World Neurosurg. 2023 Sep 9;S1878-8750(23)01266-4. doi: 10.1016/j.wneu.2023.09.015. Online ahead of print.

Clinical value of a nomogram model based on apparent diffusion coefficient values within 1 cm of the tumor cavity to predict postoperative progression of glioma

MengYu Cheng 程梦雨¹, ShuTong Pang², ZhanQiu Wang³, Yuemei Zhao³, WenFei Li⁴

Affiliations PMID: 37696435 DOI: 10.1016/j.wneu.2023.09.015

Abstract

Objective: To explore the clinical value of constructing a nomogram model based on apparent diffusion coefficient (ADC) values within 1 cm of the residual tumor cavity to predict the postoperative progression of gliomas.

Materials and methods: Clinical data of patients with glioma who underwent surgery were retrospectively retrieved from the First Hospital of Qinhuangdao. The mean apparent diffusion coefficient (mADC) was measured using a picture archiving and communication system. The Kaplan-Meier survival curve was constructed with the optimal mADC threshold determined by the X-tile. A nomogram was developed based on the independent risk factors determined using the Cox proportional hazards model (Cox regression model) to predict the progression of postoperative glioma. A receiver operating characteristic (ROC) curve was drawn to evaluate the prediction accuracy of the model, and decision curve analysis was performed to assess the clinical value of the nomogram.

Results: There was good agreement between the mADC values of the two repeated measurements before and after, with a consistency correlation coefficient of 0.83. Multivariate Cox regression analysis showed that peritumoral mADC values, degree of peritumoral enhancement, age, pathological grading, and degree of tumor resection were independent risk factors for predicting postoperative progression of glioma (all P < 0.05). The ROC curves of the nomogram predicting 1, 2, and 3 years postoperative progression were 0.86, 0.82, and 0.91, respectively. The calibration curve showed good consistency between the observed and predicted values in the model. The curve showed that the nomogram model has a good clinical application value.

Conclusion: The peritumoral mADC values, degree of peritumoral enhancement, age, pathological grade, and degree of tumor resection were independent factors affecting the postoperative progression of glioma. The nomogram model established for the first time based on mADC values within 1 cm of the tumor can predict the postoperative condition of glioma patients intuitively and comprehensively. It can provide a relatively accurate prediction tool for neurosurgeons to individualize the evaluation of survival and prognosis, and formulate treatment plans for patients.

Keywords: apparent diffusion coefficient; diffusion-weighted imaging; glioma; magnetic resonance

imaging; nomogram; peritumoral edema; postoperative progression.

Copyright $\ensuremath{\mathbb{C}}$ 2023 Elsevier Inc. All rights reserved.