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## Outcomes of elderly patients undergoing curative resection for retroperitoneal sarcomas: analysis from the US Sarcoma collaborative



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### ABSTRACT

**Background:** The postoperative outcomes of elderly patients undergoing resection of retroperitoneal sarcomas (RPS) have not been widely studied.

**Methods:** Patients undergoing surgical resection for primary or recurrent RPS between 2000 and 2015 at participating US Sarcoma Collaborative institutions were identified. Patient demographics, perioperative morbidity, mortality, length of stay, discharge to home, disease-specific survival, and disease-free survival were compared between elderly ( $\geq 70$  y,  $n = 171$ ) and nonelderly ( $< 70$  y,  $n = 494$ ) patients.

**Results:** There was no difference in perioperative morbidity (total and major complications elderly versus nonelderly: 39% versus 35%;  $P = 0.401$  and 18% versus 17%;  $P = 0.646$ ,

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respectively) or mortality between elderly and nonelderly patients with each group experiencing a 1% 30-d mortality rate. Length of stay and 30-d readmission rates were similar (elderly versus nonelderly; 7 d interquartile range [IQR: 5-9] versus 6 d [IQR: 4-9],  $P = 0.528$  and 11% versus 12%,  $P = 0.667$ ). Elderly patients were more likely to be discharged to a skilled nursing or rehabilitation facility (elderly versus nonelderly; 19% versus 7%,  $P < 0.001$ ). There was no difference in 3-y disease-free survival between the elderly and nonelderly patients (41% versus 43%,  $P = 0.65$ ); however, elderly patients had a lower 3-y disease-specific survival (60% versus 76%,  $P < 0.001$ ). In elderly patients, the presence of multiple comorbidities and high-grade tumors were most predictive of outcomes.

**Conclusions:** Advanced age was not associated with an increased risk of perioperative morbidity and mortality following resection of RPS in this multi-institutional review. Although short-term oncologic outcomes were similar in both groups, the risk of death after sarcoma recurrence was higher in elderly patients and may be related to comorbidity burden and tumor histology.

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## Introduction

Soft tissue sarcomas (STS) are a diverse group of mesenchymal tumors that comprise approximately 1% of adult malignancies. Retroperitoneal sarcomas (RPS) account for 15%-20% of all STS and are particularly challenging tumors to treat as they often grow to large sizes before causing symptoms. For this reason, RPS have a poor prognosis as patients present with advanced disease at the time of diagnosis. The Surveillance, Epidemiology, and End Results cancer registry reports that the incidence of RPS is approximately 2.7 per million people and has been stable over the last 30 y.<sup>1</sup> Although more than 70 histologic types of sarcomas have been identified, liposarcomas, leiomyosarcomas, and undifferentiated pleomorphic sarcomas, formerly known as malignant fibrous histiocytoma, account for the vast majority of RPS.<sup>2,3</sup> The etiology of these tumors is largely unknown. They typically present as sporadic tumors, though a small percentage are associated with inherited genetic syndromes such as Li-Fraumeni syndrome, neurofibromatosis-1, and retinoblastoma.<sup>4,5</sup> Ionizing radiation exposure has also been linked to the subsequent development of STS with radiation-induced sarcomas typically arising within the previously radiated field 3 y or more after the exposure.<sup>6,7</sup>

Age at diagnosis for STS has a bimodal distribution, with peaks in the fifth and eighth decades of life.<sup>1</sup> Surgical resection with negative margins remains the most effective treatment modality in localized RPS with the need to carefully balance complete excision with preservation of function and quality of life. Though advanced age is frequently encountered in the population of patients undergoing surgical resection of RPS, little is known regarding the impact of age on postoperative outcomes and prognosis of these patients. O'Connell *et al.* analyzed the Surveillance, Epidemiology, and End Results database to evaluate differences in treatment practices for older cancer patients and found significantly decreased odds of patients undergoing cancer-directed surgery for sarcoma beginning in the seventh decade of life and dropping steadily to reach statistical significance at age 85 y.<sup>8</sup> This is presumably because advanced age is associated with decreased functional status and greater medical comorbidities, which may serve as predictors of poor outcomes in patients undergoing major abdominal surgery.<sup>9-11</sup> However, it is not clear if chronologic

age is as reliable surrogate for surgery risk stratification, and the impact of advanced age on outcomes in elderly patients with sarcoma has not been widely studied. The effect of advanced age in patients undergoing major abdominal surgery for RPS using a large multiinstitutional sarcoma database was investigated to objectively define its impact on postoperative complications, mortality, and oncologic outcomes. We hypothesize that elderly patients undergoing resection of RPS have equivalent outcomes to nonelderly patients.

## Methods

### Study population

A retrospective review was performed using a multi-institutional database of patients treated at eight major academic surgical centers within the US Sarcoma Collaborative (USSC), (Medical College of Wisconsin, Milwaukee, Wisconsin; Emory University, Atlanta, Georgia; Stanford University, Palo Alto, California; Ohio State University, Columbus, Ohio; University Of Chicago Medicine, Chicago, Illinois; Wake Forest University, Winston-Salem, North Carolina; Washington University, St. Louis, Missouri; University of Wisconsin, Madison, Wisconsin). The Institutional Review Board of each participating site approved the study. Informed consent was waived at all institutions as this was a retrospective chart review. Patients undergoing surgical resection of primary or recurrent RPS between 2000 and 2015 were identified. Patients without data regarding their age, patients who underwent palliative resection, and patients with metastatic disease were excluded.

Demographic and clinicopathologic characteristics were analyzed including age, gender, race, body mass index, American Society of Anesthesiologist (ASA) class, functional status, and major preexisting comorbidities (hypertension, diabetes, chronic obstructive pulmonary disease, chronic kidney disease, and congestive heart failure), survival time from diagnosis, and time to tumor recurrence. Patients with multiple comorbidities were defined as those having more than one preexisting comorbidity before surgery. Sarcoma-specific information collected for each patient included the histopathologic type, tumor grade and stage according to seventh edition

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