The Suspicious Soft Tissue Mass
To educate providers about the features that would make a soft tissue mass suspicious for malignancy, especially a sarcoma. Discuss the appropriate diagnostic imaging and biopsy workup for a suspicious soft tissue mass. Review the overall multidisciplinary management of a soft tissue sarcoma. Discuss the management of more common benign soft tissue tumors, including the role of nonsurgical therapies.

Target Audience
This activity is intended for primary care physicians and medical oncologists.

Instructions to Receive Credit
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John M. Kane III, MD, FACS, has indicated no real or apparent conflicts.

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Learning Objectives

Upon completion, participants should be able to:

• Identify the features of a soft tissue mass that are concerning for a possible soft tissue sarcoma (STS).
• Articulate the benefits of having a preoperative diagnosis for a soft tissue mass in terms of treatment planning.
• Compare the pros and cons of the various approaches to imaging and biopsy of a suspicious soft tissue mass.
• Recognize the core components of soft tissue sarcoma (STS) treatment and the management some common non-STS tumors.
The Clinical Problem

• benign soft tissue tumors fairly common
  – soft tissue sarcomas (STS) rare
• STS diagnosis delay can impact outcome
• how STS is diagnosed can affect outcome
• many benign tumors do not require surgery
STS Facts

• primarily from mesoderm
  – all anatomic locations
• 1% of all adult cancers
• 12,750 new cases for 2019
  – 5,270 deaths
  – size is a prognostic factor
• affect all age groups
  – significant life years lost
Unique STS Issues

• proximity to critical structures
  – neurovascular, bone, GI tract
• pseudocapsule
  – 1 cm microscopic infiltration
• high implantation potential
  – biopsy scar
  – tumor spillage at surgery
Frequent STS Misdiagnoses

- hematoma
- abscess
- ganglion cyst
- “pulled muscle”
- hernia
- obesity
- lipoma
When Is a “Lipoma” More Likely a STS

- 428 lipoma patients over 1 year
- 80% < 5 cm
- only 3% subfascial (mean 6 cm)
- solitary rare on hand, thigh, lower leg, foot
- factors predictive of STS over lipoma
  - > 5 cm
  - thigh
  - deep/subfascial

Rydholm and Berg, Acta Ortho Scand, 1983
The Fallacy of the Retroperitoneal “Lipoma”

• retroperitoneal “lipoma” is NOT a common clinical entity

• will almost always be a well-differentiated liposarcoma
  – ill-defined margins
  – multifocal/field defect
  – tumor spillage will lead to sarcomatosis

• requires a sarcoma-type wide surgical resection
Soft Tissue Mass Imaging Evaluation

• plain films and ultrasound
  – minimal benefit
• MRI
  – 3 dimensional imaging
  – good neurovascular definition
  – neurogenic and myxoid masses
  – limited field of view
  – poor patient satisfaction
• CT
  – 3 dimensional imaging similar to MRI
  – large field of view
  – good bone assessment
  – radiation
Intra-abdominal/Retroperitoneal Tumor Imaging Evaluation

- CT scan chest, abdomen, pelvis
  - local extent of tumor
    - relationship to GI tract, vessels, spine, etc.
  - metastatic disease
    - liver
    - sarcomatosis
    - lungs
Soft Tissue Mass Biopsy Techniques

- **core needle biopsy**
  - prefer image guidance
    - ultrasound or CT
    - in tumor, most suspicious area, avoid major vessels

- Royal Marsden (Strauss et al., *J Surg Onc*, 2010)
  - 530 soft tissue masses
  - 97.6% accuracy benign vs. malignant
  - 86.3% and 88% for STS grade and subtype
  - only 1 false positive; 8 false negatives
Soft Tissue Mass Biopsy Techniques

- incisional bx
  - discouraged
  - minimal dissection and meticulous hemostasis
  - must consider the need for future surgery
- excisional bx- the “whoops” operation
  - strongly discouraged!!!!!!
  - only small, superficial masses
    - only if no impact on future surgery
  - must consider the need for future surgery
The Fallacy of “No Preoperative Biopsy” for Intra-abdominal Masses

• very large differential diagnosis
  – STS (including GIST), lymphoma, desmoid, metastatic testicular cancer, renal/adrenal tumors, benign neurogenic tumors
• preoperative or non-surgical therapies
  – radiation, imatinib, chemotherapy, observation
• incisional biopsy violates tumor → sarcomatosis

➢ image guided core needle biopsies
Reasons to Have a Preoperative Diagnosis

• plan the surgery
• plan the reconstruction
• possibility of preoperative radiation
• consider neoadjuvant chemotherapy
• nonsurgical management of benign tumors
STS Surgical Resection

- importance of the “pseudocapsule”
- prior to 1980’s, extremity STS treated with amputation
- goal is now limb conservation and preservation of function
- wide surgical resection
  - 2-3 cm margins normal tissue past the tumor
  - fascia is a good barrier
  - non-anatomic resection of muscle
Other Surgical Principles

- longitudinal extremities/transverse trunk
- don’t spill the tumor
- minimize violation of uninvolved areas
  - exit drains immediately next to wound
  - keep extremity incision off of trunk
- mark field with metallic clips
- try to close irradiated defects with well vascularized tissue
The Positive Margin Excision (The “Whoops”)

- most common reason is lack of preoperative biopsy/diagnosis
- formal wide resection of prior surgical site, if technically possible
- 30-55% will have residual disease on final path
  - 33% will have positive margins due to prior tumor dissemination
STS and Radiation Therapy

• goal is to improve local control
  – not all STS need radiation

• preoperative
  – better oxygenation, lower dose, smaller field, defined target, sterilize margin at critical structure
  – better long-term limb function
  – increased wound complications

• postoperative
  – path and margins known
  – larger field, higher dose
  – may not receive if healing issues
STS and Chemotherapy

- adriamycin/iphosfamide based
- adjuvant vs. neoadjuvant
- some benefit
  - rare disease
  - small improvement local control
  - variable impact on survival
- neoadjuvant allows for *in vivo* assessment of response

Soft Tissue Reconstruction

• the need for reconstruction should not compromise the oncologic resection
• quality of life is important
• prefer well vascularized, unirradiated tissue
  – increased wound healing complications after preoperative radiation
• importance of multimodality planning (especially plastic surgery)
Benign Neurogenic Tumors

- neurofibroma or schwannoma
- rarely associated with neurofibromatosis
- bright on MRI T2 sequences
- malignant degeneration risk extremely low
- treatment options
  - observation with serial imaging
  - simple excision if symptoms or enlargement
Desmoid/ Aggressive Fibromatosis

- locally aggressive but benign tumor
  - sporadic vs. FAP vs. peri/postpartum

- unpredictable growth kinetics
  - spontaneous regression upwards of 20%

Gounder et al., NEJM, 2018
Desmoid/ Aggressive Fibromatosis

• treatment options
  – **observation**
  – sulindac, tamoxifen
  – sorafenib
  – cryotherapy/HIFU
  – chemotherapy
  – surgery
    • high recurrence risk without wide resection
  – adjuvant or definitive radiation
Dermatofibrosarcoma Protuberans (DFSP)

- locally aggressive, benign tumor
  - 5-7% fibrosarcomatous transformation
- high recurrence rate without wide resection
- role of Mohs surgery
  - recurrent, anatomic location
- consider staged procedures
- en face margin assessment
- imatinib for unresectable, neoadjuvant (downstaging)
Summary

• Important to make a “differential”
• high index of suspicion for STS
  – > 5cm, deep to fascia, enlarging, symptomatic
• CT or MRI are best imaging modalities
• thorough planning of biopsy
  – image guided core needle biopsy
• multimodality approach for STS
  – wide surgical resection +/- radiation
  – reconstruction issues
  – +/- chemotherapy
Summary

• the first operation is the best chance for getting local control!!!

• there are many benign soft tissue tumors that do not require surgery for either diagnosis or treatment
  – medically appropriate
  – cost effective
  – less morbidity
• Rydholm and Berg, Acta Ortho Scand, 1983
• Strauss et al., J Surg Onc, 2010
• O'Sullivan, et al. Preoperative versus postoperative radiotherapy in soft-tissue sarcoma of the limbs: a randomized trial. Lancet. 2002
• Gounder et al., NEJM, 2018
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