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ACUTE PULMONARY EMBOLISM: PATIENT CHARACTERISTIC AND MANAGEMENT STRATEGY IN AN EGYPTIAN COHORT OF PATIENTS

Tarek H. Elzawawy[1], Mohammed A. Sadaka[2], Enas E Mohamed[3], Gehan M. Yossif [4] Mohamed H. Qutb [5]

1) *Professor of Cardiology and Angiology*, *Faculty of Medicine, Alexandria University, Egypt*

2) *Professor of Cardiology and Angiology*, *Faculty of Medicine ,Alexandria University, Egypt*

3) *Professor of Chest Diseases, Faculty of Medicine, Alexandria University, Egypt*

4) *Assistant Professor of Cardiology and Angiology*, *Faculty of Medicine, Alexandria University, Egypt*

ABSTRACT

Background: Pulmonary embolism (PE) is a relatively common cardiovascular emergency. Acute PE is the most serious clinical presentation of venous thromboembolism. PE is the consequence of deep vein thrombosis (DVT). The aim was to assess clinical presentation, risk stratification and management of different Egyptian's patients with suspected diagnosis of acute pulmonary embolism.

Results: Our study is reported that 33.5% of the DVT patients had silent PE, Patient's risk Stratification showed that 5(5%) had high risk Stratification, 11(11%) had intermediate risk Stratification and 82(82%) had low risk Stratification, Patient's treatment showed that 94(94%) had to take enoxaparine, 3(3%) had to take UF Heprin and warfarin and 3(3%) had to take enoxaparine, warfarine and streptokinase, and Patient's outcome showed that in hospital 4(4%) were death and 7(7%) had bleeding (4(57.1%) hematuria, 2(28.6%) ecchymosis and 1(14.3%) intrauterine).

Conclusion: Females are more susceptible to pulmonary embolism than males. Most of patients are above age of 50 y. Most of patients have intermediate Wells score. Most of patients have tricuspid regurge and pulmonary hypertension with normal left and right ventricular function. Most of patients have low risk stratification. Anticoagulants are the main treatment like heparin and warfarin.

Keywords: *deep vein thrombosis, heart, management and pulmonary embolism..*
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\INTRODUCTION

Venous thromboembolism (VTE) encompasses deep vein thrombosis (DVT) and pulmonary embolism (PE). It is the third most frequent cardio-vascular disease with an overall annual incidence of 100–200 per 100 000 inhabitants. [1,2] VTE may be lethal in the acute phase or lead to the chronic disease and disability, [3,4] but it is also often preventable.

The epidemiology of PE is difficult to determine because it may remain asymptomatic, or its diagnosis may be an incidental finding; [2] in some cases, the first presentation of PE may be sudden death. [5, 6] Overall, PE is a major cause of mortality, morbidity, and hospitalization in Europe.

Since patients older than 40 years are 9.5 patients and the risk approximately doubles with each subsequent decade, an ever-larger number of patients are expected to be diagnosed with (and perhaps die of) PE in the future .[7]

Acute PE interferes with both the circulation and gas exchange. Right ventricular (RV) failure due to pressure overload is considered the primary cause of death in severe PE. Pulmonary artery pressure increases only if more than 30–50% of the total cross-sectional area of the pulmonary arterial bed is occluded by throm-boemboli.[8]

The diagnosis of acute PE is based on direct evidence of a thrombus in two projections, either as a filling defect or as amputation of a pulmonary arterial branch.[9] Thrombi as small as 1–2 mm within the sub-segmental arteries can be visualized by digital subtraction angiography (DSA), but there is substantial inter-observer variability at this level.[10,11] Indirect signs of PE, such as slow flow of contrast, regional hypoperfusion, and delayed or diminished pulmonary venous flow, are not validated and hence are not diagnostic. The Miller score may be used in quantifying the extent of luminal obstruction. [12]

The prevalence of confirmed PE in patients undergoing diagnostic work-up because of suspicion of disease has been rather low (10– 35%) in large series.[13] Hence, the use of diagnostic algorithms is warranted, and various combinations of clinical assessment, plasma D-dimer measurement, and imaging tests have been proposed and validated. These strategies were tested in patients presenting with suspected PE in the emergency ward,[13] during the hospital stay and more recently in the primary care setting.[14] Failure to comply with evidence-based diagnostic strategies when withholding anticoagulation was associated with a significant increase in the number of VTE episodes and sudden cardiac death at three month follow-up.[15]

AIM OF THE WORK

The aim of the study to assess clinical presentation,risk stratification and management of different patients

admitted to main university hospitals with suspected diagnosis of acute pulmonary embolism

METHODS

This study was carried out on patients admitted within six months or one hundred patients in duration from June-December 2018 with suspected diagnosis of acute pulmonary embolism.

All patients had been subjected to the following:
A. Detailed history taking: Age, gender, residence, predisposing factors of pulmonary embolism (obesity, oral contraception, cancer, immobilization, pregnancy, smoking): Initial clinical presentation and Time of first diagnosis.
B. Wells Score(16):

Variables	Points
Predisposing factors:	
Previous pulmonary embolism or deep venous thrombosis	+1.5
Recent surgery	
Cancer	+ 1.5
	+ 1
Symptoms	
Hemoptysis	+ 1
Clinical signs	
Heart rate >100 beat per minute	+ 1.5
Clinical signs of deep venous thrombosis	+ 3
Clinical judgment	
Alternative diagnosis less likely than pulmonary embolism	+3
Clinical probability (3 levels)	**Total**
Low	0 to 2
Intermediate	2 to 6
High	≥ 7
Clinical probability (2-level)	**Total**
PE unlikely	0-4
PE likely	> 4

C. **Methods of diagnosis by any combination of the following:**

   D-Dimer, Doppler of lower limb veins, Echocardiography for all patients to assess right ventricular pressure and pulmonary artery pressure, V/Q scanning of the lung, Multidetector raw computed tomography pulmonary angiography.

D. **Risk stratification according to the ESC guidelines** [17]**:** Principal markers useful for risk stratification.

Clinical	Shock Hypotension
Markers of Rv dysfunction	RV dilation*, hypo kinesis or pressure overload on echocardiography RV dilatation
Markers of myocardial injury	Cardiac troponin T or 1 positive

*RV mid cavity diameter upper reference value 35mm(30mm-41mm), RV basal diameter upper reference value 42mm(39mm-45mm), RV longitudinal diameter upper reference value 86mm(80mm-91mm

(E) Treatment:
Line of the therapy used for the patients with one of the following: Anticoagulant therapy, thrombolysis therapy, Vena cava filter and surgical management.

(F) One month follow up: Death, Recurrence, Compliance and Follow up echocardiography

RESULTS

Most of our patients (76%) were above the age of 50 years while (14%) of patients were at age between 41-50 years, (5%) of patients were at age of 30-40 years and (5%) of patients were below the age of 30 years .The mean age was 56.81.In our study, the majority of our patients (59%) were female while (41%) of patients were male. Most of our patients (97%) were from Alexandria while (3%) of patients were from outside Alexandria. **(Table 1)**

Table (1): Distribution of the patients(N=100) according to the demographic data.

Demographic Data	No.	%
Age (year)		
<30	5	5
30 -	5	5
40 -	14	14
50+	76	76
Sex		
Male	41	41
Female	59	59
Residence		
Alexandria	97	97
Outside Alexandria	3	3

Patients with high Wells score accounted for 8% of patients, while the majority 92% of patients had intermediate. The mean of wells score was 4.13 **(Table 2)**

Table (2):Distribution of studied sample according to patient's Wells Score.

Wells Score	No.	%
High	8	8
Intermediate	92	92
Total	100	100
Min. – Max.	3 – 8.5	
Mean±S.D.	4.130±1.075	

In our study, 98% of the patients had normal RV function Tricuspid annular plane systolic excursion (TAPSE) >16mm while 2% of patients had reduced RV function (TAPSE) <16mm. In our study, 97% of the patients had normal RV dimension while 3% of patients had dilated RV dimension. Patient's EF was ranged between 34 – 79 % with a mean of 65.63 ± 5.352 %. Patient's Tricuspid regurge pressure gradient (TR PG) was ranged between 12 – 85 mmHg with a mean of 33.89 ± 16.927 mmHg. Patient's pulmonary acceleration time (PAT) was ranged between 52 – 130 ms with a mean of 96.55 ± 12.389 ms. **(Table 3)**

Table (3): Table (3): Distribution of the patients(N=100) according to ECHO findings

ECHO findings	No.	%
RV Function		
Normal(TAPSE >16mm)	98	98
Redued(TAPSE<16mm)	2	2
RV Dimension		
Normal	97	97
Dilated	3	3
EF (%)		
Min. – Max.	34 – 79	
Mean ± SD	65.63 ± 5.352	
TR PG (mmHg)		
Min. – Max.	12 – 85	
Mean ± SD	33.89 ± 16.927	
PAT (ms)		
Min. – Max.	52 – 130	
Mean ± SD	96.55 ± 12.389	

RV mid cavity diameter upper reference value 35mm(30mm-41mm), RV basal diameter upper reference value 42mm(39mm-45mm), RV longitudinal diameter upper reference value 86mm(80mm-91mm).

Patient's risk Stratification showed that 5(5%) had high risk Stratification, 11(11%) had intermediate risk Stratification and 84(84%) had low risk Stratification. **(Table 4)**

Patient's treatment showed that 94(94%) had to take Enoxaparine, 3(3%) had to take UF Heprin and Warfarin and 3(3%) was treated with Enoxaparine, Warfarin and Steptokinase. **(Table 4)**

Table (4): Distribution of studied sample (N=100) according to patient's risk stratification and type of treatment.

	No.	%
Risk Stratification		
High	5	5
Intermediate	11	11
Low	84	84
Treatment		
Enoxaparine	94	94
UF Heprin + Warfarine	3	3
Enoxaparine, Warfarin, Streptokinase	3	3

Patient's outcome showed that in hospital 4(4%) were death and 7(7%) had bleeding 4(57.1%) hematuria, 2(28.6%) ecchymosis and 1(14.3%) intrauterine.**(Table 5)**

Table (5): Distribution of studied sample according to patient's outcome

Outcome	No.	%
In Hospital complications (N=100)		
Bleeding	7	7
Hematuria	4	57.1
Ecchymosis	2	28.6
Intrauterine	1	14.3
Death	4	4
Complications within one month after discharge from hospital (N=96)		
Bleeding	2	2.1
Hematuria	1	1.04
Ecchymosis	1	1.04
Readmission	4	4.16
Chest infection	2	2.1
Reccurence	1	1.04
Heart failure	1	1.04
Death	2	2.1

DISCUSSION

Acute pulmonary embolism (PE) is a common and potentially lethal form of venous thromboembolism (VTE) which is commonly encountered in clinical practice. Most patients die of this fatal condition usually within the first 1 h of the event with mortality rate reaching nearly 10% during this period.[16] Mortality rate of diagnosed and treated pulmonary embolism ranges from 3 to 8%, but increases to about 30% in untreated pulmonary embolism.[16]

In this study, most of our patients (76%) were above the age of 50 years while (14%) of patients were at age of 41-50 years, (5%) of patients were at age of 30-40 years and (5%) of patients were below the age of 30 years and the mean age is 56.81. The majority of our patients (59%) were female while (41%) of patients were male. Most of our patients (97%) were from Alexandria while (3%) of patients were from outside Alexandria.

The mean age at baseline for the Swedish PE population in 2005 was 70 years emphasising that PE is a common disease in elderly persons and will probably increase with increasing longevity. Females had a higher incidence rate than males and lower median age at baseline. Oral contraceptives, pregnancy, and the postpartum period are risk factor for venous thromboembolism, which may contribute to the lower median age of pulmonary embolism amongst woman.[17]

Approximately 80% of all PE patients had had at least one episode of in-patient care during the preceding 8 years before the index event and cardiovascular diseases were by far the most common comorbidity registered. Although there are proposed links between arterial cardiac disease and PE, [18] This study cannot answer whether the prevalence of IHD is higher in the PE population or not, As we do not have comorbidities registered in the control population. Within the group of vascular diseases, venous diseases were the most frequent which is expected as deep venous thrombosis (DVT) and PE are manifestations of the same disease and more than 50% of DVT patients have a simultaneous PE at presentation.[19]

We show that PE patients had reduced survival compared to the background population even after excluding early deaths and malignancies. This highlights that the PE population needs careful follow-up. Notably, previous studies had reported inconclusive results regarding the survival of PE patients without any known malignancy.[20]

In this study, Patient's Predisposing Factor showed that 31(31%) were obesity, 25(25%) were smoker, 9(9%) were OCP, 2(2%) had immobilization, 4(4%) had bone fracture, 6(6%) wee malignancy, 4(4%) had postoperative and 1(1%) were pregnancy. Patient's Doppler of Lower Limb showed that 65(65%) were left, 23(23%) were right and 12(12%) were bilateral. Patients with high Wells score accounted for 8% of patients, while the majority 92% of patients had intermediate. The mean of Wells score is 4.13. Patients D Dimer was ranged between 0.5 – 10.7 with a mean of 2.357±1.705 mg/l.

Some reports showed that PE may not originate from the lower extremity deep vein thrombosis because the majority of silent PE patients did not suffer from lower extremity DVT, and so the application of the IVC filter to prevent the occurrence of PE, was thought to be the cause.[21] However, the diagnostic tool for DVT in those studies was mostly duplex ultrasonography which has lower sensitivity in asymptomatic DVT.[22]

In our study, we found that 33.5% of the DVT patients had silent PE, a little higher than 32% reported by Paul D. Stein.20 Our results are consistent with the higher incidence of silent PE in patients with DVT reported in the literature, between 34% and 50% detected by ventilation/perfusion lung scanning [23] and 34% to 47.1% by CT scanning.[24]

In this study, patient's risk Stratification showed that 5(5%) had high risk Stratification, 11(11%) had intermediate risk Stratification and 82(82%) had low risk Stratification.

In another study, the risk of postthrombotic syndrome might support DVT screening in patients with proven PE. Indeed, the use of elastic stockings is effective for preventing the occurrence of postthrombotic syndrome in patients with symptomatic proximal DVT.[25] However, it is unclear whether similar results can be expected in patients with asymptomatic and/or distal DVT.

In this study, patient's treatment showed that 94(94%) must take Enoxaparine, 3(3%) had to take UF Heprin and Warfarin and 3(3%) must take Enoxaparine, Wafarine and Streptokinase.

Reports confirm that In patients with suspected PE, diagnosing DVT may obviate the need for further testing because the treatment of DVT with and without non-severe PE is essentially the same[26] In this study, DVT and proximal DVT were found in 60% and 45% of patients with proven PE, respectively. Similarly, treating patients with proximal DVT and a history of VTE without objectively documenting PE carries the risk of treating patients with "residual" proximal thrombi without PE because approximately 30% of patients still have residual thrombi 2 years after an episode of proximal DVT, and distinguishing between acute (recent) DVT and older thrombi from a previous episode may be difficult if a baseline CUS is unavailable[27] Thus, this study provides reliable prevalence and risk factor data but also raises concerns that should be taken into account in the design of safe and cost-effective diagnostic algorithms for patients with suspected PE.

In this study, Patient's outcome showed that in hospital 4(4%) were death and 7(7%) had bleeding (4(57.1%) hematuria, 2(28.6%) ecchymosis and 1(14.3%) intrauterine). After one month follow up show that 2(2%) were death, 2(2%) had bleeding (1(50%) hematuria and 1(50%) ecchymosis) and 4(4%) were readmission (2(50%) chest infection, 1(25%) Reccurence and 1(25%) heart failure).

CONCLUSION

Females are more susceptible to pulmonary embolism than males due to obesity, oral contraceptive, bone fracture, and pregnancy. Most of patients are above age of 50 y. Most of patients have intermediate Wells score. Most of patients have tricuspid regurge and pulmonary hypertension with normal left and right ventricular function. Most of patients have low risk stratification. Anticoagulants are the main treatment like heparin and warfarin. Thrombolytics therapy rarely used except in heamodynamic unstable patients.

Abbreviations
PE: Pulmonary embolism
VTE: venous thromboembolism
DVT: deep vein thrombosis
RV: Right ventricular
DSA: digital subtraction angiography

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