SRS vs. WBRT + SRS for 1 to 4 Brain Metastases Individual Patient Data (IPD) Meta-Analysis

Arjun Sahgal
Sunnybrook Health Sciences Centre, University of Toronto, Toronto, Canada
Princess Margaret Cancer Centre, University of Toronto, Toronto, Canada

Hidefumi Aoyama M.D. Ph.D.
Niigata University Graduate School of Medical and Dental Sciences, Niigata, Japan

Martin Kocher M.D.
University of Cologne, Cologne, Germany

Binod Neupane Ph.D.
McMaster University, Hamilton, Canada

Sandra Collette Ph.D.
European Organisation for Research and Treatment of Cancer - Headquarters (EORTC HQ), Belgium

Masao Tago M.D.
Teikyo University, Misonokuchi Hospital, Kanagawa, Japan

Prakesh Shah M.D.
Mount Sinai Hospital, University of Toronto, Canada

Joseph Beyene Ph.D.
McMaster University, Hamilton, Canada

Eric Chang M.D.
University of Southern California, Los Angeles, California
MD Anderson Cancer Center, Houston, Texas
Methods

• Individual Patient Data (IPD) meta-analysis of the 3 RCTs (Japanese, EORTC, MDACC) comparing stereotactic radiosurgery (SRS) alone to whole brain radiotherapy (WBRT) plus SRS for patients presenting with 1 to 4 brain metastases

• Aim was to determine the effect of treatment on overall survival, distant brain control, and local control
  • Adjusted a priori for co-variates:
    • Age
    • RPA (Recursive Partioning Analysis Score)
    • Number of brain metastases (1 vs ≥2)

• Restricted inclusion to those with RPA 1 or 2 and KPS ≥70
  • Final cohort: 364 patients
  • Median follow-up and survival: 9.2 months
Overall survival significantly increased with SRS alone in patients age 35-50 relative to their age matched cohort treated with WBRT+ SRS.
Local failure significantly increased with SRS alone for ages 45-70 relative to their age matched cohort treated with WBRT+ SRS.
Distant brain failure significantly greater with SRS alone for age ≥55 relative to their age matched cohort treated with WBRT+ SRS.
Conclusions

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Aggregate Meta-analysis*</th>
<th>IPD Meta-analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall survival</td>
<td>No survival benefit for WBRT + SRS</td>
<td>SRS alone favored for age ≤50</td>
</tr>
<tr>
<td>Local control</td>
<td>WBRT + SRS favored</td>
<td>WBRT + SRS favored</td>
</tr>
<tr>
<td>Distant brain control</td>
<td>WBRT + SRS favored</td>
<td>WBRT + SRS favored for age ≥55</td>
</tr>
</tbody>
</table>

- Our overall survival results support treatment with SRS alone and not WBRT + SRS for patients age ≤ 50
- Spare these patients the adverse effects of WBRT

*Tsao, Xu, Sahgal. A meta-analysis evaluating stereotactic radiosurgery, whole brain radiotherapy, or both for patients presenting with a limited number of brain metastases. Cancer. 118(9), 2486-93 ,2011.
Conclusions

• Recent RCT’s have confirmed the detrimental effects of WBRT on both neurocognition and quality of life (Chang et al., Sun et al, Soffietti et al.):
  • OS favoring SRS alone in younger patients (age ≤50) may be explained by the lack of benefit of WBRT with respect to distant brain control while exposing them to the toxicities of worse memory function and harming QOL