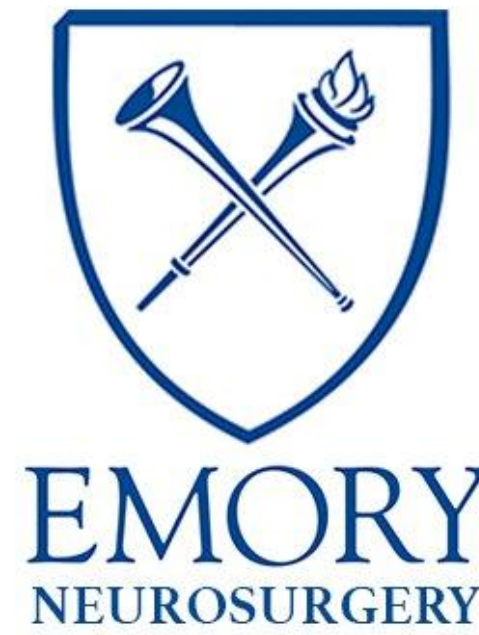


# The Utility of Hematologic Investigations as a Marker for Spheno-orbital Meningioma Invasion

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## Introduction

Spheno-orbital meningiomas (SOMs) arise from the arachnoid villi cap cells at the sphenoid ridge and have the ability to spread via soft tissue extension and cranial bone invasion. Due to their orbital hyperostosis and intraorbital soft tissue extension, they tend to have poor visual prognosis and are surgically challenging. This study aims to investigate the correlation between tumor invasion and hematologic investigations as a marker for tumor invasion and potentially a predictor of recurrence.

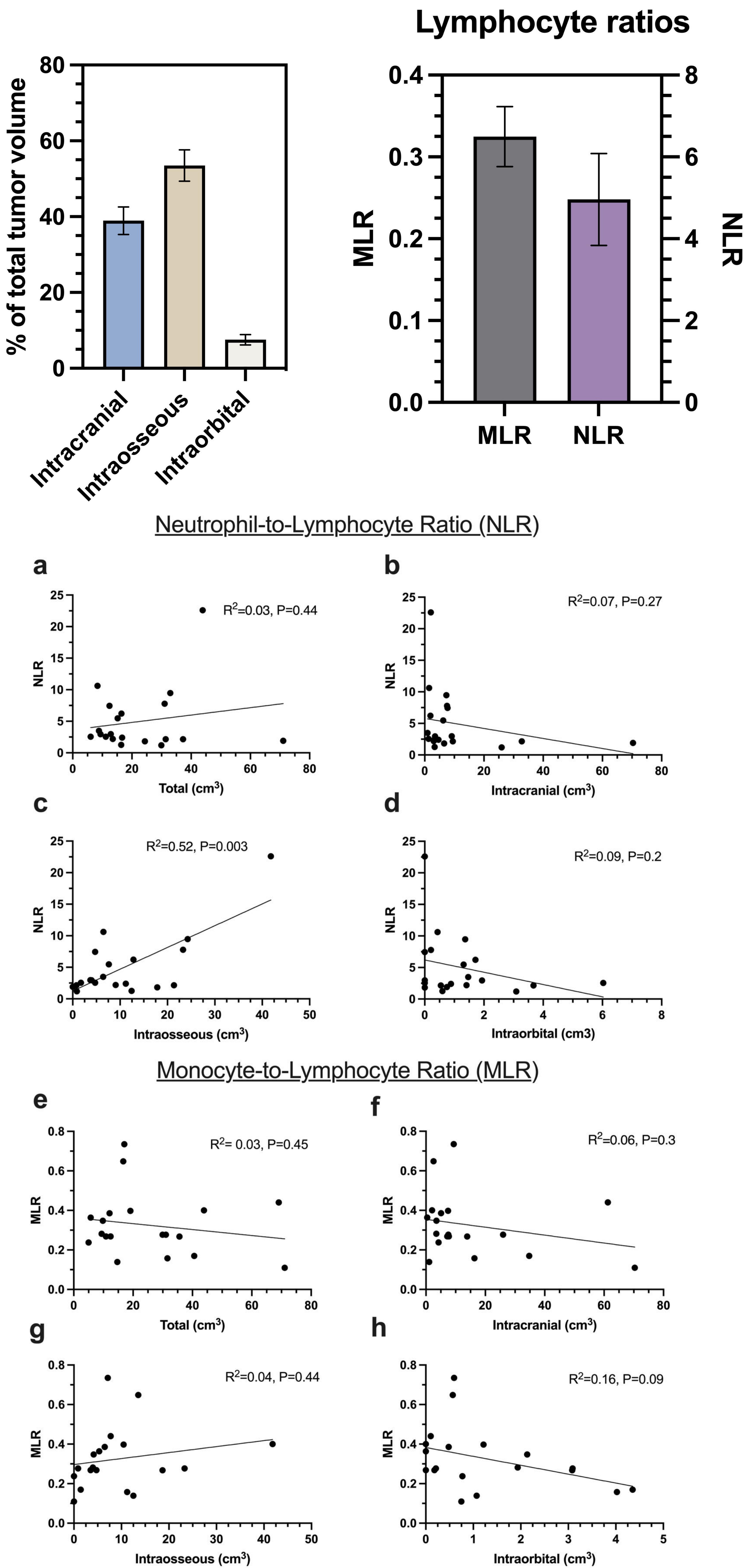
## Methods and Materials

This retrospective study included patients who underwent surgical resection of SOMs with adequate preoperative investigations and postoperative follow-up. Patients' medical records were reviewed, and collected data included patient demographics, past medical history, laboratory investigations, presenting symptoms, and postoperative outcomes. Using 3D reconstruction software, the volume of the tumor in different invaded compartments, namely intracranial, intraosseous, and intraorbital, was measured and correlated with various hematologic variables using linear and logistic regression models after controlling for co-variables. Hematologic variables investigated included RBC and WBC counts, differential WBC counts, along with computed Neutrophil-to-Lymphocyte ratio (NLR) and Monocytes-to-Lymphocytes ratio (MLR).

## Results

Our study included 70 patients with SOMs, of whom 80% were female and the mean age was  $54 \pm 12$  years. Preoperatively, 86.4% of patients presented with proptosis, 80.3% with decreased visual acuity (VA), and 30.3% with visual field defects. We found that proptosis correlated linearly with intraosseous tumor volume (coefficient=0.6,  $p<0.001$ ), while decreased VA correlated with intraorbital tumor volume (coefficient=0.4,  $p=0.01$ ). We investigated hematologic markers and found that patients with SOMs had higher NLR and MLR compared to base reference values,  $3.6 \pm 1$  and  $9 \pm 3.2$ , respectively. Linear regression models then revealed that the values of the NLR and MLR were associated with extensive tumor invasion. Both the NLR and MLR correlated with the number of invaded compartments ( $r=0.65$ , and  $r=0.74$ , respectively  $P<0.05$ ), while the MLR also linearly correlated with the intraosseous tumor volume ( $r=0.71$ ,  $P<0.01$ ).

## Results



## Conclusions

In conclusion, our study demonstrates a significant correlation between hematologic variables and the extent of SOM invasion. Specifically, elevated NLR and MLR were found to be potential markers for tumor invasion. These findings suggest that routine hematologic investigations could serve as valuable tools in the preoperative assessment and postoperative monitoring of patients with SOMs.

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