Incidence and Risk Factors for Preoperative Deep Venous Thrombosis in 314 Consecutive Patients Undergoing Surgery for Spinal Metastasis

Sweena Kahn BS, MS; Brad E. Zacharia MD MS; Gustav Y Cederquist; Evan D Bander; William P. Cope; Anne Reiner; Alexa L. Hijazi; Ilya Laufer, MD; Mark H. Bilsky MD

Department of Neurosurgery, Memorial Sloan Kettering Cancer Center, New York, NY

Learning Objectives

To identify the incidence and risk factors for preoperative deep venous thrombosis in patients undergoing surgery for spine metastasis.

Introduction

Patients with metastatic spinal disease (MSD) are at heightened risk for development of venous thromboembolism (VTE). Given their a priori risk, preoperative screening with lower extremity Doppler-ultrasonography prior to surgical intervention may be warranted. However, the true incidence and risk factors for deep vein thrombosis (DVT) in this group have not been well-characterized.

Methods

A retrospective chart review on a consecutive series of patients who underwent spinal surgery at our institution from January 2012 to December 2014. Demographic data, preoperative laboratory values and comorbidities, ambulatory status, tumor characteristics, and surgical details were analyzed. Univariate analyses were performed.

Results

Table 1. Patient Clinical Characteristics

		N	%
Total		314	
Spinal Level	Cervical	52	16.6
	Thoracic	172	54.8
	Lumbar	80	25.5
	Sacral	1	0.3
Surgical Details	Median Days from US Screening to Surgery	2	IQR [1, 5]
	Type of Surgery		
	Decompression, fusion	224	71.3
	Decompression, no fusion	54	17.2
	Percutaneous Screw Fixation	34	10.8
	Median EBL (cc) [Range]	500	[0-3400]
	Duration of Surgery (hours) [Range]	2:43	[3:29 - 12:40]
Postoperative	DVT Diagnosis	13	4.1
	PE Diagnosis	4	1.3
	Median Length of Stay (days) [Range]	7	[0-740]

Figure 1. Incidence of Preop DVT by Ambulatory Status

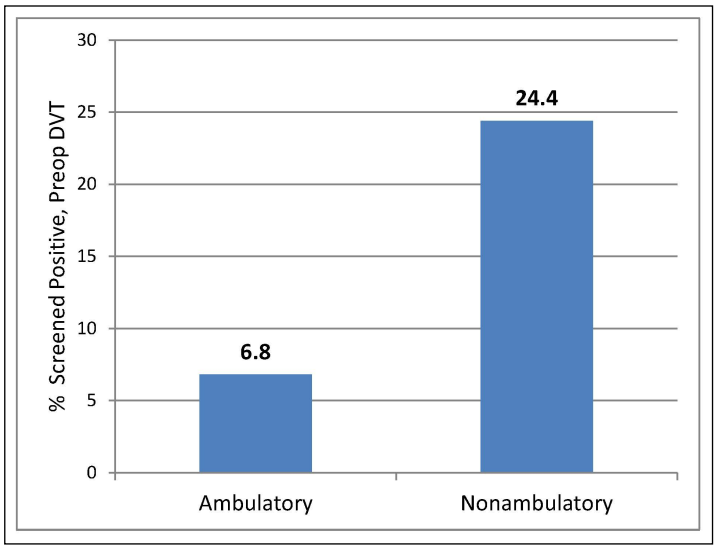

Table 2. Comparison of Screened and Unscreened Patients

		Screened		Unscreened		
		N	%	N	%	Pvalue[a]
Sex	Male	135	59	47	56	0.72
	Female	97	41	35	44	
Race		232	100	82	100	0.49
Ambulatory	No	41	18	11	14	0.43
	Yes	191	82	69	86	
BMI	<25	97	42	40	50	0.36
	25-<30	80	35	21	26	
	30+	52	23	19	24	
Diabetes Mellitus	No	199	86	71	89	0.52
	Yes	33	14	9	11	
Tobacco Use	Never	101	44	47	59	0.06
	Former	115	50	29	36	
	Current	16	7	4	5	
Hypertension	No	115	50	47	59	0.16
	Yes	117	50	33	41	
Pathology		232	100	82	100	0.46
Continuous Variable		**Median**		**Median**		**Pvalue**
Age		62		55		0.0008
Platelets		253		241		0.35
Prothrombin Time		11.7		11.5		0.12
Partial Thromboplatin Time		27.8		28.6		0.66
Hemoglobin		11.3		12.2		0.008
White blood cell count		7.8		6.7		0.0097

Table 3. Comparison of Patients With and Without DVT

		DVT		No DVT		
		N	%	N	%	Pvalue[b]
Sex	Male	15	63	154	58	0.69
	Female	9	38	110	42	
Race		24	100	264	100	0.52
Ambulatory	No	10	42	38	14	0.002
	Yes	13	58	226	86	
BMI	<25	9	39	116	44	0.74
	25-<30	9	39	82	31	
	30+	5	22	64	24	
Diabetes Mellitus	No	18	75	229	87	0.13
	Yes	6	25	35	13	
Tobacco Use	Never	9	38	122	46	0.41
	Former	12	50	126	48	
	Current	3	13	16	6	
Hypertension	No	12	50	134	51	0.94
	Yes	12	50	130	49	
Pathology	Breast	24	100	264	100	0.33
Continuous Variable		**Median**		**Median**		**Pvalue[c]**
Age		65		60.5		0.25
Platelets		255.5		247		0.98
Prothrombin Time		11.8		11.6		0.88
Partial Thromboplatin Time		26.1		27.9		0.0075
Hemoglobin		10.2		11.7		0.0007
White blood cell count		7.3		7.6		0.76

We identified 314 patients of whom 232 (73.9%) were screened pre-operatively for a DVT. Of those screened, 23 (10%) were diagnosed with a DVT. The screened patients were slightly older (median=62 vs. 55 years, p=0.0008), but otherwise similar. Ambulatory status, partial thromboplastin time, and hemoglobin level were statistically associated with screening positive for a DVT. While only 6.8% of ambulatory patients screened positive, 24.4% of non-ambulatory patients did for an odds ratio of 4.39 (95%CI 1.77-10.89). All patients who screened positive underwent placement of an IVC filter.

Conclusions

Patients requiring surgery for spinal metastasis represent a population with unique risks for VTE. We found a 10% incidence of DVT in patients screened preoperatively. The highest rates of preoperative DVT were identified in non-ambulatory patients with a four-fold increase in the likelihood of harboring a DVT. Understanding the preoperative thrombotic status may provide an opportunity for early intervention and risk stratification in this critically ill population.