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The natural history of intracranial meningiomas.

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Abstract

Object Despite the increased detection of incidental or small meningiomas, the lesion's natural history is largely unknown. Methods One year or longer of follow-up was conducted in 244 patients with 273 meningiomas managed conservatively by a single surgeon between 2003 and 2008. Data were stratified according to age, sex, tumor location, symptoms, initial tumor diameter, calcification, MR imaging intensity, and edema. Linear tumor growth was defined as a 2-mm or larger increase in the maximum diameter in any direction of the tumor. Volumetric analysis (ImageJ version 1.43) was also conducted in 154 of 273 meningiomas for which complete radiological data were available in the form of DICOM files throughout the follow-up period. A volume increase greater than 8.2% was regarded as significant because the preliminary volumetry based on 20 randomly selected meningiomas showed that the average SD was 4.1%. Results Linear growth was observed in 120 tumors (44.0%) with a mean follow-up of 3.8 years. Factors related to tumor growth were age of 60 or younger ($p = 0.0004$), absence of calcification ($p = 0.027$), MR imaging T2 signal hyperintensity ($p = 0.021$), and edema ($p = 0.018$). Kaplan-Meier analysis and Cox proportional hazards regression analysis revealed that age 60 or younger (hazard ratio [HR] 1.54, 95% CI 1.05-2.30, $p = 0.026$), initial tumor diameter greater than 25 mm (HR 2.23, 95% CI 1.44-3.38, $p = 0.0004$), and the absence of calcification (HR 4.57, 95% CI 2.69-8.20, $p < 0.0001$) were factors associated with a short time to progression. Volumetric growth was seen in 74.0% of the cases. Factors associated with a higher annual growth rate were male sex ($p = 0.0002$), initial tumor diameter greater than 25 mm ($p < 0.0001$), MR imaging T2 signal hyperintensity ($p = 0.0001$), presence of symptoms ($p = 0.037$), and edema ($p < 0.0001$). Conclusions Although the authors could obtain variable results depending on the measurement method, the data demonstrate patients younger than 60 years of age and those with meningiomas characterized by hyperintensity on T2-weighted MR imaging, no calcification, diameter greater than 25 mm, and edema need to be observed more closely. Volumetry was more sensitive to detecting tumor growth than measuring the linear diameter.

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