

Introduction

There are two published prognostic scales for brain metastasis (BM) patients undergoing radiosurgery that take into consideration the volume of the tumor treated. The score index for radiosurgery (SIR) inputs the largest tumor volume treated as a survival predictor while the cumulative intracranial tumor volume (CITV) inputs the total cumulative volume of the tumors treated. It remains unclear whether one scale is superior in terms of predicting survival.

Methods

We compared the sensitivity and specificity of SIR and CITV scales in predicting one year survival using standard measures of continuous Net Reclassification Index (NRI>0) and Integrated Discrimination Improvement (IDI). The analysis was performed in two independent cohorts: 3020 BM patients treated at either the University of California San Diego (UCSD) or the Katsuta Hospital Mito Gamma House (KHMGH), and a second cohort of 3040 patients treated at Chiba/Tsukiji (CT) hospital.

Learning Objectives

CITV outperforms SIR model as a prognostic scale for brain metastasis patients undergoing SRS.

Results

In both cohorts, models incorporating age, karnofsky performance score, presence of extracranial disease, number of metastases and CITV performed better than models where CITV was replaced with the largest tumor volume. In the first cohort, models incorporating CITV showed a Net Reclassification Index (NRI>0) improvement 0.2416 (95% CI 0.1637 - 0.3194) and Integrated Discrimination Improvement (IDI) of 0.0029 (95% CI 0.0001 - 0.0064) relative to models incorporating the largest lesion size. Similar results were observed in the second cohort (NRI>0 of 0.2431 (95% CI 0.1692 - 0.3171) and IDI of 0.0068 (95% CI 0.0003 - 0.0011)).

Conclusions

In both cohorts, models incorporating age, karnofsky performance score, presence of extracranial disease, number of metastases and CITV performed better than models where CITV was replaced with the largest tumor volume. In the first cohort, models incorporating CITV showed a Net Reclassification Index (NRI>0) improvement 0.2416 (95% CI 0.1637 - 0.3194) and Integrated Discrimination Improvement (IDI) of 0.0029 (95% CI 0.0001 - 0.0064) relative to models incorporating the largest lesion size. Similar results were observed in the second cohort (NRI>0 of 0.2431 (95% CI 0.1692 - 0.3171) and IDI of 0.0068 (95% CI 0.0003 - 0.0011)).

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