

Is Upfront Stereotactic Radiotherapy More Effective Than Post-Operative Treatment in Brain Metastases?

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Abstract

Published 02/11/2022

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Categories: Radiation Oncology

Keywords: radiotherapy, stereotactic radiosurgery, brain metastasis

How to cite this abstract

Mousli A, Yahyeoui S, Mahjoubi K, et al. (February 11, 2022) Is Upfront Stereotactic Radiotherapy More Effective Than Post-Operative Treatment in Brain Metastases?. Cureus 14(2): a748

Abstract

Objective: Postoperative stereotactic radiotherapy (SRT) for brain metastases (BM) improve local control (LC) with preserving neurocognitive function comparing to whole Brain radiotherapy. However, even with surgery and SRT, rates of local recurrence may be still high especially for larger cavities, and there is also a known risk of leptomeningeal disease (LMD) in post-operative setting. Neoadjuvant SRT has been demonstrated to minimize these potential sequelae in several study. We aim to describe the benefit of this upfront approach through a literature review.

Methods: We review recent multi-institutional trial comparing preoperative and post-operative SRT for BM.

Results: The first prospective pre-operative SRT study was published by Asher et al. 47 patients, and the results showed 6 and 12-month LC rate of 97.8 and 85.6% respectively. Subsequently Patel et al. performed a multi-institutional retrospective comparison of outcomes and toxicities and demonstrated any statistical difference in the rates of local, distant brain recurrence as well as overall survival but the pre-operative SRT was related to significantly lower rates of symptomatic radionecrosis (RN) (4.9% vs. 16.4%, $p=0.01$) and LMD (3.2% vs. 16.6%, $p=0.01$). In addition, another potential advantage of pre-operative SRT is a theoretical increased response to radiation due to intact vasculature and greater peri-tumoral oxygen content since more radiobiological effective than postoperative SRT. In the other hand, reducing the target volume to a well enhancing lesion may lead to dose escalation without increasing RN risks and avoid target miss with dynamic operative cavities changes. Surgery was performed around 48 hours after RT and there was no proof of higher perioperative complications rate in most of studies.

Conclusion: Neoadjuvant SRT can improve accuracy of target volume delineation and decrease the volume of irradiated normal tissue reducing toxicity. It has emerged as a promising sequencing management approach. Ongoing trials will further explore this treatment method.