ETIOLOGICAL, CLINICAL AND EVOLUTIVE ASPECTS OF PULMONARY EMBOLISM DIAGNOSED IN HOSPITALIZED PATIENTS – A RETROSPECTIVE STUDY

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ABSTRACT: We investigated time-related changes regarding etiology, clinical and evolutive aspects of pulmonary embolism (PE) diagnosed in hospitalized patients. We studied medical documents of hospitalized patients for PE in Cardiology Clinic, following history, clinical, electrocardiographic and imagistic features used for positive diagnosis during five years. We recorded a group of 54 patients (40 women, mean age 65,4±4,6 years and 14 men, mean age 68,2±7,3 years), for whom the etiologic factors were lower limbs deep vein thrombosis (DVT) in 29 cases (53,7%), orthopedic pathology in 11 patients (20,37%), pelvic pathology in 9 cases (16,66%) and prolonged use of oral contraceptives in 5 women (9,26%). We noted dyspnea in all patients, chest pain in 44 cases (81,4%), anxiety in 41 patients (75,9%), signs of acute cor pulmonale in 30 patients (55,5%) and syncope in 8 cases (14,8%). Angiographic pulmonary CT scan proved to be the most reliable diagnosis method (positive for 53 patients), and we noted the preponderance of right anatomical localization of PE lesions. Favourable evolution was recorded in 43 cases, while 11 patients died, most of them (9 cases) with bilateral PE. Conclusions. PE morbidity is more frequent in women, general mortality is high in bilateral lesions, but relative mortality is higher in men. DVT, orthopedic and pelvic pathology was the dominant etiology. Angiographic pulmonary CT scan proved to be the most reliable method for positive diagnosis of PE.

Keywords: pulmonary embolism, deep vein thrombosis, angiographic pulmonary CT scan.

ASPECTE ETIOLOGICE ȘI CLINICO-EVOLUTIVE ALE EMBOLIEI PULMONARE DIAGNOSTICATE LA PACIENȚII SPITALIZAȚI – STUDIU RETROSPECTIV

Rezumat: Am studiat modificările în timp referitoare la etiologie, aspectele clinice și evolutive ale emboliei pulmonare (EP) diagnosticate la pacienții spitalizați. Am cercetat documentele medicale ale pacienților cu EP spitalizați în Clinica de Cardiologie, urmărind datele anamnestice, aspectele clinice, electrocardiografice și imagistice folosite pentru diagnosticul pozitiv și consemnate în decurs de cinci ani. În lotul de 54 de pacienți (40 femei cu vârsta medie 65,4±4,6 ani și 14 bărbați cu vârsta medie 68,2±7,3 ani) cauzele EP au fost reprezentate prin tromboza venoasă profundă a membrelor inferioare la 29 de subiecți (53,7%), patologie ortopedică de fond în 11 cazuri (20,37%), patologie de mic bazin la 9 bolnavi (16,66%) și uz prelungit de anticoncepcional oral la 5 paciente (9,26%). Dispnea a fost prezentă la întreg lotul de pacienți, durerea toracică la 44 de bolnavi (81,4%), anxietatea în 41 de cazuri (75,9%), tabloul clinic de cord pulmonar acut la 30 de subiecți (55,5%), iar sincopa la 8 persoane (14,8%). AngioCT pulmonară s-a dovedit cea mai fiabilă metodă de diagnostic pozitiv a EP (53 de cazuri), iar localizarea anatomică a leziunilor a fost predominant în dreapta. Evoluția bolnavilor cu EP a fost favorabilă în 43 de cazuri, înregistrându-se 11 decese, din care cu EP bilaterală la 9 subiecți. Concluzii.Morbiditatea prin EP este mai frecventă la femei, mortalitatea generală este mai ridicată în leziunile bilaterale, dar mortalitatea relativă este mai mare la bărbați, etiologia fiind dominată de TVP, patologia ortopedică și de mic bazin. AngioCT pulmonar este metoda diagnostică de elecție.

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INTRODUCTION

The annual incidence of pulmonary thromboembolism (PTE) in the general population is estimated at 70-113 cases / 100,000 inhabitants (1,2), considering the circumstances that 70% of cases from major pulmonary embolism (PE) had been missed by the clinician(3). Because necropsy is not systematically performed to all deaths, no matter of etiology, it is difficult to assess by autopsy data the prevalence of PTE or death by PE.

Clinical studies showed an exponential age-related rise of PTE incidence over 40 years, with maximum between 60 and 80 years(1,2). Thus, the PTE incidence between age 25-35 years was 30 cases/100,000 inhabitants/year and it rises at 70-79 years up to 300 cases/100,000 inhabitants/year (4). There were no evidence for statistical significant PTE risk differences among men and women, but for different races/populations it has been recorded an 2.5 to 4 times lower PTE risk in Asia-Pacific area and Hispanic populations. Relative incidence of EP versus deep venous thrombosis (DVT) was different in clinical studies, lower in those without performed autopsy (33% PE vs. 66% DVT) than autopsy studies (55% PE vs. 45% DVT)(5).

The aim of this paper was a retrospective assessment of etiology, clinical and evolutive aspects of diagnosed PE in hospitalized patients in Cardiology Clinic from Emergency County Hospital Timișoara during five years.

MATERIALS AND METHODS

We studied a group of 54 patients diagnosed with PE and hospitalized in Cardiology Clinic during 2004-2008, including 40 women (74.07%), mean age of 65.4±4.6 years and 14 men (25.93%), mean age 68.2±7.3 years (women vs. men ratio 2.85 : 1 ). We examined from patients medical files history data regarding etiological conditions for PE appearance, clinical objective elements recorded at admission and during hospitalization. Electrocardiographic (ECG) changes were examined on 12 channels ECG recordings, performed with Siemens Megacart unit, while echocardiographic (ECHO) assessment was performed with Vingmed CFM-800 unit (2004-2007) and respectively Acuson Sequoia 512 (2008), using 3.5 MHz probes, all of these in Cardiology Clinic. Computerized tomography (CT) examinations were performed in Department of Radiology and Medical Imaging using a Siemens unit.

RESULTS AND DISCUSSIONS

PE etiology (Figure 1) was clearly dominated by DVT, identified in 53.70% cases; next positions, in decreasing frequency pattern were occupied by orthopedic pathology (20.37%), surgical or non-surgical pelvic pathology (16.66%) and prolonged use (more than 12 months) of oral contraceptives (9.26%).(fig.1)

![Fig.1. Etiological risk factors for PE (number of cases)](image)

We noted the increasing weight of primary non-venous pathology in PE etiology, consecutive to surgical operations of multiplication, increasing surgical patients age and, not least, amplification of pharmacological and non-pharmacological lower limbs veins injury.

Clinical symptoms at admission included (Figure 2) :
- dyspnoea (predominant inspiratory and tachypnoea type)
- chest pain (usually, violent and sudden onset)
- anxiety
n clinical signs for acute cor pulmonale (arterial hypotension, diaphoresis, facial cianosis, jugular veins turgor, painful hepatomegaly

- syncope as first onset symptom

We remarked the presence of dyspnoea in all cases and, in significant percentage, the chest pain (81%) and anxiety (75%). Thus association with clinical signs of right chambers acute hemodinamical overloading (55%) indicates a very evocative clinical feature of PE diagnosis suspicion. Resting or effort syncope, even less frequent (14%), represents an important element, mostly historical, for considering the PE possibility. For clinical suspicion confirmation we used supplementary elements provided by ECG and imagistic investigation, respectively ECHO and CT pulmonary angiography.

Classic ECG changes described in PE(6) were as follows:

- resting sinus tachycardia (cardiac frecquence more than 100 beats/minute)
- axial deviation more than +900 (right axial deviation)
- S wave in DI, Q wave and inverted T wave in DIII (S1Q3T3 pattern)
- complete or not complete new installed right bundle branch block
- P wave amplitude exceeding 0,25 mV in lead DII ("pulmonary P wave" pattern)
- atrial fibrillation or flutter.

Analysing ECG records (Figure 3) we remarked right chambers overloading signs presence in more than 80% of cases. Thus, sinus tachycardia and pulmonary P wave were found in 45 patients (83,3%), right axial deviation and S1Q3T3 pattern in 50 cases (92,6%), but the most frequent ECG change was T wave inversion (negative) in leads V1-V4 found in 51 subjects (94,4%). Atrial arrhythmia and intraventricular conduction disturbances were found in less than half of all patients (3,7%, respectively 48,1%), but their specificity were very good, representing valuable diagnosis elements when present.
There were 3 cases when ECG records were out of any mentioned changes even if further supplementary explorations evidently documented the presence of PE.

ECHO changes were next aspects studied despite their less frequency and specificity for PE, but for accessibility of this non-invasive method:
- right ventricular dilatation or right ventricular free wall hipokinesis
- paradoxical interventricular septum movement toward left ventricle
- tricuspid regurgitation
- pulmonary hypertension with tricuspid regurgitation jet velocity >2.6 m/sec.
- loss of respiratory-phasic collapse of the inferior vena cava with inspiration
- dilated inferior vena cava without physiological inspiratory collapse
- direct visualization of thrombus in right chambers.

The results were not encouraging (Figure 4). Excepting right ventricular dilatation (50 patients, 92.6%), septal kinesis abnormalities (49 cases, 90.7%) and tricuspid regurgitation evidence (29 subjects, 53.7%), the other described ECHO changes were found in less than half of the patients studied. Moreover, in 4 cases there were no previously described ECHO changes noted, although clinical symptomatology suggested PE diagnosis.

Pulmonary angio CT permitted direct visualization of intraluminal suspected pulmonary artery thrombus and confirmation of PE diagnosis in 53 cases (98.1%). This it becomes the most reliable method for positive diagnosis of PE(7,8). The main sign of PE is low attenuation of filling defect within the pulmonary artery or its branches, with partial or complete obstruction of the lumen, leaving the distal vessels partially or totally unopacified (figure 5, arrows).

The only case we could not perform this examination was a woman with well-known intolerance to contrast media used during investigation.

Anyway, informations obtained by this imagining method (Figure 5) are not limited to qualitative aspect of positive diagnosis of PE; we can assess the morphological changes regarding size, shape, extension, oldness and spontaneous or after therapy recanalization of thrombus.

In this study the anatomical and topographical distribution of PE is showed in fig. 6.

**Fig.4.** ECHO changes in studied patients with PE

**Fig.5.** A.V., female, 58 years-old
We observed a minor preponderance of right localization of thrombus and also bilateral topography of lesions in a quarter of cases. This involved direct influence to patients evolution as it shows in table 1.

We noted unfavourable evolution of most patients with bilateral PE (9 deaths from all 11), very good prognosis for left arterial branch location (no death) and relative high death rate in male (28,5%) vs. female (17,5%).

**CONCLUSIONS**

- PE remains a serious problem for positive diagnosis
- DVT, orthopedic and pelvic pathology remains the main etiological factors
- Respiratory signs and anxiety dominate clinical aspects
- Pulmonary Angio-CT is the most valuable paraclinical method for positive diagnosis in PE
- Right anatomical localization of PE is most frequent
- Prognosis is relatively poor, especially in bilateral localization of PE
- Although PE morbidity is higher in women, relative mortality is higher in male
- To improve this prognosis sustained efforts are necessary for much earlier positive diagnosis and optimal therapeutic measures.
REFERENCES


