

Transfusion of stored erythrocytes is associated with the increased risk of morbidity and mortality in critical infections, but the mechanism is incompletely understood. Previous studies have suggested that RBC-derived extracellular vesicles (EVs) may be potential risk factors for the occurrence of transfusion-related immunomodulation. The purpose of our study was to evaluate the effects of RBC-derived EVs under inflammatory conditions and explore the underlying mechanisms. In vivo, the activity of EVs was evaluated in cecal ligation and puncture (CLP)-induced sepsis. Our results showed that EVs significantly aggravated the inflammatory response to sepsis in serum and lung tissue by promoting the production of the proinflammatory factors tumor necrosis factor- α (TNF- α), interleukin-6 (IL-6), and interleukin-1 β (IL-1 β) and reduced the survival rate of septic mice in vivo. Importantly, adoptive transfer of EVs-pretreated bone marrow-derived macrophages (BMDMs) obviously aggravated systemic proinflammatory factors in mice after CLP surgery. In vitro, the proinflammatory properties of EVs were shown to elevate TNF- α , IL-6, and IL-1 β levels in lipopolysaccharide (LPS)-stimulated BMDMs. Moreover, EVs promoted LPS-induced macrophage polarization into a proinflammatory phenotype. The underlying mechanism might involve EV-mediated up-regulation of TLR4-MyD88-NF- κ B-MAPK activity to favor macrophage cytokine production¹⁾.

Massive hemorrhage in pediatric cranioplasty operations may necessitate blood transfusion, which may cause many complications. Radical-7 Pulse CO-Oximeter (Massimo Corporation, Irvine, CA) can provide continuous hemoglobin concentration (SpHb) measurements noninvasively. In this study, we aimed to evaluate the effects of SpHb measurement on perioperative transfusion management and postoperative patient outcomes. For this retrospective case-control study, we collected the data of pediatric patients undergoing fronto-orbital advancement surgery for plagiocephaly and trigonocephaly between 2018 and 2021. Perioperative SpHb monitoring was performed for patients in the SpHb Group. Other patients that were managed conventionally were considered as the control group (C Group). The data on patients' demographic and clinical characteristics, intraoperative hemodynamic and laboratory variables such as blood gases, intraoperative blood losses, the amount of the transfused blood products, the length of postoperative intensive care unit (ICU) stay, and the duration of hospital stay were collected. The data of 42 patients were collected, and 29 of these patients were males (69%). In 16 of the patients, SpHb monitoring was performed. The demographic, clinical, and perioperative hemodynamic characteristics of the patients were comparable between the groups. Compared to the C Group, the SpHb Group had significantly lower perioperative packed red blood cell (PRBC) transfusion (136.3 ± 40.1 vs. 181.5 ± 74.8 mL, $P = 0.015$), less postoperative drainage (125.3 ± 47.7 vs. 185.8 ± 97.6 mL, $P = 0.013$), and shorter ICU stay (37.1 ± 12.0 vs. 64.8 ± 24.9 h, $P < 0.001$). There was a positive correlation between the amount of PRBC transfusion and the length of ICU stay ($r = 0.459$, $P = 0.003$). Patients with perioperative continuous SpHb measurement have lower intraoperative PRBC transfusion, less postoperative bleeding, and shorter ICU stay. When necessary, SpHb, together with clinical judgment and laboratory confirmation, can be used in decision-making for perioperative PRBC transfusion²⁾.

1)

Gao Y, Jin H, Tan H, Cai X, Sun Y. Erythrocyte-derived extracellular vesicles aggravate inflammation by promoting the proinflammatory macrophage phenotype through TLR4-MyD88-NF- κ B-MAPK pathway. *J Leukoc Biol.* 2022 Apr 12. doi: 10.1002/JLB.3A0821-451RR. Epub ahead of print. PMID: 35411633.

2)

Saracoglu A, Abdullayev R, Sakar M, Sacak B, Girgin Incekoy F, Aykac Z. Continuous hemoglobin measurement during frontal advancement operations can improve patient outcomes. *J Clin Monit Comput.* 2022 Mar 7. doi: 10.1007/s10877-022-00813-5. Epub ahead of print. PMID: 35257263.

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