

Ryuichi Fukuda, Masatake Matsuoka<sup>1</sup>, Tomohiro Onodera<sup>1</sup>, Koji Iwasaki<sup>2</sup>, Dai Sato<sup>3</sup>, Taku Ebata, Yoshiaki Hosokawa, Eiji Kondo<sup>4</sup>, Norimasa Iwasaki<sup>2</sup>

**INTRODUCTION:** Bone sarcomas (BSs) are malignant bone tumors that comprise a variety of histological subtypes and can arise in nearly any part of the body. BSs can occur at any age, relatively tend to be in young people such as adolescents. The 5-year overall survival rate (OS) for localized BSs is approximately 50-75 %. In contrast, patients with metastatic BSs at initial presentation show poorer prognosis. Currently, BSs patients with metastatic lesions are treated by systemic chemotherapy, radiation and possibly with resection of the primary tumor or metastatic lesions. No standard treatment strategy has been devised for BS patients with metastatic lesions along with the variety of clinical presentations. The positive effects of primary tumor resection on survival have been reported in patients with metastatic malignant bone tumors such as osteosarcoma, chondrosarcoma, and Ewing's sarcoma. We, therefore, hypothesized that surgical resection of the primary tumor may improve survival in metastatic patients with BSs. To test this hypothesis, we investigated a population-based cohort from the surveillance, epidemiology, and end results (SEER) database to clarify whether the resection of primary tumor in an extremity among patients with metastatic BSs improved survival.

**RESULTS:** After excluding cases with unknown cancer-specific survival, unknown historic stage, and unknown surgical status, a total of 1,071 patients were enrolled in the study. Among the enrolled patients, 730 (68%) underwent primary tumor resection (Surgery group), while 341 (31%) did not (No-surgery group). The median age at diagnosis was 18 years in the Surgery group and 32 years in the No-surgery group. The five-year CSS was 36% in the Surgery group and 19% in the No-surgery group. The five-year OS was 34% in the Surgery group and 18% in the No-surgery group. To diminish the patient backgrounds differences between the Surgery and No-surgery groups, propensity score matching was performed. After adjusting for patient characteristics, a total of 516 patients were included for analysis (Surgery, 258 patients No-surgery, 258 patients). Survival in Surgery group were almost equal to those in No-surgery group (CSS: Hazard ratio [HR] = 0.88, 95% confidence interval (CI) 0.71–1.01, OS: HR=0.86, 95% CI 0.70–1.05).

A study using the SEER database analyzed 1,071 patients with metastatic lesions and found that primary tumor resection did not improve survival in patients with BSs and metastatic lesions. This contradicts previous findings in metastatic soft-tissue sarcoma, where surgical resection of primary tumors prolonged survival. In conclusion, our study showed that primary tumor resection does not improve survival in cases of metastatic bone sarcomas. These findings highlight the need for further research, including randomized clinical trials with detailed data.

