Personalising Surgical Margins in Limb Soft Tissue Sarcomas

Chandrajit P Raut, MD, MSc

Brigham and Women’s Hospital
Dana-Farber Cancer Institute
Harvard Medical School
Disclosure Slide

- No relevant disclosures
Extremity Soft Tissue Sarcoma

• Complex differences in behavior of various histologic subtypes warrants multidisciplinary evaluation to determine optimal therapy

• Standard of care is limb-sparing surgery +/- radiation therapy

• Goal of surgery is achieving a negative margin while preserving limb function

• What constitutes an appropriate margin is a matter of debate
• Margins of resection should be personalized to specific sarcoma histology, reflecting differences in tumor biology

Crago and Singer (2011), ACS Surgery
Standard of Care: Radical Resection

- 48 year-old woman with right forearm MPNST
Importance of Local Control

• Impact of local recurrence is controversial
  – Associated with disease-specific survival
  – Using Bayesian modeling, there is an association between local recurrence and death from disease, worse with recurrence within 18 mo

• Positive surgical margins are predictive of:
  – Higher rates of local recurrence
  – Worse disease-specific survival (not consistently)

• Positive surgical margins are NOT predictive of:
  – Distant recurrence

Stojadinovic et al. (2002), *J Clin Oncol*
Forsberg et al. (2012), *Ann Surg Oncol*
Planned Positive Margin

- On occasion, critical neurovascular structures are immediately adjacent to but not encased or invaded by a limb sarcoma

- Options
  1. En bloc resection/reconstruction of neurovascular structures
     - Negative margin but potential perioperative morbidity
  2. Planned positive margin against critical structures
     - Positive margin but potentially less morbid
Planned Positive Margin

- 53 year-old man
- Noted asymmetry in his distal posterior left thigh while wearing shorts
- MRI
  - 8.5 cm mass in left thigh posterior compartment involving adductor magnus muscle
  - Adjacent to distal superficial femoral vessels
Planned Positive Margin
Planned Positive Margin

- Core needle biopsy – myxoid liposarcoma
- No evidence of metastatic disease
- Treatment plan reviewed in a multidisciplinary conference
  - Surgical oncology, medical oncology, radiation oncology, oncoradiology, pathology
  - Patient preference and input is critical
- Neoadjuvant radiation therapy
  - Discussion with radiation oncologist about expected close margin along vessels
Planned Positive Margin

Sciatic nerve

Superficial femoral artery and vein

Semimembranosus covering tumor in adductor magnus

Semitendinosus tendon

Tumor bed
Planned Positive Margin

- Planned positive margin during primary resection (with radiation therapy) is associated with a low rate of local recurrence
- No additional benefit from IORT or brachytherapy
- Therefore, under appropriate circumstances, function preservation at the expense of margin should be a goal of surgery without compromising outcomes

Gerrand et al. (2001), *J Bone Joint Surg*  
Pan et al., 2013 CTOS

18-19 February 2014, Milan, Italy
Deliberate Marginal Excision: Atypical Lipomatous Tumor

- Low grade
- Slow growing
- Low recurrence rate
- May recur late
- Essentially no metastatic potential
- Typically large at presentation, adjacent to critical neurovascular structures
Deliberate Marginal Excision

- 54 year-old woman
- Mass noted in left medial thigh while doing ballet exercises
- MRI
  - Mass in medial compartment within adductor brevis
  - Between adductor longus (anterior), adductor magnus (posterior), and gracilis (medial) muscles
Deliberate Marginal Excision
Deliberate Marginal Excision

- Biopsy not necessary
- Options
  1. En bloc resection of adductor compartment and obturator nerve
     - Negative margin but loss of adduction
  2. Deliberate marginal excision
     - Positive margin but preservation of adduction
Deliberate Marginal Excision

• For patient, maintaining leg function to continue to dance was paramount
• Removed en bloc with adductor brevis muscle
• Function sparing, preserving branches of obturator nerve
Deliberate Marginal Excision

- Close margin is okay given inherent tumor biology

- A histologic subtype with more aggressive behavior would require a wider margin of resection
  - Additional adductors
  - Sacrifice obturator nerve
Extended Margins: Myxofibrosarcoma

- Superficial
- Extremity (leg > arm)
- Elderly patients
- Infiltrate well beyond palpable extent of tumor, often along fascia, muscle, nerves, or vessels
  - 1 cm margin around palpable mass is often inadequate
- Higher rate of local recurrence than other sarcomas (~20%)
- Lower rate of distant metastases (~15%)
Extended Margins

- 70 year-old man
- Ill-defined, progressively enlarging right forearm mass
- MRI – subcutaneous mass against muscle fascia, with fascial enhancement
Extended Margins

- Core-needle biopsy - myxofibrosarcoma
Extended Margins

- Preoperative radiation therapy
- Radical resection
  - Overlying skin
  - Underlying muscle and fascia
  - Exposed median and ulnar nerves
  - Myocutaneous free flap from leg
- Negative margins
Myxofibrosarcoma

- Unique behavior with recurrence pattern different than for other sarcomas
- Positive margins associated with local recurrence
- Repeated local recurrences can lead to amputations
- Surgery
  - Wider margins than for other sarcomas
  - Attention to fascia, muscle, nerve and vessel margins
  - Could be performed in stages
  - Plastic surgery consultations

Gronchi et al. (2010), Ann Surg
Haglund et al. (2012), IJROBP
Myxofibrosarcoma

Gronchi et al. (2010), *Ann Surg*

18-19 February 2014, Milan, Italy
Conclusions

• Customize margins of resection
  – Balance importance of wider margin v. morbidity
  – Function
  – Histology
  – Pathologic extent of disease
  – Type of tissue at margin (fascia, even if distance is small)
  – Patient preference
Conclusions

• Planned positive margins
  – Local recurrence rates are not worse
  – Consider preoperative radiation therapy

• Deliberate marginal excision
  – For low grade, indolent sarcomas, prioritize function and quality of life

• Extended margins
  – Histologies with microscopic extensions
  – Review imaging to determine extent of surgery and radiation field
Conclusions

• Importance of an experienced multidisciplinary team
• Careful discussion of options and outcomes with patient
Thank you
craut@partners.org