Effects of glutamine-containing total parenteral nutrition on phagocytic activity and anabolic hormone response in rats undergoing gastrectomy

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Abstract

AIM: To investigate the effect of glutamine (Gln)-containing parenteral nutrition on phagocytic activity and to elucidate the possible roles of Gin in the secretion of anabolic hormones and nitrogen balance in rats undergoing a gastrectomy.METHODS: Rats with an internal jugular catheter were divided into 2 experimental groups and received total parenteral nutrition (TPN). The TPN solutions were isonitrogenous and identical in nutrient compositions except for differences in amino acid content. One group received conventional TPN (control), and in the other group, 25%of the total amino acid nitrogen was replaced with Gln.After receiving TPN for 3 d, one-third of the rats in each experimental group were sacrificed as the baseline group.The remaining rats underwent a partial gastrectomy and were killed 1 and 3 d, respectively, after surgery. Plasma,peritoneal lavage fluid (PLF), and urine samples were collected for further analysis.RESULTS: The Gin group had fewer nitrogen losses 1 and 2 d after surgery (d1, 16.6±242.5 vs -233.4±205.9 mg/d,d2, 31.8±238.8 vs-253.4±184.6 mg/d, $P < 0.05$). There were no differences in plasma growth hormone (GH) and insulin-like growth factor-1 levels between the 2 groups before or after surgery. The phagocytic activity of peritoneal macrophages was higher in the Gin group than in the control group 1 d after surgery (4 1185±931 vs 323±201,$P < 0.05$). There were no differences in the phagocytic activities of blood polymorphonuclear neutrophils between the 2 groups at the baseline or on the postoperative days.No significant differences in interleukin-1β or interleukin-6concentrations in PLF were observed between the 2 groups.However, tumor necrosis factor-α level in PLF was significantly lower in the Gin group than in the control group on postoperative d 3.CONCLUSION: TPN supplemented with Gin can improve the nitrogen balance, and enhance macrophage phagocytic activity at the site of injury. However, Gin supplementation has no effect on phagocytic cell activity in the systemic circulation, GH and insulin-like growth factor-1 might not be responsible for attenuating nitrogen losses in rats with a partial gastrectomy.