

Infectious Complications After Craniotomy for Tumor: A National Surgical Quality Improvement Program Analysis Hormuzdiyar H. Dasenbrock MD; Sandra C. Yan BS, BA; Timothy R. Smith MD, PhD, MPH; Elizabeth Claus MD; William B. Gormley MD; Ian F. Dunn MD

[Department of Neurosurgery; Brigham and Women's Hospital; Harvard Medical School]

Introduction

Although hospital-acquired infections are a major cause of mortality and morbidity, there are limited national data evaluating systemic hospital-acquired infections after craniotomy for tumor.

Methods

The prospective **National Surgical Quality Improvement Program** (NSQIP, 2007-2013) registry was utilized to evaluate the thirty-day cumulative incidence and predictors of systemic infectious complications—<u>pneumonia</u>, sepsis, surgical site infections (SSI), and urinary tract infections (UTI)—after craniotomy for tumor. <u>Multivariable logistic regression</u> evaluated independent significant predictors of each complication. Variables screened included patient characteristics; American Society of Anesthesiologists (ASA) classification; comorbidities; recent oncologic treatment; preoperative laboratory values; operative time; and postoperative complications that preceded infectious complications. Subsequenty, scales were proposed to highlight which patients have the greatest odds of developing each complication, and the discrimination of these scales determined using the Concordance statistics.



Results

Among the 11,326 patients, the cumulative incidence of pneumonia was 1.7%, sepsis was 2.2%, SSI was 2.1%, and UTI was 2.6%.

Predictors of **pneumonia** were age greater than 70 years; dependent functional status; infratentorial tumor location; ASA class 3-5 designation; operative time greater than 300 minutes; and postoperative transfusion, reintubation, or mechanical ventilation. **Sepsis** was associated with ASA class 3-5 designation; hypertension; operative time greater than 300 minutes; and postoperative neurologic, pulmonary, and infectious complications. Predictors of SSIs were ASA class 3 designation; morbid obesity; preoperative chemotherapy; operative time greater than 180 minutes; and postoperative reintubation and sepsis. **UTIs** were associated with age greater than 70 years; female sex; diabetes mellitus; ASA class 3-5 designation; preoperative neurologic deficits; operative time greater than 300 minutes; and postoperative pulmonary and thromboembolic complications (all p<0.05).

NSQIP & Craniotomy scales were proposed for each complication, which had concordance statistics of 0.83 for pneumonia, 0.88 for sepsis, 0.74 for SSI, and 0.69 for UTI.

Pneumonia was also associated with increased odds of subsequent prolonged ventilation and pulmonary emboli; sepsis was associated with subsequent cardiac complications, prolonged ventilation, and deep venous thrombosis. All infectious complications were associated with extended hospitalization and non-routine hospital discharge.

Pneumonia (odds ratio (OR): 2.54, 95% confidence interval (CI): 1.53-3.95, p<0.002) and sepsis (OR: 2.05, 95% CI: 1.29-3.27, p=0.003) were also associated with thirty-day mortality.

Conclusions

In this NSQIP analysis, higher ASA classification, longer operative time, and postoperative complications were among the strongest predictors of infectious complications. The importance of pneumonia and sepsis is underscored by their association with subsequent complications and mortality. NSQIP & Craniotomy scales were constructed to provide patient risk stratification.

