# Postoperative stereotactic radiosurgery for brain metastases

see also Preoperative stereotactic radiosurgery for brain metastases

- Population-Based Real-World Outcomes of Post-Operative Adjuvant Brain Cavity Radiotherapy Versus Observation
- Impact of Extent of Resection on Survival in Brain Metastasis: An Analysis of 867 Patients
- Therapy, Safety, and Logistics of Preoperative vs Postoperative Stereotactic Radiation Therapy: A Preliminary Analysis of a Randomized Clinical Trial
- A prospective study of minimally invasive keyhole craniotomy and stereotactic brachytherapy for new brain oligometastases
- Prognostic factors after salvage resection for local progression of brain metastases after radiotherapy
- Hypo-Fractionated Radiotherapy to the Cavity for Resected Brain Metastases: A UK Series
- Preoperative Stereotactic Radiosurgery for Brain Metastases: A Single-Institution Experience
- Interventional stereotactic radiotherapy (brachytherapy) for unresected brain metastases: Systematic review of outcome and toxicity

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Whole brain radiotherapy for intracranial metastases (WBRT) is the standard of care to improve intracranial control following brain metastases surgery. However, stereotactic radiosurgery (SRS) to the surgical cavity is widely used in an attempt to reduce cognitive toxicity, despite the absence of high-level comparative data substantiating efficacy in the postoperative setting [1)]

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Postoperative stereotactic radiosurgery for brain metastases is typically done when surgery alone is not able to completely remove the tumor, or when there is a high risk of tumor recurrence. SRS can be used as a boost treatment after surgery, to target any remaining cancer cells and reduce the likelihood of recurrence.

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It is typically planned on a post-recovery MRI, 2-4 weeks after resection. However, the intracranial metastasis may (re-)grow in this period. Planning SRS directly on the post-operative MRI enables shortening this time interval, anticipating the start of adjuvant systemic therapy, and so decreasing the chance of extracranial progression. The MRI-Linac (MRL) allows the simultaneous execution of the post-operative MRI and SRS treatment.Direct post-operative MRL-based SRS for resection cavities of brain metastases is dosimetrically acceptable, with the advantages of increased patient comfort and logistics. Clinical benefit of this workflow should be investigated given the dosimetric plausibility [2)].

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Significant heterogeneity exists in target volumes for postoperative stereotactic radiosurgery.

The standard therapy for brain metastasis was surgery combined with whole brain radiotherapy (WBRT). The latter is however, associated with important neurocognitive toxicity. To reduce this

toxicity, postoperative stereotactic radiosurgery (SRS) is a promising technique.

Decline in cognitive function was more frequent with WBRT than with SRS and there was no difference in overall survival between the treatment groups. After resection of a brain metastases, Stereotactic radiosurgery should be considered one of the standards of care as a less toxic alternative to WBRT for this patient population [3].

Postoperative stereotactic radiosurgery to the resection cavity safely and effectively augments local control of large brain metastases. Patients with <4 metastases and controlled systemic disease have significantly lower rates of distant brain failure (DBF) and are ideal treatment candidates [4].

[1], [3]
Brown PD, Ballman KV, Cerhan JH, Anderson SK, Carrero XW, Whitton AC, Greenspoon J, Parney IF, Laack NNI, Ashman JB, Bahary JP, Hadjipanayis CG, Urbanic JJ, Barker FG 2nd, Farace E, Khuntia D, Giannini C, Buckner JC, Galanis E, Roberge D. Postoperative stereotactic radiosurgery compared with whole brain radiotherapy for resected metastatic brain disease (NCCTG N107C/CEC·3): a multicentre, randomised, controlled, phase 3 trial. Lancet Oncol. 2017 Aug;18(8):1049-1060. doi: 10.1016/S1470-2045(17)30441-2. Epub 2017 Jul 4. PMID: 28687377; PMCID: PMC5568757.

[2]
Seravalli E, Sierts M, Brand E, Maspero M, David S, Philippens MEP, Voormolen EHJ, Verhoeff JJC. Dosimetric feasibility of direct post-operative MR-Linac-based stereotactic radiosurgery for resection cavities of brain metastases. Radiother Oncol. 2022 Dec 30;179:109456. doi: 10.1016/j.radonc.2022.109456. Epub ahead of print. PMID: 36592740.

[4]
Ling DC, Vargo JA, Wegner RE, Flickinger JC, Burton SA, Engh J, Amankulor N, Quinn AE, Ozhasoglu C, Heron DE. Postoperative stereotactic radiosurgery to the resection cavity for large brain metastases: clinical outcomes, predictors of intracranial failure, and implications for optimal patient selection. Neurosurgery. 2015 Feb;76(2):150-7. doi: 10.1227/NEU.0000000000000584. PubMed PMID: 25549189.