

THE IMPACT OF RADIATION THERAPY ON SURVIVAL IN MYXOID LIPOSARCOMA

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Background

Myxoid liposarcoma (MLS) is a malignant tumor characterized by the FUS-DDIT3 translocation, and is typically regarded as radio- and chemo-sensitive with low rates of local recurrence and metastasis compared to other liposarcoma subtypes (Crago and Dickson 2016). Radiation therapy (RT) is consistently used for treatment of MLS – and local effects on the tumor are typically pronounced – yet numerous recent studies found no significant improvement in overall survival with radiation therapy (Chowdhry, Goldberg et al. 2018, Wu, Qian et al. 2019, Zheng, Yu et al. 2019, Amer, Congiusta et al. 2020). As these studies have largely been performed at single institutions or used smaller databases and thus are limited in size, we investigated the National Cancer Database (NCDB) to determine the role for RT in MLS.

Purpose

To assess the impact of radiation therapy, and particularly that of advanced modality RT, on survival in patients with myxoid liposarcoma

Methods

Design: Retrospective Study, NCDB Study

We retrospectively reviewed 3,811 patients with a diagnosis of MLS in the National Cancer Database (NCDB) from 2004 through 2015. After inclusion and exclusion criteria were met, 3,263 patients remained. Univariate analysis by Pearson Chi-Square method assessed differences between cohorts. Survival differences between patients who received no radiation or different modalities of radiation (conventional EBRT or advanced modalities) were assessed using the Kaplan-Meier method. Multivariate analysis with multiple imputation and proportional hazards regression were used to assess patient, tumor and treatment variables as independent predictors of survival.

Results

Figure 1: Kaplan-Meier survival of patients with myxoid liposarcoma revealed a 5-year survival rate of 79% in those who received no radiation, compared with 80% who received conventional EBRT and 84% who received advanced modality radiation. The survival difference was not statistically significant (Log-rank $p=0.0533$).

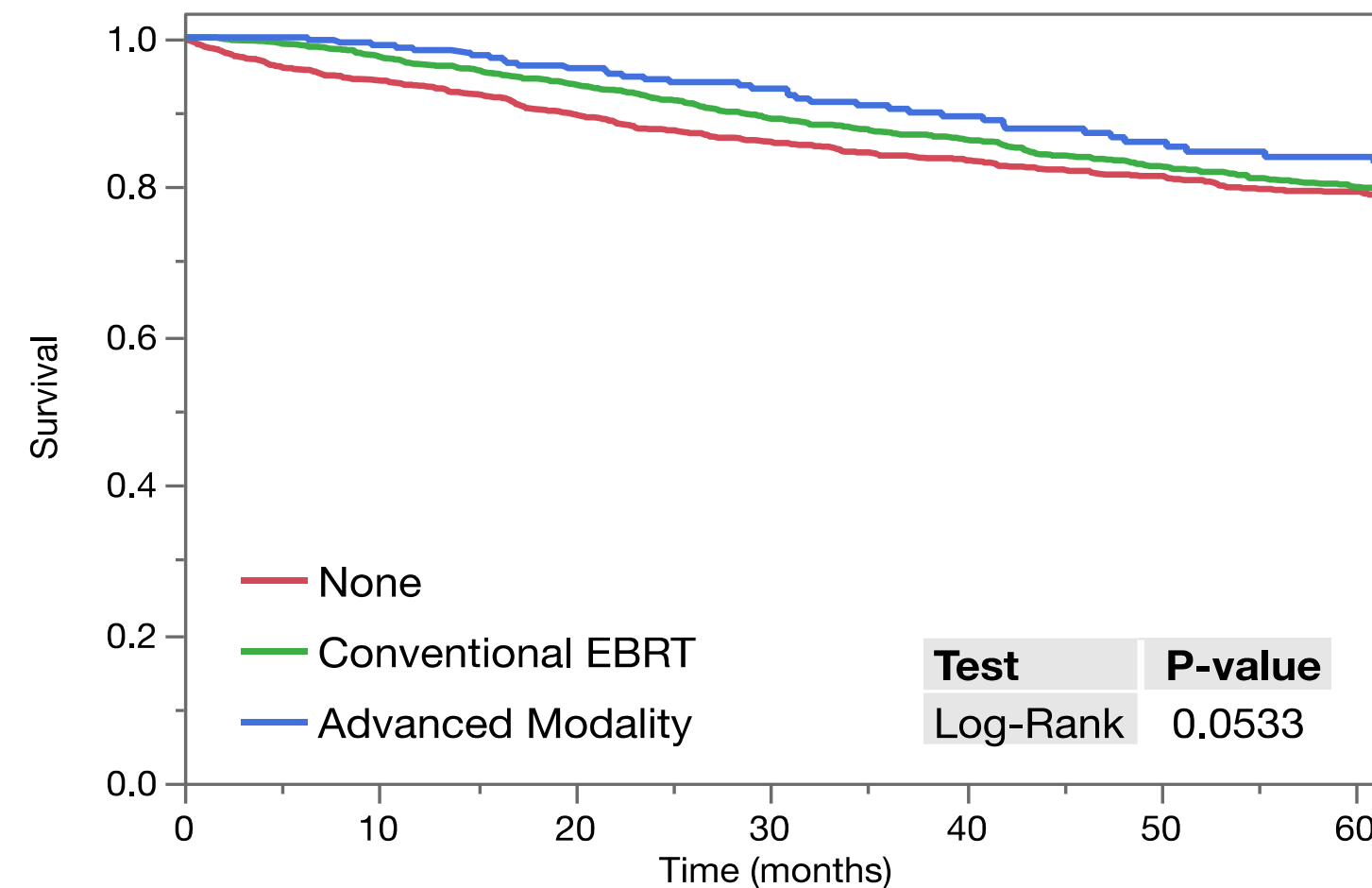
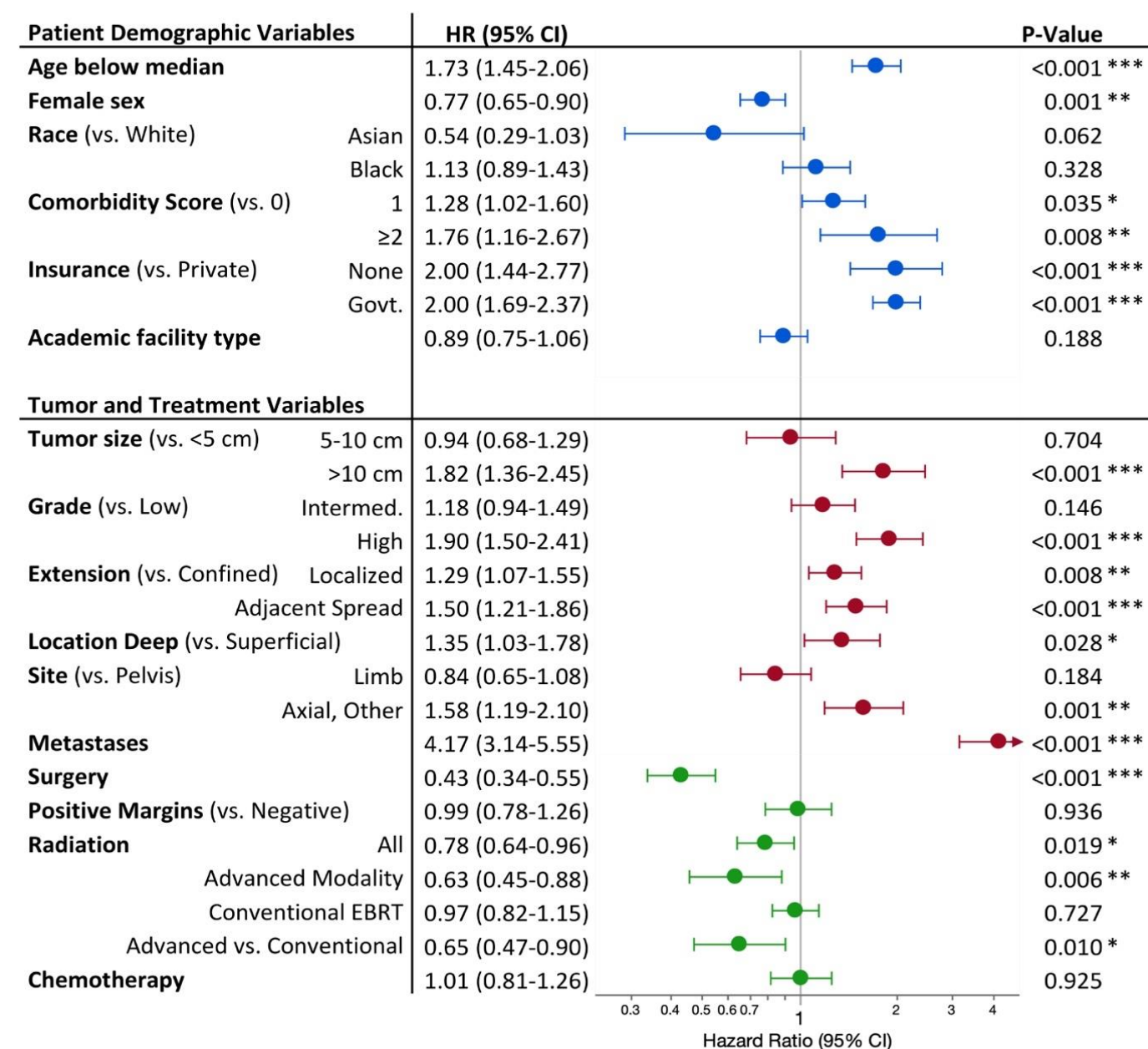


Figure 2: Patient, tumor and treatment variables were assessed for their influence on unplanned readmissions by multivariate proportional hazards regression. Hazard ratios and 95% confidence intervals are shown and demonstrated in the forest plot.



Results cont'd

Myxoid liposarcomas were predominantly located in the extremities (76% vs. 11% in pelvis, 13% other axial locations). The 5-year survival for entire cohort was 79%. 1,766 (54%) patients received radiation therapy, of which 1467 (83%) received conventional EBRT and 299 (17%) received advanced modalities. IMRT constituted the majority of advanced modality RT with 290 patients, as well as 1 stereotactic radiosurgery (SRS), 1 proton-beam therapy (PBT), and 1 neutron-beam therapy. Patients receiving conventional EBRT received a mean of 50 Gy compared with 51 Gy for advanced modalities ($p=0.047$). Compared to no radiation, patients who received neoadjuvant radiation were less likely to have positive margins (10% vs. 17%, $p<0.001$). 5-year survival was 80% for patients who received conventional EBRT and 84% for advanced modality radiation (Log-rank $p=0.0533$). In multivariate analysis, RT was associated with significantly improved survival compared to no radiation (HR 0.78 [0.64-0.96], $p=0.019$), and advanced modality RT also demonstrated a survival benefit compared to conventional EBRT (HR 0.65 [0.47-0.90], $p=0.010$). MLS was more predominant in males (60%), with female sex conferring an independent survival advantage in multivariate analysis (HR 0.77 [0.65-0.90], $p<0.001$). Comorbidities, insurance status, metastases, as well as tumor size, grade, and depth were all significant predictors of survival (Figure 2). While surgical resection conferred a significant survival advantage (HR 0.43 [0.34-0.55], $p<0.001$), there was no significant difference in survival between positive and negative margin status ($p=0.936$). Race, facility type, and chemotherapy were also not predictive of survival (Figure 2).

Conclusion

Radiation therapy is already commonly used to treat patients with MLS in conjunction with surgical resection. Contrary to recent prior studies, we found that RT did confer a statistically significant survival advantage. Furthermore, the use of advanced modalities such as IMRT significantly improved survival compared to conventional EBRT, and further studies may be useful to determine their utility in neoadjuvant treatment of this radiosensitive tumor, as well as post-operatively for treatment of positive margins or resection of high-grade or locally aggressive tumors.