

Is Surgical Resection of the Primary Site Associated with an Improved Overall Survival for Patients with Primary Malignant Bone Tumors Who Have Metastatic Disease at Presentation?

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Introduction

The management of primary malignant bone tumors in patients with metastatic disease at presentation remains a challenge. Although surgical resection has been a mainstay in the management of non-metastatic malignant bone tumors, there is a lack of large-scale evidence-based guidance on whether surgery of the primary site/tumor improves overall survival in malignant bone tumors with metastatic disease at presentation.

Questions

- Is surgical resection of the primary tumor associated with improved overall survival in patients with primary malignant bone tumors who have metastatic disease at presentation?
- What other factors are associated with improved and/or poor overall survival?

Materials and Methods

- **2004 to 2016 National Cancer Database**
- Patients with primary malignant bone tumors of the extremities and/or pelvis with metastatic disease at presentation.
- The study sample was divided into two distinct groups: those who underwent surgical resection of the primary tumor and those who did not.
- Multivariate Cox regression analyses were used to assess whether undergoing surgical resection of the primary tumor was associated with improved overall survival, after controlling for differences in baseline demographics, tumor characteristics (grade, location, histologic type, and tumor size), and treatment patterns (resection of distant or regional metastatic sites, positive or negative surgical margins, and use of radiation therapy or chemotherapy).

Results

- A total of 2288 patients with primary malignant bone tumors (1121 osteosarcomas, 345 chondrosarcomas, and 822 Ewing sarcomas) with metastatic disease at presentation were included,
- **46% (1053 of 2288) underwent surgical resection of the primary site.**
- Around 33% (348 of 1053) patients undergoing surgical resection of the primary site, also underwent additional resection of metastases.
- After controlling for differences in baseline demographics, tumor characteristics, and treatment patterns, we found that surgical resection of the primary site was associated with reduced overall mortality (hazard ratio 0.42; 95% confidence interval, 0.36-0.49; $p < 0.001$).
- Among other factors, in the stratified analysis, radiation therapy was associated with improved overall survival for patients with:
 - Ewing sarcoma (HR 0.71; 95% CI, 0.57-0.88; $p = 0.002$)
 - But not for those with osteosarcoma (HR 1.14; 95% CI, 0.91-1.43; $p = 0.643$) or chondrosarcoma (HR 1.08; 95% CI, 0.78-1.50; $p = 0.643$).
- Chemotherapy was associated with improved overall survival for those with:
 - osteosarcoma (HR 0.50; 95% CI, 0.39-0.64; $p < 0.001$)
 - chondrosarcoma (HR 0.62; 95% CI, 0.45-0.85; $p = 0.003$)
 - but not those with Ewing sarcoma (HR 0.79; 95% CI, 0.46-1.35; $p = 0.385$).

Conclusions

- Surgical resection of the primary site was associated with an overall survival advantage in patients with primary malignant bone tumors who presented with metastatic disease.
- Further research, using more detailed data on metastatic sites (i.e. size, location, number), chemotherapy regimen and location of radiation (primary or metastatic site) is warranted to better understand the most effective way of ensuring local control in primary malignant bone tumors with metastatic disease at presentation