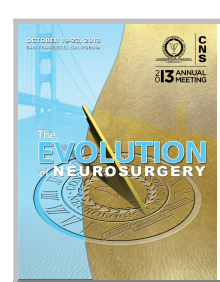


Net Fluid Balance Change Under Hypervolemic Therapy as a Predictor of Delayed Cerebral Ischemia

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Introduction: Delayed cerebral ischemia, is one of the most severe complications after aneurysmal subarachnoid hemorrhage. Previous, triple H therapy was recommended to prevent delayed cerebral ischemia. However, we noticed several cases had refractory low central venous pressure (CVP) after triple H therapy. In addition, the cases with low CVP level seemed to have lower risk of developing delayed cerebral ischemia. We performed this retrospective study to clarify the relationship between the body fluid level change under triple H therapy and the risk of developing delayed cerebral ischemia.

Methods: Among 110 patients with an aSAH, 60 patients who received surgical treatment within 48 hours and received postoperative triple-H therapy were eligible for the study. Among the 60 patients who received surgery, 1 patient with postoperative severe upper gastrointestinal (GI) hemorrhagic and subsequent shock, 1 patient with postoperative pneumonia sepsis and subsequent shock, and 4 patients with postoperative intracranial hemorrhage were excluded because of failure to maintain an adequate central venous pressure (CVP) and mean arterial pressure (MAP) after surgery. Thus, the final study population consisted of 54 patients. The primary outcome was the occurrence of delayed cerebral ischemia, defined as (1) the development of new focal neurological signs and (2) CT scan showed new hypodensity lesion.

Results: Totally 54 patients were included in our study. Delayed cerebral ischemia occurred in 14 patients (25.93%). Patients who initially presented with poor GCS (GCS ≤ 13) had higher risk of developing delayed cerebral ischemia ($p=0.004$). During postoperative period, all patient received triple H therapy had similar CVP and MAP. However, patients who developed delayed cerebral ischemia had significant positive net fluid balance especially in the 2nd (904.5cc v.s. 93.33cc, $p=0.01$) and 3rd day (785.21cc v.s. -148.56cc, $p=0.009$). In addition, patients who developed delayed cerebral ischemia had anti-diuretic phase in the first 5 days and the following diuretic phase. However, patients who did not have ischemia had stable net fluid balance in the 10-day period.

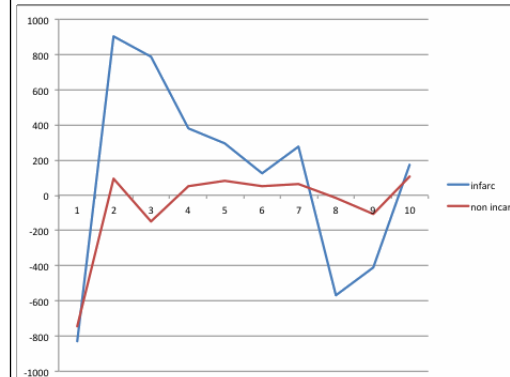
Conclusions: Under prophylactic triple H therapy, patients who developed delayed cerebral ischemia could have anti-diuretic phase and diuretic phase after SAH. Therefore, the extra fluid accumulated in the beginning would be expelled in the following day. This could be the possible reason to explain why triple H therapy is unlikely to prevent delayed cerebral ischemia.

Learning Objectives: By the conclusion of this session, we demonstrated the totally different natural courses in aSAH patients who developed delayed cerebral ischemia. Therefore, according to the net fluid balance change postoperatively, we could identify the patient who is at the risk of developing delayed cerebral ischemia. furthermore, in addition to CVP level, we could use the daily fluid balance as the alternative marker to evaluate the efficiency of triple H therapy.

References:

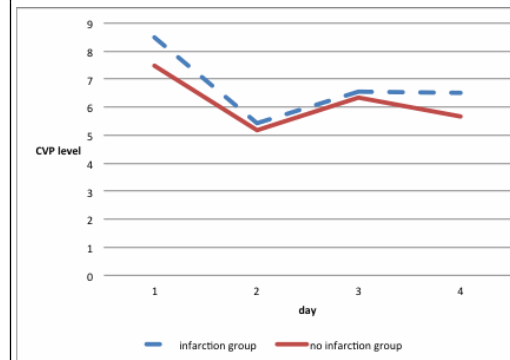
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daily fluid balance in 10 day period



24 hours net fluid balance in two groups. Ischemia group has significant unstable net fluid balance during postoperative period.

CVP level



CVP level in both groups were similar