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Blood loss estimation with Intraoperative Cell Salvage (ICS) for Pediatric Craniofacial Surgery (PCFS)

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Introduction: Haemorrhage is common during PCFS (Kearney, 1989). Autologous transfusion from ICS reduces allogeneic blood use during PCFS (Dahmani, 2000). Blood loss estimation is useful during these cases for optimal fluid and blood product management.

Methods: Data were collected from the Sorin Group Xtra™ ICS system printout and haematology laboratory. Two methods of blood loss estimation were compared: (A) amount of blood available for retransfusion from the ICS multiplied 3-fold (Sorin Group recommendation), and (B) Hct-based red cell loss formula calculation (Waters, 2004). We assumed an estimated blood volume (EBV) of 80 ml kg^{-1}, and estimated Hct of packed red cells of 0.6. Estimated red cell volume (ERCV) losses corrected for patient weight were reported. Results were reported as range (median) values. Non-multiple paired values were compared using a Bland-Altman plot (Bland, 1999).

Results: 14 patients – aged 1-23 (12) months – were analysed. Patients weighed 3.9 – 13.5 (9.4) kg. Surgery included corrections of scaphocephaly (3), trigonocephaly (7), unicoronal synostosis (2), cranial vault expansion (1), and monobloc advancement (1). Four children were diagnosed with syndromic synostosis. Formula-estimated ERCV losses were 0-51 (17) ml kg^{-1}; ICS-estimated ERCV losses were 4-22 (10) ml kg^{-1}. Bland-Altman bias was -8 (SD 14) ml kg^{-1}, with 95% limits of agreement of -35 to 19 ml kg^{-1}.

Conclusions: The Sorin Group Xtra™ ICS system estimated blood losses were closer to the formula-based estimations at lower magnitudes of blood loss, but progressively underestimated at higher volume blood losses (as demonstrated by the Bland-Altman plot). Further refinement of the blood loss calculation by the Sorin Group should be considered.