NEOADJUVANT RADIATION THERAPY FOR EXTREMITY SOFT TISSUE SARCOMAS
CASE PRESENTATION
HPI

- 56 yo female admitted to DMC for elective w/u and treatment of a right thigh mass

- KCHC November 2010- c/o swelling in right thigh for several weeks affecting gait
HPI

- KCHC W/U
  - CT Scan of RLE
    - Large complex proximal medial thigh intramuscular lipomatous tumor with complex septations, nodularities and calcifications
    - Prominent posterior branch of the common femoral artery is seen coursing along the apical aspect of this lesion

R/O LIPOSARCOMA
CT SCAN RLE
PMH/PSH

- HTN
- Asthma
- Hyperlipidemia
- C-section
PHYSICAL EXAM

- VS 141/61; 97F; 92/min
- Right thigh mass comprising the adductor compartment, soft, non tender w/o signs of inflammation extending from the groin to the mid thigh
- Normal pulse exam
PREOPERATIVE WORK-UP

Labs- within normal

CXR- normal

2D echo- normal ejection fraction
# OPEN BIOPSY/PATHOLOGY

- **ATYPICAL LIPOMATOUS TUMOR/ WELL DIFFERENTIATED LIPOSARCOMA**

<table>
<thead>
<tr>
<th></th>
<th>ALT- Superficial</th>
<th>WDL- Deep</th>
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<tbody>
<tr>
<td><strong>Recurrence rate</strong></td>
<td>0% if resectable</td>
<td>Infrequent</td>
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<tr>
<td><strong>Dedifferentiation</strong></td>
<td>&lt;2%</td>
<td>20%</td>
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<tr>
<td><strong>Metastases</strong></td>
<td>Almost never</td>
<td>15-20%</td>
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MRI RLE

- Complex fat signal tumor w/i the medial thigh
- 10.5x8.1x20cm
- Involves the adductor compartment
- Mass effect on the femoral neurovascular structures anteriorly and medially

LIPOSARCOMA
Planned incision extending to the groin for vascular exposure and taking the biopsy site (red Arrow)
OPERATIVE PROCEDURE

En bloc resection of the mass with the adductor muscles after control of the femoral vessels
Reconstruction of the pectineus muscle over a JP drain and closure after en-bloc resection of the mass with the adductor longus, brevis, magnus and minimus, as well as parts of the pectineus and obturator externus muscles.
Operative Procedure

Specimen with attached muscles
## POSTOPERATIVE COURSE

<table>
<thead>
<tr>
<th>POD</th>
<th>Details</th>
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<tbody>
<tr>
<td>POD1-3</td>
<td>Transferred from recovery to step down; early mobilization; started on HSQ 5000 units Q8h</td>
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<tr>
<td>POD4</td>
<td>Minimal drainage from JP and Hemovac; Removed by the orthopedics service</td>
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<tr>
<td>POD5-7</td>
<td>Right sided pleuritic chest pain; tachycardia; decreased SaO2 ⇒ <strong>CTA of chest showed bilateral PE</strong> ⇒ <strong>Lovenox to bridge to coumadin</strong>; IVCF placement</td>
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<tr>
<td>POD8-17</td>
<td>Drainage from the wound ⇒ seroma; Treatment with compressive drainage with improvement</td>
</tr>
<tr>
<td>POD18</td>
<td>Discharged home; Follow with Radiation Oncology for possible adjuvant RT</td>
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PATHOLOGY

- Atypical lipomatous tumor/well differentiated liposarcoma
- Intact pseudocapsule
- Grade 1
- Size 23cm
- Deep
- G1T2bNxMx
- Margins negative
NEOADJUVANT RADIATION THERAPY IN SOFT TISSUE SARCOMAS OF THE EXTREMITIES
INTRODUCTION: ROLE OF RADIOTHERAPY IN EXTREMITY SARCOMAS

- RT delivered with wide local excision or function preserving surgical procedures provides a significant benefit in local disease control w/o effect on overall survival or distant metastases.

- RT cannot compensate for inadequate resection.
INTRODUCTION: ROLE OF RADIOTHERAPY IN EXTREMITY SARCOMAS

NCCN Guidelines

- High grade sarcomas
- Low grade sarcomas > 5cm
- Close or positive margins (<1cm)
INTRODUCTION: ROLE OF RADIOTHERAPY IN EXTREMITY SARCOMAS

- Other factors affecting local recurrence

- **AGE**

  >50 is an independent predictor of local recurrence following conservative surgery and radiotherapy

  < 50 predictive of better local control
TIMING OF RADIOTHERAPY

- Preoperative
- Intraoperative
- Postoperative
WHY IRRADIATE PREOPERATIVELY?

- Smaller target volume ⇒ Lower radiation dose (50Gy vs 66-70Gy)
- Short interval between RT and surgery
- More conservative surgery - tumor downstaging
- Lower likelihood of tumor cell spillage into the tumor bed
- Better long term functional outcomes
WHY NOT IRRADIATE PREOPERATIVELY?

- Wound morbidity is higher after preoperative RT
  - 35-37% vs 17%
  - 16-23% reoperation for wound morbidity
  - Decreased collagen production by fibroblasts
  - Full pathological analysis is more difficult due to tissue destruction
IS THERE ANY SURVIVAL BENEFIT FROM PREOPERATIVE RADIOTHERAPY?

No difference in survival between preoperative and postoperative RT

O’Sullivan et al. (2002)

• Small but significant better overall survival in preoperative RT
• Visible only at 2.5 years of FU
• 90 VS 75% at 36 months
IMPACT ON FUNCTIONAL OUTCOME

- Davis et al.
  - Slight but significant lower functional outcomes at 6 weeks after surgery for preoperative RT
  - The difference disappeared at 3 months to 3 years follow up
  - It could be attributed to the wound morbidity after surgery and preoperative RT
IMPACT ON FUNCTIONAL OUTCOME

Preoperative RT

Less extensive fibrosis at 2 years

Better MST/S/TESS scores and functional outcomes
IMPACT ON FUNCTIONAL OUTCOME

Standard Regimen

- EBRT 3-6 weeks before surgery
- Total dose 50Gy in 25Gy fractions
- Extending 5cm above and 5cm below the most proximal and distal margins of the tumor
- If margins involved ⇒ postoperative EBRT to a field 2cm around the tumor bed 16-20Gy
SHOULD SENSITIZING CHEMOTHERAPY BE ADDED?

- Doxorubicin and Ifosfamide have a radiosensitizing effect
- Studies have shown promise
- High rate of postoperative complications
POSTOPERATIVE RADIOTHERAPY

Used in a variety of situations including:

- Incidental diagnosis of STS at surgery
- Upgrading after evaluation at surgery
- Inability to obtain negative margins with acceptable functional outcomes
- More extensive lesion than expected based on preoperative imaging
- As a **definitive therapy** in advanced or metastatic tumors when surgery is not an option
BRACHYTHERAPY IN THE TREATMENT OF EXTREMITY STS

- Placement of catheters intraoperatively
- Loading of the radioactive isotope at POD5-7 and treatment for 6-7 days
  - If loaded prior to 5th day postop \(\Rightarrow\) increased rate of wound complications
- Overall local control 91% comparable to EBRT
- Benefit mainly in high grade lesions
BRACHYTHERAPY IN THE TREATMENT OF EXTREMITY STS

Advantages

- Less radiation scatter

- Lower dose than EBRT
  - 45-50Gy if used as the only form of RT
  - 15-25Gy if used as a boost after EBRT
CONCLUSIONS

- Preoperative and postoperative radiation therapy are both valid approaches to treatment of STS.
- It is still controversial which is better.
- Advantages of preoperative RT are make it more appealing.
- No impact on survival.
- Strictly a local technique.
- Sensitizing chemotherapy is debatable.
REFERENCES

- **Singer S, Canter RJ.** Soft tissue sarcoma. *Cameron: Current Surgical Therapy 9e, Section 16- Skin and Soft Tissues, Chapter 230: 1101-1107*


- **Hohenberger P, Wysocki WM.** Neoadjuvant treatment of locally advanced soft tissue sarcoma of the limbs: which treatment to choose? *The Oncologist 2008; 13: 175-186*
REFERENCES
