

Category : **Brain: Neurologic disease**

A151 - The effect of the volemic and cardiac status on brain oxygenation in SAH patients

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Introduction:

Optimal fluid management in patients after subarachnoid hemorrhage (SAH) aims at optimization of cerebral blood flow and brain oxygenation. Here, we investigated the effects of fluid management on brain oxygenation by integrating advanced hemodynamic monitoring (PiCCO) and invasive neuromonitoring.

Methods:

This observational cohort bi-center study included data of consecutive poor-grade SAH patients, who underwent PiCCO monitoring and invasive neuromonitoring. Fluid management was guided by the transpulmonary thermodilution system and aimed at euvolemia (cardiac index, CI ≥ 3.0 L/min/m²; global end-diastolic index, GEDI 680-800 mL/m²; stroke volume variation, SVV <10%). Patients were managed using a P_{bt}O₂ targeted protocol to prevent brain tissue hypoxia (BTH, P_{bt}O₂ <20 mmHg). To assess the association between CI and P_{bt}O₂ and the effect of fluid challenges on CI and P_{bt}O₂ we used generalized estimating equations.

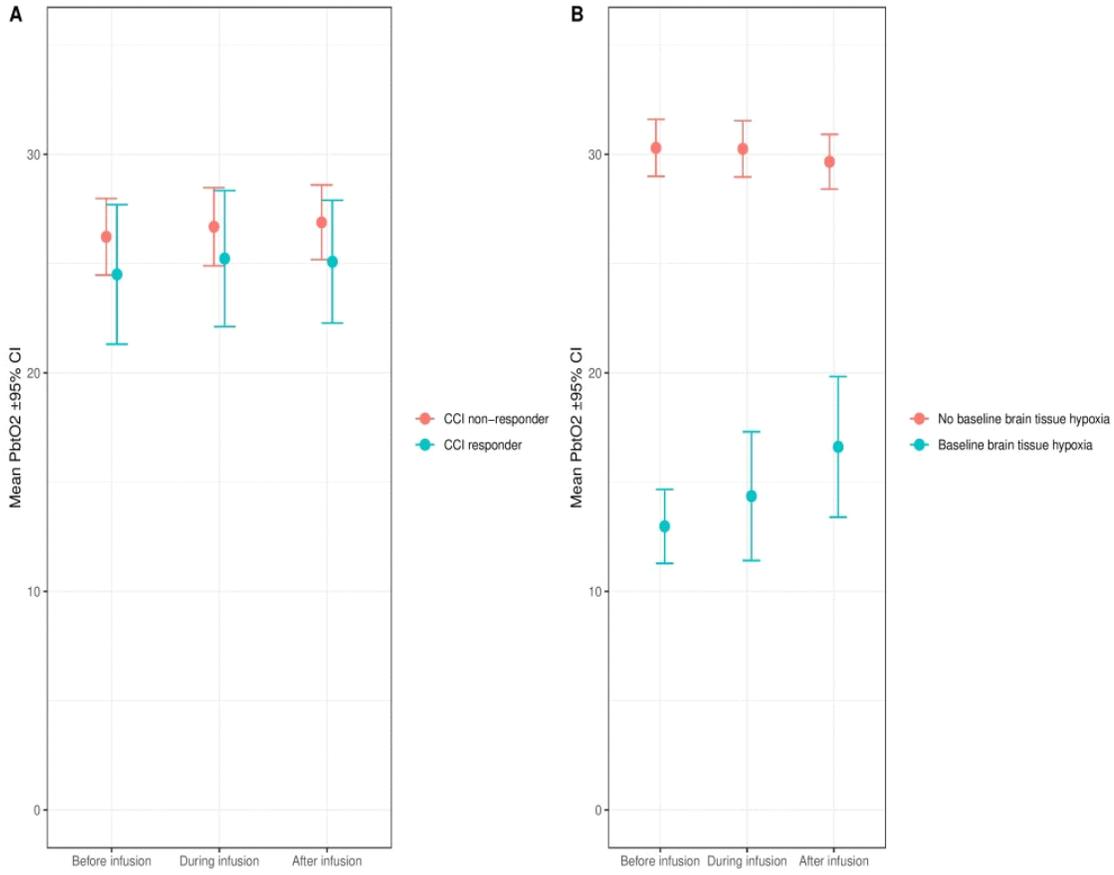
Results:

On a total of 60 included patients (median age 56 [IQRs 47-65] years), BTH occurred in 23% of the monitoring time during the first 10 days since admission. Overall, mean CI was within normal ranges (ranging from 3.1±1.3 L/min/m² on day 0 to 4.1±1.1 L/min/m² on day 4). Higher CI values were associated with higher P_{bt}O₂ levels (Wald=14.2; p<0.001). Neither daily fluid input nor fluid balance were associated with absolute P_{bt}O₂ levels (p=0.94 and p=0.85, resp.) or the occurrence of BTH (p=0.68 and p=0.71, resp.). P_{bt}O₂ levels were similar during hypovolemia and euvolemia. P_{bt}O₂ increased as a response to fluid boluses only if BTH was present at baseline (from 13±6 to 16±11 mmHg, adjusted OR=15.2 [95% CI 2.3-99.6]; p=0.005), but not in all interventions (p=0.89).

Conclusion:

In this study, a moderate association between increased cardiac output and brain oxygenation was observed. Fluid challenges may improve P_{bt}O₂ only in the presence of BTH at baseline. Individualized hemodynamic management requires advanced cardiac and brain monitoring in critically ill SAH patients.

Image :



(A) PbtO₂ did not change ($p=0.89$) as a response to fluid boluses both in CI responders and non-responders ($p=0.92$, $p=1.00$). (B) PbtO₂ increased as a response to fluid boluses in the setting of BTH at baseline ($p=0.005$).