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Visual deterioration outcomes following optic pathway glioma treatment: a 12-year single institution retrospective study

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Abstract

Objective: The surgical treatment of optic pathway gliomas (OPG) remains controversial, with visual outcomes often unpredictable. The present study explored surgical and clinical factors influencing visual acuity (VA) after OPG treatment and developed anatomical subtypes correlated with clinical symptoms.

Methods: Children with OPG who underwent initial partial tumor resection at Beijing Tiantan Hospital from January 2011 to December 2022 were retrospectively analyzed. Multivariate logistic regression and random forest analyses were performed to identify risk factors for post-treatment VA deterioration and a decision tree model was created based on significant factors.

Results: A total of 140 patients were enrolled. Multivariate logistic regression analysis identified surgical approach and initial VA as independent predictors of post-treatment VA deterioration ($P < 0.05$). Surgical approach, initial VA, and extent of tumor resection were the most significant factors for risk assessment and were included in the decision tree model, with surgical approach as the most important "root" node. The model demonstrated good predictive performance, with area under the curve values of 0.75 and 0.66 for the training and test datasets, respectively. A simple anatomical classification was developed, which revealed clinical characteristic differences among OPG types. Meanwhile, a correlation analysis of post-treatment visual deterioration was performed for each of the three anatomical types.

Conclusion: This study offers a predictive model for visual outcomes following initial tumor-reduction surgery in OPG patients, which may help in visual outcomes risk stratification. Additionally, the anatomical classification effectively indicates OPG growth direction, offering potential insights into clinical symptoms.

Keywords: Anatomical classification; Decision tree model; Optic pathway glioma; Tumor reduction; Visual acuity prognosis.

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