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Disease severity and mean platelet volume in elderly patients with pulmonary embolism

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Abstract:

Elderly patients are at higher risk of venous thromboembolism, including pulmonary embolism. Furhtermore, clinical course is frequently more servere. Platelet parameters are of increasing interest in thrombosis research, including mean platelet volume, which is a recognized indicator of increased thrombotic activity.

The aim of the study was to compare severity of pulmonary embolism as measured by computed tomography, as well as mean platelet volume in younger and elderly patients.

Retrospective analysis of 150 patients data was performed. Both younger and older patients presented with similar pulmonary embolism severity, time since onset of symptoms, as well as d-dimer levels. Elderly patients, however presented with significantly wider pulmonary artery diameter and larger mean platelet volume were observed.

In older patients group, even at the same severity of PE, significant differences of both CT-derived and platelet parameters are present.

Introduction

Modern healthcare systems are facing the problem of aging societies with their morbidity, course of diseases and possible complications different from youger patients. Venous thromboembolism (VTE) risk increases significantly with age: Montagnana et al. report, that with each 10 years of age, risk of VTE increases almost twice [1].

In recent years, several researches have reported significant differences in platelet parameters between patients with different course of pulmonary embolism [PE]. In particular mean platelet volume (MPV) has been observed to be significantly increased in patients with PE as compared with those with excluded PE [2], as well as non-survivors vs. survivors [3].

The purpose of this study was to compare the severity of PE in younger and older patients using the recognized computed tomography pulmonary angiography (CTPA) parameters as well as platelet volume.

Material and methods

Clinical data of 227 consecutive patients (F:M = 107:120, mean age: 65,5+/-16 years, range: 21-97) hospitalized at Department of Cardiology of Medical University of Lublin were

retrospectively analyzed. By analysis of histogram of age distribution, the patients were divided into three tertiles. Comparison of data from youngest (Group A) and eldest group (Group B) has been conducted. The study protocol has been approved with a waiver of informed consent by local Bioethical Committee (KE-0254/41/2011).

In all patients, PE has been confirmed by CTPA performed with 64-row VCT scanner (GE Medical Systems), with a standard protocol used at our institution, i.e. scanning of the full chest from lung apices to costodiaphragmatic recesses, 64×0.625 mm collimation, slice thickness 0.625 mm, with continous reconstruction. SmartPrep was used for adjustment of the initiation of injection of approximately 70 mL of iodinated contrast medium (Ultravist 370, Bayer Healthcare, Germany), at a flow rate of
4–5 mL/sec by automatic injector, followed by 40 mL bolus of NaCl.

CTPA has been evaluated by four researches with > 6 years experience in thoracic imaging. Qanadli score has been used to assess the severity of PE as described elsewhere [4]. RV/LV short axis ratio has been measured, as recommended by European Society of Cardiology guidelines [5].

Platelet parameters evaluated within 24 hrs from the PE diagnosis have been reviewed, and mean platelet volume (MPV) has been analyzed in this study.

Statistical analysis has been performed with SPSS 16.0 statistical package.
Quantitative parameters are presented as minimal, maximal and median. Qualitative parameters are presented as percentages. Chi-squre and Mann-Whitney test were used with $p \leq 0.05$ considered significant.

Results

Study group consisted of 150 patients, Group A: 76 patients, Group B: 74 patients. Basic descriptive data and d-dimer test results are presented in Table 1. No siginificant differences of sex distribution, time since the symptoms occurence, as well as d-dimer result have been observed between groups. Table 2 presents PE severity as measured by CTPA as well as MPV. Detailed distribution of MPV in the study group is presented at Figure 1.

Table 1. Basic characteristics of study groups. Numbers are medians, minimal and maximal value or pecetages whed indicated.

	Group A (n=76)	Group B (n=74)	p
age [yrs]	50,0 (21,0-61,0)	81,5 (77,0 - 97,0)	<0,001
females [%]	47%	58%	0,096
symptoms [days]	3 (1-14)	4 (0-19)	0,634
d-dimer [µg/L]	4682 (930-14060)	6146 (422 - 26954)	0,558

Table 2. CT measurements and MPV in the study groups. Numbers are medians, minimal and maximal value.

	Group A (n=76)	Group B (n=74)	p
Obstruction score [pts]	20 (2-38)	17 (1-36)	0,506
RV/LV	1,13 (0,49-2,47)	1,12 (0,54-1,86)	0,488
PA	29,1 (20,08-43,23)	32,6 (20,03-48,18)	0,002
MPV	8,14 (6,30 – 12,10)	8,65 (6,80 – 11,90)	0,043

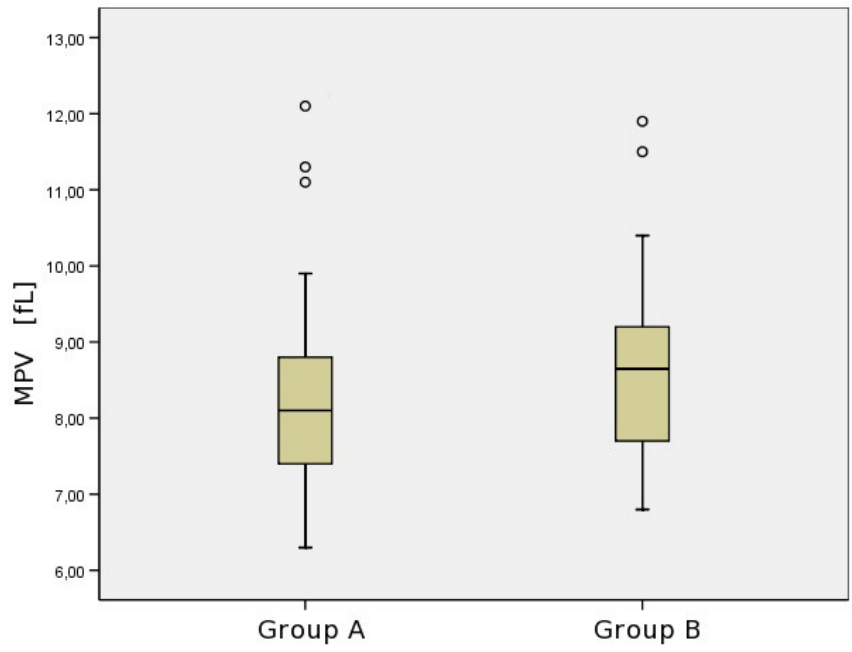

Figure 1. MPV distribution in study groups.

Discussion

Frequency of venous thromboembolism increases with age, and it also involves less favorable outcomes[6]. According to Weberova et al. [7], it is the third most common cause of mortality after 65yrs. of age. Presentation of PE is also different in elderly, with less frequent or less developed deep vein thrombosis in the lower limbs [8].

Elderly patients frequently suffer from comorbidities, which may significantly complicate the course of acute pulmonary embolism. In the study group, eldelrly patients showed signifcantly larger PA diamter than younger group, which may indicate the tendency for pulmonary artery hypertension [9]. In particular, the severity of pulmonary obstruction was similar in both groups, which may indicate the influence of comorbitidies in elderly patients group.

MPV is a recognized indicator of platelet activation and thrombotic potential[10]. Increase in MPV results from activation of platelets, as well as production of fresh platelets, which are larger[11]. Increased MPV has been recognized as risk factor of stroke [12] and other cardiovascular disorders, with recently suggested link between platelet activation and vascular inflammatory response[13]. Huang et al. [14] analyzed the utility of MPV for

suspected PE, and report a cutoff value of 8.45 fL to be characterized by sensitivity of 89%, specificity of 50%, PPV of 62% and NPV of 78%, and suggest use of MPV in combination with d-dimer for better identification of patients at risk. Similarly, Braekkan et al. [15] show 1.5 times increased risk of unprovoked VTE in patients with MPV > 9.5 fL as compared with those with MPV < 8.5 fL. Furthermore, Kostrubiec et al. report increased MPV to be a risk factor of early death in the course of acute PE [3], and it also correlated with increased troponins.

MPV seems to be promising factor to identify patients who require more aggresive treatment. Peng et al. report, that the incresed MPV is predictor of unfavorable outcome of trombectomy in ischemic stroke [16], while Norgaz et al. observed increased risk of restenosis in patients with increased MPV[17], with similiar observations by Jaster et al.[18].

Interestingly, recent study has shown, that in patients with cancer increased MPV was related with decrease in thrombosis risk, which authors explain with possible different mechanism leading to increased thrombosis in cancer patients [19].

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