



Factors Associated with Venous Thromboembolic Events in Spine Surgery Patients in the Intensive Care

Setting: A Single-Institution Experience with 1269 Consecutive Patients

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Introduction

Venous thromboembolic events (VTE) are a common cause of morbidity and mortality after spine surgery. Patients admitted to the ICU following spine surgery are a subgroup of patients who are at higher risk of complications, including VTE. We identified factors independently associated with VTE in this unique patient population.

Methods

We retrospectively analyzed 6869 patients who underwent spine surgery at our institution, of whom 1269 were admitted to the ICU. For ICU patients, we identified demographic, clinical, and procedural factors independently associated with VTE during three time periods: during the ICU admission, after leaving the ICU, at any point during the first 30 postoperative days.

Table 1				
Characteristics of patients selected for ICU admission				
	p value	OR	95% CI	
Surgery > 4 hours	<0.001	4.25	2.99	6.06
Length of stay	<0.001	1.45	1.36	1.54
Transfusion	<0.001	4.81	2.95	7.84
Lumbar surgery	<0.001	0.29	0.20	0.41
Comorbid disease burden	<0.001	1.45	1.22	1.73
Gender	<0.001	2.01	1.45	2.80
Fracture	<0.001	4.29	1.99	9.27
EBL > 500mL	0.009	1.95	1.19	3.20
Osteotomy	0.006	20.47	2.39	175.09
Bleeding disorder	0.028	2.85	1.12	7.27
Corpectomy	0.007	3.48	1.40	8.69
BMI	0.027	1.03	1.00	1.05

Table 3		
Median time to VTE by surgery and pathology		
Group	Median time to VTE (days)	p-value
Fusion	3.97	0.0056
Fracture	4.28	0.0113
Scoliosis	5.95	0.0431
Laminectomy	6.08	0.2371
Osteotomy	8.16	ref

Table 4				
Factors independently associated with DVT				
DVT 30 day	p value	OR	95% CI	
IVC filter placed	<0.001	3.41	1.81	6.44
History of DVT	<0.001	3.25	1.70	6.19
Length of stay	0.002	1.05	1.02	1.09
Interbody fusion	0.037	2.38	1.05	5.39
DVT during postop ICU stay				
IVC filter placed	<0.001	8.98	3.52	22.95
Surgery > 4 hours	0.015	0.30	0.12	0.79
History of PE	0.066	3.54	0.92	13.63
Fracture	0.051	3.09	1.00	9.58
DVT after postop ICU stay				
History of DVT	<0.001	6.43	2.81	14.70
Fusion	0.017	0.36	0.15	0.83
Interbody fusion	0.047	2.64	1.01	6.89
Osteotomy	0.045	3.14	1.03	9.61

Results

There was a difference in time-to-VTE based on the type of surgery being performed, with osteotomy patients having a prolonged median time-to-VTE. A history of DVT, PE, and prior IVC filter placement were associated with having a DVT or PE during more than one of the three time periods analyzed. DVT in the ICU was associated with undergoing longer surgeries (OR 1.05, p=0.002), and there was a trend toward significance for fractures (OR 3.09, p=0.051). DVT after leaving the ICU was associated with fusion (OR 0.36, p=0.045) and osteotomy (OR 3.14, p=0.045). PE during the ICU stay was associated with fractures (OR 7.02, p=0.040) and scoliosis correction (OR 7.78, p=0.024). Prophylactic anticoagulation was negatively associated with PE during the ICU stay (OR 0.16, p=0.031). Men were less likely to develop a PE after leaving the ICU (OR 0.12, p=0.006).

Conclusions

Patients admitted to the ICU following spine surgery are typically in poorer health, and are undergoing high-risk surgeries. Time-to-VTE varies between types of surgeries. Some factors are independently associated with VTE events throughout the 30-day postoperative period, while others are associated with VTE specifically during the ICU stay or after leaving the ICU.

Learning Objectives

Specific factors are associated with VTE in patients admitted to the ICU following surgery compared to non ICU admission

Table 5				
Factors independently associated with PE				
PE 30 day	p value	OR	95% CI	
History of PE	<0.001	15.65	4.43	55.27
Chemoprophylaxis	0.021	0.34	0.13	0.85
Surgery > 4 hours	0.047	3.84	1.02	14.53
PE in ICU				
History of PE	0.015	12.68	1.62	99.15
Fracture	0.04	7.02	1.09	45.18
BMI	0.036	0.85	0.73	0.99
History of DVT	0.042	5.11	1.06	24.69
Chemoprophylaxis	0.031	0.16	0.03	0.85
Scoliosis	0.024	7.78	1.31	46.08
PE after ICU				
History of PE	<0.001	37.48	6.07	231.48
Gender	0.006	0.12	0.03	0.55
Laminectomy	0.041	3.81	1.06	13.70
Transfusion	0.043	0.16	0.03	0.95