Elective craniotomy length of stay

- Role of modified enhanced recovery after surgery (mERAS) in awake craniotomy performed under monitored anesthesia care (MAC); a single center retrospective study
- Effect of the enhanced recovery after surgery protocol in patients undergoing elective craniotomies: a systematic review and meta-analysis
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The length of stay (LOS) following an elective craniotomy can vary based on factors like the patient's overall health, the complexity of the neurosurgery, and the hospital's protocols. However, in general, the average length of stay for an elective craniotomy is typically around 4 to 7 days.

Patients often spend the first 1-2 days in the intensive care unit (ICU) for close monitoring and management of any immediate postoperative issues. Once stable, they may be transferred to a general surgical ward where their condition is further managed before discharge.

It's important to note that recovery time and discharge criteria depend on the individual case, including the presence of complications, the patient's preoperative condition, and their recovery progress. Some patients may require a longer stay if there are issues like infections, neurological deficits, or other complications.

Retrospective cohort studies

Lesha et al. aimed to provide a comprehensive evaluation of length of stay, specifically identifying variables associated with extended LOS (eLOS), in children and young adults following elective craniotomy for tumor resection.

All elective craniotomies for tumor resection performed at a tertiary care children's hospital from January 2010 to December 2022 were included for review, excluding patients > 21 years of age. Demographic, clinical, and procedural variables for each craniotomy were collected. LOS was defined as the interval in days from index surgery to discharge. eLOS was defined as greater than 7 days.

1,276 patients underwent a total of 1,497 elective craniotomies for tumor resection. The median age was 9.45 years old, with the most common age group being > 10 years (45.6%). Most patients had supratentorial tumors (63.4%) and underwent de novo surgery (60.7%). Patients with an eLOS experienced longer ICU admissions, longer surgical times, and were younger. Variables found to be significantly associated with eLOS were posterior fossa resection (OR = 2.45), de novo craniotomy (OR = 0.49), prior shunt or ETV (OR = 1.80), tumor type (craniopharyngioma (OR = 3.74) and medulloblastoma (OR = 0.51)), and the presence of at least one postoperative event (POE) (OR =

29.85).

This is the largest study evaluating factors (patient, tumor, surgical) associated with eLOS after elective craniotomy for tumor resection in children and young adults. The findings of this clinical study are important for preoperative counseling, neurosurgical team preparedness, and healthcare delivery optimization [1].

A retrospective medical record review of 139 consecutive craniotomies for tumor resection (CTR) was performed between July 2020 and July 2021. Univariate and multivariable analyses determined which factors were associated with an eLOS (≥8 days).

Median LOS was 6 days (IQR 3-9 days). Fifty-one subjects (36.7%) experienced an eLOS. Upon univariate analysis, potentially modifiable factors associated with eLOS included days to occupational therapy (OT), physical therapy (PT), and case management clearance ($p < .001$); and discharge disposition ($p < .001$). Multivariable analysis revealed that pre-operative anti-coagulant use (OR 10.74, 95% CI 2.64-43.63, $p = .001$), Medicare (OR 4.80, 95% CI 1.07-21.52, $p = .04$), ED admission (OR 26.21, 95% CI 5.17-132.99, $p < .001$), transfer to another service post-surgery (OR 30.00, 95% CI 1.56-577.35, $p = .02$), and time to post-operative imaging (OR 2.91, 95% CI 1.27-6.65, $p = .01$) were associated with eLOS. Extended LOS was not significantly associated with ED visits ($p = .45$) or unplanned readmissions within 30 days of surgery ($p = .35$), and both ($p = .04$; $p = .04$) were less likely following a short LOS (<5 days).

While some factors driving LOS related to CTR are uncontrollable, expedient pre-and post-operative management may reduce LOS without compromising care [2].

All pediatric patients and young adults undergoing an elective craniotomy between January 1, 2010, and April 1, 2019, were retrospectively identified using a prospectively maintained database. Demographic, clinical, radiological, and surgical data were collected. The primary outcome was extended LOS, defined as a postsurgical stay greater than 7 days. Bivariate and multivariable analyses were performed.

Results: A total of 1,498 patients underwent 1,720 elective craniotomies during the study period throughout 1,698 hospitalizations with a median LOS of 4 days (interquartile range 3-6 days). Of these encounters, 218 (12.8%) had a prolonged LOS. Multivariable analysis demonstrated that non-Caucasian race (OR = 1.9 [African American]; OR = 1.6 [other]), the presence of an existing shunt (OR = 1.8), the type of craniotomy (OR = 0.3 [vascular relative to Chiari]), and the presence of a postoperative complication (OR = 14.7) were associated with an extended LOS.

Inherent and modifiable factors predict a hospital stay of more than a week in children and young adults undergoing an elective craniotomy [3].

The goals of the study were to use multivariate regression to examine which preoperative characteristics and postoperative complications predict a prolonged hospital stay and to assess the impact of length of stay on unplanned hospital readmission. METHODS Data were extracted from the National Surgical Quality Improvement Program (NSQIP) database from 2007 to 2013. Patients who

underwent craniotomy for resection of a brain tumor were included. Stratification was based on the length of hospital stay, which was dichotomized by the upper quartile of the interquartile range (IQR) for the entire population. Covariates included patient age, sex, race, tumor histology, comorbidities, American Society of Anesthesiologists (ASA) class, functional status, preoperative laboratory values, preoperative neurological deficits, operative time, and postoperative complications. Multivariate logistic regression with forward prediction was used to evaluate independent predictors of extended hospitalization. Thereafter, hierarchical multivariate logistic regression assessed the impact of length of stay on unplanned readmission. RESULTS The study included 11,510 patients. The median hospital stay was 4 days (IQR 3-8 days), and 27.7% (n = 3185) had a hospital stay of at least 8 days. Independent predictors of extended hospital stay included age greater than 70 years (OR 1.53, 95% CI 1.28%-1.83%, p < 0.001); African American (OR 1.75, 95% CI 1.44%-2.14%, p < 0.001) and Hispanic (OR 1.68, 95% CI 1.36%-2.08%) race or ethnicity; ASA class 3 (OR 1.52, 95% CI 1.34%-1.73%) or 4-5 (OR 2.18, 95% CI 1.82%-2.62%) designation; partially (OR 1.94, 95% CI 1.61%-2.35%) or dependent (OR 3.30, 95% CI 1.95%-5.55%) functional status; insulin-dependent diabetes mellitus (OR 1.46, 95% CI 1.16%-1.84%); hematological comorbidities (OR 1.68, 95% CI 1.25%-2.24%); and preoperative hypoalbuminemia (OR 1.78, 95% CI 1.51%-2.09%, all p ≤ 0.009). Several postoperative complications were additional independent predictors of prolonged hospitalization including pulmonary emboli (OR 13.75, 95% CI 4.73%-39.99%), pneumonia (OR 5.40, 95% CI 2.89%-10.07%), and urinary tract infections (OR 11.87, 95% CI 7.09%-19.87%, all p < 0.001). The C-statistic of the model based on preoperative characteristics was 0.79, which increased to 0.83 after the addition of postoperative complications. A length of stay after craniotomy for tumor score was created based on preoperative factors significant in regression models, with a moderate correlation with length of stay (p = 0.43, p < 0.001). Extended hospital stay was not associated with differential odds of unplanned hospital readmission (OR 0.97, 95% CI 0.89%-1.06%, p = 0.55). In this NSQIP analysis that evaluated patients who underwent craniotomy for tumor, much of the variance in hospital stay was attributable to baseline patient characteristics, suggesting the length of stay may be an imperfect proxy for quality. Additionally, longer hospitalizations were not found to be associated with differential rates of unplanned readmission [4)]

Cross-Sectional Studies

A cross-sectional study was conducted in the Department of Neurosurgery Unit B, Medical Teaching Institution (MTI) - Lady Reading Hospital (LRH), Peshawar. We reviewed the admission charts and discharge slips of all patients who were admitted and underwent operations between September 2018 and August 2019. A form was made and was completed with each patient's records like age, gender, number of days spent preoperatively and postoperatively the total duration of stay, indication for surgery (spinal, cranial, peripheral nerve), etc. Patients who had undergone elective neurosurgical procedures were included while those who had undergone emergency surgeries or had expired during the hospital stay, had been discharged or referred to other centers were excluded from the study. All the data were entered into the statistical software SPSS version 22 (IBM Corp., Armonk, NY) and were converted into tables and charts.

A total of 1818 patients were admitted/discharged during the study period, and of them, 823 patients were admitted for elective neurosurgical procedures. There were 601 (73.7%) males and 222 (26.3%) females with a male-to-female ratio of approximately 3:1. The age range was from 09 days to 72 years and was further subdivided into six groups. The procedures were broadly divided into cranial, spinal, related to hydrocephalus (HCP)-related, and miscellaneous. Cranial procedures comprised of surgeries for brain tumors, transsphenoidal operations, vascular procedures for aneurysms, and nerve decompressions, and they comprised about 29.43% (n=244) while spinal procedures accounted for

317 (36.63%) procedures, the rest were related to HCP and miscellaneous. Preoperative and postoperative stay durations were calculated and then added to determine the total stay durations and were further stratified for the specific procedures and categorized into days and weeks. About 58.26% (n=143) of cranial cases, 156 (49.36%) of spinal cases, 37.57% (n=65) of HCP-related cases, and 36.66% (n=41) of cases in the miscellaneous group had a duration of stay between eight days to more than three weeks [5].

Conclusion

In conclusion, the length of stay (LOS) following an elective craniotomy for tumor resection can vary significantly depending on factors such as the patient's overall health, the complexity of the surgery, and hospital protocols. Generally, the average LOS for elective craniotomy is around 4 to 7 days, with patients often spending 1-2 days in the ICU for close monitoring before transitioning to a general ward. Recovery times and discharge criteria are influenced by the patient's preoperative condition, the complexity of the surgery, and any postoperative complications.

Several retrospective cohort studies have identified key factors associated with extended LOS (eLOS) in both pediatric and adult populations. For instance, a study by Lesha et al. highlighted factors such as younger age, type of tumor, and the presence of postoperative complications as significant predictors of prolonged hospitalization. Similarly, a large cohort analysis from the National Surgical Quality Improvement Program (NSQIP) showed that age, race, comorbidities, and complications like pneumonia and pulmonary emboli were associated with longer hospital stays after craniotomy for tumor resection. In addition, modifiable factors such as timely physical therapy, case management, and post-operative care coordination have been identified as potentially reducing eLOS.

While length of stay is a commonly used metric, it is not always an accurate indicator of quality of care. Longer stays are not necessarily associated with lower rates of unplanned hospital readmissions, suggesting that patient characteristics and postoperative complications are more reliable predictors of hospital outcomes. Therefore, efficient preoperative preparation and post-surgical management are essential in optimizing patient recovery and minimizing unnecessary hospital stays.

1)
Lesha E, Roach JT, Miller LE, Nichols CS, Vaughn B, Laird DG, Orr T, Graham D, Motiwala M, Shimony N, Klimo P Jr. Length of stay following elective craniotomy for tumor resection in children and young adults: a retrospective case series. J Neurooncol. 2024 Nov 29. doi: 10.1007/s11060-024-04887-w. Epub ahead of print. PMID: 39612129.
2)
Phillips KR, Enriquez-Marulanda A, Mackel C, Ogbonna J, Moore JM, Vega RA, Alterman RL. Predictors of extended length of stay related to craniotomy for tumor resection. World Neurosurg X. 2023 Mar 31;19:100176. doi: 10.1016/j.wnsx.2023.100176. PMID: 37123627; PMCID: PMC10139985.
3)
Hersh DS, Smith LGF, Jones TL, Fraser BD, Kumar R, Vaughn B, Klimo P. Predictors of an Extended Length of Stay following an Elective Craniotomy in Children and Young Adults. Pediatr Neurosurg. 2020;55(5):259-267. doi: 10.1159/000511090. Epub 2020 Oct 23. PMID: 33099552.
4)
Dasenbrock HH, Liu KX, Devine CA, Chavakula V, Smith TR, Gormley WB, Dunn IF. Length of hospital stay after craniotomy for tumor: a National Surgical Quality Improvement Program analysis. Neurosurg Focus. 2015 Dec;39(6):E12. doi: 10.3171/2015.10.FOCUS15386. PMID: 26621410.
5)

Khan B, Haqqani U, Ullah S, Hamayun S, Bibi Z, Khanzada K. Duration of In-hospital Stay for Elective Neurosurgical Procedures in a Tertiary Care Hospital. Cureus. 2021 Jun 18;13(6):e15745. doi: 10.7759/cureus.15745. PMID: 34285851; PMCID: PMC8286779.