

# A Retrospective Characterization of 30-day Perioperative Venous Thrombosis in 1346 Consecutive Spine Surgery Patients

Timothy Wang BS; Visakha Suresh; Gautam Nayar; Jeffrey Sakamoto; Daniel Loriaux BS; Rupen Desai BS; Joel Martin MD; Maragatha Kuchibhatla PhD; Jessica Rose Moreno RN, BSN; Carlos Antonio Bagley MD; Isaac Karikari MD; Oren Gottfried MD



MD

## Introduction

Deep vein thrombosis (DVT) is a dreaded postsurgical complication. Identifying a perioperative DVT risk profile may improve the surgeons' ability to assess patients safety for surgery. Additionally, this data will help identify patients who would benefit from earlier DVT chemoprophylaxis.

## Methods

We evaluated all medical records and radiographic data of 1346 consecutive patients who underwent spinal surgery at Duke University for incidence of deep vein thrombosis within 30 days of surgery and documented all demographic, preoperative, operative, and postoperative variables. Associations between postoperative DVT and individual risk factors in all patients were determined using adjusted logistic regression analysis. Presence of postoperative DVT was determined by clinical documentation, as well as confirmative findings on ultrasound. Patients were stratified into emergent and elective groups and a similar analysis was performed.

## Results

Overall, 15 patients (1.1%) had a DVT in the 30 days following surgery, 7 patients (0.6%) undergoing elective surgery and 8 patients (4.2%) after emergent surgery ( $p = .03$ ). Overall, multivariate logistic regression determined that prior DVT, postoperative urinary tract infection, American Indian race, and creatinine  $> 2.0$  mg/dL were identified as positive predictors. When stratified by emergent surgery, we found blood transfusion, surgical blood loss  $> 2.0L$ , and deep surgical site infection to be independently associated with increased risk of postoperative DVT. When stratified by elective surgery, we found that coronary artery disease and atrial fibrillation were associated with increased risk of DVT. No patients with DVT experienced 30-day perioperative mortality, and 5 (33.3%) patients experienced 1-year mortality.

**Table 1:** Preoperative and intraoperative risk factor assessment for postoperative deep vein thrombosis in spine surgery patients.

Variable	n(%)	Odds Ratio	Confidence		Sig
			Lower	Upper	
<b>Patient demographics</b>					
Age (>60 years)	618 (45.9%)	0.92	0.34	2.47	0.80
Male	654 (48.6%)	2.35	0.81	6.80	0.36
A-Fib	61 (04.5%)	1.41	0.18	10.86	0.50
Anticoagulant Use	58 (04.3%)	3.25	0.72	14.65	0.25
CAD	160 (11.9%)	0.49	0.06	3.74	0.97
CHF	42 (03.1%)	2.10	0.27	16.25	0.68
COPD	27 (02.0%)	3.34	0.43	26.26	0.06
Cr ( $>2$ mg/dL)	19 (01.4%)	4.86	0.61	38.78	0.01*
Diabetes	243 (18.1%)	0.65	0.15	2.86	0.32
Hypercholesterolemia	144 (10.7%)	0.55	0.07	4.22	0.64
Hypertension	690 (51.3%)	1.59	0.58	4.41	0.74
Obese	551 (40.9%)	1.45	0.54	3.89	0.40
Prior DVT	17 (01.3%)	21.69	5.56	84.63	0.00*
Prior MI	25 (01.9%)	3.63	0.46	28.58	0.22
Prior Spinal Surgery (same area)	281 (20.9%)	0.54	0.12	2.38	0.58
Smoker	241 (17.9%)	0.72	0.21	2.45	0.60
<b>Intraoperative Variables</b>					
EBL $> 2L$	83 (06.2%)	2.20	0.49	9.86	0.19
Intraoperative Steroid Use	527 (39.2%)	0.51	0.16	1.60	0.73
LOS $> 7$ days	241 (17.9%)	6.08	2.24	16.51	0.88
Operative Time $> 5$ hours	306 (22.7%)	0.78	0.22	2.76	0.11
pRBC Transfusion	267 (19.8%)	1.85	0.64	5.38	0.36
Cervical	466 (34.6%)	0.43	0.12	1.52	0.80
Thoracic	98 (07.3%)	10.59	3.86	29.09	0.42
Lumbar	781 (58.0%)	0.43	0.16	1.19	0.86
Trauma	82 (06.1%)	7.40	2.51	21.82	0.48
Degenerative	764 (56.8%)	0.25	0.08	0.78	0.80
Deformity	375 (27.9%)	0.86	0.28	2.69	0.94
Neoplasm	110 (08.2%)	2.64	0.74	9.40	0.53
Anterior	315 (23.4%)	0.22	0.03	1.64	0.38
Posterior	977 (72.6%)	1.65	0.47	5.81	0.86
Lateral	183 (13.6%)	1.47	0.42	5.22	0.29

**Table 2:** Demographic and perioperative variables for patients with 30-day perioperative deep vein thrombosis

Patient	Age	Sex	DM	Race	Indication for Surgery	Location	Type	# Levels	# Days Between Surgery and DVT Diagnosis	DVT Class	Chemoprophylaxis	Treatment
1	74	M	26.1	C	TRA	T	F, LM	4	12	W, ASA	-	-
2	49	F	34.7	AI	DEF	T	F	6	16	-	-	W
3	38	M	20.1	AA	NFO	T	F, LM	8	21	-	-	-
4	30	F	39.8	C	NFO	L	LM	1	4	LMWH	FSN	FSN
5	74	M	18.6	AA	TRA	CT	F, LM	7	11	-	-	II
6	65	F	56.6	C	DEG	L	F	2	29	-	-	LMWH, W
7	61	M	15.1	C	NFO	T	F	2	21	LMWH	FSN	FSN
8	57	M	36.5	C	DEF	L	LM	3	30	-	-	W
9	62	M	20.7	C	DEF	TL	F, LM	16	11	-	-	LMWH, W
10	66	M	33.1	AI	TRA	C	F	1	5	-	-	LMWH, W
11	50	F	47.5	C	DEF	T	F, LM	8	14	LMWH	LMWH, W	LMWH, W
12	35	M	30.0	C	TRA	T	F	4	3	LMWH	-	-
13	22	M	45.6	C	TRA	OC	F	2	6	-	-	W
14	64	M	39.7	AA	DEF	L	LM	4	4	-	-	LMWH, W
15	81	F	39.8	C	DEG	T	F	1	30	-	-	LMWH

⊖ = occiput; C = cervical; T = thoracic; L = lumbar; S = sacral

†: F = fusion; LM = laminectomy

‡: W = warfarin; FON = fondaparinux; II = heparin; LMWH = low molecular weight heparin

## Conclusions

The present study demonstrates a low incidence of DVT after elective surgery with a higher incidence after emergent spine surgery and identifies patient factors predictive of postoperative DVT. For patients undergoing emergent spine surgery, risks of early DVT chemoprophylaxis may be offset by prevention of DVT. Identification of these factors impacts discussions of risk assessment and surgical decision-making.

## Learning Objectives

By the conclusion of this session, participants should be able to: 1) Describe the importance of perioperative venous thromboembolism in the setting of spine surgery, 2) Discuss, in small groups, the demographic, preoperative, and intraoperative risk factors for perioperative venous thromboembolism, 3) Identify an effective treatment options for spine patients who are at high risk for developing perioperative venous thromboembolism

## References

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