



Introduction

While meningiomas are generally regarded as benign tumors, some have histological characteristics suggestive of more aggressive behavior and may even exhibit infiltrative features. These high-grade meningiomas, WHO grade II (atypical) and grade III (malignant), are difficult to treat and carry a significantly worse prognosis than their grade I counterparts. Due to the rarity of these tumors, few large studies evaluating the effect of both patient and treatment factors on overall survival have been done and even fewer of these have been performed following the latest revision of the WHO diagnostic criteria.

Methods

The Surveillance, Epidemiology, and End Results (SEER) database was utilized to identify patients diagnosed with high-grade meningiomas from 2004-2009. Patient, tumor, and treatment characteristics were summarized and analyzed to identify prognostic factors for survival.

**Table 1:** Baseline characteristics for 455 patients diagnosed with high-grade meningioma

All Patients (n=455)	
Age, median (years)	60
Female, n (%)	249 (54.7)
Male, n (%)	206 (45.3)
Median tumor size (cm)	4.5
No. undergoing resection (%)	439.1 (96.5)
No. gross total resection (%)	227 (49.8)
Postoperative radiotherapy (%)	125 (27.4)
1-year survival (%)	334 (73.4)
2-year survival (%)	250 (55.0)
5-year survival (%)	44 (9.7)

Results

A total of 455 patients met the inclusion criteria of having a diagnosis of high-grade meningioma. The median age was 60 years, with females accounting for 54.7% of patients. The median tumor size was 4.5 centimeters. The majority of patients underwent surgical resection (96.5%), with 49.8% receiving gross total resection. Postoperative radiotherapy was only utilized in 27.4% of patients. One-, 2-, and 5-year survival rates were 73.4%, 55.0%, and 9.7%, respectively. Age > 65 years (p<0.0001) and gross total resection (p=0.011) significantly impacted survival. Conversely, female gender (p=0.069), tumor size (p=0.099), and radiotherapy (p=0.19) had no effect on patient outcomes. On multivariate analysis, only age > 65 years (HR: 3.52; 95% CI: 2.24-5.53; p<0.0001) and an increased extent of resection (HR: 0.59; 95% CI: 0.38-0.92; p=0.019) were significant prognostic factors.

Conclusions

Patients with high-grade meningiomas have a poor prognosis overall, with older age conferring even worse survival. Aggressive resection provides the most significant benefit and should be the goal of surgery when feasible. Currently, there is no evidence for the use of radiotherapy in these tumors.