Black Patients With Pituitary Tumors Have Greater Ki67 Levels, Which Is Independently Associated With Increased Tumor Volume

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Introduction

Pituitary adenomas represent the most common tumor found in the sella turcica. They vary greatly in their composition, as they can be nonfunctional and exhibit symptoms of mass effect, or they can secrete hormones in addition to their mass effect[1]. Ki67, a marker of cellular proliferation, has been studied extensively in pituitary neoplasia. Some studies show correlation between Ki67 levels and tumor subtype, but those findings are non-uniform[2]. Similarly, there are inconsistent findings in the association between Ki67 levels and degree of invasion[2]. Finally, it is still unclear from existing data whether Ki67 levels are in any way correlated to frequency of tumor recurrence.

In this single-center study, we aimed to determine if Ki67 levels were correlated with tumor volumes and recurrence and assessed if there was a racial component in differences in Ki67 levels.

Methods and Materials

We conducted a retrospective chart review of patients treated for pituitary adenoma between 2017 and 2023 at single academic tertiary care center. A total of 139 patients were included in this study. By race, 72 (52%) patients were Black, and 67 (48%) patients were non-Black, which included White, Asian, and other/declined to respond.

Tumor volume was calculated using the traditional formula: (AP x CC x TR)/2, where AP, CC, and TR refer to the three dimensions of the tumor in centimeters. With regards to Ki67 levels, patients were categorized as either having low (0 to 1%) levels or intermediate (>1 to ≤ 3%) levels.

Statistical analysis was carried out using GraphPad Prism and Microsoft Excel.

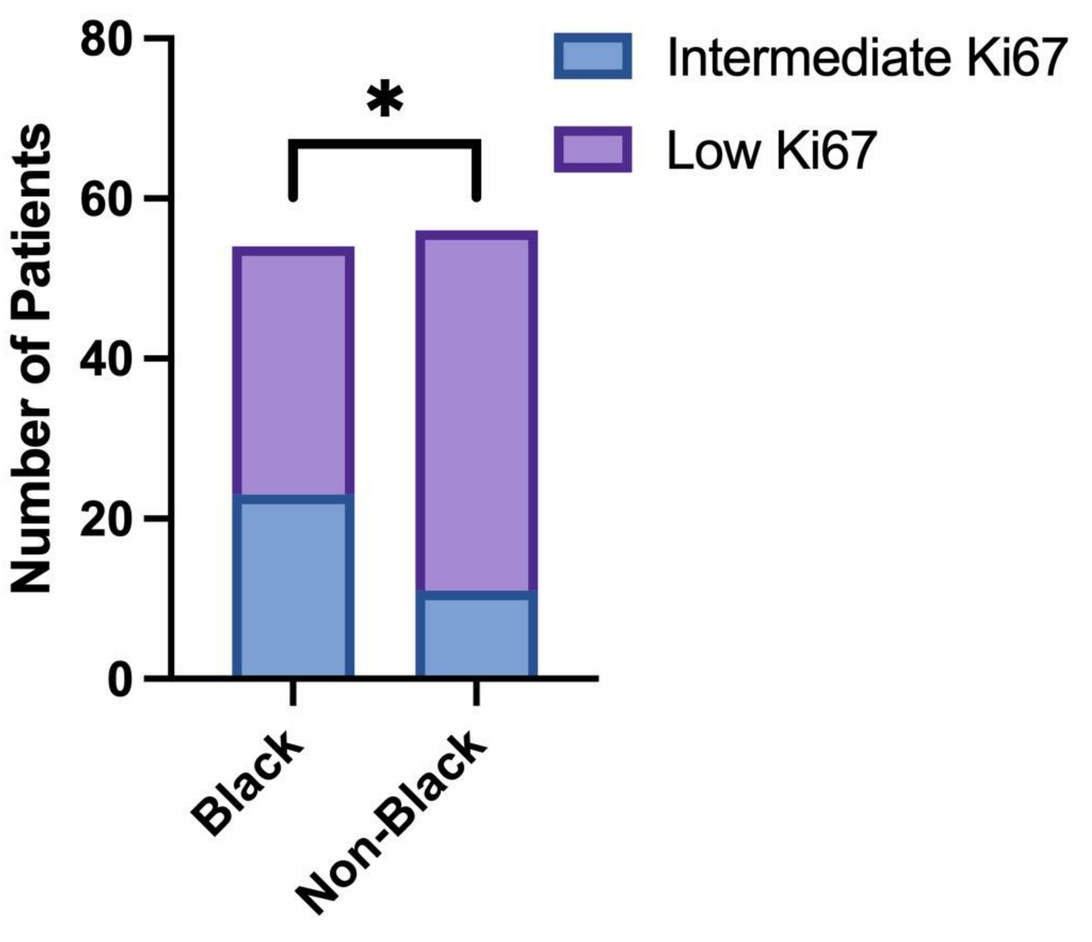

Figure 1. Fisher's Exact test comparing Black race and presence of intermediate vs. low Ki67 levels with respect to expected values in pituitary adenoma (p = 0.01*).

References

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2. Salehi, F., Agur, A., Scheithauer, B. W., Kovacs, K., Lloyd, R. V., & Cusimano, M. (2009). Ki-67 in pituitary neoplasms: a review—part I. Neurosurgery, 65(3), 429-437.

Results

Our analysis showed that those patients with intermediate Ki67 levels had greater tumor volumes in cubic centimeters than those with low Ki67 levels (10.1 [95% CI (6.2, 14.0); n=23] vs. 5.6 [95% CI (3.9, 7.4); n=44]; p=0.029*). However, using Fisher's exact test to analyze differences in rates of recurrence compared to expected values, there was no difference in rates of recurrence between those with low Ki67 levels and intermediate Ki67 levels (25.0% vs 36.7%; p=0.24 [n=102]).

Additionally, Black patients were more likely to have intermediate than low Ki67 levels than non-Black patients (42.6% vs. 19.6%; p=0.01* [n=110]. However, Black patients did not have a significantly larger tumor volume in cubic centimeters than non-Black patients (7.7 [95% CI (4.6, 10.8); n=53] vs. 8.9 [95% CI (5.8, 12.0); n=36]; p=0.43).

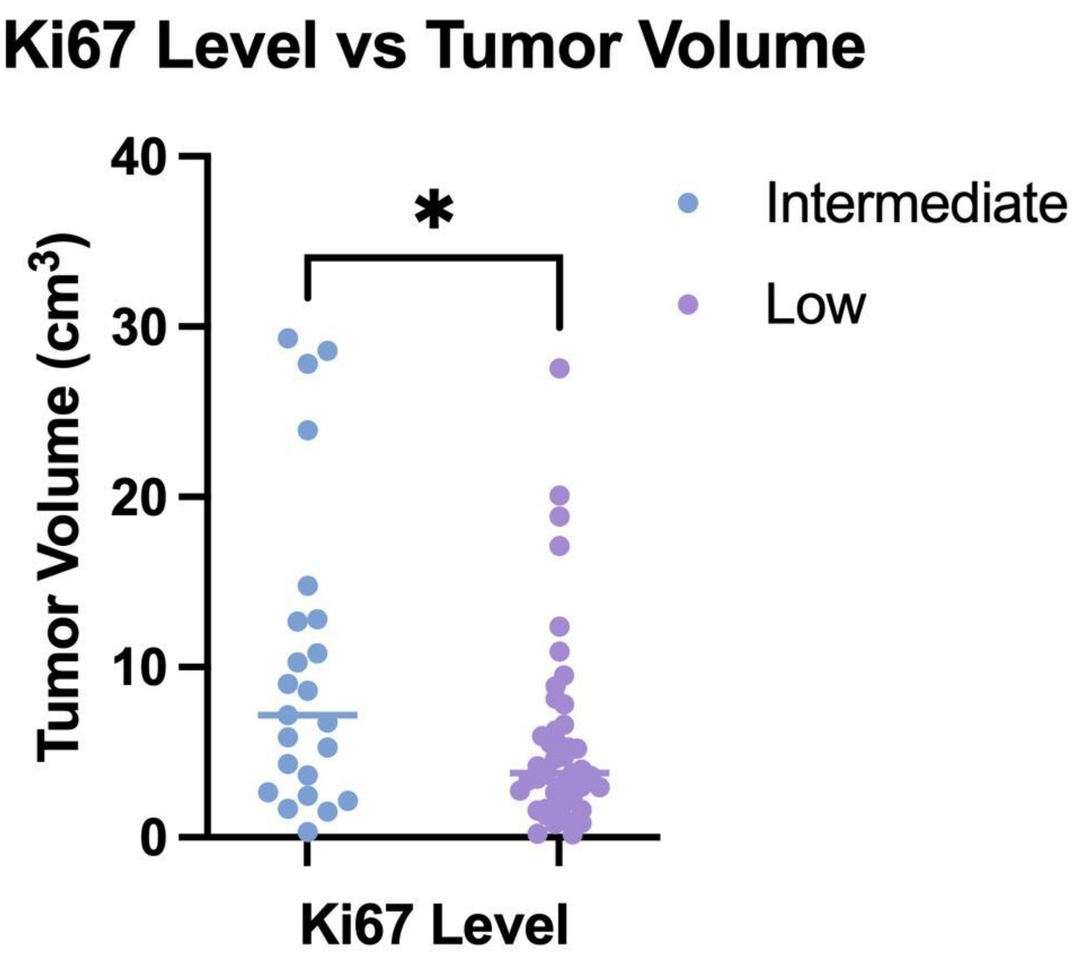

Figure 2. Mann-Whitney U Test comparing mean tumor volumes between patients with intermediate Ki67 levels and patients with low Ki67 levels (p = 0.029*).

Discussion

In our study, we aimed to contribute to the existing literature on the relationship between Ki67 levels, pituitary tumor volumes, and recurrence rates. We found that patients with intermediate Ki67 levels had significantly larger tumor volumes compared to those with low Ki67 levels. However, despite this difference in size, recurrence rates between the two groups remained similar, suggesting that while Ki67 may play a role in tumor proliferation, other factors likely influence recurrence risk.

Additionally, we observed that Black patients were more likely to have intermediate Ki67 levels compared to low levels. Interestingly, this was not associated with increased tumor volume, indicating that while there may be racial or genetic predispositions influencing Ki67 expression, these factors alone do not explain the observed differences in tumor size. Further investigation is needed to assess whether other biological, genetic, or socioeconomic factors contribute to the disparities in tumor volume among different patient populations.

Future directions for research should include evaluating whether tumor subtype, molecular markers, or treatment variations impact these trends. Additionally, understanding how Ki67 interacts with other proliferative markers could provide a more comprehensive view of tumor behavior and potential therapeutic targets.

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