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Monitoring tissue blood oxygen saturation in the internal jugular venous area using near infrared spectroscopy

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ABSTRACT. Central venous blood oxygen saturation ($ScvO_2$) is an important monitoring index of fluid resuscitation. However, monitoring of $ScvO_2$ is not continuous and invasive. Near infrared spectroscopy (NIRS) is an optical technology for the noninvasive detection of hemodynamic changes, with advantages of being real-time, continuous, low-cost, and portable. The present study aimed to determine whether a correlation exists between the tissue blood oxygen saturation in the internal jugular venous area (StO_2) data obtained with NIRS and the $ScvO_2$ and whether these two quantities are equivalent. Data were collected from 13 patients. We used ultrasound to locate the placement site for the NIRS light source outside the internal jugular vein. Meanwhile, a sample for blood gas analysis was obtained through the

central venous catheter. A correlation analysis between the StO_2 and $ScvO_2$ of 13 samples was performed (Pearson correlation coefficient), suggesting a high correlation between them (r = 0.906, StO_2 =1.0018 $ScvO_2$ +2.8524). Bland-Altman analysis was also performed between the StO_2 and $ScvO_2$. Results were as follows: 100% of monitored points fell within the range of the mean ± 1.96 SD of the difference between the StO_2 and $ScvO_2$; range of the mean ± 1.96 SD of the difference between the StO_2 and $ScvO_2$ was 3 ± 10.2; confidence interval of the difference between the StO_2 and $ScvO_2$ was -7.2 to 13.2%. The StO_2 monitored with NIRS correlated highly with the $ScvO_2$ measured in the internal jugular vein. Therefore, the StO_2 can be used for directing clinical treatment with further research.

Key words: Central venous blood oxygen saturation; Internal jugular venous; Near infrared spectroscopy

