

Tumor Progression in Patients Receiving Adjuvant Whole-Brain Radiotherapy vs. Localized Radiotherapy After Surgical Resection of Brain Metastases.

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Introduction

We examined the effect of postsurgical whole brain radiotherapy (WBRT) vs. localized radiotherapy (LRT), including stereotactic radiosurgery (SRS) and intraoperative radiotherapy (IORT) on the rate of recurrence both local and distal to the resection site in the treatment of brain metastases.

Methods

Data were obtained from the Cleveland Clinic Brain Tumor Database on patients who underwent surgical resection for brain metastases between Feb, 2004 and Jan, 2012. Patients who received adjuvant WBRT, SRS, or IORT were included. Patients with non-metastatic lesions, who received radiotherapy prior to surgery, or lacked follow-up imaging studies were excluded.

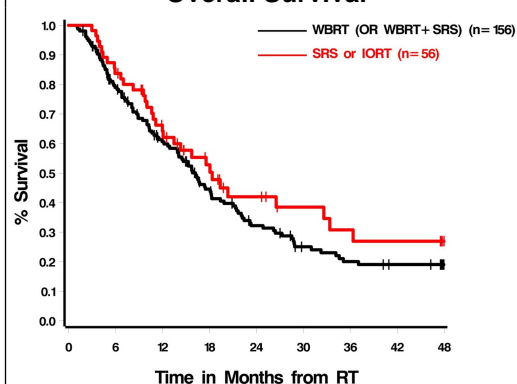
The final analysis included 212 patients. Of these, 156 were included in the WBRT group for analysis, including 12 who received both WBRT and SRS. In the LRT group, 37 patients received SRS and 19 patients received IORT only as adjuvant. Because a large number of patients died without recurrence or progression of their metastatic lesions, we used competing-risks methodology to assess the rate of recurrence between groups. All research activity was conducted under IRB approval.

Table 1

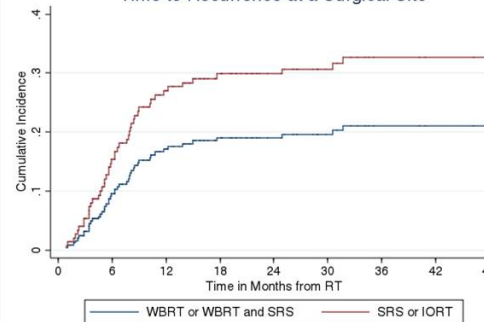
Factor	WBRT ¹ (n=156)	SRS (n=37)	IORT (n=19)
Age at time of brain mets	58 (30-83)	60 (45-82)	60 (40-74)
<60 (%)	91 (58)	18 (49)	8 (42)
≥60 (%)	65 (42)	19 (51)	11 (58)
Gender			
Male (%)	62 (69)	17 (46)	11 (58)
Female (%)	94 (77)	20 (54)	8 (42)
Primary Cancer²			
NSCLC (%)	78 (52)	22 (61)	8 (42)
Melanoma (%)	17 (11)	4 (11)	1 (5)
Breast (%)	24 (16)	3 (8)	3 (16)
Other	31 (21)	7 (19)	7 (37)
No. Lesions			
1 (%)	83 (53)	23 (62)	19 (100)
2-3 (%)	52 (33)	14 (38)	0
>3 (%)	21 (13)	0	0
No. Lesions Resected			
1 (%)	135 (87)	36 (97)	19 (100)
2 (%)	17 (11)	1 (3)	0
3 (%)	4 (3)	0	0
Average Tumor Diameter (cm)	3.2 (1.1 - 6.9)	2.7 (0.9 - 5.0)	2.6 (0.8 - 4.8)
Initial KPS			
90-100 (%)	48 (31)	5 (9)	2 (11)
80	58 (38)	7 (19)	11 (58)
≤70	47 (31)	25 (68)	6 (31)
GPA			
≤1 (%)	32 (21)	2 (5)	0
1.5 - 2.5 (%)	85 (54)	15 (41)	11 (58)
3.0 (%)	28 (18)	16 (43)	7 (37)
>3.0 (%)	11 (7)	4 (11)	1 (5)
RPA Group			
1 (%)	30 (19)	9 (24)	3 (16)
2 (%)	115 (74)	25 (68)	15 (79)
3 (%)	11 (7)	3 (8)	1 (7)

Given as 'mean ± standard deviation', or 'N (%)', as appropriate.
¹ Includes 12 patients who were also treated with SRS as adjuvant.
² Missing for 3 patients

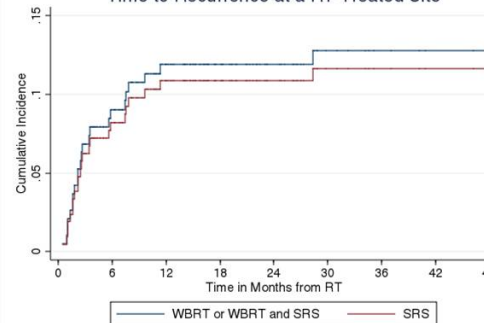
Overall Survival



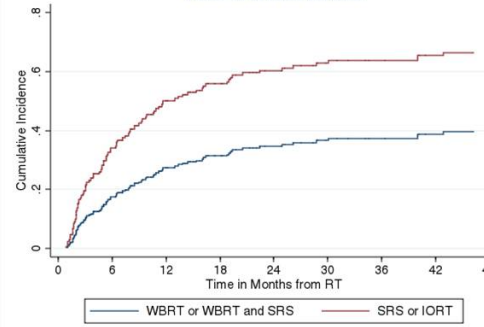
Time to Recurrence at a Surgical Site



Time to Recurrence at a RT-Treated Site



Time to a New Lesion



Results

Multivariable analysis found no significant difference in the rate of recurrence at the resection site (HR 1.46, p=.26) or of unresected radiotherapy-treated lesions (HR 1.70, p=.41) for LRT vs. WBRT. There was an increased hazard of development of new lesions (HR 2.41, p<.0001) and of leptomeningeal disease (HR 2.45, p=.04) for patients treated with LRT. Median overall survival was estimated to be 16.5 months and was not found to be significantly different for patients treated with LRT vs. WBRT (HR 0.96, p=.83).

Conclusions

LRT compared to WBRT after surgical resection of brain metastases is associated with an increased rate of development of new lesions and leptomeningeal disease, but not with recurrence at resection sites, progression of unresected lesions treated with radiotherapy, or a difference in overall survival. Our study incorporated an observational, retrospective design; it is possible our results were influenced by confounding variables unavailable in our registry. In addition, the LRT group had relatively fewer patients, which may have diminished our ability to discriminate outcomes between groups. However, larger studies or a major randomized trial investigating this question have not yet been performed. More study is warranted to explore the impact of adjuvant choice on tumor control.