

Exploring the Unique Risk Factors of Right vs. Left Colon Cancer: A Bayesian model averaging for Survival Prediction and Dynamic Nomogram Development

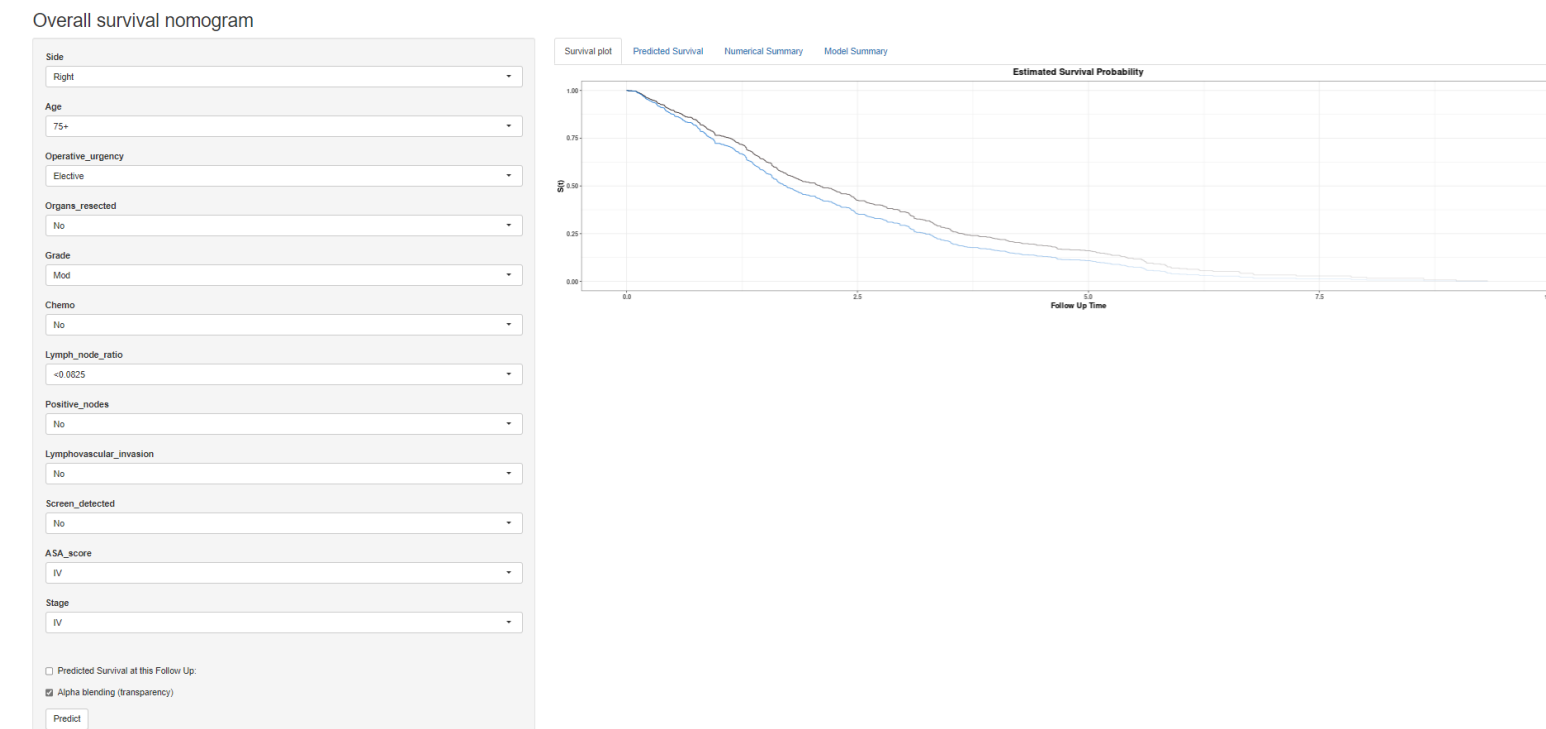
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Background

Translational statistics merges biostatistics and clinical research to effectively communicate research findings. Nomograms, graphical representations integrating independent prognostic factors, are valuable tools in colorectal cancer (CRC) research. Bayesian models for variable selection in survival outcome prediction offer advantages through Bayesian model averaging (BMA). This study aimed to utilize BMA for variable selection and develop a comprehensive nomogram for survival prediction in right-sided colon cancer (RCC) compared to left-sided colon cancer (LCC).

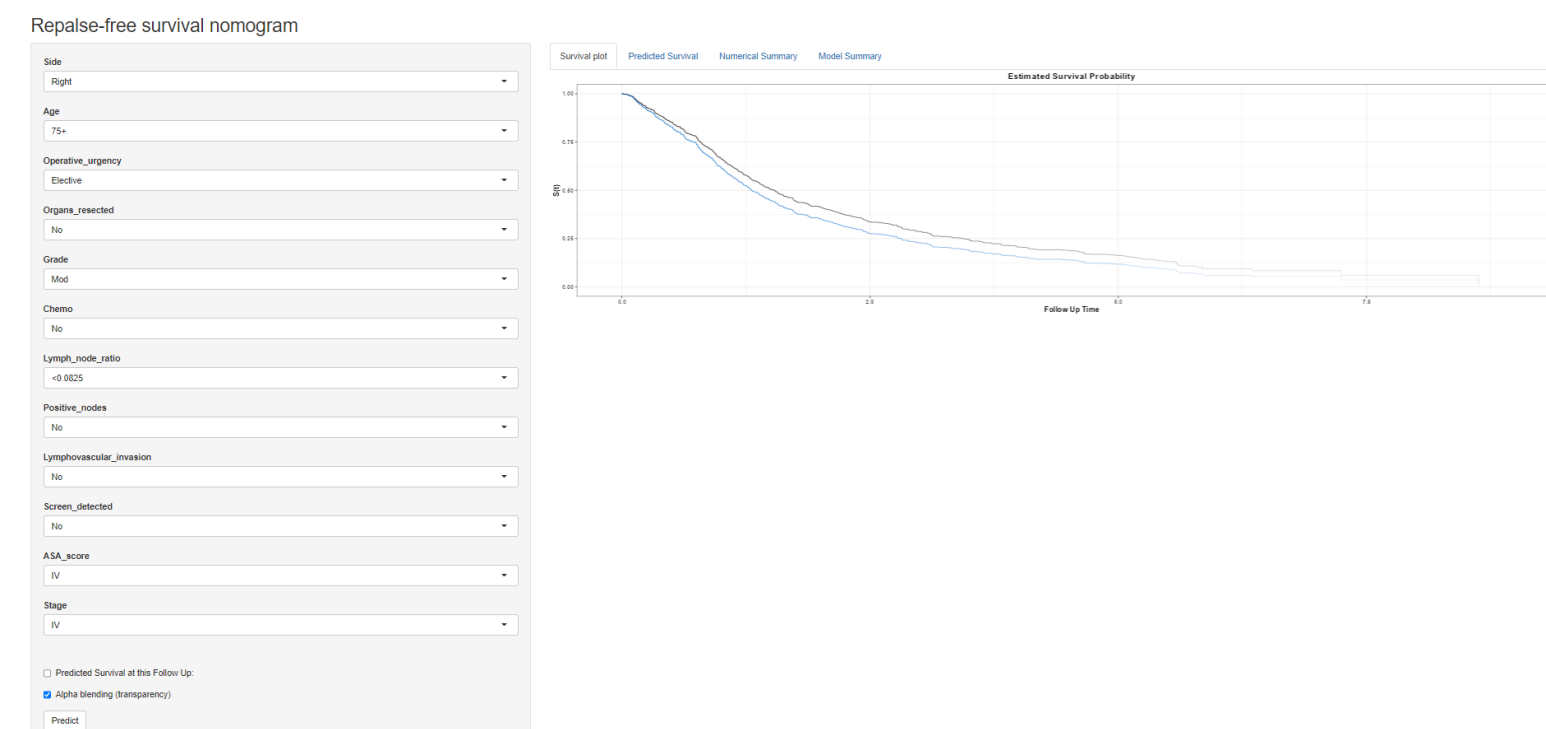
Methods

A retrospective study utilized the Cabrini Monash colorectal neoplasia database, including CRC patients who underwent surgery. Data on demographics, perioperative risks, treatment details, mortality, morbidity, and survival were collected. BMA was employed for Bayesian variable selection to identify effective risk factors for survival prediction. Sensitivity analyses using Cox-LASSO and imputation of missing data were performed. Prognostic nomograms were constructed using selected risk factors and the R-package DynNom.



Overall survival probability across selected predictors at:

https://fvx0de-mohammad-asghari0jafarabadi.shinyapps.io/crc_os/



Relapse-free survival probability across selected predictors at:

https://fvx0de-mohammad-asghari0jafarabadi.shinyapps.io/crc_rfs/

Results

The study included 2,475 CRC patients. Mortality rates were significantly higher in RCC (7.35 (95% CI: 6.55-8.25)) compared to LCC (5.32 (95% CI: 4.57-6.20)). BMA selected important predictors, including age, ASA score, overall stage, chemotherapy, lymph node ratio, operative urgency, screen detected, lymphovascular invasion, organs resected, positive nodes, grade of differentiation, and side of the cancer, with posterior inclusion probabilities >0.3. The nomogram integrated selected risk factors, providing a user-friendly tool for clinical prognosis prediction.

Conclusions

This study demonstrates the utility of BMA in identifying important risk factors for survival prediction in RCC vs. LCC patients. The developed nomogram offers clinicians valuable insights into the impact of these variables on survival outcomes, contributing to improved prognostic accuracy and personalized healthcare practices for CRC patients.

Acknowledgements

The authors thank the colorectal surgeons for providing their patients' data for this project. We thank LBBC (www.letsbeatbowelcancer.com) for financial support during this project.