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Radiation Utilization Trends in the Treatment of Brain Metastases from Non-Small Cell Lung Cancer

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Categories: Neurosurgery, Radiation Oncology
Keywords: srs, wbrt, stereotactic radiosurgery, nsclc

How to cite this abstract
Modh A, Burmeister C, Elshaikh M A, et al. (November 02, 2017) Radiation Utilization Trends in the Treatment of Brain Metastases from Non-Small Cell Lung Cancer. Cureus 9(11): a229

Abstract

Objectives: Brain metastases are the most common intracranial tumor, affecting up to 40% of all patients with cancer. More than half of these cases are lung cancer metastases. Radiation treatment utilization patterns in this group of patients have not been well elucidated. We evaluated trends in the use of WBRT and SRS in the treatment of brain metastasis from non-small cell lung cancer (NSCLC) using the National Cancer Database (NCDB).

Methods: The NCDB was used to identify patients > 18 years old with metastatic NSCLC who were treated with SRS to the brain or WBRT between 2004 and 2014. Patients receiving radiation within the range of 12–24 Gy in 1 fraction were classified as SRS and those who received 30 Gy in 10 fractions, 20 Gy in 5 fractions, or 37.5 Gy in 15 fractions were classified as WBRT. Patients who did not receive a radiotherapy dose to the brain within these ranges were excluded. Chi-square test, t-test, and multivariable logistic regression analysis were used to compare potential demographic, clinicopathologic, and health care system predictors of SRS versus WBRT.

Results: Of 40,803 patients identified, 34,183 (83.8%) received WBRT and 6,620 (16.2%) received SRS. Over time, the proportion of patients receiving SRS increased from 7% (152 cases) in 2004 to 37% (1,346 cases) in 2014 ($p < 0.001$). The proportion of patients undergoing SRS delivered by linear accelerator versus Gamma Knife increased from 13% in 2004 to 29% in 2014 ($p < 0.001$). SRS was utilized more by academic than community facilities (overall 22% versus 13%, $p < 0.001$). On multivariable analysis, the strongest independent predictors of SRS use included year of diagnosis in 2010-2014 versus 2004–2009 (odds ratio [OR] 2.62, 95% confidence interval [CI] 2.46-2.79, $p <0.0001$), metropolitan versus rural location (OR 2.26, 95% CI 1.79-2.85, $p <0.0001$), distance from cancer-reporting facility of = 30 versus < 30 miles (OR 2.36, 95% CI 2.18–2.56, $p <0.0001$), private insurance versus non-insured patients (OR 1.96, 95% CI 1.68-2.29, $p <0.0001$), and academic versus community facility type (OR 1.76, 95% CI 1.66-1.87, $p <0.0001$).

Conclusions: The use of SRS for NSCLC brain metastases has steadily increased over time in the United States, especially in the academic setting, but WBRT remains the most commonly used radiation treatment modality. Wide geographic and socioeconomic variation exists in the utilization of SRS and WBRT for this patient population.

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Published 11/02/2017