

Modulation of Inflammatory Response in Surgical Trauma

Akademisk avhandling

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av

Andreas Kvarnström
Leg. läkare

Fakultetsopponent
Professor Lars Lundell
Gastrocentrum, Karolinska Universitetssjukhuset, Huddinge

Avhandlingen baseras på följande delarbeten:

- I. 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;95:33-38
- II. Kvarnström A, Sarbinowski R, Bengtson JP, Jacobsson L, Bengtsson A.
Complement activation and interleukin response in major abdominal surgery.
Scand J Immunol. 2012;75:510-516
- III. Kvarnström A, Sokolov A, Swartling T, Kurlberg G, Mollnes TE, Bengtsson A.
Alternative pathway activation of complement in laparoscopic and open rectal surgery.
Scand J Immunol. 2012;76:49-53
- IV. Kvarnström A, Swartling T, Kurlberg G, Bengtson JP, Bengtsson A.
Pro-inflammatory cytokine release in rectal surgery. Comparison between laparoscopic and open surgical techniques.
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Modulation of Inflammatory Response in Surgical Trauma

Andreas Kvarnström

Department of Anesthesiology and Intensive Care Medicine

Institute of Clinical Sciences at Sahlgrenska Academy, University of Gothenburg, Sweden.

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Abstract

Surgical trauma results in the activation of inflammatory cascade systems in the body. Excessive systemic inflammation can lead to organ dysfunction in one or several organs. The thesis aims to describe the body's inflammatory response during major surgery and the extent to which the answer depends on different methods of blood salvage, anesthesia and surgical technique.

Method: Twenty-four patients scheduled for total hip arthroplasty were randomized to two groups. Blood was collected via a heparin-coated device or via a non-heparin-coated device. Samples were taken from collected blood to measure quality and inflammatory activation. Fifty consecutive patients who were scheduled for elective open colorectal surgery were included in a prospective and randomized study. The patients were randomized to total intravenous anesthesia with propofol-remifentanyl or inhalation anesthesia with sevoflurane. Twenty-four patients with rectal cancer were randomized to open or laparoscopic rectal resection. Blood samples were taken before, during and after surgery for analysis of inflammatory metabolites including cytokines and complement split products.

Results: I: IL-6, IL-8, C3a and SC5b-9 were higher in salvaged blood than in venous blood. There were no significant differences between the blood salvaged in the system with heparin-coated surfaces compared to non-heparin-coated surfaces regarding these parameters. II: IL-6, IL-8 and C3a increased during surgery and were elevated compared to baseline in both groups. III: Bb concentrations increased in both groups during surgery. A significant increase in SC5b-9 concentration was seen in both groups in the postoperative period. IV: IL-6, IL-10 and CRP were higher in the open group as compared to the laparoscopic group.

Conclusions: Blood salvaged intra-operatively during total hip arthroplasty contains elevated levels of complement split products and pro-inflammatory cytokines. Heparin-coated surfaces of the salvage device do not significantly influence the formation of inflammatory mediators. Major colorectal surgery leads to activation of the complement cascade and the release of both pro-inflammatory and anti-inflammatory cytokines. Complement is activated through the alternative pathway. There are no significant differences between total intravenous anesthesia (TIVA) with propofol and remifentanyl and inhalational anesthesia with sevoflurane and fentanyl regarding complement activation and the release of pro- and anti-inflammatory interleukins. Rectal surgery causes release of both pro- and anti-inflammatory cytokines. The inflammatory response is lower in laparoscopic rectal surgery as compared to conventional open surgery.

Keywords: inflammatory response, cytokines, complement activation, colorectal surgery, laparoscopy, inhalation anesthesia, intravenous anesthesia, autologous blood transfusion

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