

Vision Loss At Presentation Is Associated With Increased Likelihood Of Pituitary Tumor Recurrence

Sayak Ghosh, BS^{1,2}; Anne Lally, BA^{1,2}; Isabella Pecorari, BS^{1,2}; Vijay Agarwal, MD^{1,2}
¹ Albert Einstein College of Medicine, ²Montefiore Medical Center

Introduction

Pituitary tumors are most commonly benign lesions of the central nervous system. They vary in their composition, and the estimated prevalence in the general population is 16.7%¹. Functional tumors may present with a wide spectrum of symptoms due to the secretion of hormones, while both non-functional and functional tumors can present with symptoms of mass effect². A common symptom of pituitary tumors is visual impairment, due to their proximity to the optic chiasm³. Some studies demonstrate a relationship between tumor volume and rates of visual impairment⁴. However, the literature on the association between visual impairment and rates of tumor recurrence is limited.

In this single-center study, we aimed to determine if presence of vision loss at presentation in patients with pituitary tumors was associated with an increased tumor volume and an increased likelihood of tumor recurrence.

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 125 patients were included in this study. By race, 65 (52%) patients were Black, 11 (9%) patients were White, 2 (2%) were Asian, and 47 (38%) were other or declined to respond. By ethnicity, 39 (31%) patients were Hispanic/Latino, 72 (58%) were non-Hispanic/Latino, and 14 (11%) declined to respond.

Vision loss was determined to be any presence of vision loss within one year prior to tumor resection. Tumor volume was calculated using the traditional formula: $(AP \times CC \times TR)/2$, where AP, CC, and TR refer to the three dimensions of the tumor in centimeters. Recurrence was defined as tumor recurrence at any point following resection.

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

Vision Loss vs. Recurrence

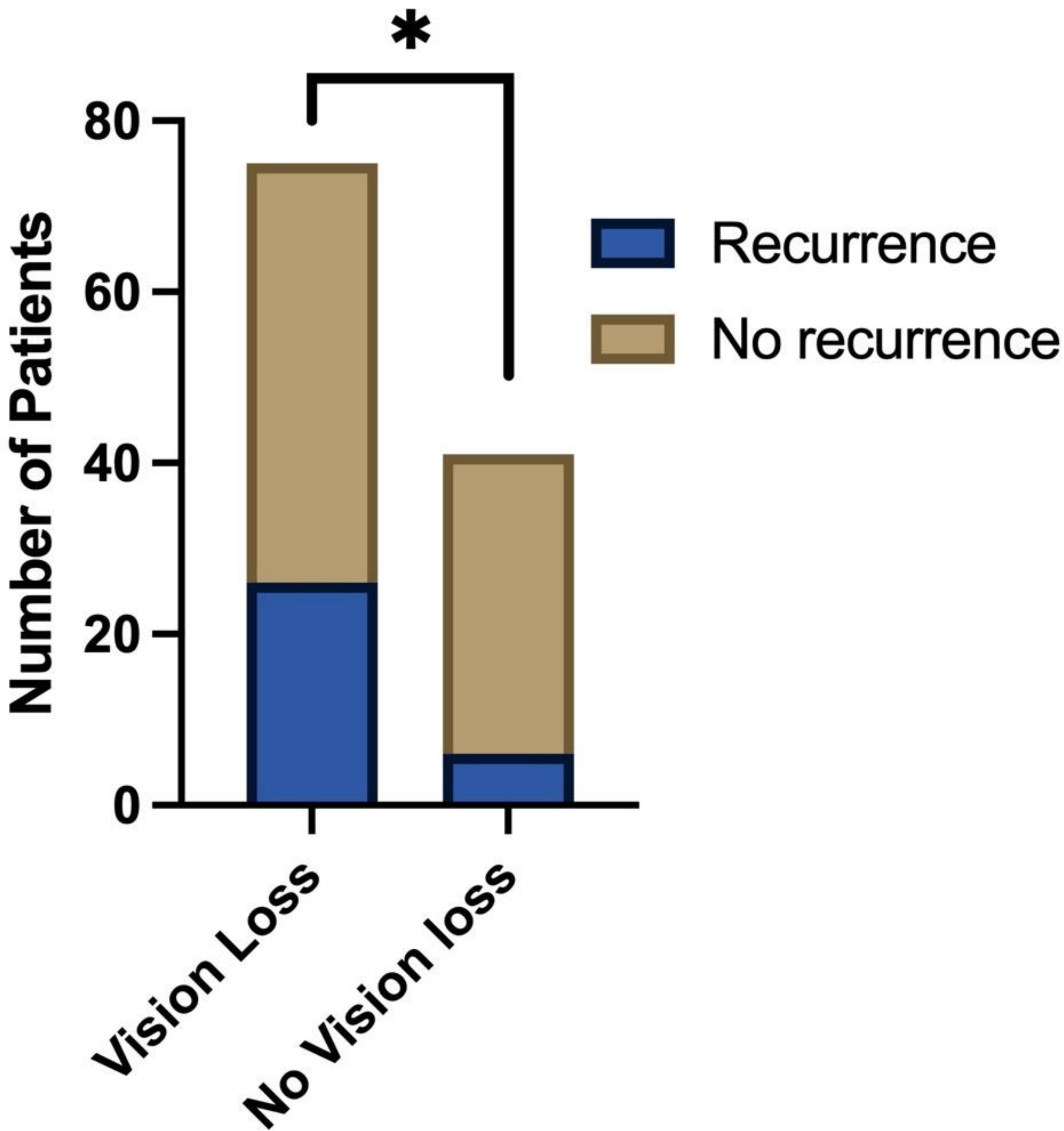


Figure 1: Fisher's Exact test comparing rates of pituitary adenoma recurrence between patients experiencing vision loss and patients not experience vision loss compared to expected values ($p = 0.03^*$).

Results

Our analysis demonstrated a significant association between vision loss at presentation and increased tumor volume. Patients who presented with vision loss had a mean tumor volume of 11.5 cm³ [95% CI (8.0, 14.9); $n=52$], which was substantially larger than the mean tumor volume of 3.1 cm³ [95% CI (2.2, 3.9); $n=31$] observed in patients without vision loss ($p<0.0001^{****}$). These findings suggest that larger tumor size may contribute to the development of visual symptoms, likely due to mass effect on the optic chiasm.

Additionally, we examined the relationship between vision loss and tumor recurrence. Using Fisher's exact test, we found that patients with vision loss at presentation had a significantly higher recurrence rate compared to those without vision loss (34.7% vs. 14.6%; $p=0.03^*$). This increased recurrence rate may indicate differences in tumor biology, surgical resectability, or other factors that warrant further investigation.

Vision Loss vs. Tumor Volume

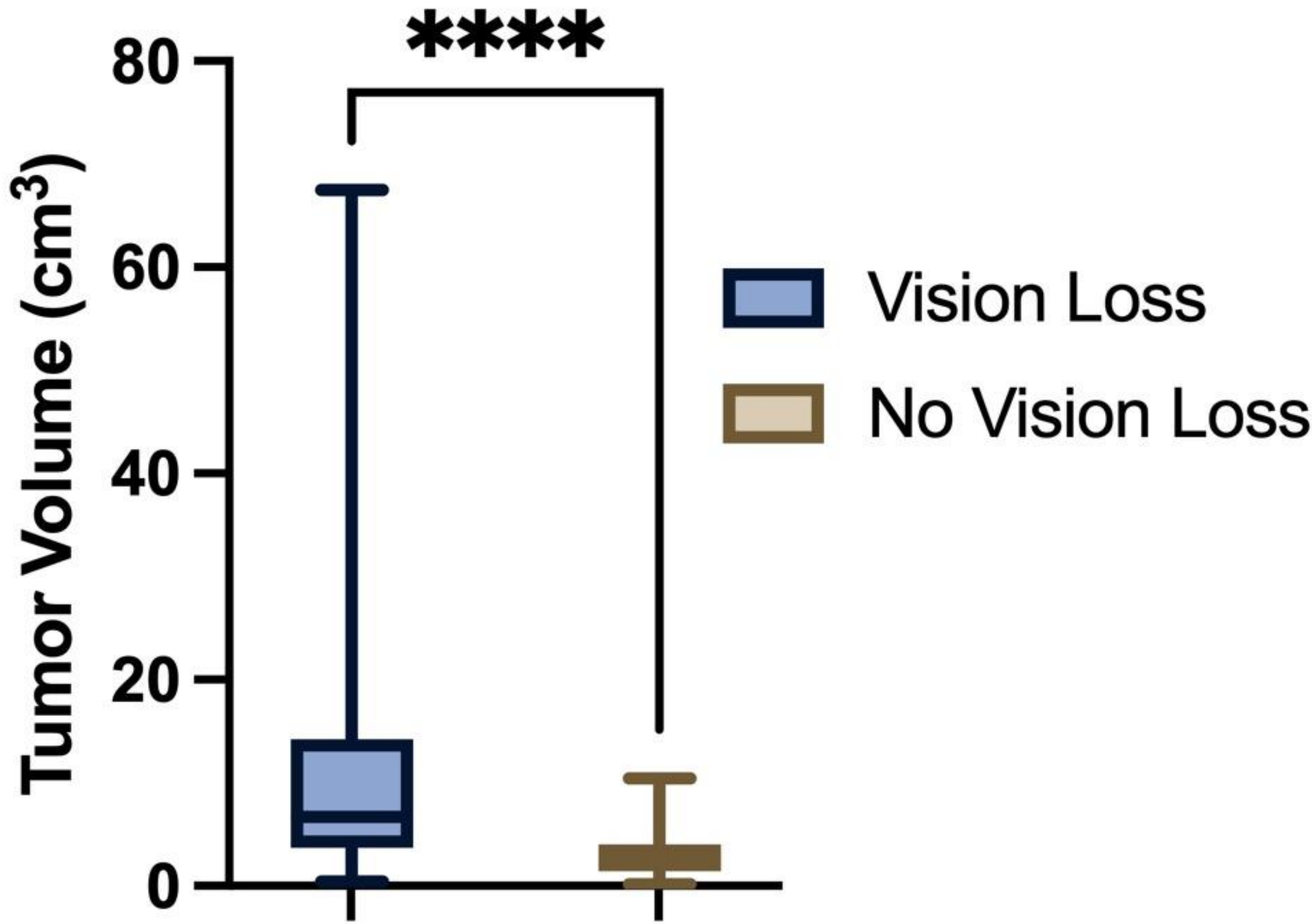


Figure 2. Mann Whitney U Test comparing mean tumor volume between patients with pituitary adenomas experiencing vision loss and those without vision loss ($p < 0.0001^{****}$).

Discussion

Our findings suggest that vision loss at presentation is associated with significantly larger pituitary tumor volumes, reinforcing the hypothesis that mass effect on the optic chiasm occurs with larger tumor sizes. Additionally, we observed a higher recurrence rate among patients with vision loss, which may indicate a more aggressive tumor biology or challenges in achieving complete resection in these cases. These findings highlight the importance of early detection and intervention in preventing both visual impairment and tumor recurrence. To build upon these findings, future analyses will focus on correlating the extent of resection with tumor recurrence rates, as well as assessing whether specific tumor subtypes contribute to the observed differences in recurrence.

References

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