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WILL HIGH-DOSE HEPARIN REDUCE INFLAMMATORY RESPONSE IN PATIENTS UNDERGOING CARDIOPUMONARY BYPASS?

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Background

Cardiac surgery requiring the use of CPB provokes the inflammatory system. Heparin, the main anti-coagulant in CPB, has been shown to possess anti-inflammatory effects. The aim of this study was to investigate if a high dose of heparin versus a standard dose of heparin during CPB could reduce the inflammatory response and to investigate if this high dose would affect peroperative bleeding.

Patients and methods

30 patients undergoing coronary artery bypass grafting (CABG) surgery were randomized into two groups, a control group and an intervention group. The intervention group received a higher dose of heparin before and during CPB. A series of inflammatory markers were measured in conjunction with CPB, and blood loss was documented.

Data collection and results

The intervention group received more heparin in mean than the control group (I) regarding the initial bolus and in total, 43000 ± 5800 IU vs. 35000 ± 4100 IU ($p<0.001$) and 58000 ± 9500 IU vs. 45000 ± 7900 IU ($p<0.001$).

IL-6 and TNF-α increased in both groups after initiation of CPB, without any statistically significant differences between the groups during the observed period.

C3 level decreased after heparin administration, reaching its lowest level 15 minutes after initiation of CPB, and then rebounding towards the baseline. Other than sampling drawn five minutes after declamping the aortic crossclamp, where the median C3 level were higher in the control group (I) compared to the intervention group (II) (0.835 g/L vs. 0.625 g/L, $p=0.03$), no other statistically significant differences could be found between the groups.

Intraoperatively there were no statistically significant difference between the median values of bleeding between the control group (I), 150 ml (interquartile range [IQR] 100-325) and the intervention group (II) 225 ml (IQR 200-350), $p=0.15$. The amount of median chest tube blood loss 12 hours postoperatively was 300 ml (IQR 250-385) in the control group (I) vs. 450 ml (IQR 315-505) in the intervention group (II), $p=0.029$.

Conclusion

High-heparin dosage during CPB may not reduce the inflammatory response or affect the intraoperative or the postoperative blood loss in a clinically significant way, compared to a standard dose.

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Can in vivo lung ventilation extend the 1-hour warm ischemia limit in DCD lungs? An animal experimental model to investigate reconditioning of donor lungs with Ex Vivo Lung Perfusion after exposure to warm ischemia

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Lung transplantation is limited by a shortage of organs. A way to extend the pool of donor lungs is to use circulatory death donors (DCD) as a source. DCD lungs can tolerate one hour of warm ischemia. The aim of our study was to investigate if in situ lung ventilation after circulatory death can extend this limit.

Pigs (n =12) were put down by ventricular fibrillation (VF). In both the control (N=6) and ventilation (N=6) group lungs were subjected to 2 hours of warm ischemia. In the ventilation group this was started 30 minutes after VF and continued until the end of warm ischemia. After lung retrieval and ex vivo lung perfusion reconditioning (89+/-20 min) lungs were evaluated at FiO2 1.00 and 0.21. Endpoints were physiological parameters, delta weight and histopathological score. TNF-alpha and IL-8 was measured in bronchoalveolar lavage fluid, tissue homogenates and perfusion buffer.

We found no significant difference (p=0.450) between the groups, but 2 out of 6 lungs in the control group passed the criteria for transplantation (PaO2>13 kPa) compared to 4 out of 6 in the ventilation group. Levels of TNF-alfa and IL-8 was a little higher, not significantly, in the control group at the end of the experiment compared to the ventilation group. There was no difference in the histopathological score, but this was lowered after EVLP in all groups.

Results show that in vivo ventilation extend the tolerable duration of warm ischemia for some of the lungs in a DCD pig model.

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ECMO-outcomes in Southeastern Sweden

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Background: Extracorporeal membrane oxygenation (ECMO) is an increasingly used therapeutic modality within cardiothoracic surgical units. ECMO-treatment is resource demanding and associated with a high risk of complications, especially bleeding and thrombosis, and a high mortality rate. The optimal size and volumes of centers giving ECMO treatment has been discussed and results from centers with lower volumes has been questioned. The cardio-thoracic surgery department at the University Hospital in Linköping is a small volume center where ECMO has been given since 2009.

Objectives: To describe and evaluate the outcome of ECMO-treated patients in Linkoping, and in addition to study the influence of bleeding and other factors on mortality.

Methods: We performed a retrospective, structured review of the medical records of 62 of the 65 patients treated with ECMO in Linkoping since 2009 until October 2018. Patient characteristics, mortality, anticoagulation, blood loss, transfusions and parameters of organs function were registered.

Results: Most of the patients (56%) are alive six months after initiation of ECMO. Bleeding occurs in 71% of the patients with a mean daily consumption of 1227±1322 ml red blood cells. No significant difference between survivors and non-survivors was noted.

Conclusions: The incidence of ECMO is increasing for every year. Despite the small volume of ECMO-patients, Linkoping's hospital outcome compares well to international survival rates (in-hospital mortality France 53%, Germany 66%, low-volume centers USA 48%). Bleeding is a very frequent complication but wasn't related to mortality. Outcome seems rather to be affected by comorbidity and systemic inflammation.