Prognostic Factors that Predict Durable Response and Survival with Salvage Radiosurgery for Brain Metastases

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Disclosures

• No conflicts to declare
Introduction

• At present, there are no guidelines for the role of salvage SRS and no criteria to guide selection of appropriate candidates for this salvage treatment¹

• Particularly following prior whole brain radiotherapy, SRS may be offered more liberally with the aim of limiting toxicity of repeat whole brain radiation
Purpose

• To evaluate the clinical outcomes following salvage SRS following prior brain radiotherapy (SRS and/or WBRT)

• To identify which patient, tumor, or treatment-related factors are predictive of better outcomes
Methods: Patient Selection

- Retrospective review from an established prospective REB approved Brain Oligometastases Database

113 patients reviewed for eligibility

Eligibility: Patients treated with salvage SRS from 2006-2011 following whole brain RT or SRS alone

2 patients excluded: did not ultimately receive salvage SRS

111 eligible patients were included in the analysis
Data Analysis

- **Data collection:** patient demographics (age, performance status, and extracranial control), tumor (histology), and treatment data (prior RT dose, fractionation, and timing; and salvage SRS dose)

- **Endpoints:**
  - LC = time from salvage SRS to first date of radiological progression of the treated tumor(s)
  - PFS = time from salvage SRS to date of any intracranial progression or death
  - OS = date of salvage SRS treatment to date of death

- **Statistical Analysis:** Univariate and multivariable analyses
# Patient Demographics at Salvage SRS

<table>
<thead>
<tr>
<th>Category</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Male: 33% Female: 67%</td>
</tr>
<tr>
<td>Age</td>
<td>Mean 57.9 years (range 32-88)</td>
</tr>
<tr>
<td>Histology</td>
<td>Lung: 49.6% Breast: 20.7% Other: 29.7%</td>
</tr>
<tr>
<td>Extracranial Disease Status</td>
<td>Controlled: 47.7% Uncontrolled: 33.3% Unspecified: 18.9%</td>
</tr>
<tr>
<td>Performance Status</td>
<td>ECOG 0 – 1: 78.4% ECOG 2 – 3: 14.4% Unspecified: 7.2%</td>
</tr>
<tr>
<td>Number of Metastases Treated</td>
<td>Mean: 2 per patient (range 1-12)</td>
</tr>
<tr>
<td>Dose Delivered per Metastasis</td>
<td>Median: 21 Gy (range 12-24 Gy)</td>
</tr>
<tr>
<td>Follow-up</td>
<td>Median: 241 days (range 0 – 2054)</td>
</tr>
</tbody>
</table>
Local Control of Mets Treated with Salvage SRS

Cumulative Incidence Function

- Local Progression
- Death without Progression

Time to Local Progression (Months)

Cumulative Incidence Function

0.0  0.2  0.4  0.6  0.8  1.0

0  10  20  30  40
Survival from Initial Diagnosis of Brain Metastasis

Figure 3: Survival from Initial Date of Brain Metastases Diagnosis

Median Survival from Date of Initial Brain Metastases Diagnosis:
22.2 months (Range: 4.1-82.4 months)
Overall Survival Following Salvage SRS

Median OS from salvage SRS:
12.7 mos (95% CI 10.0, 20.6)
## Summary of Outcomes Following Salvage SRS

<table>
<thead>
<tr>
<th>Time</th>
<th>OS</th>
<th>LC</th>
<th>PFS</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 mos</td>
<td>70.2%</td>
<td>82.6%</td>
<td>52.5%</td>
</tr>
<tr>
<td>1 yr</td>
<td>56.5%</td>
<td>58.4%</td>
<td>21.7%</td>
</tr>
<tr>
<td>2 yrs</td>
<td>28.9%</td>
<td>45.2%</td>
<td>4.6%</td>
</tr>
<tr>
<td>3 yrs</td>
<td>25.3%</td>
<td>42.5%</td>
<td>2.3%</td>
</tr>
</tbody>
</table>
# Prognostic Factors Affecting Survival

<table>
<thead>
<tr>
<th>Variable</th>
<th>Multivariable Analysis $p$-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>0.034</td>
</tr>
<tr>
<td>ECOG (0,1 vs. 2,3)</td>
<td>0.016</td>
</tr>
<tr>
<td>Extracranial Control</td>
<td>0.022</td>
</tr>
<tr>
<td>Intracranial Control</td>
<td>0.031</td>
</tr>
</tbody>
</table>
Discussion

• As patients survive longer with brain metastatic disease, the management of recurrent brain metastases is a growing challenge.

• In our study, salvage SRS was associated with prolonged survival and with durable local control.
  
  – Median OS of 12.7 months from time of salvage SRS
  – 3-year OS: 25.3%
  – 2-year LC: 45%

• Further prospective investigations of salvage SRS for brain metastases should aim to measure its impact on QoL and treatment-related toxicity.
Conclusions

Salvage SRS is an effective treatment for recurrent brain metastases, particularly in selected patients:

Young patients with good performance status and controlled extracranial disease
Thank you

Questions