AUDIT ON THE USE OF CTPA IN PATIENTS WITH CLINICALLY SUSPECTED PULMONARY EMBOLISM

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ABSTRACT:

BACKGROUND:	*Acute pulmonary embolism (PE) is a usual and frequently lethal sequelae of venous thromboembolic disease (VTE) (1). PE is a considerable healthcare load that is mortality of more than 15% in few months after identification of PE(2) .The subjective manifestations of acute PE is fluctuating. Majority may be asymptomatic, or unexpected demise may be the first manifestation. Usual clinical symptoms of acute PE comprises angina, rapid heartbeat, low blood pressure, shortness of breath, cough and spitting up blood.*
AIMS & OBJECTIVE:	*To evaluate PE diagnostic examination before sending request for CTPA and to investigate if CTPA is exceedingly demanded.*
MATERIAL & METHODS:	*This study was conducted in the department of diagnostic radiology in collaboration with department of cardiology, PIC, Lahore over a period of 9 months from 01-03-2020 to 30-11-2020. All patients who had clinical suspicion of pulmonary embolism and age (20-60 years) were included in the study and exclusion criteria was CKD, contrast allergy and patients with chronic lung disease. The results of patients demographics, pre CT work up (Well's score, Chest X-Ray, ECG, D-Dimers, Doppler USG for DVT and CTPA findings) were calculated, entered in SPSS version 21 and simple % was estimated. This data was correlated with other similar researches.*
RESULTS:	*In our research 75 patients were followed up for pulmonary embolism, 39 (52%) were males and 36 (48%) were females. Mean age was 44 years, 5 (7%) had malignancy, 12 (16%) had previous surgery or trauma, 30 (40%) had previous DVT. Wells score was calculated in (7%), ECG (15%), CXR (70%), D-Dimer (7%). Only (35%) patients were having pulmonary embolism on CTPA. Wells score was calculated before CTPA in only (4%) of patients diagnosed PE on CTPA.*
CONCLUSION:	*The study proposes that CTPA was an exceedingly demanded investigation in our hospital and insufficient prior clinical assessment is leading to improper use of CTPA.*
KEY WORDS:	*CTPA, Pulmonary embolism, Deep venous thrombosis, Well's score.*

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BACKGROUND:

Acute pulmonary embolism (PE) is a usual and frequently lethal squeal of venous thromboembolic disease (VTE)[1]. PE is a considerable healthcare load that is mortality of more than 15% in few months after identification of PE[2]. The subjective manifestations of acute PE is fluctuating. Majority may be asymptomatic, or unexpected demise may be the first manifestation. Usual clinical symptoms of acute PE comprises angina, rapid heartbeat, low blood pressure, shortness of breath, cough and spitting up blood. Extensive PE exhibits symptoms like low blood pressure, shock and heart attack.Proximal deep vein thrombosis (DVT) exhibits signs and symptoms of lower limb ache, inflammation, edemaand redness.[1]

Considering variable presentations and excessive fatality, the proceeding to its clinical assessment must be effective so that medication may be initiated as soon as feasible to reduce threatening death rate. Modified Wells score (MWS) and D-dimer levels are one of the most frequently practiced diagnostic criteria for PE. Patients are documented as high or low risk of having PE using this criteria. Patients are classified on the basis of modified wells score (MWS) as (PE likely group) with a score of more than 4 and need more assessment with computed tomography pulmonary angiography (CTPA) to establish the diagnosis, whereas (PE unlikely group) having score of ≤4 don't need CTPA if the accompanying D-dimer level is insignificant (≤500 μg/L). Practitioners can recognize high-risk patients following these directions who will gain from additional assessment and primarily low-risk patients who can be saved from the risks of CTPA like hazards of radiation and contrast.[3]

The hazards of intravenous contrast and radiation exposure are reduced using modified CTPA techniques like increasing the pitch and lowering the voltage of tube. Diagnostic probability of CTPA for PE is increasing persistently, with accuracy rate of more than 90% in researches that utilize advanced facilities. Thus, criterias have been established to improve the decision making of CTPA for patients and predominantly focus to determine preliminary probability of PE.[4]

The objective of this audit was to evaluate PE diagnostic examination before sending request for CTPA and to investigate if CTPA is exceedingly demanded.

This was a retrospective cohort study. Random, convenient, non purposive sampling technique was used for collection of data. The study was conducted in the Department of Diagnostic Radiology in collaboration with Department of Cardiology, Punjab Institute of Cardiology Lahore. All patients who had clinical suspicion of pulmonary embolism and age (20-60 years) were included. Patients with known case of CKD, contrast allergy, chronic lung disease. CTPA was performed on patients in the supine position using 640 slice CT (TOSHIBA AQUILION ONE). The tube voltage, current and Slice thickness were 120 kVp, 550 mA and 0.5 X 4mm respectively. Non ionic contrast medium(KOPAQ) 100 ml used with dose injected through Dual head power injector with speed of 4 ml/sec, after that 30 ml of normal saline injected at the rate of 3 ml/sec. The technique of Bolus tracking was used with a CT attenuation of 150 HU as activating limit in the main pulmonary artery. The data regarding following factors was collected for interpretation: Age, Gender, malignancy, previous surgery or trauma, DVT, Wells' score, CXR, ECG, D-dimer and CTPA findings. The collected data was entered and analyzed using SPSS 21 where simple % was calculated and compared with studies done worldwide. The results were evaluated by calculating percentages between variables.

RESULTS:

75 patients who underwent CTPA from 1/3/2020 to 30/11/2020 were involved in the study. 44 years was mean age. The study constituted 36 females (48%) and 39 males (52%). 7% (5/75) had malignancy, 16% (12/75) of patients had previous surgery or trauma. (Table 1)

No CXR performed in 30% (23/75). Those who underwent CXR, 20% (14/75) showed some form of abnormality, and 50% (38/75) were unremarkable. CXR abnormality refers to anything from prosthetic valves to increased cardiac shadow to patch of consolidation. 15% (20/75) of patients had an ECG, The commonest finding was tachycardia (80% (16/20)). D-Dimers test was done in 7% (5/75). Wells' score was estimated in 7% (5/75) of CTPAs done within the duration of nine months. Of the 5 calculated Wells' scores, 3 (60%) scored more than 4 while 2(40%) scored less than or equal to 4.(Table 2 a,b).

26 (35%) were total PEs detected on CTPA in this study.There was male prevalence, with 80% males and 20% females. This is in coordination with former studies with men having more chances of PE. All patients who had PE, 10% (3/26) of them had previous surgery or trauma, 8% (2/26) had malignancy, 40% had earlier PE/DVT, these statistics indicate that PE/DVT was the single major risk factor for PE in our study. In patients with PE,

Table 1. Demographics.

		75
Age, mean (years)		44
Gender, n%	Male	39 (52%)
	Female	36 (48%)
Malignancy	Yes	5 (7%)
	No	70 (93%)
Recent surgery or trauma	Yes	12 (16%)
	No	63 (84%)

Table 2-a. Tests done.

Test	% of total patient (75) test was done in (%)	% of positive findings (%)
ECG	15	100*
CXR	70	20
D-Dimer	7	94

Table 2-b.

Test	Total patients with test (%)	% less than or equal to 4	% >4
Wells Score	7	40	60
*80% - Tachycardia, *20% - Arrythmia, normal pattern			

Table 3. CTPA results

		n = 26
Gender%	Male	80
	Female	20
Current/previous malignancy %		08
Previous PE/DVT%		40
Previous surgery/trauma%		10
D-dimer% Done	Normal	3.4
	Elevated	6.6
Not done		93
Well score,% Done	>4	02
	< or = 4	02
Not done		96

D-dimer were normal in 3.4%,raised in 6.6%, and 93% did not have D-dimer tested and only 4% had Wells scoring done.(Table 3)

DISCUSSION:

CTPA is regarded as the best test for detection of PE.[3] The diagnosis of PE often presents great challenge to the clinicians. If the clinical symptoms arouse the suspicion of PE then CXR and an ECG are initially performed tests. If there is high clinical probability after evaluation then D-dimer tests should only be ordered. Regrettably clinical probability was seldom assessed in our study. PE is successfully ruled out if both clinical probability score and D-dimer levels are low. With the advanced new generation CT scan machines, other diagnoses are also made.[5] Thus clinicians find CTPA more attractive but this should not let clinicians to neglect the reasonable subjective assessment. Echocardiography can detect massive PE with haemodynamic compromise. However in case of non-massive PE, echocardiography might not definitively diagnose PE.[6] Very low use of Wells score in the early clinical evaluation of PE is the most fearful result of our study. All patients with clinical suspicion of PE must be evaluated using Wells score[7]. We hypothesized that insufficient early clinical evaluation with Well's scoring could be the leading cause for excessive utilization of CTPA in our study.

We propose that our hospital could incorporate Well's score criteria in the request form for CTPA so that Wells score must be assessed before making request for CTPA. Another main cause for the excessive use of CTPA is its constant accessibility and the expectation that another diagnosis could be promptly described.[8]

The risk status of suspected patients must be assessed appropriately so that accurate treatment may be given according to ongoing recommendations.[8] It is seen from study of Deblois S et al that various intercessions in diagnosing pulmonary embolism do not rise the death rate or complexities.[9]

CTPA is the one of the slightest incursive test to diagnose pulmonary embolism up to a significant level of confidence to permit various therapies like anti platelet drugs.[10] Pulmonary vasculature can be assessed up to sub segmental level using CTPA.[11]

Pulmonary hypertension which is a consequence of pulmonary embolism causes significant increase in right sided cardiac chambers size and alteration in shape of inter ventricular septum.[12]

The information regarding pulmonary embolism is promptly given to the directing medical practitioner.[13]

The large pulmonary embolism significantly increases load on right ventricle causing cardiac failure in high risk patients.[14] Right ventricular failure is the gravest consequence of pulmonary embolism.[15]

Previous similar researches show positive CTPA for PEs in about 10% of their patients and likewise emphasize use of CTPA as a screening test.[2] As compared with similar researches done in different hospitals, in our hospital 35% of CTPAs are positive for PE, inspite of the fact that only 7% of the CTPA done had calculated Well's score. Although, this outcome must be refined.

CONCLUSION:

The study proposes that CTPA was an exceedingly demanded investigation in our hospital. The insufficient prior clinical assessment is leading to improper use of CTPA along with unnecessary exposure to radiation and contrast. So, we recommend that Well's scoring must be promoted for initial assessment and prediction of clinical probability for PE to improve the quality of health care system.

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