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POSTER ABSTRACTS

332.THROMBOSIS AND ANTICOAGULATION: CLINICAL AND EPIDEMIOLOGICAL

Predictors and Timing of Venous Thromboembolism in Lung Cancer

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Introduction

Venous thromboembolism (VTE) is a common complication in lung cancer, but its risk factors and incidence have not been fully characterized. While prophylactic anticoagulation is recommended for some patient with cancer to prevent VTE, the thrombosis-risk prediction Khorana score considers lung cancer intermediate risk for development of VTE and combines all subtypes of lung cancer into a single entity. There are also limited data on the impact of therapy-type on VTE risk in patients with lung cancer. This study aimed to identify the incidence of VTE and its associated risk factors in patients with lung cancer at our university cancer center.

Methods

Using data from our tumor registry, we identified patients diagnosed with lung cancer between 2018 and 2022 who received first therapy beyond surgery alone after date of first contact. Using automated text search from our electronic medical record (EPIC®) combined with natural language processing review, VTE events were identified from 90-days before and up to one year(y) after initiation of systemic therapy. VTE events, including lower extremity deep vein thrombosis (DVT) or pulmonary embolism (PE), were captured by physician investigators, with final, secondary adjudication by one of us (GAS). We report time to event analysis and survival analysis using Kaplan-Meier curve. The study was censored at one year. Univariate and multivariate analyses were performed using COX-regression model. We evaluated the effect of lung cancer subtype, stage, age, sex, race, ethnicity, white blood cell count, hemoglobin, and platelet count.

Results

A total of 635 lung cancer patients were included in the study with a median age of 65 years. The median white blood cell count (WBC) was 8.8 × 109/L, median hemoglobin (Hgb) was 12.7 g/dL, and platelets (Plt) was 284 × 109/L. Other patient characteristics can be seen in Table 1.

The overall 12-month incidence of VTE (lower extremity DVT and/or PE) was 10.1% (n=64). Of the 64 VTE events, 20 were identified before the start of therapy. Univariate analysis revealed that age <60 and WBC >= 11 were associated with a higher risk of VTE ($p<0.05$), which remained significant after multivariate analysis including age, stage, WBC, and surgery.

There was a trend towards a higher risk of VTE in patients receiving chemoimmunotherapy, compared with chemotherapy alone, (HR 1.22), although this trend did not reach significance. Targeted therapy was associated with a lower trend (HR = 0.89), but that also was not significant.

The median overall survival was 18 months. Univariate analysis showed that VTE was associated with an increased risk of death (HR 2.05, $p<0.001$). Other parameters associated with reduced Overall Survival (OS) were age >=60, male sex, stage III-IV, WBC, Hgb, and Plt. After multivariate analysis considering age, sex, stage, lung cancer histology, Hgb, Plt, WBC, surgery, therapy type, and VTE, age >=60, stage III-IV, WBC >=11, Hgb <10, and VTE remained significant predictors of death.

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Discussion

In a retrospective study of more than 600 patients with lung cancer, there was a significant risk of VTE. Every subgroup of patients analyzed in this study retained a high risk of VTE after multivariate analysis. The only hematologic parameter from the Khorana score significantly associated with VTE after multivariate analysis was WBC. WBC and Hgb were associated with increased risk of death. Age <= 60 was associated with increased risk of VTE, while age >60 was associated with increased mortality. There was a trend towards a higher risk of VTE in patients receiving chemoimmunotherapy compared with chemotherapy alone. There were too few immunotherapy-only patients to allow for any interpretation. The development of thrombosis was associated with a significantly decreased overall survival, although we do not have data on the potential contribution of VTE to death. These findings were derived from a single-center data set, and further validation using independent data sets is warranted. If confirmed, a prospective study re-evaluating the risk of VTE and benefits of prophylactic anticoagulation specifically in contemporary patients with lung cancer receiving systemic therapy regardless of histology, treatment, or other factors described here may be indicated. Our findings do not support limiting any such study to any specific sub-group of patients with lung cancer.

Disclosures Trabolsi: *Johnson & Johnson:* Current equity holder in publicly-traded company. **Kronenfeld:** *Bayer Healthcare Pharmaceuticals:* Research Funding. **Caballero:** *Microsoft Corp:* Current equity holder in publicly-traded company; *Organon & Co:* Current equity holder in publicly-traded company; *Exact Sciences Corp:* Current equity holder in publicly-traded company; *Merck And Co Inc:* Current equity holder in publicly-traded company. **Soff:** *Anthos Therapeutics:* Research Funding; *Sanofi:* Consultancy.

Characteristic	Number (635 total)	Percent of total (%)	Univariate analysis			
			VTE HR (95% CI)	p	OS HR (95% CI)	p
Age						
>=60	470	74.1	0.55 (0.33, 0.91)	0.02	1.65 (1.12, 2.44)	0.012
Sex						
Male	326	51.4	0.96 (0.59, 1.57)	0.869	1.50 (1.10, 2.05)	0.01
Race						
White	563	88.8	Ref		Ref	
Black	54	8.5	0.90 (0.36, 2.24)	0.818	0.64 (0.34, 1.21)	0.166
Other/unknown	17	2.7	0.56 (0.08, 4.05)	0.566	NE	
Ethnicity						
Non-Hispanic	363	57.3	Ref		Ref	
Hispanic	252	39.7	1.49 (0.90, 2.45)	0.122	0.95 (0.70, 1.30)	0.773
Unknown	19	3	1.95 (0.60, 6.41)	0.268	0.84 (0.31, 2.27)	0.729
Baseline WBC						
>=11	151	23.8	2.01 (1.20, 3.35)	0.008	2.45 (1.80, 3.35)	<0.001
Baseline Hgb						
>=10	532	83.9	1.73 (0.75, 4.01)	0.201	0.58 (0.40, 0.84)	0.004
Baseline Plt						
>=350	460	72.6	1.36 (0.81, 2.30)	0.243	1.60 (1.16, 2.20)	0.004
Lung cancer type						
AC	388	61.2	Ref		Ref	
SCC	108	17	0.77 (0.37, 1.58)	0.474	1.62 (1.10, 2.38)	0.014
NSCLC, NOS	34	5.4	1.40 (0.55, 3.53)	0.478	1.77 (0.97, 3.23)	0.065
SCLC	94	14.8	0.59 (0.25, 1.38)	0.222	1.56 (1.03, 2.36)	0.036
Unknown	10	1.6	0.87 (0.12, 6.32)	0.891	NE	
AJCC Stage						
I-II	102	16.1	Ref		Ref	
II-IV	491	77.4	2.29 (0.99, 5.30)	0.054	13.69 (4.37, 42.9)	<0.001
Unknown	41	6.5	NE		1.73 (0.29, 10.4)	0.548
Therapy Type						
Chemotherapy	223	35.1	0.89 (0.27, 3.01)	0.855	0.96 (0.44, 2.12)	0.928
Chemo/ immunotherapy	294	46.3	1.22 (0.37, 3.98)	0.74	1.52 (0.71, 3.27)	0.285
Immunotherapy	3	0.47	4.23 (0.44, 40.66)	0.212	4.81 (1.00, 23.18)	0.05
Targeted therapy	77	12.1	0.89 (0.23, 3.46)	0.872	0.40 (0.15, 1.09)	0.074
Radiation therapy	283	44.6	1.30 (0.79, 2.12)	0.3	1.24 (0.92, 1.69)	0.159
Surgery	159	25.1	0.49 (0.25, 0.95)	0.036	0.07 (0.03, 0.18)	<0.001
Thrombosis						
Yes	64	10.1	Not applicable		2.05 (1.37, 3.06)	<0.001

Table 1. Selected Characteristics of the Patients and their Associations with VTE and OS. Race and ethnic group were reported by the patient. Patients who received radiation therapy and surgery could have received other therapies. Bolded fields significant at p <0.05. CI = confidence interval. Ref = reference population. NE = not estimable. AJCC = American Joint Committee on Cancer.

Figure 1

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