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BLOOD VOLUME ANALYSIS CAN DISTINGUISH TRUE ANEMIA FROM HEMODILUTION IN CRITICALLY ILL TRAUMA PATIENTS

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Introduction: Decreased peripheral hematocrit (pHct) is traditionally used as a marker for blood loss. In critically ill trauma patients who are fluid resuscitated, pHct may not adequately represent red blood cell volume (RBCV). We hypothesize that the use of pHct alone may overestimate anemia, potentially leading to unnecessary interventions.

Methods: Patients admitted to the trauma intensive care unit underwent blood volume analysis. Serial blood samples were collected after injection of ^{131}I-albumin. Samples were then processed by the BVA-100 Blood Volume Analyzer (Daxor Corporation, New York, NY). RBCV and total blood volume (TBV) were calculated using the directly measured plasma volume (PV) and pHct. A computed normalized hematocrit (nHct) adjusts pHct to the patient's ideal blood volume.

Results: Twenty-seven patients (13 male) with a mean age of 49.6 ± 3.8 years, APACHE II score 17.9 ± 1.5, and Injury Severity Score (ISS) 29.8 ± 2.5 had 65 blood volume analyses performed on three consecutive days. Using ratios of TBV compared to ideal TBV, patients were stratified into three separate groups: hypovolemic (12/65), normovolemic (20/65), and hypervolemic (33/65). Mean differences between pHct and nHct in each group were 5.2 ± 3.3 (p<0.001), 0.1 ± 1.2 (p=0.83), and -6.4 ± 4.4 (p<0.001), respectively. pHct when compared to nHct, diagnosed anemia (Hct < 30) equally within the hypovolemic and normovolemic groups. However, pHct overdiagnosed anemia in 54.5% of hypervolemic patients.

Conclusion: Use of blood volume analysis in critically ill trauma patients may help to distinguish true anemia from hemodilution, potentially preventing unnecessary interventions.