Effects of arginine-enriched total parenteral nutrition on inflammatory-related mediator and T-cell population in septic rats

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Abstract

OBJECTIVES: Previous reports have shown that oral arginine (Arg) has immune-enhancing properties in injury. However, the effects of parenterally infused Arg on sepsis are not well understood. We used a septic rat model to study Arg infusion in inflammatory-related cytokines and blood T lymphocyte population in vivo.

METHODS: Rats with internal jugular catheters were assigned to one of two groups. Both groups received isonitrogenous total parenteral nutrition (TPN) supplemented with 270 mg of nitrogen per kilogram per day as Arg or glycine (Gly). TPN provided 270 kcal/kg of body weight, and the kilocalorie:nitrogen ratio was 143:1. TPN was maintained for 5 d plus 2, 4, or 6 h or 6 d, according to the scheduled deaths of the rats. On day 5, sepsis was induced by cecal ligation and puncture (CLP). After CLP for 2, 4, 6, and 24 h, rats were killed.

RESULTS: The results showed that interleukin-1β and tumor necrosis factor-α concentrations in peritoneal lavage fluid at 6 h and interleukin-6 levels at 24 h after CLP in the Gly group were significantly higher than those in the Arg group. The T-lymphocyte population in blood showed that CD8+ suppressor T-cell number was significantly higher in the Gly group than in the Arg group at 6 h after CLP. The blood CD4+:CD8+ ratio was significantly higher in the Arg group than in the Gly group at 24 h after CLP. A negative nitrogen balance was observed in the Arg and Gly groups after CLP; there was no significant difference in nitrogen balance between the septic groups. No difference in survival rate at 24 h after CLP was observed between the groups.

CONCLUSIONS: The results showed that, compared with the Gly group, TPN preinfused with Arg reduces the production of inflammatory mediators at the site of injury and that cellular immunity is enhanced at 24 h after CLP. Parenterally

administered Arg had no beneficial effect in preventing nitrogen loss and improving survival in septic rats. Whether Gly has specific effects that reduce the effects of Arg require further investigation.