

when permissive hypotension is applied in the presence of life-threatening HS. Apoptosis plays crucial roles in various pathological conditions including HS. We aimed to clarify the effects of ischemic invasion on the brain function by investigating the development of apoptosis in the brain. **Methods:** Pressure-controlled HS was applied at mean arterial pressure (MAP) of 40 mmHg for 60 or 75 min (phase I) to 12 rats under sevoflurane anesthesia and then blood pressure was normalized by fluid resuscitation for 60 or 75 min (phase II). Observation for up to 96 h (phase III) included outcome evaluations including survival, overall performance categories (OPC), neurological deficit scores (NDS) and brain apoptosis evaluated using TUNEL. Six rats were randomized to undergo phases I and II for a total of 120 min (group 1) or phases I and II for 150 min (group 2). Three sham rats were anesthetized and observed for 150 min, and then awakened during phase III. **Results:** All rats survived beyond phases I and II or the

150-min period. At the end of phase II, values for base excess (BE) and IL-1 β were significantly better in group 1 than group 2 (-2.7 \pm 2.2 vs. -6.4 \pm 3.6 mmol/L and 67 \pm 11 vs. 152 \pm 107 pg/L; $p < 0.05$ for both). The three sham rats as well as five and two of six rats in groups 1 and 2 respectively, survived up to 96 hours ($p = 0.07$, group 1 vs. 2). All survivors were functionally normal with OPC=1 and NDS=0 at 96 hours and apoptotic neurons were not found in the hippocampus. **Conclusions:** The higher mortality rate and worse BE and IL-1 β values in group 2 suggested a more profound effect of HS compared with group 1. However, HS at MAP 40 mmHg for 60 to 75 min did not cause either functional damage or brain neuron apoptosis. These findings suggest that permissive hypotension can safely maintain MAP of 40 mmHg (at which level cerebral blood flow seems to be preserved by an auto-regulation mechanism) without causing brain damage.

Research Snapshot Theater: Surgery/Trauma/Burns IV

1518

INFLUENCE OF GLASGOW COMA SCALE ON EARLY, GOAL-DIRECTED MOBILIZATION EFFECTS

Sefan Schaller, Manfred Blobner, Stephanie Grabitz, Markus Heim, Timothy Houle, Nicole Mazwi, Matthias Walz, Matthias Eikermann

Learning Objectives: In the recently published SOMS (Surgical Optimal Mobilization Scale) trial, we reported that early, goal-directed mobilization improved patients' functional independence rate and status at hospital discharge. Data from stroke populations suggests that more neurologically compromised patients may be less likely to benefit from very early mobilization. In this analysis we tested if the initial conscious state (Glasgow Coma Scale [GCS]) affected effectiveness of early, goal-directed mobilization in the surgical intensive care unit for functional independence and status at hospital discharge. **Methods:** A hypothesis-driven, posthoc analysis of 200 patients enrolled in the multicenter, randomized controlled SOMS trial was performed. We investigated if the effectiveness of early, goal-directed mobilization in the surgical intensive care unit depends on initial conscious state quantified by GCS. We used logistic regression for functional independence and Wilcoxon test and ordinal logistic regression for mini-modified functional independence measure (mmFIM) in STATA. **Results:** GCS level did not moderate effectiveness of early, goal-directed mobilization (interaction term GCS*intervention ($p = 0.657$)). The odds ratio for functional independence at hospital discharge receiving early, goal-directed mobilization compared to standard of care was 3.7 [95% confidence interval (CI) 1.0-13.1], $p = 0.046$ for patients with $GCS \leq 8$ and 2.3 [CI 1.1-4.7] for patients with $GCS > 8$. The median [interquartile range] mmFIM in patients with $GCS \leq 8$ was 5 [2-6] and 7 [4-8] and with $GCS > 8$ 6 [2-8] and 8 [4-8] in the control ($p = 0.0394$) and intervention group ($p = 0.0022$), respectively. **Conclusions:** Early, goal-directed mobilization in the surgical intensive care unit improves functional independence across the spectrum of admission GCS scores, even in patients presenting with critical, initial impairment of conscious state.

1519

COMPUTER-ASSISTED INSTRUMENT GUIDANCE: ENHANCED PROCEDURAL EFFICACY AND SAFETY

David Pechman, Timothy Kelly, Christine Park, Asaf Gave, Hyunsook Suh

Learning Objectives: The Clear Guide ONE (Clear Guide Medical, Baltimore, MD) is a Computer-Assisted Instrument Guidance (CAIG) device, which optically tracks a procedure needle and calculates a "projected" path, which is displayed on a screen for live guidance. We hypothesize that CAIG will enhance the efficacy and decrease the risk of complication for ultrasound-guided procedures, especially for less-experienced operators. **Methods:** Fifteen surgery residents performed simulated central venous cannulations on a training mannequin. The first attempt was performed with standard ultrasound guidance (SUG); the second attempt was performed with CAIG. Puncture time (PT), number of skin punctures (#SP), and number of needle passes (#NP) were recorded for all attempts. PT was defined as time from skin puncture until visible venous return. Participants were encouraged to minimize procedure time and number

of attempts, but were blinded to the purpose of the study and were unaware that their performance was being recorded. **Results:** Relative to SUG, CAIG significantly decreased procedure duration and the number of attempts required. CAIG decreased mean PT by 27.3 seconds (79% decrease, $p = 0.007$), #SP by 0.7 (42%, $p = 0.03$), and #NP by 2.4 (64%, $p = 0.001$). Greatest improvement was observed in novice ultrasound operators. Six of the 15 participants had previously performed 10 or fewer SUG procedures; for these users, CAIG decreased mean PT by 45.3 seconds (86%, $p = 0.03$), #SP by 1.3 (57%, $p = 0.04$), and #NP by 3.8 (70%, $p = 0.01$). **Conclusions:** These results suggest that supplementation of ultrasound-guidance with CAIG enhances procedural efficacy and decreases risk of damage to adjacent tissue. The benefits of CAIG, especially for novice ultrasound operators, reflect its potential value as a clinical and educational tool. We will next perform randomized controlled trials to examine whether the addition of CAIG to ultrasound-guided internal jugular central venous catheterizations and fine needle aspiration (FNA) biopsies improves procedural efficacy and/or decreases the rate of complications.

1520

BACK TO THE BASICS: PREDICTORS OF OPERATIVE INTERVENTION IN PATIENTS WITH LACTIC ACIDOSIS

Brittany Bankhead-Kendall, Eliza Slama, Pavan Isanaka, Virginia Parker, Amy Braddock

Learning Objectives: Lactic acid values have been increasingly utilized in guiding resuscitation. Their elevation, without an identifiable etiology, often results in a surgical consult to exclude an intraabdominal source. To date, there have been few studies to identify the relevance of other clinical parameters. The purpose of our study was to determine if there are factors that would predict appropriateness of obtaining a surgical consultation as determined by need for operative intervention. **Methods:** We performed a retrospective review over a five year period (2009 - 2013) for consults placed to the general surgery service at a community hospital for "lactic acidosis." Data included demographics, subjective complaints, vital signs, home medications, laboratory values, and physical exam findings, and whether the patient required operative intervention. **Results:** 686 patients met our inclusion criteria; 126 (18%) required operative intervention. The only statistically significant predictor leading to surgical exploration was physical exam findings. Patients exhibiting "peritoneal signs" were twice as likely (OR 2.02; CI .99, 4.13) to go to the operating room. Those with "diffuse tenderness" were three times as likely (OR 2.77; CI 1.5, 5.08) and those with "focal tenderness" were twice as likely (OR 1.76; CI 1.01, 3.04) to undergo operative intervention. Other parameters evaluated, including abnormal laboratory values, vitals, and subjective complaints did not show predictive value for operative intervention. **Conclusions:** As healthcare costs rise, appropriation of resources will prove to be of benefit to the healthcare system and patient care. In our population, physical exam was the only independent predictor of the need for operative intervention in patients with lactic acidosis. Lactic acidosis, combined with an abnormal physical exam would appear to be adequate reasons to obtain a surgical consultation. Prospective data to analyze these predictors may further demonstrate causality between elevated lactic acid levels and the need to pursue a surgical consultation.