

Validation of prognostic RPA models and nomograms for prediction of distant brain recurrences after linac-based stereotactic radiosurgery for a max. of 4 brain metastases

Introduction

- Stereotactic radiosurgery (SRS) is the standard of care for a limited number of brain metastases (BM).
- Assessing the risk of distant brain recurrences (DBR) is important for determining the need and frequency of follow-up.
- **We therefore validated two published RPA models and two nomograms for prediction of DBR after SRS for BM.**

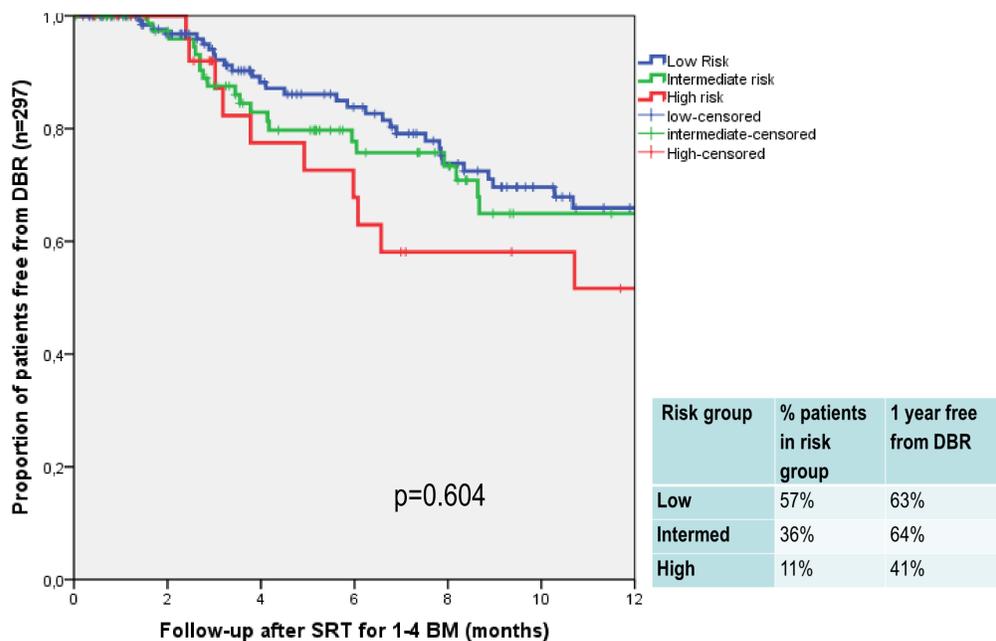
Materials and Methods

- Between July 2004 and July 2014, 297 patients with a maximum of 4 newly diagnosed BM were treated with Linac-based SRS at MAASTRO clinic.
- Follow up data were available in 274 of the 297 retrospectively analyzed patients.
- Three monthly follow-up with MR was the standard protocol.
- 64% NSCLC patients & 36% other primary tumors, 72% single BM & 28% 2-4 BM, median age 63 years
- The Rodrigues and Ayala RPA models and nomograms were validated [1,2].

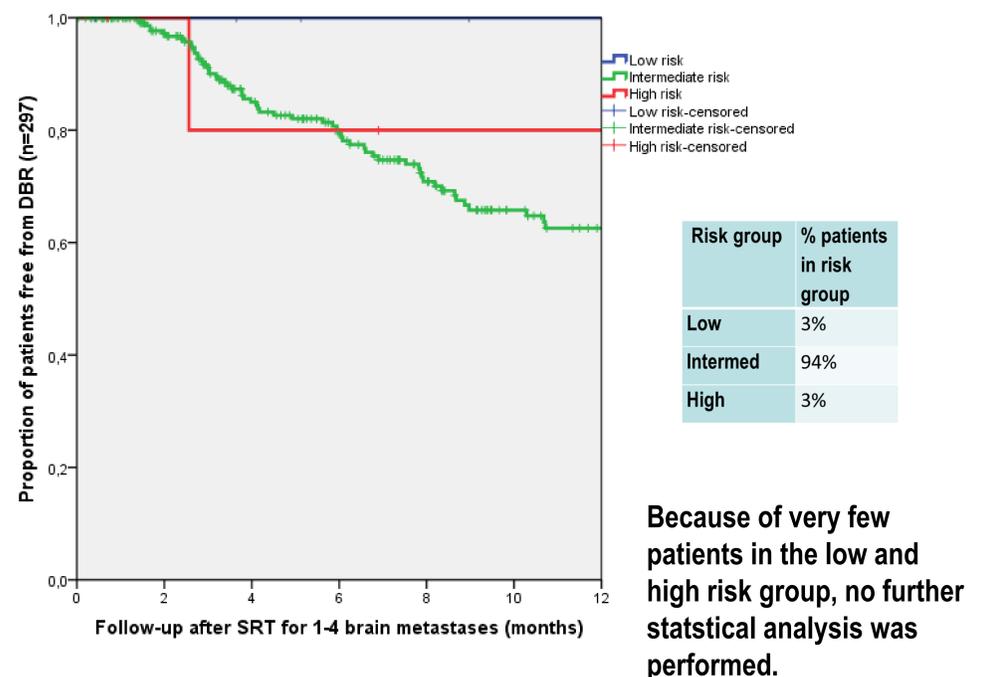
Results

- Median survival was 9 months, with 1- and 5-year overall survival rates of 36% and 8 %, respectively.
- The respective risks of DBR at 1 and 5 year were 38% and 67%.
- Baseline characteristics did not significantly predict DBR, nor number of treated BM, age, or maximum gross tumor volume.
- Applying the **Rodrigues RPA** classification onto our cohort resulted in 57% of the patients in the low-, 33% in the intermediate- and 11% in the high-risk group for DBR. The risk of 1 year DBR in these prognostic groups was 37%, 36%, and 59%, respectively (compared to 25%, 45%, and 70%, respectively, in [1]).
- Validation of the **Rodrigues nomogram** with ROC curve analysis with respect to 1 year risk of DBR resulted in an area under the curve (AUC) of 0.57, and an r^2 coefficient of 0.58.
- Assessing the **Ayala RPA classification** in our dataset resulted in 3%, 94%, and 3% of patients in the low-, intermediate-, and high-risk group, respectively which impaired further validation.
- Validation of the **Ayala nomogram** with ROC curve with respect to 9 months DBR resulted in AUC of 0.48 and an r^2 coefficient of 0.51.

Rodrigues classification: DBR free survival



Ayala classification: DBR free survival



Conclusion

- For prediction of DBR after SRS for BM, the Rodrigues RPA performed better than the Ayala RPA, because of a more balanced patient distribution within prognostic groups.
- The Rodrigues nomogram performed better than the Ayala nomogram with a slightly higher AUC and r^2 coefficient
- More advanced statistical modeling may further improve prediction models for DBR with the eventual aim of shared decision for patients regarding their follow-up

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References

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2. Ayala-Peacock Neuro Oncol. 2014 Sep;16(9):1283-8