Morphological characteristics of platelet in patients with severe sepsis

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Goal of Study: Patients with severe sepsis have a multiple organ dysfunction including system of hemocoagulation. Thrombocytopenia is present in 30-40% patients. Recently, a significant interest has been shown in morphological characteristics of platelets, including mean platelet volume because it can present functionality of the platelets better than platelet count. Measurement of MPV (mean platelet volume) is used in everyday practice. Increased MPV can exist in terms of increased number of platelets due to hyperproduction, or in case of their activation. The recent studies are pointing out at the correlation between increased MPV and thromboembolic complications. We aimed to estimate the variation in morphological characteristics of platelets in patients with sepsis.

Materials and Methods: 60 patients with sepsis were enrolled, divided into two groups according to the platelets count. The Group 1 consisted of 26 patients with thrombocytopenia ($<100 \times 10^9/L$) and Group 2 had 34 patients without thrombocytopenia. We took into consideration specific factors as: platelet count, MPV, platelet large cell ratio (P-LCR), platelet distribution width (PDW). Clinical blood analysis and determination of the morphological parameters of the platelets have been conducted at hematological analyzer Sysmex XS-1000i (Japan).

Results and Discussion: Mean platelet count in Group 1 was $70 \times 10^9/L$ and in Group 2 - $225 \times 10^9/L$. In patients with thrombocytopenia the increased MPV has been found (11,3 fl vs 10,5 fl; $P=0,008$). P-LCR also has been increased in Group 1 (36,3% vs 30,1%; $P=0,004$). PDW in Group 1 was also confirmed enlarged compared to Group 2 (16,1% vs 13,6%; $P=0,007$). The possible causes for increased MPV in patients with thrombocytopenia suffering severe sepsis are: hyperproduction of platelets due to increased production of thrombopoietin and activation of platelets with increased cell volume (transformation of the platelets). It can be suggested that activation of thrombopoiesis due to consumption and destruction of platelets results in both MPV and PDW increase. Although, if transformation of the platelets occurs only MPV is expected to be increased and PDW to remain unchanged.

Platelet count in patients with sepsis

Morphological characteristics of platelets

Parameter	Group 1	Group 2	P
Platelet count $\times 10^9/l$	70 (41-117)	225(203-315)	
MPV	11,3 ($\pm 1,1$)	10,5 ($\pm 1,4$)	0,008
PDW, %	16,1 ($\pm 3,1$)	13,6 ($\pm 2,6$)	0,008
P-LCR,%	36,3 ($\pm 7,8$)	30,1 ($\pm 9,7$)	0,004
PCT	0,08	0,25	

Conclusions: The consumption of the platelets during the septic process lead to thrombocytopenia. Increased MPV and P- LCR are noted in thrombocytopenia. This represents their hyperproduction, regeneration of platelet population and increased thrombogenic capacity.