Effects of parenteral structured lipid emulsion on modulating the inflammatory response in rats undergoing a total gastrectomy

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Abstract

Objectives

Structured lipid emulsion improves the nitrogen balance and is rapidly cleared from the blood of moderately catabolic patients. However, the effects of structured lipids on inflammatory reactions during major surgery are not clear. This study investigated the effect of a parenteral structured triacylglycerol emulsion on leukocyte adhesion molecule expression and inflammatory mediator production in rats undergoing a total gastrectomy.

Methods

Normal rats with internal jugular catheters were assigned to three experimental groups and received total parenteral nutrition. At the same time, a total gastrectomy was performed on the experimental groups. The total parenteral nutrition solutions were isonitrogenous and identical in nutrient compositions except for differences in the composition of the fat emulsion. Group 1 received a conventional fat emulsion with long-chain triacylglycerols (LCTs), group 2 received a physical mixture of medium-chain triacylglycerols (MCTs) and LCTs (MCT/LCT), and group 3 received structured lipids composed of MCTs and LCTs (STG). Half of the rats in each respective group were sacrificed 1 d and the other half 3 d after surgery to examine the analytical parameters.

Results

Plasma cholesterol and free fatty acid levels in the STG group were lower than those in the other groups after surgery. The STG group had lower leukocyte CD11a/CD18 expressions than the MCT/LCT group 3 d after surgery, and CD11b/CD18 expressions in the STG group were lower than those in the LCT group on

postoperative days. The STG group had higher monocyte chemotactic protein-1 and macrophage inflammatory protein-2 levels in peritoneal lavage fluid than did the other two groups.

Conclusion

These results suggest that, compared with the LCT and MCT/LCT groups, rats administered STG had lower plasma lipid concentrations and leukocyte integrin expressions. In addition, STG administration may cause increased recruiting of neutrophils and monocytes at the site of injury and enhance antipathogenicity in rats undergoing a total gastrectomy.