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The Most Common Detected Risk and Etiologic Factors of Pulmonary Thromboembolism

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ORIGINAL PAPER

ABSTRACT

Introduction: Pulmonary thromboembolism (PTE) is the most serious manifestation of thromboembolic disease. **Objective:** to determine the most common risk and etiologic factors of pulmonary thromboembolism in patients treated in Intensive care unit of Clinic for Pulmonary Diseases and TB "Podhrastovi" in three-year period from 2008. to 2010. Material and methods: we retrospectively analysed patients with PTE treated in Intensive care unit of Clinic for Pulmonary Diseases and TB "Podhrastovi" in three-year period from 2008. to 2010. PTE was diagnosed by high resolute computed tomography, in most of them ventilatory /perfusion scintigraphy (V/P SPECT) was made, with proper laboratory analyses (D-dimmer, platelets, fibrinogen, and if it was needed protein C, S and AT III factor were examined). In all of them echosonography of abdomen and pelvis was done, also the examination by angiologist, and in patients with indications echosonography of the heart and Color Doppler of leg veins was made. We analysed risk and etiologic factors for PTE in each patient. Results: In 222 treated patients with PTE risk factors were found in 124 or 55.86% patients, etiologic factors were found in 31 or 13.96%, and both risk and etiologic factors in one patient were found in 18 or 8.11% patients. **Conclusion:** PTE is very serious disease that very often has fatal prognosis, and can develop with previously entirely healthy people, and as soon as we become suspicious of its presence we have to made appropriate diagnostic procedures and include appropriate therapy. We can after look for risk and etiologic factors and try to influence them.

Key words: pulmonary thromboembolism (PTE), risk factors, etiologic factors.

1. INTRODUCTION

Embolism of the pulmonary artery or one of its branches is the most striking and characteristic appearance of thromboembolic disease (1-6). According to textbooks and most of literature in most cases the starting point of the embolus is phlebothrombosis or thrombophlebitis of veins of lower extremities (1-5).

Even in cases of diseased heart emboli departure is more often from the lower limbs, than from the heart chambers (1). A blockage of the pulmonary artery or one of its branches may occur on site (in situ) because of the damage of the wall of the pulmonary artery or its branches-some with no emboli passed by blood (1-3).

There is also a perception that there exists one general disorder of coagulation e.g. thromboplastin activity where thrombi are formed all around the body, even in the pulmonary artery (1). It is often difficult to determine the starting point of pulmonary emboli. Pulmonary embolism is very common nowadays, and favoring factors for its occurrence are the chronic

diseases and therefore a long lying (bed rest), which leads to the development of phlebothrombosis and a large number of different surgical operations (1-6)

1.1. The etiology of pulmonary embolism:

- Phlebothrombosis and thrombophlebitis of lower extremities veins
- Phlebothrombosis of pelvic and abdominal veins usually after surgery
- Thrombophlebitis and phlebothrombosis of veins of lower extremities after trauma and various surgical operations
- Intracardiac thrombosis of the right cardiac ventricle
- Thrombosis of the pulmonary artery or some of its branches in situ
- There are other, less common types of emboli: e.g. tissue cells, fat, oil, gas embolism and the like (1)

1.2. Risk factors for deep vein thrombosis and pulmonary thromboembolism

Factors dependent on the patient:

- Age over 40 years
- Obesity
- Immobilization / bed rest/- lying in bed for longer than 4 days
- Deep vein thrombosis or pulmonary embolism in history
- Thrombophilia, deficiency of antithrombin(AT) III factor, protein C, protein S; lupus anticoagulant, resistance to activated protein C, hemocistinemija (2,4,5)

Factors dependent on the type of illness or surgery

- Trauma or surgery: especially the pelvis, hip, leg
- Malignant processes-particularly in the pelvis, abdomen, primary or metastatic
- Heart failure
- Recent myocardial infarction
- Hormonal therapy (estrogen, progesterone)
- Using the contraceptive pills
- Paraplegia
- Severe infection
- Intestinal inflammations
- Polycythemia
- Paraproteinemia
- Behcet's disease
- Paroxysmal nocturnal haemoglobinuria (2,4,6)

It is not always easy to make a diagnosis or suspect of acute PTE because it occurs suddenly, the clinical picture is developing rapidly and quickly withdraw, and often has rapid fatal ending (in patients with massive embolism). The disease occurs suddenly, often in previously perfectly healthy people (1-6).

2. OBJECTIVE

Objective of this study is to determine the most common risk factors and etiologic factors of pulmonary thromboembolism in patients treated in the Intensive care unit of Clinic for Pulmonary Diseases and Tuberculosis "Podhrastovi" in three-year- period from 2008. to 2010.

3. MATERIALS AND METHODS

We analyzed retrospectively patients who were treated in the Intensive care unit of Clinic for pulmonary diseases and TB "Podhrastovi" in Sarajevo due to pulmonary thromboembolism during the three- year –period: since 2008. to 2010. Pulmonary thromboembolism was proven by high resolute computed tomography (CT) of thoracic organs and at the majority of patients diagnosis was confirmed by ventilation / perfusion scintigraphy (V/P SPECT) and with the appropriate laboratory tests (D-dimmers, platelets, fibrinogen, and in selected patients protein C , protein S and AT III factor was determined). In all patients ECHO (ultrasound preview of the abdomen and pelvis) was done and all patients were examined by angiologist, and when there was indication Color- Doppler of lower extremities veins was made.

In all patients we searched for risk and etiologic factors of PTE, and we analyzed how many patients had risk factors for PTE, how many had clear etiology of PTE, and how

many patients had been proven to have associated risk factors and etiologic factors of PTE. Statistical evaluation was performed with SPSS 15 software and MS Office Excel 2007..

4. RESULTS

Results are presented in Table 1, 2, 3 and 4 (As a risk factor we did not use age over 40 years).

Sex	M	F	TOTAL
	25 (41.67%)	35 (58.33%)	60
Age (years)	50 (24-81)	59.71 (21-79)	54.8
Risk factors of PTE detected in (number of patients):	10 (40%)	19 (54.23%)	29 (48%)
Etiologic factors of PTE detected in (number of patients)	4 (16%)	5 (25.71%)	9 (15%)
Risk and etiologic factors of PTE associated in one patient detected in (number of patients)	1 (4%)	5 (14.29%)	6 (10%)

Table 1. Risk factors and etiologic factors of PTE in patients treated in 2008.year

Detected risk factors in 10 male patients: 2 operations, 3 long bed-rest (2 because of brain stroke, and 1 because of kidney failure,1 trauma (bone leg fracture), 1 malign disease, 2 heart failure and 1 paraplegia. Etiologic factors (phlebothrombosis or thrombophlebitis of lower extremities) were detected in 4 patients -in 1 of them associated with malign disease.

Detected risk factors in 19 female patients: 6 operations, 4 heart failures, 3 traumas (leg fracture), 1myocardial infarct (MI), 1 brain stroke, 1 malign disease, 1 thrombophilia, 1 relapse , 1 long bed-rest (kidney failure). Etiologic factors (phlebothrombosis or thrombophlebitis of lower extremities) were detected in 5 of them: 2 associated with operation, 1 with recidivated PTE, 1 with trauma, 1 with thrombophilia. (4 patients had history of deep phlebothrombosis, but now there was no evidence about relapse).

Sex	M	F	TOTAL
	48 (58.54%)	34 (41.46%)	82
Age (years)	56.15 (20-85)	59.41 (24-86)	57.78
Risk factors of PTE detected in (number of patients):	29 (60 %)	22 (64.71%)	51 (62.20%)
Etiologic factors of PTE detected in (number of patients)	6 (12.5%)	4 (11.76%)	10 (12.20%)
Risk and etiologic factors of PTE associated in one patient detected in (number of patients)	4 (8.33%)	4 (11.76%)	8 (9.76%)

Table 2.Risk factors and etiologic factors of PTE in patients treated in 2009.year

Detected risk factors in 29 male patients: 9 operations, 4 myocardial infarcts,3 brain strokes, 3 heart failures, 3 malign diseases; 2 long bed rests (1 hemiplegia, 1 comma posttraumatic) , 1 trauma fracture of leg bone , 1 thrombophilia, 1 obesity, 1 severe infection ,1 associated brain stroke and myocardial infarct . Etiologic factors (phlebothrombo-

sis or thrombophlebitis of lower extremities) were detected in 6 patients and in 4 of them associated with: operation, trauma, comma and heart failure, but in two of them we did not detected risk factors.

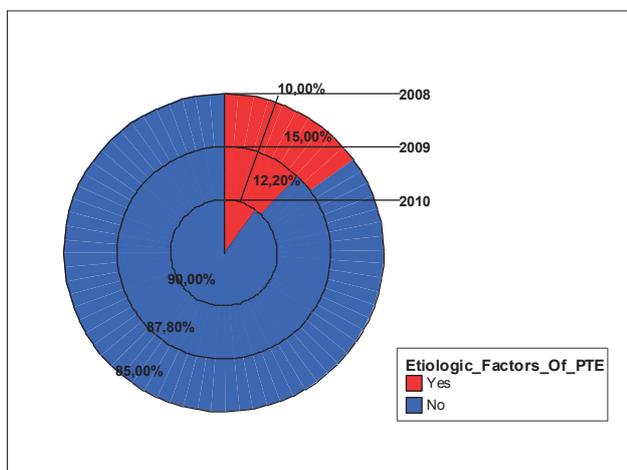
Detected risk factors in 22 female patients: 10 operations, 5 heart failures, 2 long bed-rest (because neurological disease),1 brain stroke, 1 obesity, 1 trauma -leg bone fracture, 1 malign disease, 1 delivery(birth child). Etiologic factors (phlebothrombosis or thrombophlebitis of lower extremities) were detected in 4 patients -all associated with surgical operation.

Sex	M	F	TOTAL
	45 (56.25 %)	35 (43.75%)	80
Age (years)	55.29 (31-82)	60.17 (22-61)	57.73
Risk factors of PTE detected in (number of patients):	17 (37.77 %)	27 (77.14%)	44 (55%)
Etiologic factors of PTE detected in (number of patients)	6 (13.33%)	2 (5.71%)	8 (10%)
Risk and etiologic factors of PTE associated in one patient detected in (number of patients)	2 (4.44%)	2 (5.71%)	4 (5%)

Table 3. Risk factors and etiologic factors of PTE in patients treated in 2010.year

Detected risk factors in 17 male patients: 5 operations, 4 associated heart failures with brain stroke, 2 myocardial infarcts, 2 heart failures, 1valvular heart defect, 2 traumas- leg bone fracture, 1 long bed-rest because of general arteriosclerosis. Etiologic factors (phlebothrombosis or thrombophlebitis of lower extremities) were detected in 6 patients: in one of them associated with operation, in one with long bed rest, in 4 of them we did not detected risk factors.

Detected risk factors in 27 female patients: 14 operations, 3 associated brain stroke and heart failure, 2 heart failures, 2 long bed rest (1 because of general arteriosclerosis and 1 for kidney failure), 1 myocardial infarct, 1 malign disease with operation, 1 trauma- leg bone fracture, 1 relapse of PTE,1 delivery- birth child, 1 using contraceptive pills. Etiologic factors (phlebothrombosis or thrombophlebitis of lower extremities) were detected in 2 patients; one asso-



Graph 1. Etiologic factors of PTE in patients treated in from 2008. - 2010.

ciated with operation and one with long bed rest- general arteriosclerosis.

For years 2008. and 2009. there were no correlations between age and risk factors: 2008. (r =0.031, p=0.815); 2009. (r=-0.149, p=0.182). For year 2010. we found moderate correlation (r=0.400, p<0.001). We found no correlation between age and etiologic factors for observed period: 2008. (rho=0.208, p=0.111); 2009.(r=0.103, p=0.356); 2010. (r=0.026, p=0.818)

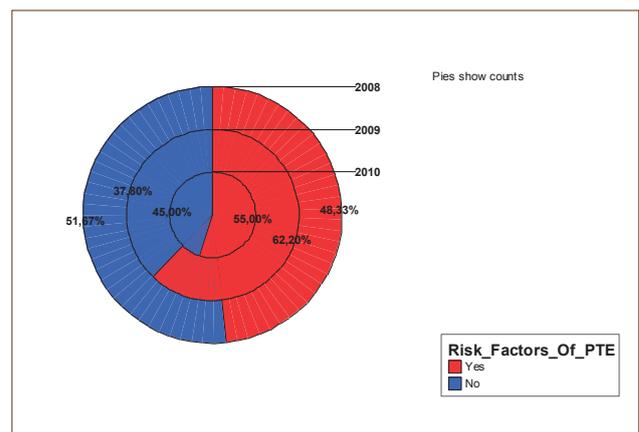
Chi-square test did not show significant dependency in Risk Factors of PTE between males and females for years 2008. C2(1, n=60) = 0,14 p= 0.407; and for 2009. C2(1, n=82) = 0,04 p= 0.870.

For year 2010. Chi-square test showed significant dependency in Risk Factors of PTE between males and females, C2(1, n=80) = 0.393 p= 0.001.

Chi-square test did not show significant dependency in Etiological Factors of PTE between males and females for observed years.

Sex	M	F	TOTAL
	118 (53.15 %)	104 (48.84%)	222
Age (years)	53.81	59.73	56.77
Risk factors of PTE detected in (number of patients):	56 (47.45 %)	68 (65.38%)	124 (55.86%)
Etiologic factors of PTE detected in (number of patients)	16 (13.56%)	15 (14.42 %)	31 (13.96%)
Risk and etiologic factors of PTE associated in one patient detected in (number of patients)	7 (5.93%)	11 (10.58 %)	18 (8.11%)

Table 4. Risk factors and etiologic factors of PTE in patients treated in from2008.-2010.



Graph 2. Risk factors of PTE in patients treated in from 2008. - 2010.

This table shows detected risk and etiologic factors in all patients (male and female treated in three -year-period)

5. DISCUSSION

Pulmonary embolism is very common nowadays, and favoring factors for its occurrence are the chronic diseases and therefore a long lying in bed, which leads to the development of phlebothrombosis and a large number of different surgical operations (1-6). In textbooks and most of literature

it is still saying that in most cases the starting point of the embolus in PTE is phlebothrombosis or thrombophlebitis of veins of lower extremities (1-6). Working in a practice with a large number of patients with exactly diagnosed PTE by appropriate diagnostic procedures we noticed that in most our patients we were not be able to determine the risk factor or etiologic factor for the development of PTE so we decided to analyze that cases again retrospectively.

In this study we have attempted to determine by a retrospective analysis the most common risk factors and causes -etiologic factors of PTE in patients treated in the Intensive care unit of the Clinic for Pulmonary Diseases and TB "Podhrastovi" in Sarajevo during the three- year- period from 2008.-2010. In 222 patients treated of PTE risk factors for PTE were detected in 124 or 55.86% of patients, causes-etiologic factors of PTE were detected in 31 patients or 13.96%, and both risk factors and etiologic factors of PTE in one patient were detected in 18 or 8.11% patients. (As a risk factor we did not use age over 40 years).We can conclude that in our patients the most common risk factors were surgical operations, traumas-first of all fractures of leg bones, heart failure nearly always with cardiac arrhythmias, recent myocardial infarct, brain stroke, long bed rest, and most common etiologic factors were phlebothrombosis or thrombophlebitis of lower extremities), but in most of our patients with exactly diagnosed PTE we were not be able to find out neither the risk factor nor the etiologic factor of PTE.

6. CONCLUSION

Pulmonary thromboembolism is the most striking and characteristic appearance of thromboembolic disease. In clinical practice it is often difficult to determine the starting point of pulmonary embolus. It is not always easy to

make a diagnosis or even suspect to acute PTE because it occurs suddenly, the clinical picture develops rapidly and quickly withdraw, and often has rapid fatal ending (in patients with massive embolism).PTE is very serious disease that very often has fatal prognosis, and can develop with previously entirely healthy people, we are often not able to detect risk and etiologic factors of PTE, and because of that as soon as we become suspicious of its presence we have to made appropriate diagnostic procedures and include appropriate therapy. We can after, during the clinical treatment of patient, look for risk and etiologic factors and try to influence them.

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