

Anesthesia Time as a Predictor for Perioperative, Postoperative, and Post-Discharge Outcomes Following Posterior Lumbar Fusion

Nir Tomer BS; Sean N Neifert BS; Daniel J Snyder BS; Jared C Tishelman BA; Samuel DeMaria MD; John M. Caridi MD; Jonathan S. Gal MD
Icahn School of Medicine at Mount Sinai



Introduction

- Posterior lumbar fusion (PLF) is a common procedure performed by orthopedic and neurologic surgeons for a variety of spinal pathologies [1,2]
- Time under anesthesia can be used as a surrogate to determine length and difficulty of surgery [3]
- This analysis looked to see if time under anesthesia could be a predictor for poor outcomes. This data can be used to help surgeons map out postoperative care of their patients

Learning Objectives

- Understand the importance of anesthesia time on episode-based outcomes in patients undergoing PLF

Methods

- PLF cases were queried from a single institution based on the CPT codes 22630, 22633, and 22612
- Cases were stratified based on time under anesthesia and separated into quintiles
- Chi-square test and multivariable logistic regression were used to compare the shortest anesthesia quintile to all other quintiles for a variety of outcomes. Data were controlled for age, sex, and ASA class. A Bonferroni correction was applied, such that alpha=0.0125 and all confidence intervals were 98.75%

Results

- 3273 PLF cases were obtained for analysis
- Increasing anesthesia time was predictive for the perioperative and postoperative outcomes, prolonged extubation time, required ICU stay, in-hospital complications, and non-home discharge
- Increasing anesthesia time was not predictive for the post-discharge outcomes, 30 and 90 day readmission and 30 and 90 day ED visits

Table 1. Characteristics of patients undergoing PLF split into quintiles by time under anesthesia

Quintile	1 (n=654)	2 (n=650)	3 (n=668)	4 (n=648)	5 (n=653)
Age*	55.00 (15.57)	55.90 (14.33)	58.60 (14.1)	58.45 (13.82)	58.29 (13.55)
p-value	ref.	<.0001	<.0001	<.0001	<.0001
Sex (male)	342 (52.29%)	274 (42.15%)	312 (46.71%)	310 (47.84%)	324 (49.62%)
p-value	ref.	0.0002	0.0422	0.108	0.3332
ASA Class					
I	91 (13.91%)	49 (7.54%)	42 (6.29%)	35 (5.4%)	32 (4.9%)
II	388 (59.33%)	413 (63.54%)	401 (60.03%)	368 (56.79%)	325 (49.77%)
III	167 (25.54%)	180 (27.69%)	214 (32.04%)	232 (35.8%)	281 (43.03%)
IV	8 (1.22%)	8 (1.23%)	11 (1.65%)	13 (2.01%)	15 (2.3%)
V	0	0	1 (0.38%)	0	0
p-value	ref.	0.0031	<.0001	<.0001	<.0001
Emergency Status	11 (1.68%)	4 (0.62%)	3 (0.45%)	5 (0.77%)	3 (0.46%)
p-value	ref.	0.1164	0.0325	0.2074	0.0561

*data are presented as mean (SD);

Table 2. Postoperative and perioperative outcomes of patients undergoing PLF split into quintiles by time under anesthesia

Table 2. Postoperative and perioperative outcomes of patients undergoing PLF split into quintiles by time under anesthesia					
Quintile	1 (n=254)	2 (n=258)	3 (n=260)	4 (n=258)	5 (n=258)
Unadjusted Chi-square analysis					
Prolonged Extubation	8 (1.22%)	8 (1.23%)	12 (1.8%)	15 (2.31%)	126 (19.3%)
p-value	ref.	0.99	0.1349	<.0001	<.0001
Required ICU Stay	4 (0.61%)	16 (2.46%)	17 (2.54%)	54 (8.33%)	193 (29.56%)
p-value	ref.	0.0066	0.0049	<.0001	<.0001
In-hospital Complication	55 (8.41%)	111 (17.08%)	151 (22.6%)	200 (30.86%)	336 (51.45%)
p-value	ref.	<.0001	<.0001	0.0001	<.0001
Non-Home Discharge	59 (9.75%)	112 (17.47%)	136 (20.51%)	175 (27.43%)	268 (41.68%)
p-value	ref.	<.0001	<.0001	<.0001	<.0001
Prolonged LOS	54 (8.26%)	117 (18%)	156 (23.35%)	211 (32.56%)	363 (55.59%)
p-value	ref.	<.0001	<.0001	<.0001	<.0001
Adjusted Logistic Regression Presented as Odds Ratios (98.75% CI)					
Prolonged Extubation		0.936 (0.266 - 3.298)	1.31 (0.41 - 4.13)	1.65 (0.55 - 5.00)	16.88 (6.681 - 42.66)
p-value	ref.	0.8959	0.563	0.256	<.0001
Required ICU Stay		3.84 (0.94 - 15.64)	3.78 (0.93 - 15.26)	12.81 (3.48 - 47.19)	59.01 (16.53 - 210.68)
p-value	ref.	0.0168	0.0175	<.0001	<.0001
In-hospital Complication		2.14 (1.38 - 3.32)	2.971 (1.945 - 4.539)	4.55 (3.01 - 6.89)	10.92 (7.27 - 16.39)
p-value	ref.	<.0001	<.0001	<.0001	<.0001
Non-Home Discharge		2.299 (1.48 - 3.58)	3.08 (2.01 - 4.73)	4.88 (3.21 - 7.42)	12.97 (8.58 - 19.61)
p-value	ref.	<.0001	<.0001	<.0001	<.0001
Prolonged LOS		2.11 (1.32 - 3.37)	2.23 (1.41 - 3.51)	3.43 (2.20 - 5.37)	7.50 (4.83 - 11.64)
p-value	ref.	<.0001	<.0001	<.0001	<.0001

Table 3. Post-discharge outcomes of patients undergoing PLF split into quintiles by time under anesthesia

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Quintile	1 (n=254)	2 (n=258)	3 (n=260)	4 (n=258)	5 (n=258)
Unadjusted Chi-square analysis					
30-Day Readmission	21 (3.21%)	9 (1.38%)	17 (2.54%)	28 (4.32%)	31 (4.75%)
p-value	ref.	0.0278	0.4686	0.2927	0.1554
90-Day Readmission	31 (4.74%)	15 (2.31%)	24 (3.59%)	35 (5.4%)	45 (6.89%)
p-value	ref.	0.0173	0.2963	0.5866	0.0966
30-Day ED Visit	16 (2.45%)	19 (2.92%)	20 (2.99%)	18 (2.78%)	16 (2.45%)
p-value	ref.	0.5944	0.5408	0.7078	0.9965
90-Day ED Visit	26 (3.98%)	20 (3.08%)	24 (3.59%)	20 (3.09%)	23 (3.52%)
p-value	ref.	0.3791	0.7153	0.3849	0.6662
Adjusted Logistic Regression Presented as Odds Ratios (98.75% CI)					
30-Day Readmission		0.40 (0.15 - 1.10)	0.75 (0.33 - 1.72)	1.28 (0.61 - 2.68)	1.37 (0.66 - 2.85)
p-value	ref.	0.024	0.3893	0.4088	0.276
90-Day Readmission		0.45 (0.20 - 1.00)	0.72 (0.356 - 1.44)	1.08 (0.57 - 2.05)	1.38 (0.75 - 2.54)
p-value	ref.	0.0128	0.2287	0.7536	0.1827
30-Day ED Visit		1.15 (0.49 - 2.72)	1.19 (0.51 - 2.79)	1.07 (0.44 - 2.56)	0.89 (0.36 - 2.20)
p-value	ref.	0.688	0.6128	0.8564	0.7453
90-Day ED Visit		0.72 (0.33 - 1.53)	0.87 (0.42 - 1.79)	0.71 (0.33 - 1.53)	0.77 (0.37 - 1.61)
p-value	ref.	0.2726	0.6193	0.264	0.3694

Discussion

- Results indicate that time under anesthesia is associated with perioperative and postoperative outcomes in patients who undergo PLF, but it does not play a role in post-discharge outcomes
- Time under anesthesia can be used as a proxy to understand the duration and complexity of the procedure performed [4, 5]
- The influence of time under anesthesia on complications can improve quality of care and management of hospital costs

Conclusions

- Time under anesthesia was found to be a predictor for perioperative and postoperative outcomes but was not a predictor for post-discharge outcomes
- The present findings can be used by physicians to better understand what factors contribute to surgical complications and help predict and manage postoperative care in patients
- This warrants further investigation into anesthesia time as a predictor for morbidity in patients undergoing PLF

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