Real-world outcomes comparing zoledronic acid and pamidronate in patients with metastatic breast cancer with bone metastases: A propensity score matched analysis from a global federated health research network

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INTRODUCTION

- Breast cancer most commonly metastasizes to the bones, with bone pain and other skeletal related events (SREs) having a limiting effect on quality of life.
- Bisphosphonates are widely used in breast cancer patients to reduce SREs and bone loss, particularly in those with bone metastases or receiving endocrine therapy.
- We aim to study the real world comparative data between two widely used bisphosphonates in clinical practice, zoledronic acid and pamidronate, along with evaluation of their toxicity profiles.

METHODS

- A retrospective cohort study was conducted using the US Collaborative Network TriNetX, covering January 2000 to December 2023, and encompassing data from 105 global healthcare organizations.
- Female patients aged 18 and above with breast cancer metastatic to the bone were identified and then stratified into two groups based on treatment with zoledronic acid or pamidronate.
- The two groups were then propensity-matched based on age, sex, race, and comorbidities.
- We followed these patients for 5 years to assess outcomes, including mortality, osteoporotic fracture, hypercalcemia, pathological fracture, fall, and osteonecrosis.

RESULTS

- We identified 7887 patients in the zoledronic acid cohort and 635 patients in the pamidronate cohort.
- After propensity matching, each cohort consisted of 625 patients with similar baseline characteristics.
- The average age was 66.4 years in zoledronic acid cohort and 69.1 in the pamidronate cohort.
- In the zoledronic acid cohort, the ethnicity distribution was 74.68 % White, 11.55% African American, and 6.36% Hispanic. In contrast, the pamidronate group had an ethnicity distribution of 63.04% White, 20.64% African American, and 8.16% Hispanic.
- Our analysis found that within 5 years, patients with breast cancer metastatic to the bone who received zoledronic acid had a significantly lower risk of:
  - Mortality
  - Osteoporotic fracture
  - Hypercalcemia
  - Pathological fracture
- The zoledronic acid group had a higher risk of falls compared to pamidronate.
- There was no statistically significant difference in the occurrence of osteonecrosis between the two cohorts.

TABLE 1: Outcomes among patients with breast cancer metastatic to the bone who received zoledronic acid compared to pamidronate

Outcomes	HR; RD	95% CI	p-value
Mortality	HR 0.593	0.509-0.691	<0.001
Osteoporotic fracture	RD -5.28%	-7.65 to -2.90	<0.001
Hypercalcemia	HR 0.262	0.212 - 0.323	0.001
Pathological fracture	RD -6.88%	-10.69 to -3.07	<0.001
Risk of falls	RD 3.52%	0.518 to 6.522	0.021

HR Hazard Ratio; RD* Risk Difference*

CONCLUSIONS

- Our study revealed that patients with breast cancer with metastatic disease to the bone who received zoledronic acid had significantly lower rates of mortality, osteoporotic fracture, hypercalcemia, and pathological fracture compared to those receiving pamidronate.
- Additional longitudinal cohort studies are imperative to explore the outcomes between these agents and inform clinical practice guidelines.

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