RADY 403: Case Presentation

Shoulder Pain

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Focused patient history and workup

- Patient is a 14 y/o fully-vaccinated previously healthy male with PMHx of asthma, allergic rhinitis, and ADHD who presented as a transfer from Cape Fear ED with 3-week history of progressive right shoulder pain following injury during a flag football game.
 - No previous trauma to RUE.
 - Denied fever, night sweats, other bone pain, chest pain, dyspnea, abdominal pain, N/V/D, hematochezia, headache, hearing or vision changes, and GU issues.
 - Surg hx: ORIF of L radius
 - No pertinent FMHx
- Remarkable OSH workup: X-ray with sclerotic mass involving proximal R humeral metaphysis with periosteal reaction, c/f malignancy





DDx:

BONE LESIONS LYTIC/SCLEROTIC LOCATION & AGE



Courtesy of <u>https://radiologyassistant.nl/musculoskeletal/bone-</u> <u>tumors/osteolytic-ill-defined#ewings-sarcoma</u> and UWORLD

- Primary Malignancy
- Osteosarcoma
- Ewing's Sarcoma
- Lymphoma
- METS



American College of Radiology ACR Appropriateness Criteria[®] Shoulder Pain-Traumatic

Traumatic shoulder pain. Any etiology. Initial imaging.

ACR Appropriateness Criteria:

Procedure	Appropriateness Category	Relative Radiation Level
Radiography shoulder	Usually Appropriate	œ
CT arthrography shoulder	Usually Not Appropriate	ବବବବ
CT shoulder with IV contrast	Usually Not Appropriate	ଚଚଚ
CT shoulder without and with IV contrast	Usually Not Appropriate	ଚଚଚ
CT shoulder without IV contrast	Usually Not Appropriate	ଚଚଚ
FDG-PET/CT skull base to mid-thigh	Usually Not Appropriate	ବବବବ
MR arthrography shoulder	Usually Not Appropriate	0
MRI shoulder without and with IV contrast	Usually Not Appropriate	0
MRI shoulder without IV contrast	Usually Not Appropriate	0
Bone scan shoulder	Usually Not Appropriate	ବବବ
US shoulder	Usually Not Appropriate	0

What imaging should we get?

Variant 1:

List of imaging studies

- X-ray of right shoulder with AP, Grashey and Scapular views
- MRI Upper Extremity Non-Joint R with and without contrast
- CT chest with contrast
- Nuclear Medicine Bone Scan



Can you identify the abnormalities?



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AP view of R Shoulder X-Ray



What type of imaging modalities was used, and identify the abnormalities?





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T1 Coronal Right Humerus: Iso-intensity MRI with heterogenous enhancement



Permeative cortical appearance with periosteal elevation and soft tissue involvement

Pre-FS T1 Axial Right Humerus



Mass-like soft tissue component is seen circumferentially surrounding the proximal humeral metaphysis

Radiology

Imaging modality used? Are there abnormalities?





Coronal view of Chest CT



Impression: No evidence of metastatic disease in the thorax. No pulmonary nodules.



Imaging modality? Are there abnormalities?



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Nuclear Medicine Bone Scan



IMPRESSION: Proximal right humerus osteosarcoma. No scintigraphic evidence of osseous metastatic disease.

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Osteosarcoma

- Definition: Malignant, osteoid, and bone-forming tumor arising from mesenchymal stem cells (osteoblasts)
- Epi: Bimodal distribution
 - \odot 1°: Puberty/adolescence (peak incidence 10-30 years) \odot 2°: Advanced age
- Classic features:
 - $_{\odot}$ Pain (progressive, worsens at night and with activity)
 - Decreased ROM
 - Tender to palpation
 - o Possible B Symptoms
 - Localized to metaphysis of long bones (particularly distal femur and proximal tibia)



Osteosarcoma – Malignancy patterns

- Synchronous metastases= Detected at time of diagnosis
- Metachronous metastases= Appear after end of Tx
- 60% to 80% of osteosarcoma patients who get chemotherapy can still show relapses in lungs and 20% to 40% in other sites.
- LUNGS MOST COMMON AREA FOR METASTASES!!!



Diagnostics

- Conventional x-ray: Sunburst appearance of lytic bone lesions and/or Codman triangles
- MRI to assess full involvement, better for visualizing soft tissue extension
- Diagnostic biopsy & pathologic evaluation for definitive
- Labs: Elevated alkaline phosphatase, LDH, ESR





Source: AMBOSS





- Chemotherapy and surgery!
- Conventional osteosarcoma is believed to be relatively resistant to radiation therapy



Back to our patient!

Radical resection right proximal humeral osteosarcoma and did R reverse total shoulder arthroplasty + R open biceps tenodesis



Surgical changes of the reversed total shoulder arthroplasty and oncologic humeral prosthesis



Patient treatment or outcome

- On Floor: Normal labs, further imaging studies, bone biopsy (6/28/22) consistent with osteosarcoma, consulted Peds Heme-Onc, normal echo (6/28/22), no evidence of osseous metastatic disease on NM bone scan of whole body (7/13/22)
- Went through multiple rounds of chemo and got a radial resection of tumor + arthroplasty (10/03/2022)
- Unfortunately, now has extensive METS to lumbar spine, pelvis, proximal femurs bilaterally, liver, and lungs®



UNC Top Three (or Test Yourself or Wrap Up)

- 1. Keep your differential broad, presented as MSK shoulder injury but ended up being malignancy
- 2. If you don't see areas of metastasis in osteosarcoma initially, still a relatively high chance can reappear later
- 3. X-Ray of shoulder is appropriate first step for traumatic injury to the shoulder



Test Yourself: Can you identify these bone malignancies?



Case courtesy of Yaïr Glick, Radiopaedia.org, rID: 63104



Case courtesy of Muhammad Asadullah Munir, Radiopaedia.org, rID: 80151



Case courtesy of Mohammad Osama Hussein Yonso, Radiopaedia.org, rID: 24985



Test Yourself: Answers



Ewing Sarcoma



References

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