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Preoperative volume assessment using bioelectrical impedance analysis for minimizing blood loss during hepatic resection

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Introduction : Bioelectrical impedance analysis (BIA) is a method recently used for monitoring volume status, with the advantages of noninvasiveness, rapid processing, and easy handling with a portable instrument. The aim of this study was to determine whether preoperative volume assessment using BIA can be feasible for reducing cardiac preload to minimize blood loss during hepatic resection.

Methods : We investigated 149 patients who underwent hepatic resection from January 2017 to December 2020. Regression analysis showed a significant correlation between central venous pressure (CVP) and the ratio of extracellular water to total body water (ECW/TBW), measured using InBody S10 (Biospace, Seoul, Korea) that ECW/TBW value of 0.378 correlates to a CVP of 5 mmHg ($R = 0.839$, $P < 0.001$). Patients were divided into two groups; 58 patients with $ECW/TBW < 0.378$ (group A) and 91 patients with $ECW/TBW \geq 0.378$ (group B). Demographics and intraoperative and perioperative outcomes were compared between the groups.

Results : There were no significant differences in demographics, diagnosis, preoperative liver function, and type of hepatic resection between the groups. Estimated blood loss was significantly decreased in group A, compared with group B (324 ± 193 mL vs. 508 ± 321 mL, $P < 0.001$). Identified predictors for estimated blood loss ≥ 500 mL were body mass index (odds ratio [OR], 1.151; 95% confidence interval [CI], 1.037-1.278; $P = 0.008$) and $ECW/TBW < 0.378$ (OR, 0.271; 95% CI, 0.127-0.577; $P = 0.001$).

Conclusions : BIA can be utilized for preoperative volume assessment to minimize blood loss during hepatic resection.

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