

Prophylactic Fixation of Metastatic Lesions in Long Bones Extends Patient Survival

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INTRODUCTION: Advancements in the treatment of many cancers and tumor types have led to an increase in the prevalence of metastatic bone disease. When it occurs, the femur and humerus are the two most common long bones affected, often placing patients at risk for pathologic fractures. Prophylactic fixation is a common treatment modality for metastatic lesions. It is therefore important to determine whether prophylactic fixation improves patient survival compared to the fixation of pathologic fractures.

METHODS: The TriNetX Global Collaborative Network is a deidentified patient database; IRB approval was not required. Patients with secondary malignant neoplasms of the respective long bone (humerus or femur) were split into two cohorts. The first cohort included patients who, following their diagnosis of metastasis, underwent prophylactic fixation. The second cohort consisted of patients who, following their diagnosis of a metastatic lesion, had surgical intervention following a pathological fracture. Cohort balancing was performed based on age at index, sex, BMI, HbA1C, and nicotine dependence. Cohort balancing was confirmed by $p > 0.05$ across all covariates. The primary outcomes analyzed were median survival (days) and survival probability at 730 days, compared between cohorts. A p -value < 0.05 was considered statistically significant.

RESULTS: For patients with metastatic disease of the femur, 1,342 patients were obtained in each cohort. Patients with prophylactic fixation of the femur had a median survival 92 days longer than those undergoing fixation after a pathologic fracture. Overall survival probability was significantly higher in patients with prophylactic fixation by 2.49% ($p = 0.0208$). For humeral metastases, 467 patients were obtained in each cohort. Patients with prophylactic fixation had a median survival 233 days longer than those fixed after fracture ($p < 0.0061$) and demonstrated an 8.66% increase in 2-year survival probability ($p < 0.0061$). (Figures 1,2)

DISCUSSION: This is the first study using a world database to demonstrate increased survival with prophylactic fixation of the femur and humerus in the setting of metastatic disease. Our findings suggest that prophylactic fixation of metastatic lesions in long bones is associated with significantly improved survival compared to fixation after fracture.

SIGNIFICANCE/CLINICAL RELEVANCE: Prophylactic fixation of femoral and humeral metastases extends patient survival and may lower the threshold for surgical stabilization before fracture in patients with metastatic bone disease.

FIGURES:

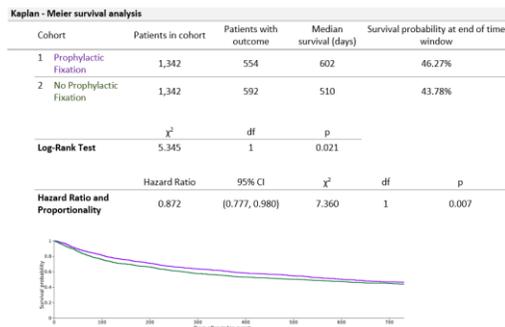


Figure 1: Kaplan-Meier survival analysis comparing prophylactic fixation of the femur to pathologic fracture fixation.

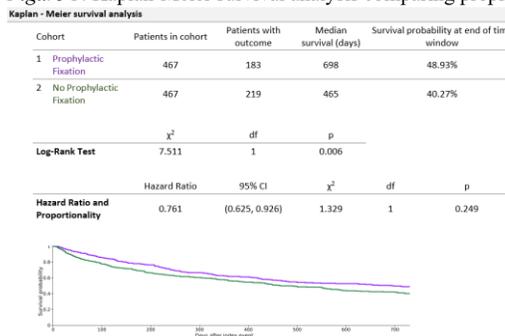


Figure 2: Kaplan-Meier survival analysis comparing prophylactic fixation of the humerus to pathologic fracture fixation.