Clinical and Pathologic Factors In Breast Cancer Patients with Bone Metastases Undergoing Surgery for Pathologic and Impending Fractures

Emily Bochner, Kerith Wang1, Benjamin Leiby2, Ayako Miura2, and Dr. Wm. Kevin Kelly1
1Medical Oncology, 2Division of Biostatistics

Introduction and Objective

Bone is the most common place for breast cancer to metastasize. Metastatic lesions to bone not only carry a poor prognosis, but can also be responsible for significant morbidity in patients, including pain, fractures, and decreased quality of life. Pathologic or impending fractures in these patients may require emergent surgical evaluation.

Not all patients who develop metastatic breast cancer with bone lesions develop pathologic or impending fractures. This project sought to identify the characteristics of a population of breast cancer patients with bone lesions who experienced pathologic or impending fractures.

The goal of this project was two-fold:

- Identify clinical and pathologic characteristics in breast cancer patients with metastatic bone lesions who underwent surgery for pathologic or impending fractures
- Evaluate potential associations between these clinical and pathologic characteristics with the occurrence of pathologic or impending fractures

Methods

We evaluated the Bone Biorepository Bank at Sidney Kimmel Cancer Center. This database is comprised of 140 patients with primary or metastatic bone lesions who underwent standard of care surgery. We identified a cohort of 20 breast cancer patients with metastatic lesions to bone who underwent surgery for pathologic or impending fractures. We evaluated the clinical and pathologic characteristics of the patients and their tumors:

- Clinical factors
  - Age
  - Smoking History
  - Systemic treatment prior to surgery
  - Radiation to tumor sample prior to surgery
  - Time from diagnosis to surgery
- Pathologic factors
  - Stromal proliferative response
  - Tumor burden

We analyzed the clinical characteristics of this group, and performed Fisher’s Exact Testing to determine any associations between the pathologic characteristics of the tumor specimens and the occurrence of pathologic or impending fractures.

Results

Among the 20 patients in our study...

- 90% of patients received systemic chemotherapy prior to surgery
- 15% of patients had bone directed radiation prior to surgery
- 40% of patients had a history of smoking
- 35% of patients underwent surgery for a pathologic fracture and 65% of patients underwent surgery for an impending fracture
- The average time between diagnosis to surgery was 6.21 years
- The average patient age was 63 years
- 60% of the tumor specimens demonstrated medium or high tumor burden
- 70% of the tumor specimens demonstrated a medium or high stromal proliferative response

Based on the results obtained from Fisher’s exact test, neither the differences in proportions of level of tumor burden by the main reason for surgery (p-value: 0.09) nor the differences in proportions of level of stromal proliferative response by the main reason for surgery (p-value: 0.06) reached statistical significance.

Conclusions

Breast cancer patients undergoing surgery for boney metastasis were noted to have a wide range of ages and time from diagnosis to surgery.

While there was a higher percentage of patients with tumors of high and medium tumor burden and stromal proliferative response, this trend was not found to be statistically significant.

Future studies with larger sample sizes are required to determine the relationship between these features. Additionally, more research is needed in order to explore the differences between breast cancer patients with metastatic bone lesions who experienced fractures versus those who did not experience fractures.

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References