1 Tumor vs. Trauma:
Clinical and Imaging Overlap

Leanne L Seeger, MD, FACR
Professor of Radiology & Orthopaedic Surgery
Chief, Musculoskeletal Imaging
UCLA Health System
lseeger@mednet.ucla.edu

2

3 • 13 patients initially thought to have sports injuries
- 3 malignant bone tumors
- 5 benign bone tumors
- 2 benign soft tissue tumors (PVNS)
- 3 arthritis (OA, Reiter's, sepsis)

4 • 36 patients initially thought to have sports injuries
- 10 malignant bone tumors, 8 malignant soft tissue tumors, 18 benign bone/soft tissue
- 92% (33/36) lower extremity, 61% (22/36) knee region
- 70% of patients with malignant lesions around the knee underwent arthroscopy, arthrography or both

5 • 6 patients with soft tissue sarcoma, all initially diagnosed as traumatic hematoma
• characterized by rapid growth
• aspiration biopsy in 5 negative for malignancy

6 • 1980-1998: 667 knee tumors

- 25 (3.7%) previously treated with arthroscopy (none had a previous MRI)
  - 11 benign
  - 14 malignant

7 • 15 patients with initial clinical or imaging diagnosis of hematoma, final diagnosis of high grade soft tissue sarcoma
• mean time to diagnosis 7 months
• most common location was the thigh

8 Trauma can present as tumor

9 • 6 ischial avulsions referred as neoplasm
- imaging confusing, especially subacute

10 • 390 patients referred to orthopedic oncology over 12 month period with imaging findings interpreted elsewhere as "tumor or potential tumor"
• 1/3 had findings that were either non- neoplastic or benign tumors that did not require follow-up from an orthopedic oncologist (e.g., soft tissue trauma, stress fracture/reaction)

11 • 7 year review,
• 750 cases referred as soft tissue tumor
• 132 subsequently diagnosed as non-neoplastic lesions
  - ganglion/synovial cyst, synovitis, bursae: 32%
  - myositis ossificans: 17%
  - abscess: 7%
  - hematoma: 5%
  - muscle tear: 3%

12

- Niimi R, et al. Soft-Tissue Sarcoma Mimicking Large Haematoma: A Report of Two Cases and Review of the Literature. *J Orthop Surg (Hong Kong)* 14(1):90-95; 2006

- Ogose A, et al. Extraskeletal Ewing's Sarcoma Mimicking Traumatic Hematoma. *Arch Orthop Trauma Surg* 118(3): 172-173; 1998

13

- Cebesoy O, et al. Spontaneous Giant Expanding Thigh Hematoma Mimicking Soft Tissue Neoplasm. *Joint Bone Spine* 75(1):64-66; 2008

- Gomez P, Morcuende J. High-Grade Sarcomas Mimicking Traumatic Intramuscular Hematomas: A Report of Three Cases. *Iowa Orthop* 24:106-110; 2004

14 **Differentiation between trauma and tumor**
- **presentation (history, physical exam)**
- **imaging findings**

15 **Tumor mistaken for trauma**
- **any neoplasia**

16 **Trauma mistaken for tumor**

Soft tissue
- **hematoma, heterotopic mineralization ("myositis ossificans"), chronic compartment syndrome**
- **muscle/fascia injury**

Bone
- **diaphyseal periostitis, stress reaction/ fracture**
- **apophyseal avulsion**

- **joint malalignment**

17 **Concerns for imaging work-up**
- **delayed diagnosis of neoplasm: assuming trauma for cause of pain and/or mass**
  - **delayed treatment, less favorable outcome, legal implications**
- **unnecessary & costly work-up of trauma**
  - **added cost, added risk (if invasive), emotional stress to patient**

18

19

20

Muscle edema does not = trauma
- infection
- acute denervation
- DVT
- metabolic (rhabdomyolysis)
- ruptured Baker's cyst
- neoplasm

21

Hematoma vs. sarcoma
- STS may become huge before noticed
  - thigh, buttock
- sarcomas may bleed, especially after trauma
- blood products with no malignancy on biopsy does not exclude sarcoma
- any "hematoma" should be followed to clinical or imaging resolution

22

Chronic hematoma

- often not noticed for years
- well defined
- discrete low signal peripheral rim

23 

Heterotopic ossification (HO)
- not truly "myositis ossificans"
- fate of some soft tissue hematomas
- probably relates to size
  - small resolve
  - large persist
- can lead to chronic compartment syndrome

24 

Fascia herniation
- rectus common
- may occur anywhere
- scan with muscle contraction

25 

26 

Apophyseal and insertional injuries
- chronic: no problem
- acute: may require further imaging
- an isolated fracture of the lesser trochanter in an adult is metastatic disease until proven otherwise

27 

Longitudinal stress fractures
- any long bone, usually LE
- MR may show only edema
- CT diagnostic

28

Joint malalignment

- sternoclavicular joint
  - subluxation (age, trauma)
  - osteoarthritis: capsular hypertrophy, osteophytic spurs

29

Conclusion

- tumor can look like trauma
- trauma can look like tumor

30