

Insight into Cancer-associated Thrombosis in the Elderly

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ABSTRACT

Cancer-associated thrombosis (CAT) is a clinically significant complication of cancer. This study aims to describe baseline characteristics, and detail the nature of CAT events in elderly cancer patient who developed CAT. A total of 208 cancer patients from the Radiology and Oncology Pharmacy Department, Hospital Kuala Lumpur between 2018 and 2021 who developed CAT. We analysed retrospectively demographic information, clinical characteristics, and CAT event characteristics of cancer patients. CAT events were then categorised according to type, location, and timing. Elderly CAT patient showed higher prevalence in lung, rectal, and kidney cancer ($p=0.001$). Older patients show a significantly ($p=0.005$) higher prevalence of Stage IV CAT (64.8%) compared to younger patients (44.7%). The presence of a central venous catheter ($p=0.009$), smoking, and a platelet level greater than $350 \times 10^9/L$ ($p=0.031$) and two comorbidities, hypertension ($p<0.001$) and ischemic heart disease (IHD) ($p=0.005$) were significantly higher in elderly. Both groups predominantly manifested CAT as deep vein thrombosis (DVT) with a significant proportion occurring within the first three months post-cancer diagnosis. This study emphasises the most relevant risk factors of CAT in elderly cancer patients and may help to inform the development of tailored CAT risk stratification to better manage this special population.

Keywords: Cancer-associated thrombosis (CAT), CAT events, clinical characteristics, deep vein thrombosis (DVT), elderly

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INTRODUCTION

Cancer-associated thrombosis (CAT) is a clinically significant complication of cancer (Ikushima et al., 2016). Evidence on epidemiology of CAT and the clinical characteristics of the cancer patients who succumb to CAT, particularly in Malaysia is limited. In the general population, older age

(United Nation, 2024) is a well-documented risk factor for venous thromboembolism (VTE). However, the presence of cancer further complicates this risk profile. Understanding the interaction between age, cancer, and VTE risk (Horsted et al., 2012) is essential for developing a tailored risk stratification tool to inform prevention and treatment strategies for this vulnerable population. The study aims to describe Malaysia-specific risk factors associated with cancer-associated thrombosis event in elderly cancer patient, finally contributing to the development of tailored CAT risk stratification tool for elderly cancer patient.

METHODOLOGY

A total of 208 cancer patients who were in the anticoagulant recipient list from the Radiology and Oncology Pharmacy Department, Hospital Kuala Lumpur between 2018 and 2021 met the inclusion and exclusion criteria of our study. We include (i) those who were newly diagnosed with cancer, (ii) aged 18, and (iii) individuals with confirmed cases of VTE events. Conversely, we excluded cancer patients who (i) had undergone any thromboprophylaxis or had a history of thrombosis before being diagnosed with cancer, (ii) presented with more than one primary malignant disease or had cancer sites that could not be categorised, and (iii) were currently pregnant at the time of diagnosis. We analysed retrospectively demographic information, cancer type and stage, and comorbidities. VTE events were confirmed and categorised according to type, location, and timing. Statistical analyses were performed using the SPSS software version 28 to compare significant ($p < .05$) difference in characteristics of elderly and non-elderly CAT patients. Listwise deletion was used to handle missing data.

RESULTS

Our findings indicate significant differences in cancer types and stages ($p=0.005$) between different age groups (Figures 1 and 2). Elderly patients showed higher CAT prevalence in lung, rectal, and kidney cancer, whereas younger patients had higher prevalence in heart/mediastinum, lung, and kidney cancer. Advanced cancer stages (Stage IV) were

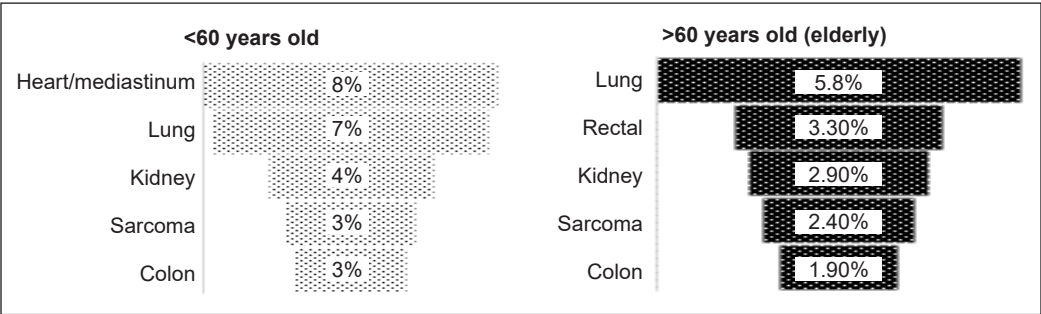


Figure 1. Prevalence of cancer type in CAT patients

more common in the elderly ($p=0.001$). There were significant different in comorbid hypertension and IHD among the groups. Additional factors found to be significant were the presence of a central venous catheter ($p=0.009$), smoking, and a platelet level greater than $350 \times 10^9/L$ ($p=0.031$) (Table 1). However, performance status and presence of infection have no significance difference between the groups ($p=0.061$). Most of the CAT events (63%) presented as deep vein thrombosis ($p=0.778$) and occurring within the first three months post-cancer diagnosis ($p=0.801$).

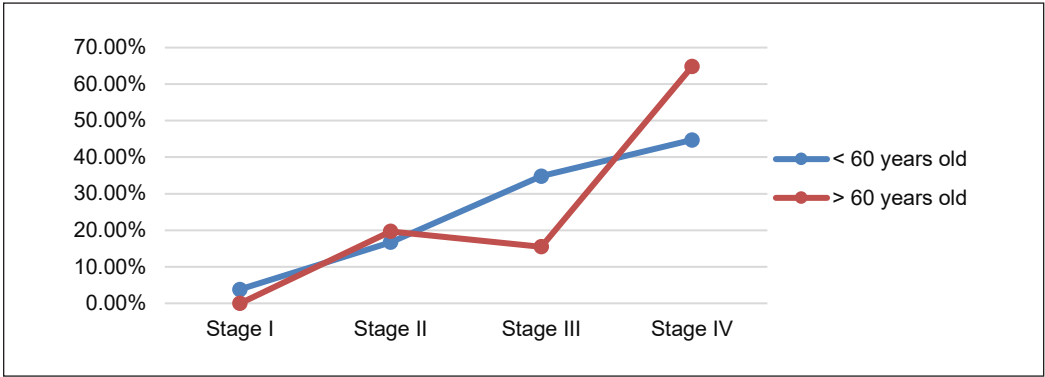


Figure 2. Cancer staging among elderly and young in CAT patient

Table 1
Clinical characteristics and VTE event characteristics

	Total	<60 years	>60 years	p-value
Comorbidities				
Hypertension	71(34.1%)	27(13.0%)	44(21.2%)	$p=0.001$
IHD ^b	5(2.4%)	0(0%)	5(2.4%)	$p=0.005$
BMI(n=184)	24.02(5.7)	23.96(6.14)	24.11(4.86)	$p=0.466$
ECOG				
0	63(30.3%)	43(20.7%)	20(9.6%)	$p=0.338$
1	91(43.8%)	58(27.9%)	33(15.9%)	
2	30(14.4%)	16(7.7%)	14(6.7%)	
3	17(11.6%)	14(6.7%)	3(1.4%)	
4	7(3.4%)	5(2.4%)	2(1%)	
CVC	145(69.7%)	103(49.5%)	42(20.2%)	$p=0.009$
Smoker	66(31.9%)	44(21.1%)	22(10.6%)	$p=0.007$
Infection	57(27.4%)	43(20.7%)	14(6.7%)	$p=0.061$
Platlevel (>350 × 10⁹/L)	99(49%)	72(54.4%)	27(38.6%)	$p=0.031$
Type of VTE				
DVT	131(63%)	85(40.9%)	46(22.1%)	$p=0.778$
PE	57(27.4%)	39(18.8%)	18(8.7%)	

Table 1 (continue)

	Total	<60 years	>60 years	p-value
DVT & PE	20(9.6%)	12(5.8%)	8(3.8%)	<i>p=0.801</i>
Time to event				
<3 months	105(50.5%)	69(50.7%)	36(50%)	
3-6 months	37(17.8%)	23(16.9%)	14(19.4%)	
6-12 months	26(12.5%)	19(14.0%)	7(9.7%)	
>12 months	40(19.2%)	25(18.4%)	15(20.8%)	

DISCUSSION

The elevated percentage of CAT in elderly cancer patients with stage 4 and prevalence of different cancer types suggest that they are strongly associated with elderly CAT patients, consistent with previous studies (Gade et al., 2017), and were the main factors used in the CAT risk assessment scoring (Khorana et al., 2008; Louzada et al., 2012). Most prevalent cancer in elderly CAT patients were lung and rectal cancer which is consistent with what was reported in Vietnam (Than et al., 2023). The presence of hypertension and IHD in elderly increases a layer of complexity, as these comorbid exacerbate the risk of thrombosis through mechanisms such as endothelial dysfunction (Akrivou et al., 2022; Sepúlveda et al., 2017). The association of the central venous catheters with CAT in our study ($p = 0.009$) is consistent with what was found by Verso et al. (2005). Elevated platelet counts and CAT ($p = 0.031$) in our study is consistent with (Khorana et al., 2008) who identified it as the contributor to CAT. Smoking has been found to be a significant risk factor for CAT patients and strong correlation with advanced cancer and smoking-related cancer (Paulsen et al., 2021). A potential thromboprophylaxis may be important predominantly in cancer patient with hypertension, IHD, elevated platelet level, smoker, and requiring CVC especially in elderly patients who may have further risk factors. Thromboprophylaxis with Low-molecular-weight heparin (LMWH) or mechanical compression stockings may be important for preventing venous thromboembolism in elderly cancer patients without increasing the bleeding complication (Kahn et al., 2012; Stanley & Young, 2010). Most of CAT events presented within 6 months of the cancer diagnosis and deep vein thrombosis found to be the most common type of CAT event and match those observed in earlier study (Qdaisat et al., 2020). The identification of significant risk factors highlights important factors for the development of risk stratification tool and CAT event characteristics may navigate thromboprophylaxis strategies for elderly CAT patient.

CONCLUSION

The insights into cancer-associated thrombosis in the elderly cancer patients, helps in identifying most relevant factors for the development of the high-performing risk prediction

model. It can significantly enhance decision-making processes and patient outcomes. However, the use of a cross-sectional design may lead to incomplete recorded information and capture limited scope of risk factors. Future research should emphasis on prospective studies and intervention trials to address the unique challenges in elderly CAT patients.

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