**Radiation Therapy in Addition to Surgical Resection Improves Local Control for Retroperitoneal Sarcoma: A Systematic Review and Meta-Analysis**

*S.C. Desai, N. Ohri, J.L. Fox, K.T. Papalezova, S.H. Packer, and M.K. Garg*

**Purpose/Objective(s):** There is a paucity of high-level evidence supporting the use of radiation therapy (RT) in addition to surgical resection for the management of retroperitoneal sarcoma (RPS). Radiation therapy is thought to reduce the risk of locoregional recurrence. Concerns of increased toxicity with postoperative radiation therapy (post-RT) has spurred considerable interest in preoperative radiation therapy (pre-RT) delivered when critical organs at risk are displaced by gross tumor. In this study, we examined the effect of RT on LRR and compared pre-RT and post-RT by performing a quantitative meta-analysis of published data.

**Materials/Methods:** We performed a systematic literature review to identify publications reporting actuarial local control (LC) for RPS treated with surgical resection with or without RT. Individual patient data from relevant series were extracted from actuarial LC curves using an iterative algorithm to solve the inverted Kaplan-Meier equation along available time points and aggregated to form a single dataset. Actuarial LC curves for patient subgroups (RT, no RT, pre-RT, and post-RT) were generated using the Kaplan-Meier method. Statistical comparisons were made using log-rank testing. Meta-analysis of adjusted hazard ratios (HRs) from series with multivariable analyses examining the effects of RT on LC was performed using the inverse variance method with fixed effects.

**Results:** Nineteen papers including 1,349 patients met all inclusion criteria and formed the dataset for this analysis. Median external RT dose in series using pre-RT ranged from 45.0 to 59.4 Gy. Median external RT dose in series using post-RT ranged from 50.0 to 59.4 Gy. Use of RT was associated with statistically significant improvement in LC, but timing of RT was not associated with LC. Metaanalysis of multivariable models revealed that RT use is associated with improved LC (HR = 0.47, 95% CI 0.37 to 0.59, P < .001). Toxicity information was not reported consistently across studies, precluding quantitative analysis.

**Conclusion:** The addition of RT to surgical resection in the management of RPS is associated with a meaningful improvement in long-term LC. Available data do not demonstrate that the timing of perioperative RT has a significant influence on local control. Prospective studies to optimize the implementation of RT in RPS are needed.