Predictive Algorithms Show Mortality is Associated with Longer Time to Surgical Treatment of Malignant Intracranial Neoplasms

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Introduction

• Patients with malignant intracranial neoplasms often have multiple comorbidities that complicate inpatient stay.
• As a result, time to surgical resection of neoplastic tumors is highly variable between patients.
• Here, we develop predictive algorithms to optimize the time-to-treatment of malignant intracranial neoplasms.
Methods

• Using the 2016 National Inpatient Sample database, we conducted a retrospective cohort analysis of 3,251 patients admitted with a primary diagnosis of a malignant intracranial neoplasm who underwent microscopic or endoscopic tumor resection as the primary procedure.

• Time-to-treatment (TTT) is defined as the number of inpatient days a patient waited before surgical intervention. Negative TTT values and patients admitted on the weekend were excluded.

• Statistics were conducted using RStudio, and predictive algorithms were developed using generalized gaussian logistic regression models. Significance was determined from paired or unpaired two sample t-tests.
Results

• Mean TTT was 1.72±2.44 days (range:0-24 days). No association between TTT and postsurgical inpatient death was identified (p=0.165).

• However, within the logistic regression model, TTT was significantly correlated with postoperative inpatient death (p=0.0114) and showed a 0.185% increase in death rate with each additional day spent waiting for treatment.
Results

• Furthermore, TTT was significantly associated with increased rates of postoperative hemorrhage and hematoma formation in both the raw data ($p=0.0392$) and predictive model ($p=0.00613$).

• Each additional day spent waiting for resection was found to increase the chance of postoperative hemorrhage and hematoma by 0.182%.
Discussion

• Patients hospitalized with a primary diagnosis of malignant intracranial neoplasm may have higher complication rates as TTT increases.

• These delays may be due to more complex overall medical comorbidity, and poor outcomes may be confounded by this as well.

• Predictive algorithms are promising new developments that may allow for optimization of inpatient surgical timing to improve patient outcomes and may find significant patterns that traditional statistical methods may overlook.
Key Points

• Increased TTT may increase the rate of perioperative comorbidities.
• Predictive models may help better highlights connections between TTT and surgical complications.