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Lung

Stereotactic radiosurgery versus whole brain radiotherapy in patients with intracranial metastatic disease and small-cell lung cancer: a systematic review and meta-analysis

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BACKGROUND

Patients with small-cell lung cancer (SCLC) are at high risk for intracranial metastatic disease (IMD). Although stereotactic radiosurgery (SRS) has supplanted whole brain radiotherapy (WBRT) as first-line treatment for IMD in most solid cancers, WBRT remains first-line treatment for IMD in patients with SCLC. We aimed to evaluate the efficacy of SRS in comparison with WBRT and assess treatment outcomes following SRS.

METHODS

In this systematic review and meta-analysis, we searched MEDLINE, Embase, CENTRAL, and grey literature sources for controlled trials and cohort studies published in English reporting on SRS for IMD treatment in patients with SCLC from inception to March 23, 2022. Studies were excluded that did not report on SRS for IMD secondary to SCLC. Summary data were extracted. The primary outcome was overall survival, presented as pooled hazard ratios (HR) through random-effects meta-analysis for studies comparing SRS with WBRT with or without SRS boost, and as medians for single-arm SRS studies. This study is registered with the Open Science Framework, DOI 10.17605/OSF.IO/8M4HC, and PROSPERO, CRD42021258197.

FINDINGS

Of 3823 identified records, 31 were eligible for inclusion; seven were included in the meta-analysis. Overall survival following SRS was longer than following WBRT with or without SRS boost (HR 0.85; 95% CI 0.75-0.97; n=7 studies; n=18 130 patients), or WBRT alone (0.77; 0.72-0.83; n=7 studies; n=16 961 patients), but not WBRT plus SRS boost (1.17, 0.78-1.75; n=4 studies; n=1167 patients). Using single-arm studies, pooled median overall survival from SRS was 8.99 months (95% CI 7.86-10.16; n=14 studies; n=1682 patients). Between-study heterogeneity was considerable when pooled among all comparative studies ($I^2=71.9\%$).

INTERPRETATION

These results suggest survival outcomes are equitable following treatment with SRS compared with WBRT in patients with SCLC and IMD. Future prospective studies should focus on tumour burden and differences in local and distant intracranial progression between WBRT-treated and SRS-treated patients with SCLC.