients who will receive expandable prosthesis or undergo rotationplasty to monitor and manage limb length discrepancies
3. After surgical clearance

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Approved by Executive Committee of the Medical Staff on 10/19/2021
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**ADJUVANT TREATMENT**

If there is disease progression?
- No
- Yes

Is the primary tumor resectable?
- Yes
- No

Consider local treatment options for primary disease

Pulmonary metastases?
- Yes
- No

**TKI** = tyrosine kinase inhibitors

1. Surgery is the primary modality of local therapy
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PRIMARY TREATMENT

Metastasis

Doxorubicin1, cisplatin, high dose methotrexate for 2 cycles

Restage to assess for progression

Is there disease progression?

Yes

High-dose ifosfamide with or without etoposide for 2 cycles

Reassess for treatment response

Is there disease progression?

Yes

Local control of primary tumor

Continue chemotherapy (consider adding high-dose ifosfamide with or without etoposide)

Consider local therapies2 to metastatic sites

No

ADJUVANT TREATMENT

Yes

Consider systemic therapy agents:

- Gemcitabine/docetaxel
- Oral TKIs such as sorafenib, regorafenib, cabozantinib
- Consider phase I or II clinical trials
- Consider palliative local therapies to primary and metastatic sites

No

Local control of primary tumor

Continue chemotherapy

Consider local therapies2 to metastatic sites

Is there disease progression?

Yes

See Page 4 for Surveillance

No

1 With dexrazoxane for cardioprotection

2 Surgery is the primary modality of local therapy
# Pediatric Osteosarcoma Surveillance

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<thead>
<tr>
<th>Total Years for Surveillance</th>
<th>Yr 1</th>
<th>Yr 2</th>
<th>Yr 3</th>
<th>Yr 4</th>
<th>Yr 5</th>
<th>Yr 10</th>
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<tr>
<td><strong>Frequency of Surveillance by month</strong></td>
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<td>6</td>
<td>9</td>
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<tr>
<td>Total protein, albumin, calcium, phosphorus, magnesium, glucose, AST, creatinine, total bilirubin, alkaline phosphatase, LDH</td>
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<td>x</td>
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<td>Plain films of primary</td>
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<td>Pelvic primaries: MRI with and without contrast</td>
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</table>

**Note:** Functional assessments post-limb salvage and cardiac surveillance should continue for life

1. Consider PET CT in patients with metastatic disease, those who underwent surgery for resection of lung nodules, or at relapse
2. May omit if concurrent with PET CT
3. Once at entry into long-term follow-up. If problems are detected, repeat yearly until stable. If there is evidence of progressive hearing loss, test more frequently as needed, until stable.
4. Leg length x-ray scanogram of bilateral lower extremities for skeletally immature patients who received limb-salvage surgery with expandable prosthesis or underwent rotationplasty to monitor and manage limb length discrepancies. Followed by physical exam - may not need scanogram with every visit.
SUGGESTED READINGS


Children’s Oncology Group Protocols: CCG7921 and COG AOST 0331


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DEVELOPMENT CREDITS

This practice algorithm is based on majority expert opinion of the Pediatric Osteosarcoma workgroup at the University of Texas MD Anderson Cancer Center. It was developed using a multidisciplinary approach that included input from the following:

Najat Daw Bitar, MD (Pediatrics)†
Wendy Garcia, BS*
Eugenie S. Kleinerman, MD (Pediatrics)
Valerae O. Lewis, MD (Orthopaedic Oncology)†
Patrick P. Lin, MD (Orthopaedic Oncology)
John A. Livingston, MD (Sarcoma Medical Oncology)
Mary Frances McAleer, MD, PhD (Radiation Oncology)
Kevin W. McEnery, MD (Diagnostic Radiology)
Bryan S. Moon, MD (Orthopedic Oncology)
Shreyaskumar Patel, MD (Sarcoma Medical Oncology)
David C. Rice, MD (Thoracic & Cardiovascular Surgery)
Janie Rutledge, RN, MS, ANP, OCN (Orthopaedic Oncology)
Milena Zhang, PharmD*

†Core Development Team
*Clinical Effectiveness Development Team