



Poster 27



The role of preoperative serum inflammatory markers (NLR, PLR, PWR and CRP) as biomarkers of postoperative delirium in cardiac surgery

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INTRODUCTION

Postoperative delirium (POD) is an acute neuropsychiatric syndrome, associated with increased mortality, prolonged ICU and hospital stay. Delirium results from multiple insults, including neuroinflammation and oxidative stress. The aim of this study was to evaluate the role of routinely available inflammatory markers derived from white blood cell count (WBC) for their prognostic value in diagnosing delirium after cardiac surgery.

MATERIAL AND METHODS

The research was conducted on patients with coronary disease who were qualified for CABG in Cardiac Surgery Department of the Pomeranian Medical University in Szczecin, Poland, between 01.01.2014 and 31.12.2016. We performed a retrospective analysis of a prospectively collected database of patients undergoing planned coronary artery bypass grafting (CABG). Differential WBC count and CRP concentration was evaluated preoperatively (T0) and postoperatively (T1, T3, T5 on day 1, 3, 5) after CABG. Differences in neutrophil-lymphocyte ratio (NLR), platelet-lymphocyte ratio (PLR) and platelet-WBC ratio (PWR) between patients with (Del+) and without delirium (Del-) were evaluated. Multivariate logistic regression was performed to find independent preoperative predictors of delirium.

RESULTS

We included 968 patients in the study. The incidence of delirium within the first 6 days after CABG was 13.3%. Preoperative WBC (8.21 ± 3.04 G/l vs 7.55 ± 1.86 G/l, $p = 0.029$) and CRP (6.33 ± 12.34 vs 4.06 ± 7.80 , $p = 0.015$) was higher and mean platelet count was lower (217.7 ± 69.07 G/l vs 227.44 ± 59.31 G/l, $p = 0.031$) in patients with POD. Mean NLR values did not differ between both groups ($p = 0.628$). Adjusted models have shown that lower mean PLR values ($p = 0.026$) and lower mean PWR values (27.69 ± 7.50 vs 31.32 ± 9.88 , $p < 0.001$) were found in patients with delirium, the association was strongest for PWR (table 1).

Table 1. Mean levels of pre-operative inflammatory markers and derived parameters for patients with and without delirium after CABG.

Inflammatory parameters - DAY 0	Delirium + (n = 129)	Delirium - (n = 839)	p - value
Total WBC count ($\times 10^9/L$), mean \pm SD	8.21 ± 3.04	7.55 ± 1.86	0.029
Lymphocyte count ($\times 10^9/L$), mean \pm SD	2.37 ± 2.03	2.09 ± 0.71	0.499
Neutrophil count ($\times 10^9/L$), mean \pm SD	4.96 ± 1.83	4.64 ± 1.54	0.098
Platelets ($\times 10^9/L$), mean \pm SD	217.7 ± 69.07	227.44 ± 59.31	0.031
CRP [mg/L], mean \pm SD	6.33 ± 12.34	4.06 ± 7.80	0.015
Derived parameters - DAY 0			
NLR 0	2.56 ± 1.45	2.47 ± 1.30	0.628
PLR 0	109.87 ± 46.38	120.36 ± 52.98	0.026
PWR 0	27.69 ± 7.50	31.32 ± 9.88	< 0.001

Figures 2, 3, 4 and 5 show the performance of NLR, PLR and PWR before and after the operation in both subgroups of patients. Comparison of selected indicators between patients with delirium and without delirium showed statistically significant differences ($p < 0.001$). After the operation at day 1 only the platelet count was significantly lower in patients with delirium (168.56 ± 63.38 vs 176.63 ± 49.75 , $p = 0.019$), therefore the PWR was also significantly lower (15.23 ± 5.21 vs 17.36 ± 7.04 , $p < 0.001$). The association was strongest for PWR and remained significant at T1 ($p < 0.001$), T3 ($p < 0.001$) and T5 ($p < 0.001$).

CONCLUSIONS

Lower levels of PLR and PWR, but not NLR, and increased levels of CRP, were associated with POD after cardiac surgery. Preoperative PWR showed strongest correlation with POD and may be a potential new biomarker of neuroinflammation associated with delirium after CABG.

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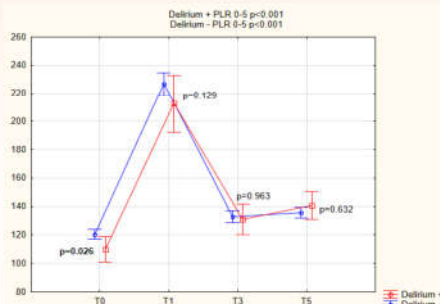


Figure 4. Pre-operative and post-operative PLR values for patients with and without delirium.

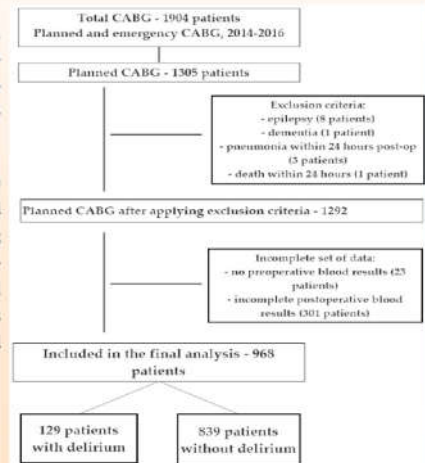


Figure 1. Study flowchart.

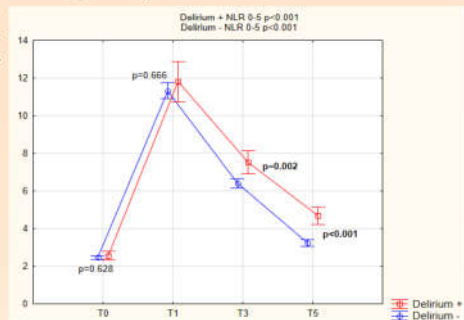


Figure 2. Pre-operative and post-operative NLR values for patients with and without delirium.

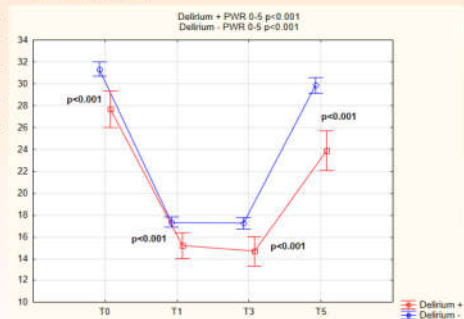


Figure 3. Pre-operative and post-operative PWR values for patients with and without delirium.

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