Research Article

Acute pulmonary embolism: high risk and non high risk patients

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Abstract

Introduction: Pulmonary embolism is common cardiovascular emergency leads to acute life threating but potentially reversible right ventricular failure. **Aim of the work**: Assessment of severity of pulmonary embolism. **Patient and methods**: clinical evaluation for who were recruited from El-Minia university hospital aged from 19 to 80 years old (mean age 49±17). **Results**: there significant difference between 2 groups regarding vital data as blood pressure was in group (Ia) 120±15 and in group (Ib) was 80±5 and p = <0.0001 also While probability score wells in group (Ia) and 6±2 in group (Ib) was 7.8±.3 and p = 0.0003 and revised geneva score in group (Ia) and 9±3 in group (Ib) was 11±2.5 and p = 0.023**. Conclusion:** clinical evaluation of the patients at presentation can change managnent of the patients.

Key words : pulmonary embolism, CTPA, high risk, non high risk.

Introduction

Pulmonary embolism It is a relatively common cardiovascular emergency, by occluding the pulmonary arterial bed it may lead to acute life-threatening but potentially reversible right ventricular failure (ESC, 2014).

If the PE is extensive enough for the mean pulmonary pressure to exceed 40 mmHg, the right ventricle will exhibit acute failure. This is the cause of death in PEpatients. (Goldhaber, 2002).

Secondary haemodynamic destabilization may occur within first 24–48 has a result of recurrent emboli and deterioration of RV function. which are common in undiagnosed or inadequately treated VTE (Hull et al., 1986).

Acute RV dysfunction is a critical determinant of outcome in acute PE, clinical symptoms and signs of acute RV failure such as persistent arterial hypotension and cardiogenic shock indicate a high risk of early death, syncope and tachycardia are associated with an unfavourable short-term prognosis.(Jime´nez et al., 2007).

Patients and Methods

Study design

This prospective study was carried out in the period from October 2014 to April 2017 on 50 patients who were recruited from El-Minia university hospital and included patients presenting with signs or symptoms of suspected acute pulmonary embolism aged from 19 to 80 years old (mean age 49±17)

Methods:

All patients were examined and subjected to the following:

I) Full history taking: From the patients or their relatives. with special emphasis to:

Age, sex, Special habits

Risk factors for venous thromboembolism as Surgery and related conditions and Medical conditions or medications as Previous DVT or PE

Presenting symptoms: Dyspnea, Chest pain, Hemoptysis, cough, leg swelling.

Associated comorbidity as Ischemic heart disease, Diabetes mellitus.

II) Clinical examination:

General examination : Vital signs including blood pressure, heart rate, respiratory rate

Local examination: (chest and heart) with emphasis on signs of pulmonary hypertension also presence of signs of consolidations, Pleural effusion

Assessing clinical likelihood

Different probability scores for pulmonary embolism were calculated for each patient as wells score and revised Geneva score and PERC rule.

III) Laboratory investigations

1- D-Dimer assay

The D-dimer cut off value ⩾500ng/ml was considered positive and results <500 ng/ml were considered negative.(Dale, 1994)

2- Renal function tests (urea and creatinine).

3- Complete blood picture mean platelet volume (MPV) and red cell distribution width (RDW) was measured using automated cell counter sysmex kx-21N (TAO Medical incurporation, Japan).

4- Arterial blood gases, including arterial partial pressure of oxygen (PaO_2),partial pressure of carbon dioxide (Pa CO_2) and arterial oxygen saturation(SaO_2)., Alveolar arterial gradient was calculated according to the formula: A-a gradient= $PAO_2 – PaO_2$

IV) Imaging

1- CT Pulmonary Angiography (CTPA):

Multi-detector CT (MDCT) pulmonary angiography was performed at Radiology Department of Minia university Hospital for all patients of the study.

Pulmonary Artery Obstruction Index (PAOI) and RVD ratios were calculated in all patients and the final PAOI for each patient was expressed as percent (Score/ 40× 100). (Qanadli et al., 2001).

2- Transthoracic echocardiography:

Transthoracic echocardiograms (TTE) was done to detect Signs of pulmonary hypertension

Results

This study was conducted on 50 patients who were recruited from from ELMINIA university hospital and included patients presenting to the emergency department as well as those who were either in respiratory, coronary, general ICU or surgical inpatients during the period from October 2014 to April 2017 .

The fifty patients was divided into 2 groups according to systolic blood pressure **Group Ia**: non high-risk group included 35 patients presented with normal blood pressure .

Group Ib: high risk embolism group included 15 patients presented with shock or hypotension

Table (1): Comparison of demographic data, hospital length of stay between high risk and non high risk groups.

	Non high risk PE, group (Ia) N=35	High risk PE, group (Ib)N =15	P value*
Demographics Findings			
Age, years	48±18	47±12	0.626
Sex, M/F	37% / 63%	31 % / 69%	
Hospital length of stay	9±2	14±3	<0.0001
Mortality rate	0	2(13%)	
Modified Wells scores	6±2	7.8±.3	0.0003
Revised Geneva scores	9±3	11±2.5	0.023
Systolic BP mmHg	120±15	80±5	<0.0001

Systolic BP: systolic blood pressure

Table 1 compare between non high risk group (Ia) and high risk group group (Ib) and showed that there significant difference between 2 groups regarding vital data as blood pressure was in group (Ia) 120±15 and in group (Ib) was 80±5 and p = <0.0001,While probability score wells in group (Ia) and 6±2in group (Ib) was 7.8±.3 and p = 0.0003 and revised geneva score in group (Ia) and 9±3 in group (Ib) was 11±2.5 and p = 0.023 there is high significant difference between 2 groups regarding length of hospital stay in group (Ia) 9±2 and in group (Ib) was14±3 and p = <0.0001

Table (2) Comparison of laboratory data between high risk and non high risk groups

	Non high risk PE, group (Ia) N=35	High risk PE, group (Ib) N =15	P value*
Laboratory findings			
PaO_2, mmHg	65±15	61±13	0.354
SaO_2, %	90±10	87±13	0.324
A-aO_2	43±19	49±14	0.259
$PaCO_2$	33±6	30±12	0.409
Platelet, ×103 µL	264771±87779	226400 ±85592	0.161
MPV, fL	8 ±0.9	8.9±1	0.017
PDW, fL	15.2±0.8	15.9 ±1.1	0.046

PaO2= arterial partial pressure of oxygen SaO2=arterial oxygen saturation
MPV= mean platelet volume PDW=platelet distribution width

There was no significant difference between 2 groups regarding PaO_2, mmHg, SaO_2%, A-aO_2, $PaCO_2$ (p =0.354, 0.324, 0.259, 0.409 respectively). also there was significant difference between 2 groups regarding MPV, PDW (p= 0.017, 0.046 respectively) while no significant difference regarding Platelet p=0.161).

Table (3): Comparison of PAOI and echocardiographic data between high risk and non high risk groups

	Non high risk PE, group (Ia) N=35	High risk PE, group (Ib) N =15	P value*
Echo findings			
sPAP, mmHg	48±15	63±12	0.0006
CTPA			
PAOI	36±13	66±13	<0.0001
RV/LV	0.9±0.2	1.2±0.2	0.001

sPAP**:** systolic pulmonary arterial pressure
RV/LV: The right ventricle to left ventricular diameter ratio
PAOI= Pulmonary artery obstruction index

there is high significant difference between 2 groups regarding sPAP in group (Ia) 48±15 and in group (Ib) was 63±12 with p = 0.0006 and there is high significant difference between 2 groups regarding PAOI in group (Ia) 36±13 and in group (Ib) was 66±13 and p = <0.0001 also there is high significant difference between 2 groups regarding RV/LV ratio in group (Ia) 0.9±0.2 and in group (Ib) was1.2±0.2 and p = 0.001

Discussion

The present study comparison between high risk and non high risk groups was done and there was significant difference between 2 groups regarding blood pressure with p= <0.0001 and this coincide with Günay et al., 2014 with p <0.001. The importance of haemo-dynamic assessment in patients presenting with PE was established by the study:Management Strategy and Prognosis of Pulmonary Embolism Registry (MAPPET) by Kasper et al., 1997. These study showed that circulatory failure and systemic hypotension predicted a poor outcome in patients with PE. and suggested a link between clinical haemodynamic parameters and radiological extent of PE.

The clinical probability score was significant difference between the groups in wells p = 0.0003 and revised geneva score p = 0.023 and this disagree with Günay et al., 2014 who found no difference regarding wells 0.584 and revised geneva 0.305 .

In the current work there was high significant difference between 2 groups regarding length of hospital stay and this supported by Günay et al., 2014 with p = <0.0001 and two (13 %) patients in the current study died during the hospitalization. Patients who died during hospitalization were more hypotensive than those who survived and this results concide

with Jeebun et al., 2010 with mortality rate 21% and this may be explained by different sample sizes also there is high significant difference between 2 groups regarding sPAP with p = 0.0006 and this agreed by Günay et al., 2014

In our study, the median PA OI was significantly higher in patients with high risk compared to non high risk patients with Median obstruction index in high risk group was 66±13 non high risk 36±13p = <0.0001 and this concide with Collomb et al., 2003 and Günay et al., 2014 with p <0.001 van der Meer et al., 2005 found that patients with a PA clot load of >40% had an11.2-fold increased risk of death at 3 months.

In the current work When we compared all these laboratory data in patients with high risk and non high risk PE, we found that higher MPV and PDW levels in high risk PE patients than non high risk PE (p= 0.017, 0.046 respectively and this results concide with Yarden et al., 2016 also Kostrubiec et al., 2010 reported that MPV values were significantly related to the severity of acute PE and Günay et al., 2014 suggested that MPV could be used for the determination of disease severity and lead to therapeutic strategies for PE patients.

In the current study demonstrated that the median RV/LV diameter on axial CT images was significantly higher in high risk patients and there was high significant difference between 2 groups regarding RV/LV ratio with p = 0.001 and this results supported by Jeebun et al., 2010 while there was no significant difference between 2 groups regarding PaO_2, mmHg p =0.354, SaO_2, % p= 0.324, A-aO_2 p= 0.259, $PaCO_2$ p=0.409 and this results supported by Günay et al., 2014

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