

Major Complication, Reoperation, Readmission, and Death after Craniotomy for Primary Malignant Brain Tumors: A National Surgical Quality Improvement Program Analysis.

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Introduction

The short-term postoperative course after surgery for a primary malignant braint tumor is frequently complicated by major adverse events, often resulting in extended length of stay, reoperation, and readmission.

Objective

This study aims to provide a descriptive analysis and identify predictors of major complication, extended length of stay (> 10 days), reoperation, readmission, and death in the first 30 days following craniotomy for primary malignant brain tumors using the American College of Surgeons (ACS) National Surgical Quality Improvement Program (NQSIP) database.

Methods

All patients who underwent craniotomy for a primary malignant brain tumor were extracted from the NSQIP registry (2005-2015) using the following criteria:

- Aged 18 years or older
- Current Procedural Terminology (CPT) code(s) indicating craniotomy for surgical resection of brain tumors (CPT: 61500, 61510, 61512, 61518, 61519, 61520, 61521, 61526, and 61530)
- Postoperative diagnosis indicative of primary malignant brain tumor according to International Classification of Diseases, Ninth Revision [ICD-9]: 191.x.

Multivariable logistic regression models were constructed using variables screened by univariable analysis for occurrence of major complication, extended length of stay, reoperation, readmission, and death.

Major complication was defined as acute renal failure, cardiac arrest, death, failure to wean from ventilator, myocardial infarction, reintubation, reoperation, stroke, venous thromboembolism, sepsis, or surgical site infection. Figure 1: Reasons for reoperation (A) and readmission (B), among NSQIP-reported patients undergoing resection of primary brain malignancy.

B. Reasons for Readmission

A. Reasons for Reoperation







Results I — **Descriptive analysis**

7376 patients were identified, of which 12.9% experienced a major complication. Most common major complications were reoperation (5.1%), venous thromboembolism (3.5%), and death (2.6%). Furthermore, 15.6% stayed longer than ten days, and 11.5% were readmitted within 30 days after surgery.

Results II — Inferential analysis

Older age, higher body mass index (BMI), higher American Society of Anesthesiologists (ASA)-classification, dependent functional status, elevated preoperative white blood cell count (WBC, >12,000 cells/mm3), and longer operative time were predictors of major complication (all p<.001). Higher ASAclassification, dependent functional status, elevated WBC, and ventilator dependence were predictors of extended length of stay (all p<.001). Higher ASA-classification and elevated WBC were predictors of reoperation (both p<.001). Higher ASA-classification and dependent functional status were predictors of readmission (both p<.001). Older age, higher ASA-classification, and dependent functional status were predictors of death (all p<.001).

Conclusions

Despite improved perioperative management, the overall rate of short-term postoperative major complications, extended length of stay, reoperation, readmission, and mortality among patients treated with a craniotomy for primary malignant brain tumors remains considerably high.

The majority of adverse events occur during the initial hospital stay. Intracranial hemorrhage and wound related complications were the major causes of reoperation and readmission, respectively.

ASA-classification and dependent functional status are primarily predictive for morbidity and mortality within 30 days after craniotomy for primary malignant brain tumors.

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