



The Influence Of Blood Volume Analysis On The Clinical Management Of Non-Traumatic Subarachnoid Hemorrhage

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Background

Non-traumatic subarachnoid hemorrhage (SAH) can cause complicated irreversible neurological injury. A key variable in the management of SAH is intravascular volume status. Blood volume analysis (BVA) is a non-invasive method of quantifying intravascular volume status using radioisotope tagged-albumin. BVA has been validated for use in surgical ICUs, but its utility for clinical decision making in SAH is unclear. We hypothesized that intravascular volume assessments would influence clinical decision making in SAH.

Methods

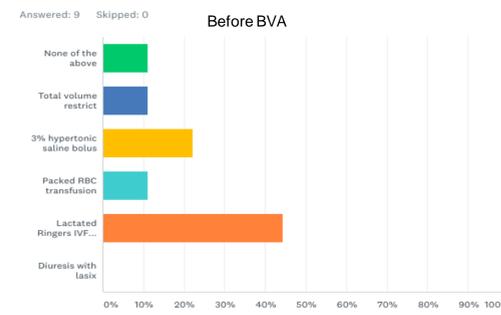
- Four clinical scenarios, consisting of hypothetical patients with SAH were presented in an anonymous IRB-exempt multiple-choice survey of 10 questions to Neurocritical care providers at a single institution neuroscience ICU. Nineteen attending physicians and advanced practice practitioners were eligible to participate. The scenarios described a variety of clinical problems including hyponatremia, vasospasm, and anemia.
- Participants were asked for their next step in management of volume status, with answers being volume restriction, hyperosmolar fluid, blood transfusion, IVF bolus, diuresis, and none of the above.
- Subsequently, BVA data was then provided, and participants were asked how they would manage the patient with this additional data.
- Qualitative differences between pre/post BVA management were analyzed.

Results

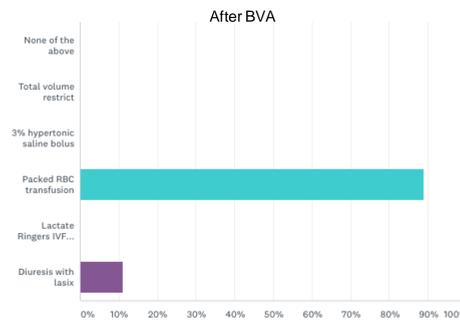
- Nine (47%) participants responded to the survey.
- Of the 36 answers, 69% (n=25) responded with different management strategies after being provided with BVA data.
- 28% (n=10) responses did not change in light of the BVA data.
- 1 question was left blank.
- All participants indicated a preference for BVA over invasive hemodynamic monitoring if given an option of either modality to monitor volume status in SAH due to the former's less invasive nature.

Results

Scenario 1: (Hypernatremic, anemic)

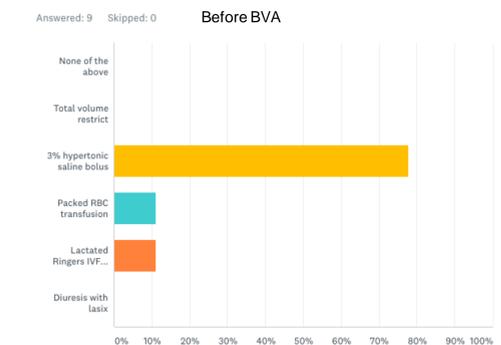


Initially the majority (44%, n=4) answered "Lactated Ringers IVF bolus"

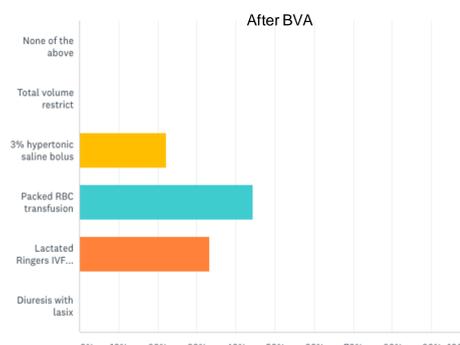


After BVA: majority (89%, n=8) answered "Packed RBC transfusion"

Scenario 2: (Delayed cerebral ischemia symptoms)

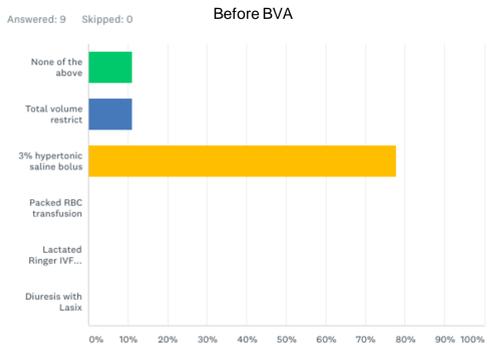


Initially the majority (77%, n=7) answered "3% hypertonic saline bolus"

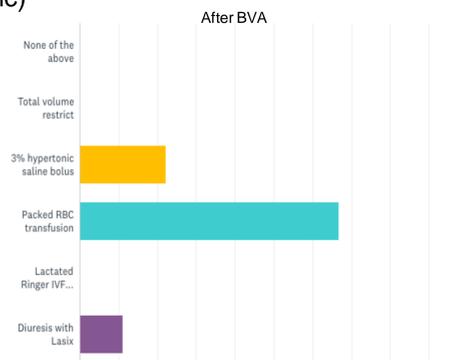


After BVA: majority (44%, n=4) answered "Packed RBC transfusion"

Scenario 3: (Hyponatremic, hypovolemic, anemic)

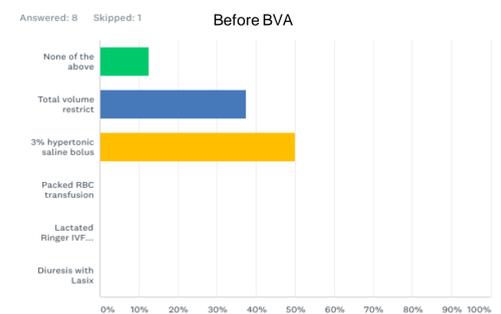


Initially the majority (77%, n=7) answered "3% hypertonic saline bolus"

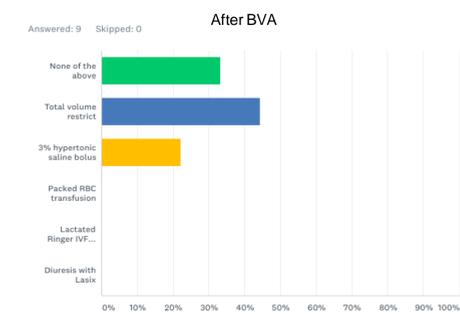


After BVA: the majority (67%, n=6) answered "Packed RBC transfusion"

Scenario 4: (Hypervolemic, hyponatremic)



Initially the majority (50%, n=4) answered "3% hypertonic saline bolus" (one answer skipped)



After BVA: the majority (44%, n=4) answered "total volume restrict"

Conclusions

In this single institution study, BVA results appeared to influence clinical management in hypothetical scenarios in SAH, though there was notable inter-provider heterogeneity in the management strategies chosen. Future work will focus on the implementation of a protocol incorporating BVA data. See Figure 1 as below.

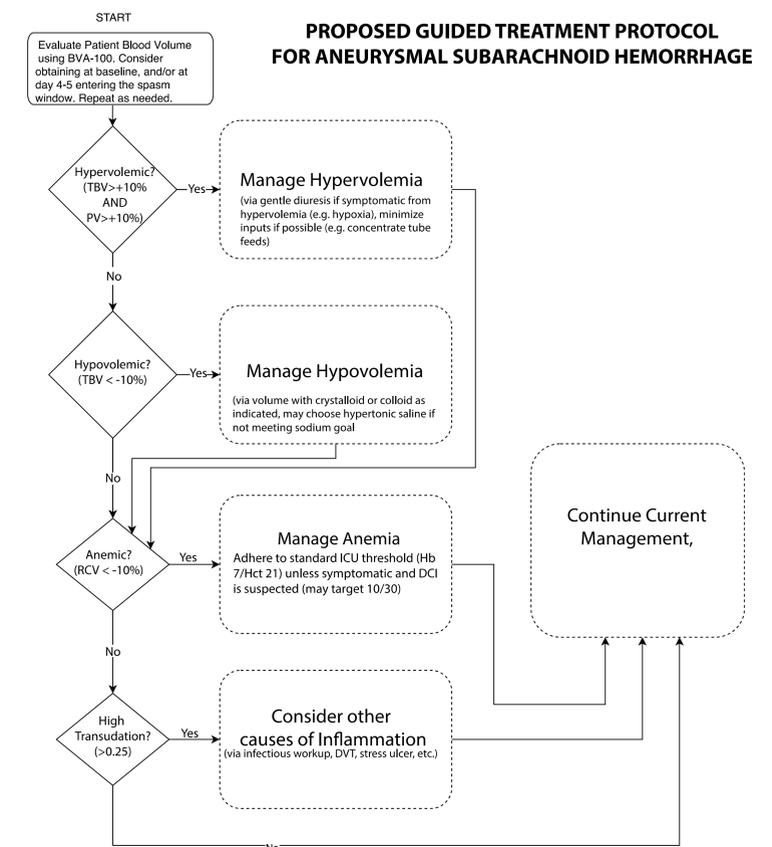


Figure 1: Proposed treatment protocol for evaluation of volume status in aneurysmal subarachnoid hemorrhage, using clinical data obtained with use of blood volume analysis.

Disclosures/ Correspondence

All authors report no relevant financial disclosures.

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