ADDIS ABABA UNIVERSITY
COLLEGE OF HEALTH SCIENCES
SCHOOL OF GRADUATE STUDIES
DEPARTMENT OF RADIOLOGY

CROSS SECTIONAL STUDY OFUNSUSPECTED PULMONARY EMBOLISM IN ONCOLOGY PATIENTS UNDERGOING CHEST COMPUTED TOMOGRAPHY IMAGING IN TIKURANBESSA SPECIALIZED HOSPITAL ADDIS ABABA UNIVERSITY, ADDIS ABABA, ETHIOPIA.

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Abstract

Background

Oncology patients have a fourfold higher risk for developing pulmonary embolism than that of the general population. Acute pulmonary embolism (PE) is a common and often fatal disease. Furthermore, most cases of PE that eventuallycause fatality are clinically unsuspected and therefore go untreated.

Finding of incidental PE in oncologic patients significantly affects management and prognosis of patients. Diagnosis of PE leads to start of therapeutic anticoagulation and prevents embolic recurrence that is associated with substantial morbidity and mortality.

Although the MDCT protocol for CT pulmonary angiography differs from that used for routine chest CT, modern CT systems, along with high-concentration contrast media, enable detection of pulmonary emboli even in routine chest CT, increasing the frequencyof detection of clinically unsuspected pulmonary embolism.

Objective

This study is designed to assess prevalence of incidentalpulmonary embolism in oncologic patients detected by chest computed tomography.

Method

Hospital based prospectivecross-sectional study conducted at TASH to address the specific objective during the study period (July, 2018-January 2019 G.C).This study was conducted among oncologic patients being evaluated at TikurAnbessa Specialized Hospital who have chest CT imaging during the study period. Chest CT was evaluated for the presence of abnormalities.

The study population included all oncologic patients having chest CT imaging during the data collection period. Data was collected by evaluating the CT by radiologist. The data was checked for clarity and completeness. Computerized data analysis was conducted by using SPSS version 20.0 software.

RESULT

The prevalence of incidental PE was 1.7% in this study. A total of 10 patients out of 573 patients had incidental PE. The most common primary malignancy was GIT malignancy (30.9%). The other malignancies were hematologic malignancies among 12.9%, breast cancer in 12.6%, and cancers of the genitourinary tract in 7.7%. the rest of patients had varieties of different cancer types.80% of the patients with PE had multiple PE and 20% had single PE.

The most commonly involved part of the lung was RLL which was involved in all cases of incidental PE. Followed by LLL which was involved in 60%. In general, the upper lobes and the RML were involved in 40% of the cases, each. All cases of single PE occurred in the RLL.

The most frequently involved divisions of the pulmonary were the lobar branches in 80% of the PE cases followed by segmental branches (70%). The main division was involved in 40% of the cases, while the subsegmental division was involved in none of the cases.

Limitation of the study

-Lack of good pulmonary arterial opacification and motion artifacts which can limit detection of PE.

-Lack of properly handled patient's chart.

-Limited sample size.

CONCLUSION

The prevalence of incidental PE detected on routine chest CT scan is 1.7% with no detected small artery PE. The risk of incidental PE was higher in older age and advanced malignancy. The diagnosis of incidental PE has significantly changed the management in all of these patients.

Good pulmonary arterial contrastopacificationis required for diagnosis.

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List of abreviations

CNS : Central nervous system

CT-scan : Computed tomography

CTPA : Computed tomographypulmonary angiography

DVT : Deep venous thrombosis

GIT : Gastro intestinal tract

GU : Genito urinary

LLL : Left lower lobe

MDCT : Multi detector computed tomography

PE : Pulmonary embolism

RLL : Right lower lobe

RML : Right middle lobe

TASH : Tikur anbessa specialized hospital

INTRODUCTION

Acute pulmonary embolism (PE) is a common and often fatal disease.[1] Most cases of PE that eventually cause fatality are clinically unsuspected and therefore go untreated.[2,3] Oncology patients have a fourfold higher risk for developing pulmonary embolism than that of the general population, increasing to sixfold if the patient is receiving chemotherapy.[4] In patients with cancer undergoing chest computed tomography (CT) imaging for reasons other than for PE detection, unsuspected PE has been found in up to 4% of overall cases and in up to 9% of inpatients.[5–7] Diagnosis of unsuspected PE is important to prevent embolic recurrence that is associated with substantial morbidity and mortality.[8]

PE symptoms like Fatigue and shortness of breath are significantly more common in patients with unsuspected PE than those who doesn't [13]. Furthermore, finding of incidental PE in oncologic patients significantly affects management and prognosis of patients, diagnosis leads to start of therapeutic anticoagulation [12]. Although many studies are done regarding the prevalence and significance of finding of incidental PE little is known in our institution.

Progress in multidetector computed tomography (MDCT) has allowed better assessment of pulmonary arteries and has led to improved detection of pulmonary embolism, making
CT pulmonary angiography (CTPA) the imaging modality of choice for the diagnosis of PE [16-18]. Moreover, although the MDCT protocol for CT pulmonary angiography differs from that used for routine chest CT, modern CTsystems, along with high-concentration contrast media, enable detection of pulmonary emboli even in routine chest CT, increasing the frequency of clinically unsuspected pulmonary embolism [10, 17].

Statement of the problem

Acute pulmonary embolism (PE) is a common and often fatal disease, early diagnosis and treatment significantly affects morbidity and mortality by preventing embolic recurrence. Oncology patients have a higher risk for developing pulmonary embolism than that of the general population, and patients with incidental PE are treated with therapeutic dose anti coagulation.

Tikur Anbesa hospital is a large oncologic center which is the only governmental hospital receiving oncology referral from all over the country which have a radiotherapy unit in the country. Despite this high patient load, there is no publication done on the prevalence of incidental pulmonary embolism in the hospital or in the countryso far.

Literature review

The prevalence of incidental PE is clinically relevant. According to a meta analysis done by F. Dentali to determine Prevalence and Clinical History of Incidental, Asymptomatic Pulmonary Embolism:the weighted mean prevalence of incidental PE was 2.6% which was found by analyzing twelve studies done over ten thousand patients. Hospitalization at the time of CT scanning and the cancer were associated with a significantly increased risk of incidental PE (OR 4.27 and OR 1.80 respectively)[15].

There are different researches done to evaluate the prevalence of incidental PE in oncologic patients.A research conducted by Silvia Tresoldi1 and Silvia Tresoldi1 published by European Society of Radiology 2015 Prospectivelystudied prevalence of incidental pulmonaryembolism and added value of thin reconstructions on Contrast enhanced chest-MDCT in oncologic patients, they have studied 999 patients and they found the prevalence to be 5 %, among these the most common anatomic locations of PE were found to be segmental (53%), unilateral. (72.5 %), right lower lobe (59 %). 27 % patients had colon cancer, 18 %lung cancer.

Among PE-positive patients (25 male; mean age70±10 years; range: 44–87 years), 25 % (13/51) had lung cancer, 15 % (8/51) colon cancer. It also concludes thatincidental PE diagnosis influences anticoagulation therapy.[9]

A research conducted by Atul B. Shinagare, MD, Mengye Guo, PhD; Hiroto Hatabu, Dana-Farber Cancer Institute, Boston, Massachusetts; Department of Radiology, 2010, studied Incidence of Pulmonary Embolism in Oncologic Outpatients at a Tertiary Cancer Center. A total of 13,783 patients were studied, of which 395 (2.87%; 95% confidence interval [CI], 2.59-3.16) developed PE. Among these, the incidence of PE was highest in the central nervous system (CNS) (12.90%); hepatobiliary (6.85%), pancreatic (5.81%), and upper gastrointestinal (5.81%) malignancies.There was significantly lower risk of PE for hematologic (incidence, 1.16 %;) and breast malignancies (incidence, 1.50%). It was concluded that PE incidence in these studies done over 6years was 2.7% among which CNS, pancreatic, upper gastrointestinal, and lung/pleuralmalignancies had a significantly higher risk for PE than other malignancies.[17]

A research conducted by Ann Michelle Browne, MB, BCh, BAO, MRCPI, FFR RCSI,Unsuspected Pulmonary Emboli in Oncology Patients Undergoing Routine Computed Tomography Imaging , It examined chest CT of 407 oncologic patients which had included baseline staging (31%),restaging after therapy (53%), routine surveillance (15%), or assessmentof extra thoracic disease (1%). The prevalence of unsuspected PE was found to be 4.4%, it has also stated that there is higher incidence among in-patients (6.4%) compared to among outpatients (3.4%), and also higher in patients with metastasis (7%) and patients who are recently receiving chemotherapy (11%). It was able to conclude that diagnosis of PE led to immediate changes in patient management.[11]

A paper published by A.J. Sebastian*, A.J. Paddon, on Clinically unsuspected pulmonary embolism an important secondary finding in oncology CT, Hull Royal Infirmary, Hull, UK, 385 oncologic patients with chest CT were prospectively assessed and 2.6% of which were incidentally found to have PE which was to any specific malignancy or chemotherapeutic regimen, and all are found central, between the main pulmonary artery and the lobar level. All patients with incidental PE were started on therapeutic anticoagulation.[12]

Another retrospective study was done by Casey L. O'Connell, on Unsuspected Pulmonary Emboli in Cancer Patients: Clinical Correlates and Relevance, published by American Society of Clinical Oncology,2006, chart review was done for 54 patients with incidental PE, retrospective case-control analysis was then performed using two age- and stage-matched control patients for each patient who had similar staging CT scans performed during the same period.

44 % were found to have symptoms commonly associated PE, increasing the percentage to 75% if fatigue is included. It was able to conclude that Fatigue and shortness of breath were significantly more common in patients with unsuspected PE than in control patients.[13]

An article published by RSNA, 2006,retrospectively assessed Prevalence, CT Evaluation, and Natural History1Incidental Pulmonary Emboli in Oncology Patients, it has also evaluated the number of such cases reported at initial thoracic computed tomographic (CT) image interpretation, and the factors that contribute tounderdiagnosis. 403 oncologic patients with chest were retrospectively assessed, 16% were found to have PE but only 4 % were reported. Among these the highest prevalence is seen with gynecologicmalignancies (15%) and in those with melanoma (10%). Missed emboli typically were solitary and involved smaller arteries; no other confounding factors were identified while all patients initially reported have multiple emboli which at least involved lobar artery.

This study has alsostated 60 % of patients with PE who underwent any lower extremity imaging had deep vein thrombosis (DVT), and reported patients started anticoagulation therapy.[14]

OBJECTIVES

General objective

To assess prevalence of incidental pulmonary embolism in oncologic patients detected by chest computed tomography.

Specific objectives

- To assess the sex and age distribution of oncologic patients with incidental pulmonary embolism finding.
- To assess whichspecific malignancies are related to pulmonary embolism.
- Toassess the presence of lung metastasis in oncologic patients during the study.
- To determineanticoagulation treatment of oncologic patients with incidental pulmonary embolism.
- To assess the presence of DVT in oncologic patients with pulmonary embolism.
- To assess anatomic distribution of PE.

METHODS AND MATERIALS

Study area and period

The study was conducted at TASH, College of health sciences, Addis Ababa University, Addis Ababa Ethiopia.TASH, located in the nation'scapital Addis Ababa, is a largest referral as well as teaching hospital. It is a main center for oncology treatment.The hospital provides a tertiary level referral treatment with over 900 beds and is open 24hrs for emergency services.

The study was conducted from July, 2018-January 2019 G.C.

Study design

A retrospective cross-sectional descriptive study among oncologic patients with chest CT evaluated in TASH.

Study Population

Source population

The source population are all oncologic patients with chest CT evaluated in TASH during the study period.

Study population

The study population were all oncologic patients with chest CT evaluated at the oncologic clinic TASH during the study period.

Inclusion and exclusion criteria

Inclusion criteria

All oncologic patients evaluated with CT examination focusedon the chest, and examinations including the chest in combination with other districts (e.g. brain orabdomen)during the study periodwere included.

Exclusion criteria

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Oncologic patients with known or suspected pulmonary embolism were excluded.

Sampling technique and sample size

All oncologic patients with chest CT taken during the study period with no clinical suspicion of pulmonary embolism were included in the study.

Data collection

Data was collected by the principal investigator from patient image registry (med web) and request paper sent to the department of radiology using a questionnaire.Charts of patients with PE finding were reviewed to look

fortreatment status additional investigations and admission status. Then questionnaire was filled out by the principal investigator.

The questionnaire consists of 11 questions including sociodemographic data, cancer stage (if chest metastasis is present), quality of contrast enhancement, the presence of clinically unsuspected PE and in patients with PE, for anatomic distribution of emboli, treatment of patients with anti-coagulation, admission status (in patient / outpatient), and presence of DVT.

Data analysis and interpretation

The data was checked for clarity and completeness. Data was analyzed using nonparametric statistical methods with the help of SPSS version 20 software package. Then summarization and comparison of data was done.

Ethical considerations ; In order to respect patients'bill of right and regulation of the hospital where the study was conducted, ethical considerations were taken in to account. Any piece of information was kept confidential by keeping anonymity of the study subjects.

Dissemination of the result

After the formal preparation of the final report the copy of the report will be submitted for evaluation, and possible future publication.

Operational definition

- PE – diagnosed by consultant radiologist.
- Image quality as routine chest CT – evaluated by principal investigator (radiology resident.)

Pulmonary embolism: detection of filling defect in the pulmonary arteries on post contrast chest CT scan and confirmed by senior radiologist.

RESULT

Chest CT scan of 573 oncologic patients was evaluated to assess incidental PE. Gender distribution of the patients showed that 45.5% were male and 54.5% were female. The mean age of the patients was 43 years with SD of 18. Most patients were in the age range of 30 to 60 years.

The most common primary malignancy was GIT malignancy (30.9%). The other malignancies were hematologic malignancies in 12.9%, breast cancer in 12.6%, and cancers of the genitourinary tract in 7.7%. the rest of patients had varieties of different cancer types. 28.5% of patients had metastatic malignancy to the chest at the time of CT scan while the rest of 71.5% had no metastasis to the chest.

The quality of pulmonary arterial opacification on contrast was poor in the majority of the scans (53.7%) and 46.3% had good opacification.

Table 1 Base line characteristics of the patients screened for incidental PE

		Count	Percent,%
Sex	M	260	45.5%
	F	312	54.5%
Age	<15	51	8.9%
	15-30	108	18.9%
	31-45	142	24.8%
	46-60	183	32.0%
	61-75	75	13.1%
	>75	13	2.3%
Type of malignancy	Hematology	74	12.9%
	GIT	177	30.9%
	Lung	58	10.1%
	Breast	72	12.6%
	GU	44	7.7%
	Others	148	25.8%
Metastasis	No	406	71.5%
	Yes	162	28.5%
Contrast opacification	Poor	305	53.7%
	Good	263	46.3%

The incidence of incidental PE was 1.7% in this study. A total of 10 patients out of 573 patients had incidental PE. 70% of patients with PE had also Doppler ultrasound examination of the lower extremities which showed DVT in 50% of the cases. Of the patients with incidental PE, 60% were being treated as inpatient and the rest 40% were being followed as outpatient.

80% of the patients with PE had multiple PE and 20% had single PE.

The most commonly involved part of the lung was RLL which was involved in all cases of incidental PE. The LLL was the next most common site which was involved in 60%. In general, the upper lobes and the RML were

involved in 40% of the cases, each. Isolated involvement of the upper lobes and the RML was not observed in any of the PE cases. All cases of single PE occurred in the RLL.

Multiple PE was more common in patients with chest metastasis. All PE cases that occurred among patients with metastatic cancer to the chest were multiple PE.

The most frequently involved divisions of the pulmonary were the lobar branches in 80% of the PE cases followed by segmental branches (70%). The main division was involved in 40% of the cases, while the subsegmental division was involved in none of the cases.

Table 2 Number and distribution of incidental PE with in the lung

		Count	Percent, %
Number of PE	Single	2	20.0%
	Multiple	8	80.0%
Site of PE in lung lobes			
RUL		3	30.0%
RLL		10	100.0%
LUL		2	20.0%
RML		4	40.0%
LLL		6	60.0%
Site of PE in PA divisions			
Main division		4	40.0%
Lobar		8	80.0%
Segmental		7	70.0%
Subsegmental		0	0%

All cases of incidental PE were detected in scans with good contrast opacification of the pulmonary arteries. No patient with poor contrast opacification had detectable PE. If only those scans with optimal pulmonary arterial contrast opacification were considered, the incidence of incidental PE will become 3.8%, underscoring the importance of quality of contrast image to detect PE.

The frequency of incidental PE was relatively higher in female (2.2%) compared with male counterpart (1.2%). Overall, 70% of incidental PE was detected among female. The incidence of unsuspected PE appeared to increase as the age of the patient increases. The highest incidence was observed among patients older than 70 years. The incidence in this age group was 23.5%. while the incidence of incidental PE was lowest in those below the age of 15 years, the incidence of which was 0%. (p value – 0.000)

The incidence of unsuspected PE was also appeared to increase in patients with chest metastasis. The incidence among patients with metastasisto the chest was 3.1% while it was 1.2% among those without metastatic cancers.

Table 3Bivariate comparison of variables with occurrence of incidental PE

	Incidental PE						
	Yes		**No**				
	Count	%	Count	%	Sig.	OR	95%CI

Sex	M	3	1.2%	257	98.8%	0.322	0.509	0.13-1.98
	F	7	2.2%	305	97.8%			
Age	<15	0	0%	51	100.0%	0.000	1.284	1.00-1.729
	15-75	7	1.4%	51	98.6%			
	>75	3	23.1%	10	76.9%			
Metastasis	No	5	1.2%	401	98.8%	0.129	0.392	0.112-1.371
	Yes	5	3.1%	157	96.9%			
Contrast	Poor	0	0.0%	305	100.0%	0.001	1.04	1.015-1.065
	Good	10	3.8%	253	96.2%			

Among the types of cancer, the incidence of PE was highest in breast cancer which was 2.8%. The incidence in genitourinary cancer was 2.3%. The incidence in GIT and lung cancer was 1.7%each. Among patients with hematologic malignancies, no patient had PE on chest CT scan.

The finding of unsuspected PE influenced the management in all patients. After the diagnosis of incidental PE, all of them were started on therapeutic dose anticoagulation.

Table 4 Comparison of type of malignancy with incidental PE

		Incidental PE			
		Yes		**No**	
		Count	%	Count	%
Type of malignancy	Hematology	0	0.0%	74	100.0%
	GIT	3	1.7%	174	98.3%
	LUNG	1	1.7%	57	98.3%

	breast	2	2.8%	70	97.2%
	GU	1	2.3%	43	97.7%
	others	3	2.0%	145	98.0%

Discussion

Acute pulmonary embolism (PE) is a common and often fatal disease. Oncology patients have a fourfold higher risk for developing pulmonary embolism than that of the general population. In patients with cancer undergoing computed tomography (CT) imaging for reasons other than for PE, detection of unsuspected PE influences treatment decisions and decrease the mortality and morbidity of untreated PE. Therefore, screening for incidental PE on CT scan done for other reasons is being recognized as an important part of evaluation in oncologic patients.

CT angiography is considered as imaging modality of choice for diagnosis of PE. However, it is well recognized that unsuspected PE can be detected even in routine contrast enhanced CT scan. Recognition of the importance of detecting unsuspected PE has resulted in modifications of protocols used for routine CT scans in patients with cancer. A study has recommended to use thin slice reconstruction of MDCT in patients with cancer.

The reports on incidence of unsuspected PE ranges from 2% to 9%. The incidence is affected by varieties of factors. The incidence of unsuspected PE in our study was 1.7% which is lower than reports from other studies. But53.7% of the scans in our study had poor contrast opacification and might have falsely decreased the incidence of PE. All cases of incidental PE in our study were detected in CT scans which had good contrast opacification. If we took the scans with good contrast opacification only, the incidence will be 3.8%. the higher incidence in other studies is probably resulted from good quality scans and utilization of protocols specific for this purpose. In addition, 80% of the PE in our study were multiple and 20% were single PE. Incidental PE are usually single and found in terminal branches. The lower proportion of single PE in our study may be due to lower detection rate of single PE that resulted in lower overall incidence of PE.

The risk of unsuspected PE is higher in inpatients than out patients. In our study, 60% of incidental PE were detected among the inpatients. The presence of metastasis, older age, and treatment with chemotherapy has also been described to be associated with increased risk of incidental PE. In our study, the incidence of unsuspected PE was higher in older patients age above 60 years, and in patients with metastatic malignancy. The incidence of PE in patients older than 60 years was 3.1%, while it was 1.2% in patients below age 30 years. The incidence in patients with metastatic malignancy was 3.5% compared to 1.3% in patients who did not have metastasis.

Studies on incidence of unsuspected PE in specific types of cancers are limited. In one study (17) which included 13,783 patients, the incidence of unsuspected PE was 2.87%. In this study, the highest incidence of PE occurred in patients with cancers of the central nervous system with incidence rate of 12.90%. Other types of cancers which had high incidence of PE were; hepatobiliary cancers (6.85%), pancreatic cancer (5.81%), and upper gastrointestinal (5.81%) malignancies.

The lowest incidence of PE in this study occurred in patients with hematologic malignancies (1.16 %;) and in patients with breast malignancies (1.50%). In another study (14), the highest incidence of PE was detected in patients with gynecologic malignancies with incidence of 15% in these groups of patients. The findings of our study showed the incidence of PE as 2.8% in breast cancer, 2.3% in gynecologic malignancies, 1.7% in lung cancer, and another 1.7% in cancers of the GIT. PE was not detected in any patient with hematological malignancies; which is consistent with findings of other studies.

In patients with PE, the incidence of DVT in lower extremity is high. In one study (14) DVT was detected in 60% of patients with PE on lower extremity Doppler ultrasound. In agreement with this study, 70% patients with PE had lower extremity Doppler and 50% of them had DVT.

Conclusion

- The prevalence of unsuspected PE detected on routine chest is 1.7% , most were multiple .
- All PE detected from main division to segmental arteries with none detected in subsegmental.
- Unsuspected PE was more more prevalent in older age(>60 years) and in patients with chest metastasis.

The diagnosis of unsuspected PE has influenced the management in all of these patients.

Recommendation

- In oncologic patients undergoing routine chest CT, protocol modification should be considered to obtain better contrast opacification including dose adjustment and thin slice reconstruction.
- Radiologists should familiarize themselves to routinely evaluate contrast enhanced chest CT for PE in all oncologic patients irrespective of the indication.
- Further large-scale study is recommended in the future with incorporating optimization protocols including CTPA.
- Doppler ultrasound should be done for all patients diagnosed to have unsuspected PE

ANNEXES

ANNEXE 1.

Tables

Table 1:- ***Socio demographic characteristics of oncologic patients evaluated with chest CT at TASH, Addis Ababa, Ethiopia during study period from June 2018- january2019.***

		Count	Percent,%
Sex	M	260	45.5%
	F	312	54.5%
Age	<15	51	8.9%
	15-30	108	18.9%
	31-45	142	24.8%
	46-60	183	32.0%
	61-75	75	13.1%
	>75	13	2.3%
	Yes	162	28.5%

Table 2: ***Presence ofPE in different anatomic regions of the lung evaluated by chest CT at TASH, Addis Ababa, Ethiopia during study period from June 2018- January 2019.***

		Count	Percent, %
Number of PE	Single	2	20.0%
	Multiple	8	80.0%
Site of PE in lung lobes			
RUL		3	30.0%
RLL		10	100.0%
LUL		2	20.0%
RML		4	40.0%
LLL		6	60.0%
Site of PE in PA divisions			
Main division		4	40.0%
Lobar		8	80.0%
Segmental		7	70.0%
Subsegmental		10	100.0%

Table 3- Specific cancer types and incidental PE finding of oncologic patients evaluated with chest CTat TASH, Addis Ababa, Ethiopia during study period from june2018- January 2019.

	Incidental PE

		Yes		No	
		Count	%	Count	%
Type of malignancy	Hematology	0	0.0%	74	100.0%
	GIT	3	1.7%	174	98.3%
	LUNG	1	1.7%	57	98.3%
	breast	2	2.8%	70	97.2%
	GU	1	2.3%	43	97.7%
	others	3	2.0%	145	98.0%

Table 4. ***Bivariate comparison of variables with occurrence of incidental PE in oncologic patients evaluated with chest CT at TASH, Addis Ababa, Ethiopia during study period from june2018- january2019.***

		Incidental PE			
		Yes		No	
		Count	%	Count	%
Sex	M	3	1.2%	257	98.8%
	F	7	2.2%	305	97.8%
Age	<30	2	1.3%	157	98.7%
	30-60	5	1.6%	240	98.4%
	>60	3	3.5%	85	96.5%
Metastasis	No	5	1.2%	401	98.8%
	Yes	5	3.1%	157	96.9%
Contrast	Poor	0	0.0%	305	100.0%
	Good	10	3.8%	253	96.2%

ANNEX 2

Data Collection Format

Patient CT No._____

1.Socio-demographic Data

Age: 1. <15yrs 2. 15-30 3.31-45 4. 46-60 5. 61-75 6. >75yrs

Sex: 1. Male 2. Female

2. State specific cancer type…….

3.Lung metastasis 1, present 2, absent

4, Pulmonary arterial opacification 1, poor 2, good

5, Is there PE 1, yes 2, no

6, No. of PE 1, single 2, multiple

7, If yes to Q no. 7 which lobe is the PE found (>01 option is possible)

1, RUL2, RML3, RLL4, LUL5, LLL

8, If yes to Q no. 7 which pulmonary artery division is the PE found (>01 option is possible) 1, main division 2, lobar, 3, segmental 4, sub segmental

9. Is the patient admitted 1, yes 2, no

10.Was doppler ultrasound done A, yes B, no

10.1 If yes to above question is there ultrasound evidence of DVT A,yes B, No

11- Was the patient treated for PE ? A, Yes B,No

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