

Extracorporeal cytokine adsorption: Significant reduction of catecholamine requirement in patients with AKI and septic shock after cardiac surgery

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BACKGROUND AND AIMS

Extracorporeal cytokine adsorption is a new option in septic shock as an additional measure to prevent severe cytokinaemia.

Purpose of this study was to investigate the effects of extracorporeal cytokine adsorption on hemodynamic in patients with acute kidney injury (AKI) and septic shock after cardiac surgery.

METHODS AND PATIENT CHARACTERISTICS

In this retrospective study 64 patients with septic shock and AKI after cardiac surgery were investigated for the effect of extracorporeal cytokine adsorption by CytoSorb® adsorber on hemodynamic.

In all patients cytokine adsorption was applied in addition to continuous renal replacement therapy (CRRT) with citrate anticoagulation.

A paired t-test has been performed to determine statistical significance.

58 % of the patients were male (37 out of 64), 42 % female (27 out of 64). The average age was 67 years (range 46-83 years). Cytokine adsorption was 15-40 h with 1 to 4 adsorbers used per patient. All patients received a minimum of one adsorber and underwent additional treatment depending on their clinical response. Adsorbers were mainly changed every 24 h.

The most common sepsis-entity in the study population was pneumosepsis with 54 out of 64 patients (84 %). The proportion of the underlying medical diseases is showed in Figure 1.

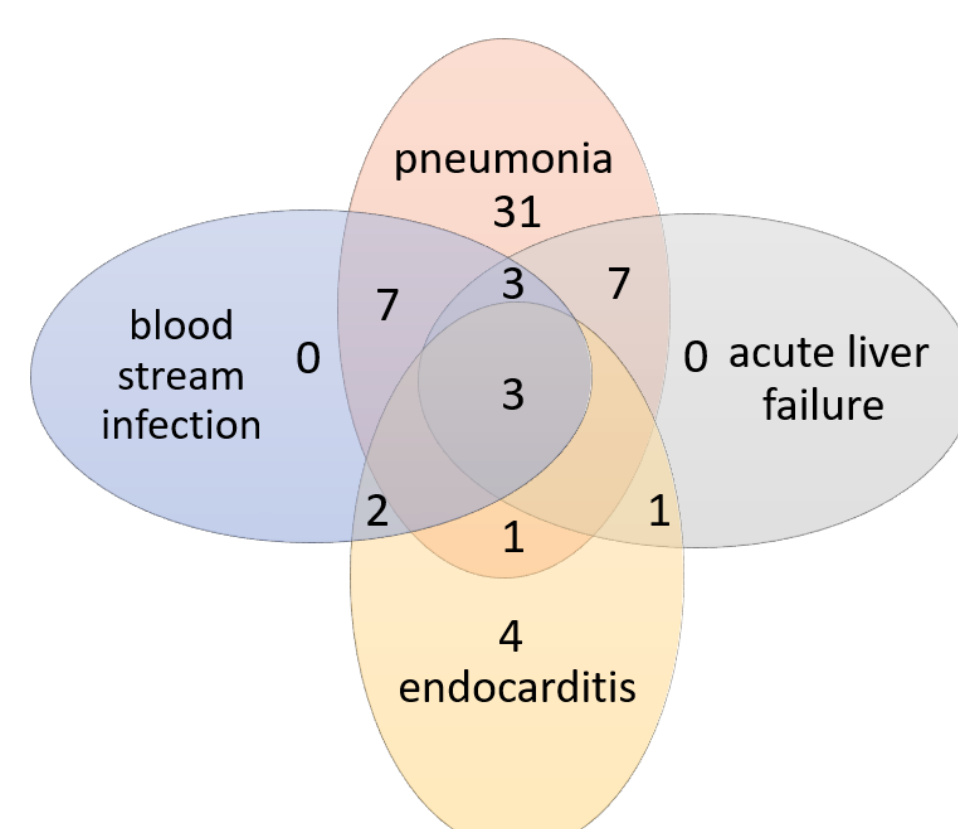


Fig. 1: Proportion of underlying medical diseases

Of the 64 patients examined in this study, 13 died before 24 hours had elapsed after the last cytokine adsorption. Another 25 patients died within 28 days after the beginning of cytokine adsorption.

CONCLUSION

In patients with septic shock and AKI after cardiac surgery, 24 h after extracorporeal cytokine adsorption by CytoSorb® the catecholamine dose required to maintain

RESULTS

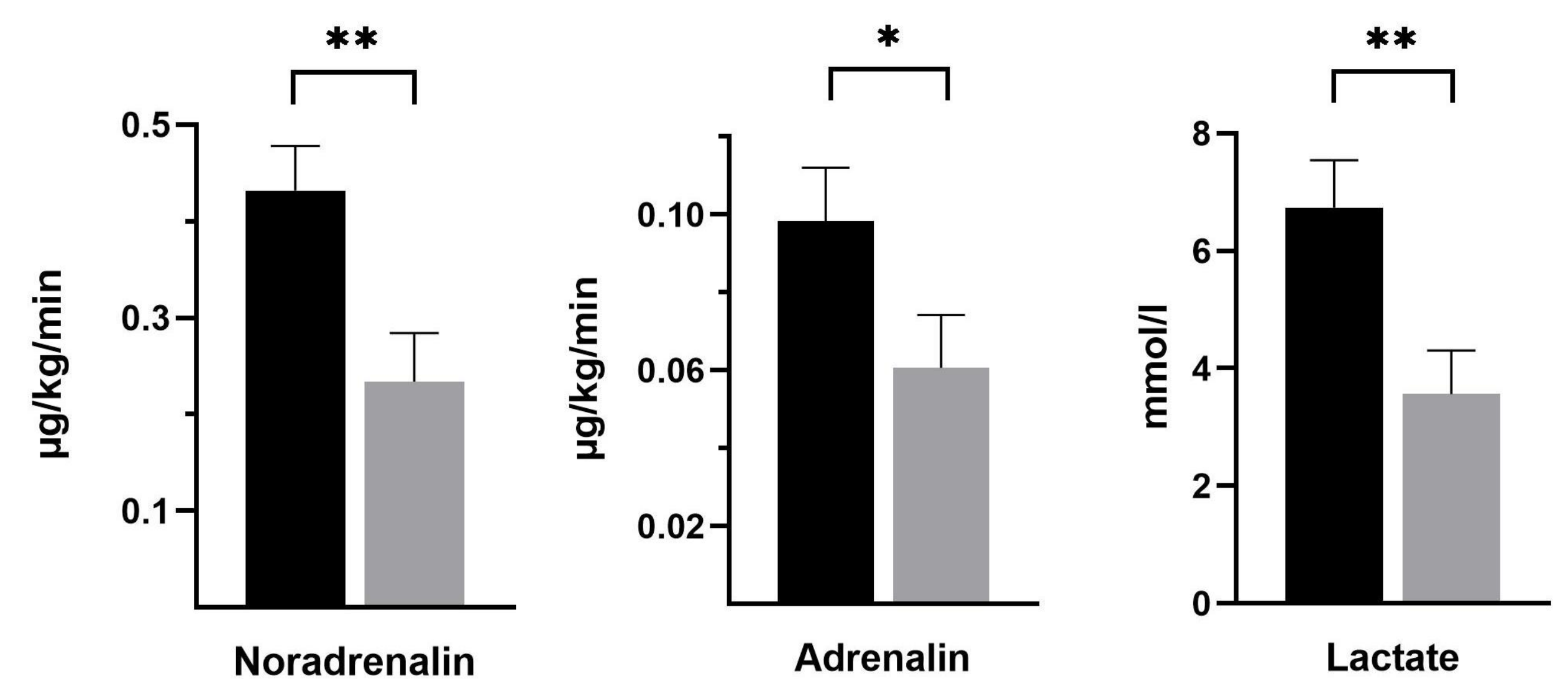


Fig.2: Catecholamine requirement and lactate 24 hours before and after cytokine adsorption. Error bars correspond to SEM. Asterisks mark differences between both groups at a significance *p < 0.05, **p < 0.01

Before treatment, the mean noradrenalin dose to reach a mean arterial pressure (MAP) > 65 mmHg was 0.43 µg/kg bw/min, the mean adrenalin dose was 0.09 µg/kg bw/min. 24 h after treatment, significantly reduced catecholamine doses were necessary to maintain a MAP > 65 mmHg (0.23 µg/kg bw/min noradrenalin; p < 0.01 and 0.06 µg/kg bw/min adrenalin; p < 0.05).

The mean blood lactate level 24 h before cytokine adsorption was 6.7 mmol/l, 24 h after treatment 3.6 mmol/l (p < 0.01).

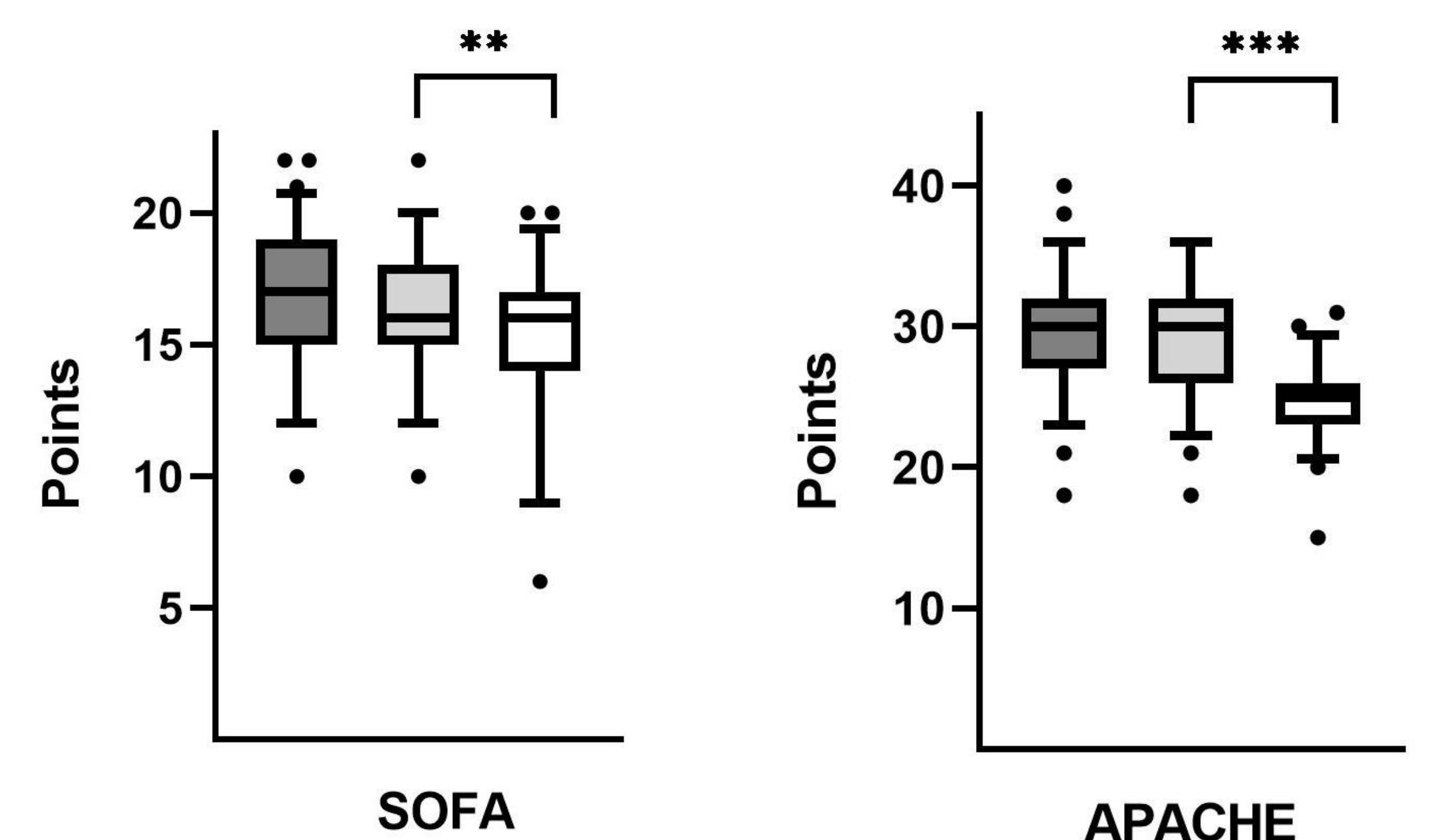


Fig. 3: SOFA- and APACHE-score 24 hours before and after cytokine adsorption. First column shows all 64 patients analyzed in the study. Second and third column shows 51 patients survived longer than 24 hours after cytokine adsorption. Whiskers show 5-95 percentile. Asterisks mark differences between both groups at a significance **p < 0.01, ***p < 0.001

The mean SOFA-score for these patients with septic shock and AKI 24 h before cytokine adsorption was 16.6 points, the mean APACHE-score was 29.8 points. The mean predicted in-hospital mortality rate based on this SOFA-score of 16.6 points was 77 %, respectively 73 % on APACHE-score, while the all-cause mortality rate of the patients in this study was 59.4 %. Both, mean SOFA- and APACHE score were significantly decreased after cytokine adsorption (p < 0.01 and p < 0.001, respectively).

a MAP > 65 mmHg was nearly halved. Additionally, observed versus SOFA- and APACHE-score predicted in-hospital mortality rate was decreased.