Surgical Management of Soft Tissue Sarcoma

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BMC Meeting, 22-23 April 2016
Introduction

- From the Greek “sarkoma” means fleshy growth.
- Malignant tumors of mesenchymal or connective tissue origin.
- Rare < 1% of adult cancers
- Heterogenous: various histologic types and biologic behavior.
Evaluation of Patient With Soft-tissue Mass

Perform physical exam

- Is the mass painful?
  - Yes: Probably non-neoplastic
    - Consider inflammatory process
  - No: Probably neoplastic
    - Benign or Malignant
      - Is mass >5cm in size?
        - No: Superficial or deep
          - Probably benign
            - Suspect benign
              - Imaging evaluation
                - CT/MRI scans
        - Yes: Deep location (below fascia)
          - Probably malignant
            - Suspect malignant
              - Needle Biopsy
                - Obtain multiple cores
                  - CT-guidance if lesion is deep

Benign
- Marginal wide excision
- No Radiation therapy
- No Chemotherapy

Malignant
- Low grade
  - Wide excision
  - Possible Radiation therapy
- High grade
  - Wide excision
  - Radiation therapy
  - Chemotherapy
General Management Approach
<table>
<thead>
<tr>
<th>Adult soft tissue sarcoma</th>
<th>Extremities or superficial trunk</th>
<th>Standard</th>
<th>Individualized</th>
<th>Investigational</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary, low-grade, superficial</td>
<td></td>
<td>Surgery: wide excision</td>
<td></td>
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<tr>
<td>Primary, low-grade, deep and ≤5 cm</td>
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<tr>
<td>Primary, low-grade, deep and &gt;5 cm</td>
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<td>Surgery: wide excision ± adjuvant radiation therapy</td>
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<td>Primary, high-grade, superficial</td>
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<tr>
<td>Primary, high-grade, deep, ≤5 cm</td>
<td></td>
<td>Surgery: wide excision + adjuvant radiation therapy OR compartmental resection</td>
<td></td>
<td>Neoadjuvant chemotherapy ± postoperative chemotherapy followed by wide surgical excision + adjuvant postoperative (or preoperative) radiation therapy</td>
</tr>
<tr>
<td>Primary, high-grade, deep, &gt;5 cm</td>
<td></td>
<td>Surgery: wide excision + adjuvant radiation therapy (pre and/OR post) + Discussion of adjuvant Chemotherapy</td>
<td>Compartmental resection + Discussion of adjuvant Chemotherapy</td>
<td></td>
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<td>Local recurrence, low-grade</td>
<td></td>
<td>Surgery: wide excision + adjuvant radiation therapy (pre and/OR post)</td>
<td>Surgery: wide excision</td>
<td>Isolated limb perfusion</td>
</tr>
<tr>
<td>Local recurrence, high-grade</td>
<td></td>
<td>Surgery: wide excision + Adjuvant Radiation therapy + Discussion of Adjuvant Chemotherapy</td>
<td>Surgery: compartmental resection + Discussion of Adjuvant Chemotherapy</td>
<td>Isolated limb perfusion</td>
</tr>
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</table>

*Table 3: Suggested management of extremity STS - adapted from ESMO guidance.*
Principles of Surgery
Principles

❖ +/- radiotherapy
❖ Whole tumor must be removed to gain local control.
❖ —> we must understand the local behavior of STS
Local Behavior of STS

- **Pseudocapsule**: atrophic compressed host tissue from centrifugal expansion of tumor.
- **Reactive zone**: area of edema and neovascularity, with inflammatory cells and micronodules of tumor surrounding the pseudocapsule (host defense).
- If tumor breaches the reactive zone it leads to satellite and skip lesions.

- ➔ resection should be outside the reactive zone.
Surgical Concepts
Amputation vs Limb Sparing Surgery

- The Rosenberg Study in 1982:
- Although there was a higher rate of local recurrence in limb-sparing surgery, there was no significant difference in either five year disease free survival or five year overall survival.
STS remains within the compartment from which it arises

Except in late stages where it extends beyond the compartment following the path of perforating vessels.

Other possible routes of extension: (Rare)

- Avascular tendinous insertion into bone
- Sheath of a major nerve encased in tumor.
Tumors in areas of less defined boundaries are called “extracompartmental” extend more rapidly and in longitudinal fashion.
Surgical Margins

- Histological examinations of the resection margins of the surgical specimen.
Enneking’s System of Margins

- **Intralesional margin**: runs through the tumor
  - has 80-100% recurrence rate

- Appropriate for synovitis, cysts, synovial chondromatosis.
- **Marginal margin**: runs through pseudocapsule.
- has 40-60% recurrence rate.
- Appropriate for most benign tumors excluding desmoid tumors.
- **Wide margin**: runs through normal tissue in same compartment.
- has 10% recurrence rate

- Appropriate for desmoid tumors, all sarcomas
Radical margin: entire compartment excised en bloc. In theory, a radical excision leaves no microscopic disease in situ.

Has 0.5% recurrence rate
Radical resection
Wide resection
Marginal resection
Intralesional resection (debulking)

= Tumor
= Reactive zone
Indications of Amputation

❖ Tumor bridges several compartments or extensively involves neurovascular structures
❖ Below-knee prosthesis would provide a better functional result than a lower limb extensively damaged by surgery and radiation
❖ The dose and field of radiation would be so large that there would be a significant risk of major complications.
Local and Systemic Recurrence

- Most important predictors of local recurrence are surgical margin status and histological grade.
- Risk of local recurrence:
  - age > 50 years
  - locally recurrent disease at presentation
  - size > 5 cm
  - upper extremity tumors
  - tumors located deep to the investing muscle fascia.
Managing Local Recurrence

- Similar to primary tumor treatment.
- Amputation?
Surgery in the Presence of Metastatic Disease

❖ considered as palliative treatment.
STS Management Remains a Multimodality system
Multidisciplinary approach

- Surgeons (Oncology, Reconstructive)
- Medical Oncologists
- Radiation Therapists
- Radiologists
- Pathologists
- Physiotherapists
Radiotherapy

❖ what’s its role? Solidification and devascularisation

❖ pre- or post- op radiotherapy?
Chemotherapy

- Debatable.
Complications of Local Treatment

- Wound Complications
- thromboembolic events
- radiotherapy complications
Followup

- Different protocols:
  - The National Comprehensive Cancer Network (NCCN) in the USA recommends follow-up initially with a chest x-ray (CXR) every 6-12 months for stage I tumors and with CXR or CT every 3 to 6 months for stage II and III tumors, with periodic imaging of the primary site based on the risk of loco-regional recurrence.

- Other authors: in the absence of other risk factors, CXR surveillance is not indicated in grade I tumors, as the risk of lung metastasis is extremely low.

- In the United Kingdom, patients are commonly reviewed with clinical examination and CXR every 3 months in years one to 3, at six monthly intervals in years 4 and 5, and annually thereafter to 10 years.
Prognosis

- Improvement in Overall Survival from Extremity Soft Tissue Sarcoma over Twenty Years.
- 5 year survival rate increased from 28% to 62%
Thank you for your Attention