

# Surgical Cavity Constriction after Resection of Brain Metastases

Matthew Potts; Michael William McDermott MD; Penny Sneed; Jugal Kaushik Shah University of California, San Francisco Department of Neurological Surgery



# Introduction:

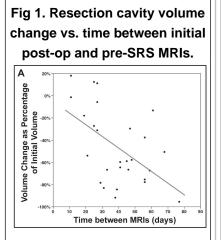
Stereotactic radiosurgery (SRS) to a surgical cavity after brain metastasis resection is a promising treatment for local control. The optimal timing of adjuvant SRS, however, has yet to be determined. Changes in resection cavity volume (RCV) and local progression in the interval between surgery and SRS are likely important factors in the decision when to proceed with adjuvant SRS.

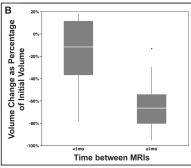
### Methods

We conducted a retrospective review of patients with a brain metastasis treated with surgical resection followed by SRS to the resection cavity. Post-operative and preradiosurgery magnetic resonance imaging (MRI) were reviewed for evidence of cavity volume changes and local tumor progression. Resection cavity volume was measured using volumetric analysis.

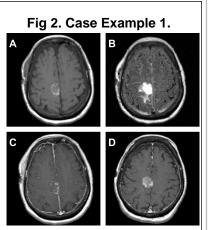
### Conclusions

These data suggest that the surgical cavity after brain metastasis resection constricts with time with greater constriction seen in patients whose pre-SRS imaging is =1mo after initial post-operative imaging. The benefits of waiting in order to treat a smaller resection cavity, however, must be weighed against the risk of local tumor progression.

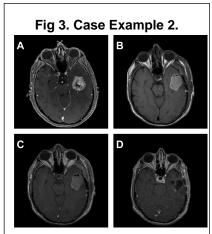




(A) Scatter plot comparing change in RCV v. time between initial post-op & pre-SRS planning MRI. Best-fit line (R2=0.28) shows general trend towards cavity volume constriction with time. (B) Box & whisker plot comparing change in volume of patients with MRI interval <1mo vs. =1mo. Mean between two groups was significantly different (p=0.0001). Upper and lower vertical lines represent highest and lowest data points, respectively, falling within 1.5\*interquartile range.



This 62 year-old female underwent gross total resection of a right parietal small-cell lung carcinoma metastasis with planned adjuvant gamma knife radiosurgery. Her initial postoperative T1-weighted MRI (A) showed a resection cavity volume of 7.2cm^3 with 11.72cm^3 of surrounding edema on T2weighted imaging (B). No enhancement was seen within the initial resection cavity (C). Her pre-SRS MRI was performed 19 days later and revealed a resection cavity 5.9cm^3 (D), resulting in a volume reduction of 18%. The resection cavity also had evidence of local tumor progression on contrastenhanced imaging (D).



This 58 year-old male underwent gross total resection of a left temporal renal cell carcinoma metastatsis with planned cyber knife radiosurgery. A) Preoperative contrast-enhanced T1weighted MRI. Initial postoperative T1-weighted imaging

(B) showed a largely blood-filled resection cavity with a volume of 18.1cm^3. There was no residual enhancement seen on a contrastenhanced T1-weighted image. A pre-SRS planning MRI was performed 59 days later and revealed a resection cavity of 5.9cm^3 (67% volume reduction) with no evidence of tumor progression on contrastenhanced T1-weighted imaging (D).

# Results

We identified 27 consecutive patients with a brain metastasis treated with surgical resection and radiosurgery to the resection cavity. Mean age was 56 years. The most common site of metastasis was the frontal lobe (44%) and the most common primary neoplasms were melanoma (30%) and lung adenocarcinoma (26%). The mean post-operative resection cavity volume was 7.2 cm^3 and shrank to a mean of 3.9 cm^3 at time of repeat imaging for radiosurgical planning (median 39 days after initial postoperative MRI), resulting in a mean reduction in cavity volume of 47%. Patients who underwent pre-SRS imaging within 1 month of their initial post-operative MRI had a mean volume reduction of 17% compared to 64% in those whose pre-SRS imaging was =1mo (p=0.0001). During the interval between MRIs, 46% of patients showed evidence of tumor progression within the resection cavity wall.

### Selected References

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