Inflammatory Response in Minor and Major Surgical Procedures

Akademisk avhandling

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The thesis is based on the following papers:

I Schmidt A, Bengtsson A, Tylman M, Blomqvist L: Pro-inflammatory cytokines in elective flap surgery. J Surg Res. 2007;**137**: 117-21.

II Schmidt A, Tomasdottir H, Bengtsson A: Influence of cold ischemia time on complement activation, neopterin, and cytokine release in liver transplantation. Transplant Proc. 2004;**36**: 2796-8.

III Schmidt A, Sues HC, Siegel E, Peetz D, Bengtsson A, Gervais HW: Is cell salvage safe in liver resection? A pilot study. J Clin Anesth. 2009;**21**: 579-84.

IV Kvarnström A, Schmidt A, Tylman M, Jacobsson M, Bengtsson A: Complement split products and proinflammatory cytokines in intraoperatively salvaged unwashed blood during hip replacement: comparison between heparin-coated and non-heparin-coated autotransfusion systems. Vox Sang. 2008;**95**: 33-8.

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Abstract

Surgical procedures promote an inflammatory response, correlating to the extent of the procedure performed and influencing outcome after surgery. The aims of the thesis were to investigate factors modulating the inflammatory response perioperatively and to evaluate cell salvage for indications so far not accepted in clinical practice.

Material and Methods: In four prospective studies, inflammatory mediators were investigated perioperatively. I: The inflammatory response to 3 methods of breast reconstruction differing in complexity and the use of silicone implants in an otherwise identical patient population was determined. II: In 18 patients undergoing orthotopic liver transplantation (OLT) the activation and release of pro-inflammatory mediators was compared in patients receiving a liver with a cold ischemia time (CIT) > 12 hours versus a CIT < 12 hours. III: To reduce allogeneic blood transfusion in liver resection, the quality of intraoperatively salvaged, washed shed blood was investigated in a pilot study. The results were compared to blood salvaged and processed during aortic surgery. IV: In 24 patients scheduled for hip arthroplasty, pro-inflammatory mediators were investigated in intraoperatively salvaged, filtered shed blood. Heparin-coated tubing systems were compared to non heparin-coated tubing systems.
Results: I: IL-6 was elevated in all groups on the first postoperative day; IL-8 was significantly elevated 2 weeks postoperatively in all groups, women with silicone implants having the highest plasma concentrations. II: Plasma concentrations of C3a, C5b-9, neopterin, IL-6, and IL-8 were elevated 120 minutes after reperfusion in both groups, only IL-8 was different between groups. III: Inflammatory mediators were elevated in the salvaged blood in both groups; after the washing procedure IL-6, C3a, and C5b-9 were lower in the salvaged blood than in patients' blood in the liver resection group; contamination with intestinal flora could not be excluded in one patient. IV: C3a, sC5b-9, PMN elastase, IL-6 and IL-8 were elevated in the salvaged blood in both groups without difference between heparin-coated and non heparin-coated tubing systems.
Conclusions: Flap procedures stimulated a minor pro-inflammatory response; however, silicone implants seemed to have an immunomodulatory effect. As has been shown previously, pro-inflammatory mediators were released upon reperfusion during OLT; only IL-8 correlated to the duration of CIT. Shed blood, salvaged during liver resection, contained high levels of pro-inflammatory mediators; but after processing, it seemed to be as safe as cell salvaged blood during aortic surgery regarding inflammatory mediators; possible contamination with intestinal flora requires further thorough investigation and evaluation. Blood salvaged intraoperatively during hip arthroplasty contained elevated levels of pro-inflammatory cytokines and complement split products; however, concentrations were lower than previously reported in postoperatively salvaged and filtered shed blood, which has been successfully transfused. Heparin-coating of the tubing systems did not influence the formation of inflammatory mediators.

Keywords: inflammatory response, surgery, cytokines, complement

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