

# Venous Thromboembolism After Craniotomy for Primary Malignant Brain Tumors: A National Surgical Quality Improvement Program Analysis.

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#### Introduction

Venous thromboembolism (VTE), including deep venous thrombosis (DVT) and pulmonary embolism (PE), frequently complicates the postoperative course of primary malignant brain tumor patients. Thromboprophylactic anticoagulation is commonly used to prevent VTE at the risk of intracranial hemorrhage (ICH).

## Objective

The National Surgical Quality Improvement Program (NSQIP) was used used to perform descriptive analysis, calculate time-to-event curves, and identify relevant predictors of DVT, PE, and ICH.





## Methods

All patients who underwent craniotomy for a primary malignant brain tumor were extracted from the NSQIP registry (2005-2015) using the following criteria 1) Aged 18 years or older. 2) Current Procedural Terminology (CPT) codes indicating craniotomy for surgical resection of brain tumors. 3) Postoperative diagnosis indicative of primary malignant brain tumor according to International Classification of Diseases, Ninth Revision [ICD-9].Predictors of VTE and ICH were identified by means of multivariable logistic regression. Separate analyses were performed for in-hospital thrombotic events and post-discharge thrombotic events.

## **Results I** — **Descriptive analysis**

Among the 7376 patients that were identified, complication rates were 2.6%, 1.5%, and 1.3% for DVT, PE, and ICH, respectively. VTE was the second-most common major complication and third-most common reason for readmission. ICH was the most common reason for reoperation.



## **Results II** — Inferential analyis

Older age and higher BMI were found to be overall risk factors of VTE. Dependent functional status and longer operative times were predictive for VTE during hospitalization, but not for postdischarge events. Admission two or more days before surgery was predictive for DVT, but not for PE. Preoperative steroid usage and male gender were predictive for postdischarge DVT and PE, respectively. ICH was associated with various comorbidities and longer operative times.

## Conclusion

This multicenter study demonstrates distinct critical time periods for the development of thrombotic and hemorrhagic events after craniotomy. Furthermore, the VTE risk profile depends on the type of VTE (DVT versus PE) and clinical setting (hospitalized versus post-discharge patients).

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