

LIFEFEST 2026

Nashville



Radiation Oncology
Radiation Oncology & Liposarcoma

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Radiation Oncology and Liposarcoma

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Disclosures

- Employee of Vanderbilt University Medical Center



Outline

- Introduction to Liposarcoma
 - Well-differentiated Liposarcoma
 - De-differentiated Liposarcoma
 - Myxoid Liposarcoma
- What is Radiation
- Localized Liposarcoma – role for radiation
 - Non-retroperitoneal
 - Retroperitoneal
 - Inoperable Patients
- Metastatic Liposarcoma – role for radiation





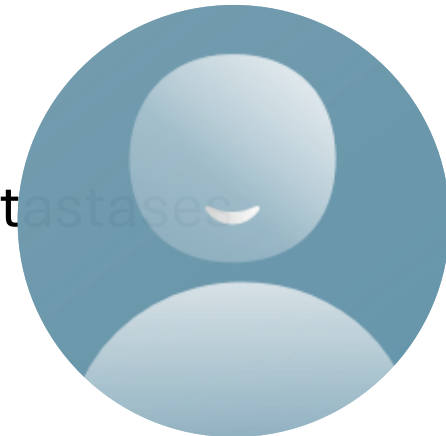
Liposarcoma

- Sarcomas in general represent ~1% of all adult cancer diagnoses¹
- Liposarcoma encompasses about 13-20% of all sarcomas²
 - Well-Differentiated Liposarcoma (WD-LPS) – ~31-33%
 - De-differentiated Liposarcoma (DD-LPS) – ~20%
 - Myxoid Liposarcoma (M-LPS) – ~19%
 - Pleomorphic Liposarcoma (P-LPS) – ~7-8%



Location

- Non-retroperitoneal – $\sim 2/3^{\text{rd}}$ of all LPS³
 - More likely to be WD-LPS, M-LPS, or P-LPS
 - Very rarely DD-LPS
 - More likely to pass away due to distant metastases
- Retroperitoneal - $\sim 1/3^{\text{rd}}$ of all LPS
 - Almost always WD-LPS or DD-LPS ($\sim 50\%$ each)
 - A WD-LPS can turn into a DD-LPS over time
 - Rarely M-LPS or P-LPS
 - Independently poor prognostic factor
 - More likely to pass away due to local disease without distant metastases



What is Radiation Therapy (RT)

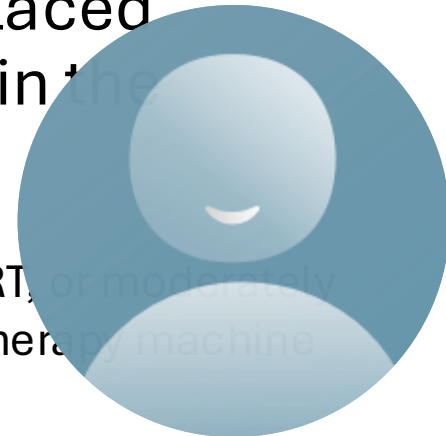
- Usually, a photon beam, targeted to a specific area
- A second local treatment in the arsenal – more similar in concept to surgery than systemic therapy
- Can treat areas surgery can't reach easily or well
- Non-invasive (most of the time)
- Getting radiation looks and feels like getting an X-ray or CT scan
- Conventional (fractionated) radiation
 - Low doses per day, long courses, delivering a small 'fraction' of cumulative dose daily
 - 25-28 treatments pre-operative
 - 30-33 treatments post-operatively
 - Historically only thing that was felt to be safe to do due to lack of targeting ability
 - Can be planned using 3D (beams from 2-4 angles) or IMRT (beamlets from 360 degrees)
- Stereotactic Body Radiation Therapy
 - High doses per day, short courses (generally 5 or less treatments)
 - Always planned with IMRT
 - Usually treating a smaller volume than conventional radiation
- Moderate hypofractionation
 - Medium doses per day, medium length treatments



Other Radiation Terminology

- Proton Therapy – An alternative to photon radiation
 - Just as effective
 - No proven benefit to lowering toxicities (depends on who you ask)
- Intraoperative Radiation
 - Done at time of the surgery (in the operating room)
 - Done rarely overall as a ‘boost’ to someone who had radiation prior to surgery
 - Sometimes considered for re-irradiation scenarios where it may not be otherwise safe to give radiation
- Brachytherapy – ‘Internal’ Radiation – a radioactive source is placed next to the tumor, generally through catheters/needles placed in the operating room

Current Practice at VUMC – We use photon radiation with either conventionally fractionated, SBRT, or moderately hypofractionated regimens in management of liposarcoma. We do not have access to a proton therapy machine and we have not incorporated intraoperative radiation or brachytherapy into our practice.



Non-retroperitoneal LPS

- Historically, amputation was the standard
- Limb-sparing surgery + post-operative RT was found to be equivalent to amputation⁴
- Pre-operative RT, while having more acute wound complications, was found to have lower chance of chronic, permanent toxicities than post-operative RT, but equally effective⁵
- More recent trials have worked to shrink the radiation margins necessary for both pre-op⁶ and post-op⁷ treatments, and with improvements in targeting, have reduced toxicities
- Ongoing trials are evaluating switching from conventional fractionation to shorter fractionation schemes (like SBRT) to confirm it is oncologically equivalent, but also to determine whether it is safe to go faster



Non-retroperitoneal LPS

- Who needs radiation - Patients with higher than acceptable risk of recurrence with surgery alone
 - Patients with positive margins that can't be re-excised should (almost) always get radiation
 - Patients with T2-4 AND high-grade disease (stage III) should (almost) always get radiation
 - Patients with T2-4 OR high-grade disease should have a discussion regarding pros/cons of radiation
 - Patients with T1 AND low-grade disease should (almost) never get radiation

Current Practice at VUMC – Patients who will be recommended radiation are generally preferred to receive it prior to surgery as long as it does not impact the ability of the patient to undergo surgery



Retroperitoneal LPS

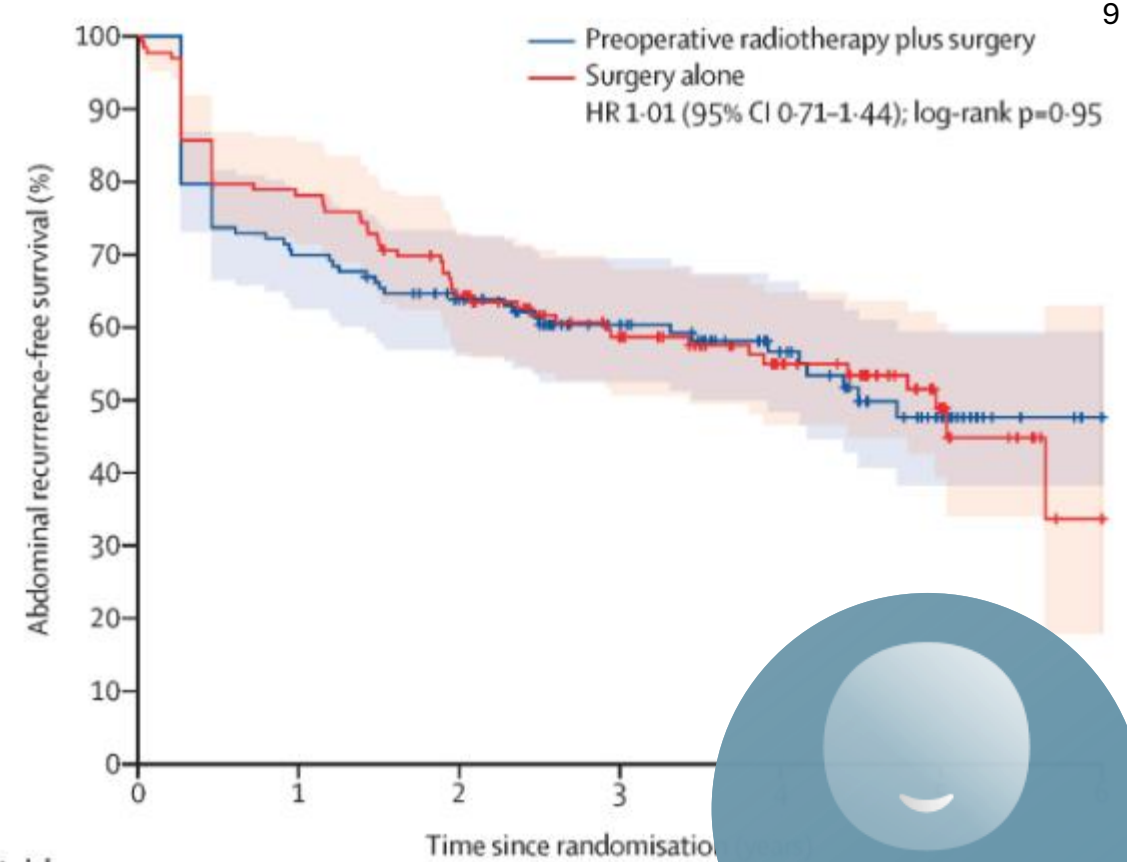
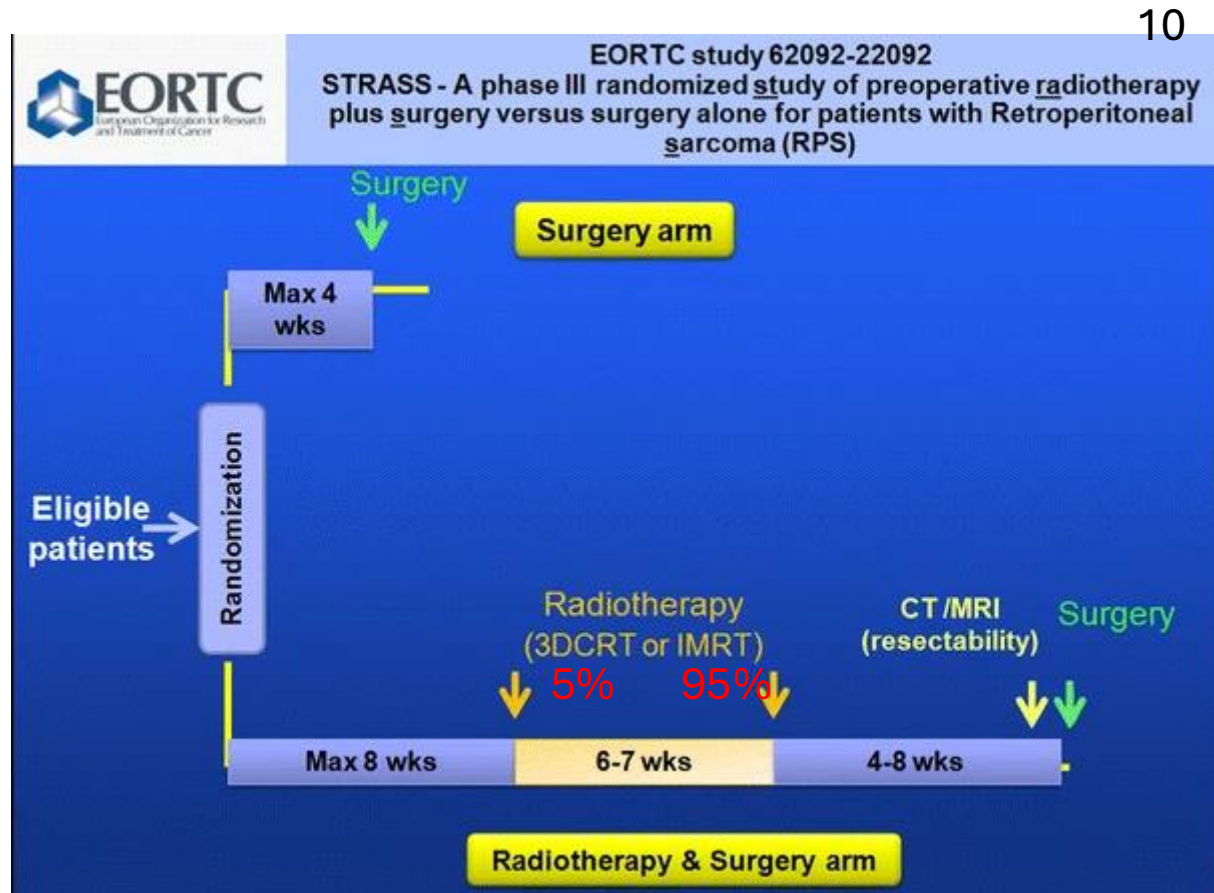
- Historically, use of radiation was mostly an extrapolation of the non-retroperitoneal data
 - Some data showing good outcomes to historical standards⁸
- Post-operative radiation is difficult to safely administer to necessary doses due to intestinal toxicity
- Thus, preference was to do pre-operative radiation (if patient needed radiation) as those lower doses could be safely given near intestines
- However, controversial as to whether it was necessary
- STRASS Trial



STRASS Trial⁹



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Unplanned Subset Analysis – Patients with Liposarcoma getting pre-op RT may have some benefit



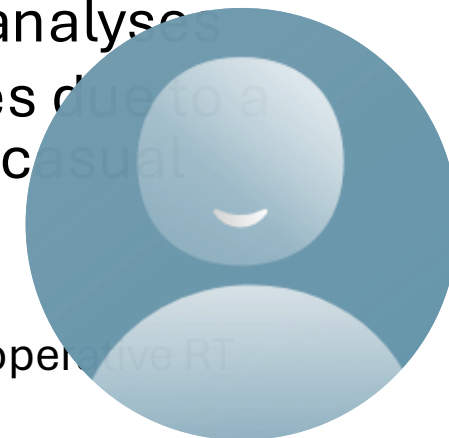
STRASS Trial

Strengths

- Randomized trial
- Multi-center
- Contemporary radiation Techniques
- Evaluating operable patients

Weaknesses

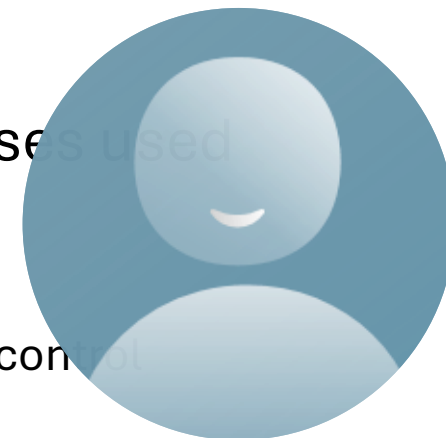
- Lumped in multiple histologies (not stratified)
 - 32-35% WD-LPS
 - 38-41% DD-LPS
 - 17% Leiomyosarcoma
 - 11-15% other histologies
- Goal was to see a 20% absolute improvement in entire cohort
 - Too optimistic?
- Underpowered for subset analyses
- Multiple sensitivity analyses due to a composite endpoint make causal interpretation difficult



Inoperable, non-metastatic LPS

- Data groups all soft tissue sarcomas, not just LPS
- Definitive Radiation
 - Not as good as surgery
 - Historical data showing 5-year local control of 45%¹¹
 - Affected significantly by size of tumor and total dose of radiation
 - Contemporary data with more advanced techniques show 1-year local control of 91%¹²
- Stereotactic Body Radiation Therapy
 - 5-year local control reportedly 52%¹³, although relatively low doses used

Current Practice at VUMC – Inoperable patients get offered RT, generally SBRT, for local control



Metastatic LPS

- Data groups all soft tissue sarcomas, not just LPS
- Historically, the standard was surgical resection of lung mets (most common site of metastatic disease for sarcomas)
- But, patients with lung metastases have excellent control with SBRT
 - 2-year local failure 1.7%¹⁴ to 10%¹⁵
 - Lung tumors can frequently be safely treated to higher doses than other parts of the body
- Other sites are generally more limited in terms of dose and may have worse outcomes – limited data
- The biggest question is generally not whether we can do radiation or not. It is whether we should.
 - If a lesion is symptomatic, treating will usually reduce symptoms but needs to be balanced with risk of treatment related toxicity
 - The best asymptomatic candidates are those with 1-3 metastases (oligometastatic). Often systemic therapy is controlling most of their cancer but 1-3 sites are progressing (oligoprogressive)

Current Practice at VUMC – The patient and I talk about whether SBRT to a metastatic site is worth it compared to evaluating the alternative options (surgery, systemic therapy, and/or observation). Shared decision making is critical.



Thank You!

- Any questions?



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