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Letter to Editor

Construction and validation of a nomogram of risk factors and prognosis for elderly patients with meningioma

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To the Editor,

Meningioma is the most common brain tumor, accounting for approximately 33 % of cases.[1] Surgical intervention is the primary treatment. The incidence of meningioma increases with age, affecting 25–30 individuals per 100,000 among those aged 65–69, with a higher risk observed in elderly patients.[2–5] Compared to younger individuals, elderly patients often present with more concurrent medical conditions, which are associated with reduced postoperative survival.[1] However, the relationship between risk factors and outcomes in elderly meningioma patients remains unclear.

This study conducted a retrospective analysis of 178 cases of meningioma in elderly patients who underwent craniotomy at West China Hospital from 2016 to 2019. The aim was to develop a prediction model for postoperative overall survival (OS) in this population. We assessed the association between clinical features, radiological characteristics, pathological features, serum indicators, and OS using statistical methods including Student's t-test, Chi-square test, log-rank test for univariate analysis, and Cox analysis for multivariate analysis. Based on factors identified through multivariate analysis, a prognostic nomogram model was constructed to predict 1-year, 3-year, and 5-year survival probabilities for elderly meningioma patients. The predictive accuracy of the nomogram was evaluated using the concordance index (C-index) and area under the curve (AUC). Calibration plots were generated for each time point to compare predicted probabilities against actual outcomes. Cross-validation was employed to validate the robustness and reliability of the model.

Through both univariate and multivariate analyses, we identified several factors significantly associated with OS following surgery for elderly meningioma patients. Specifically, postoperative Karnofsky Performance Status (KPS), prothrombin time (PT), and alkaline phosphatase (ALP) levels demonstrated significant correlations with OS ($P < 0.05$, Fig. 1A). Based on these findings, a nomogram model (Fig. 1B) was developed incorporating these independent prognostic factors. This nomogram was designed to predict survival probabilities at 1-year, 3-year, and 5-year intervals. Internal cross-validation of the nomogram yielded corrected concordance indices (C-index) of 0.835, 0.868, and 0.794 for the respective time points, indicating robust predictive performance across different survival durations. The corresponding area under the curve (AUC) values were 0.850 (95 % CI, 0.780–0.899), 0.712 (95 % CI, 0.634–0.778), and 0.700 (95 % CI, 0.628–0.755), respectively (Fig. 1C–E). These metrics underscored the model's ability to discriminate between different survival outcomes over time. Furthermore, calibration plots (Fig. 1F–H) were generated to assess the alignment of predicted survival probabilities with observed outcomes. These plots demonstrated favorable concordance between predicted and actual OS, particularly for the 5-year survival period, affirming the reliability of the nomogram in prognosticating long-term outcomes for elderly meningioma patients. However, calibration curves suggested that the model's short-term survival predictions (1 and 3 years) were not satisfactory. Given that meningioma is a benign tumor and patients often have extended postoperative survival, short-term survival predictions may not be as critical as long-term survival. In summary, our study highlights

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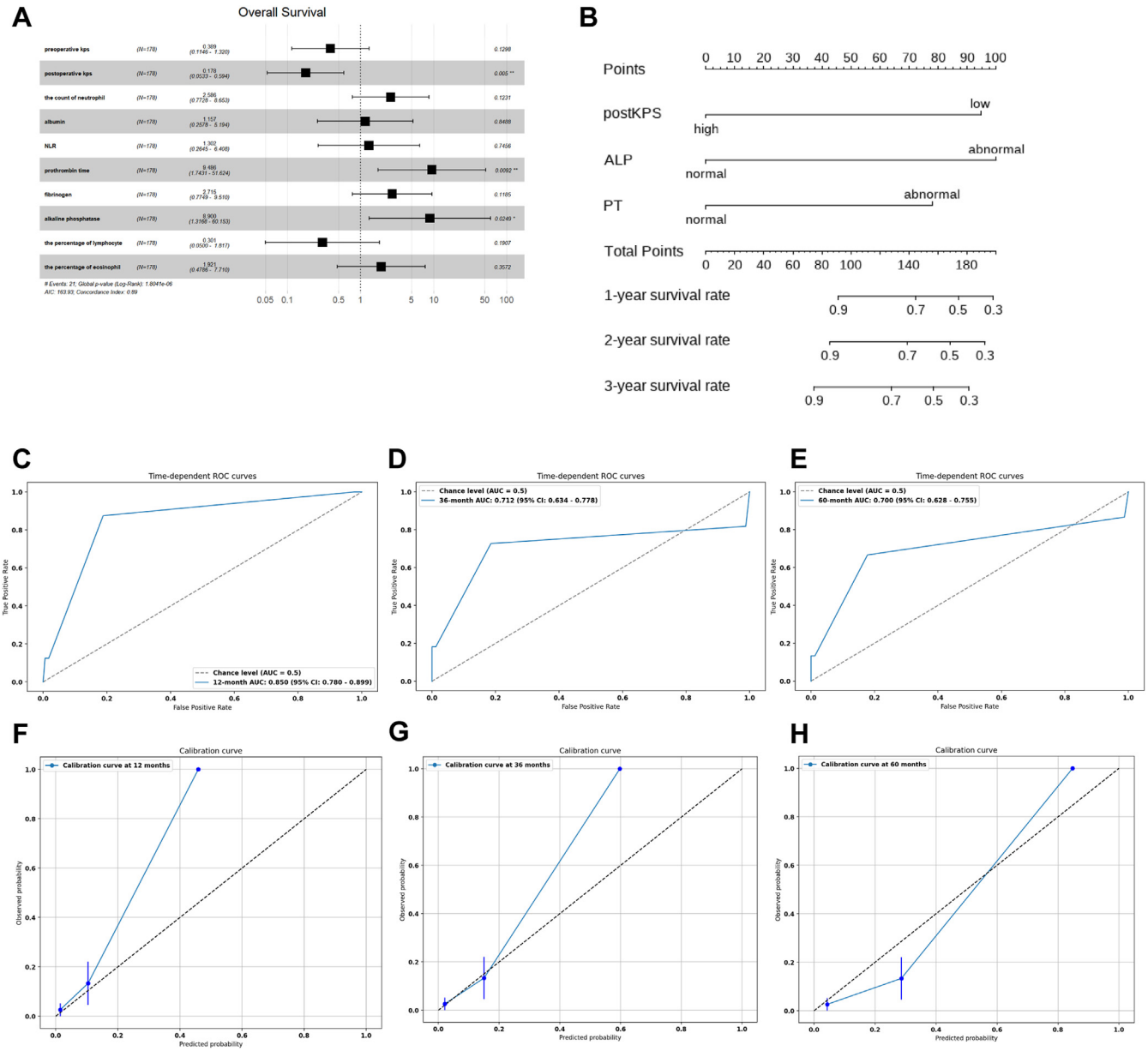

Fig. 1. Multivariate analysis and nomogram model of OS. **(A)** Multivariate analysis showed the postoperative KPS, PT, and ALP were associated with OS; **(B)** Nomogram model for 1-year, 3-year, and 5-year OS; **(C**–**E)** The AUC of the model; **(F**–**H)** Calibration curve of the predictive model.
Abbreviation: ALP, alkaline phosphatase; AUC, area under the curve; KPS Karnofsky Performance Status; OS, overall survival; PT, prothrombin time.

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the utility of a nomogram incorporating postoperative KPS, PT, and ALP levels as predictors of OS in elderly meningioma patients.

Declarations of competing interest

None.

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Institutional review board statement

The study was conducted in accordance with the Declaration of Helsinki, and approved by the Ethics Committee of West China Hospital on Dec 4, 2020(No. 2020(990)).

Informed consent statement

The consent was waived because it is a retrospective study.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors on request.

Declaration of generative AI

During the preparation of this work the authors used ChatGPT 3.0 in order to improve readability and language. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.asjsur.2024.09.033.

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