

Outcomes after Neurosurgery in American Society of Anesthesiologists Physical Status 5 Patients

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Introduction

Patients classified as American Society of Anesthesiologists (ASA) physical status 5 (ASA5) are described as “a moribund patient who is not expected to survive without the operation.” We wished to describe the outcomes of ASA5 patients who underwent neurosurgery and to identify risk factors for adverse outcomes.

Methods

We used the 2011 American College of Surgeons National Surgical Quality Improvement Program (NSQIP) database to identify 147 ASA5 patients who underwent neurological surgery between 2006 and 2011.

We identified 38,396 adult patients who underwent a neurosurgical procedure between 2006 and 2011. We excluded 55 patients with missing ASA values, and 38,194 patients with ASA values of 1-4. Our final study sample consisted of 147 patients with an ASA of 5, who underwent neurological surgery. Of these 147 patients, nearly all (N=141) had cranial surgery.

Univariate logistic regression was used to identify baseline factors associated with adverse post-operative outcomes

All factors identified were incorporated into the final multivariate models.

Results 1

Seventy percent of all patients experienced one or more complications; postoperative ventilator-assisted respiration of greater than 48 hours was the most common complication (57% of patients). Thirty-day mortality was 38.8%.

	ASA 5
Total length of hospital stay, days	
mean ± SD	16 ± 22
median	12
Prolonged LOS (>23 days)	26.5%
Urinary tract infection	8.8%
DVT or thrombophlebitis	8.2%
Pneumonia	21.1%
Unplanned intubation	9.5%
Pulmonary embolism	1.4%
>48 hour postoperative ventilator-assisted respiration	57.1%
Progressive renal insufficiency	0.7%
Acute renal failure	2.0%
Cardiovascular accident with neurological deficit	3.4%
Coma of > 24 hours	7.5%
Peripheral nerve injury	1.4%
Cardiac arrest requiring CPR	4.8%
Sepsis	20.4%
Septic shock	4.1%
Minor postoperative complications*	16.3%
Major postoperative complications†	68.7%
Any postoperative complication‡	70.1%
Return to the OR	15.7%
30 day mortality	38.8%

30-day post-operative outcomes in ASA5 patients

Results 2

In univariate analyses, obesity (BMI=30) was a risk factor for prolonged LOS; both pulmonary comorbidities and impaired functional status for any postop complication and 30-day mortality; minority race, preoperative sepsis, and emergency surgery for any complications, abnormal Cr was for death (data not shown)

Results 3

Obesity was a significant risk factor for prolonged LOS, increasing the odds by 3.6 (1.2-11.5) compared with normal body weight. Minority race and pulmonary comorbidities were associated with 4.0 (1.5-10.5) and 3.4 (1.3-8.8) times the odds for any postoperative complications, respectively.

	Prolonged LOS (>23 days)	Any postoperative complication‡	30 day mortality
Age, per 1 year	1.0 (1.0-1.0)	1.0 (1.0-1.0)	1.0 (1.0-1.0)
Female	1.1 (0.5-2.6)	1.9 (0.8-4.6)	1.1 (0.5-2.3)
Race			
Caucasian	Ref	Ref	Ref
Other	1.4 (0.6-3.3)	4.0 (1.5-10.5)	1.2 (0.6-2.8)
Partially or fully dependent functional status	0.4 (0.2-1.1)	1.9 (0.7-4.7)	1.8 (0.8-4.4)
BMI categories			
Normal weight (19-24.9kg/m ²)	Ref	Ref	Ref
Underweight (<19 kg/m ²)	1.2 (0.3-4.0)	0.6 (0.2-2.0)	1.7 (0.6-5.0)
Overweight (25-29.9kg/m ²)	1.2 (0.4-4.1)	1.2 (0.4-3.5)	0.8 (0.3-2.1)
Obese (≥30kg/m ²)	3.6 (1.2-11.5)	1.8 (0.5-6.7)	0.8 (0.3-2.3)
Pulmonary comorbidities	1.1 (0.3-3.4)	3.4 (1.3-8.8)	3.0 (1.0-9.2)
Preoperative sepsis	1.9 (0.8-4.6)	1.6 (0.6-4.0)	1.0 (0.5-2.3)
Abnormal creatinine	0.7 (0.2-1.2)	1.1 (0.3-4.0)	2.6 (0.9-7.3)
Emergency	2.1 (0.4-11.0)	2.2 (0.6-7.8)	2.0 (0.5-8.4)

Multivariate models for adverse outcomes in ASA 5 neurosurgery patients

Limitations

NSQIP only contains data on patients that underwent surgery, we cannot compare mortality rates between ASA5 patients who were referred for neurosurgery but did not have surgery due to their moribund status.

Patients' specific medical and neurological condition or deficits before and after surgery are not detailed precisely in NSQIP

NSQIP only provides the last set of lab results prior to surgery, within 90 days of surgery

Conclusions

This is the first study to describe the outcomes of ASA5 patients who undergo neurosurgery and to identify risk factors for adverse outcomes.

While there was an overall complication rate of 70% in these critically-ill patients, 90% of whom underwent emergency surgery, only 38.8% died within 30 days of surgery.

Obesity was associated with increased risk for prolonged LOS, while minority race and preoperative pulmonary disease increased the odds for experiencing one or more postoperative complications.

Our findings, using a large multi-institutional sample of prospectively-collected data, suggest that ASA5 patients who undergo neurosurgery have a reasonable chance of survival.

These novel findings may inform decision-making in critically-ill neurosurgical patients.

References

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