

Hyponatremia Predicts Vasospasm after Subarachnoid Hemorrhage

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A relation among hyponatremia and cerebral vasospasm has been previously reported after SAH. The pathophysiology behind this is still unclear. The aim of this study was to identify an association between hyponatremia and vasospasm focusing in the temporal relation of these events in a cohort of SAH patients.

Background

- Hyponatremia is a common complication after subarachnoid hemorrhage (SAH).
- Previous studies have reported an association between hyponatremia and cerebral vasospasm (CVS).
- Whether hyponatremia directly contributes to the pathogenesis of CVS, or is a by-product is still unclear.

Inclusion Criteria

- Age >18
- SAH diagnosed by imaging or LP
- Complete medical record for entire hospital course

Exclusion Criteria

- Incomplete documentation on EMR
- No adequate imaging available for evaluation of vasospasm (TCD, CTA, MRA, DSA)

Figure 1. Inclusion and exclusion criteria.

Objectives

- To identify an association between hyponatremia and CVS after SAH.
- To assess the temporal relationship among hyponatremia and CVS.
- To compare outcome at discharge (Glasgow Outcome Scale: GOS) between hyponatremic and normonatremic subjects.

Methods

- Retrospective review of patients with SAH admitted to the Baylor-St. Luke's Medical Center (January 2008 – December 2012) (Figure 1).
- Demographics, occurrence of hyponatremia (serum sodium <135), evidence of CVS (TCD, CTA, MRA, DSA) and Glasgow Outcome Scale (GOS) were collected.
- Patients divided in a hyponatremic and normonatremic group.
- CVS was defined as mean velocity >120 cm/s and Lindergaard Ratio > 3 on TCD and by the attending neuroradiologist interpretation on CTA, MRA, DSA.
- CVS incidence and outcome at discharge (GOS) were compared between the two groups using χ^2 .

Table 1. Patient demographics and vasospasm occurrence comparison among hyponatremic and eunatremic patients.

	Hyponatremia	Normonatremic
Total	66	98
Female, %	78.8	77.6
Age, yr.	58.7 ± 1.4	54.5 ± 1.4
Race, %		
Caucasian	59.1	43.9
African American	16.7	32.7
Hispanics	18.2	20.4
Asian	3.0	3.1
Other	1.5	0.0
Vasospasm, %	59	38

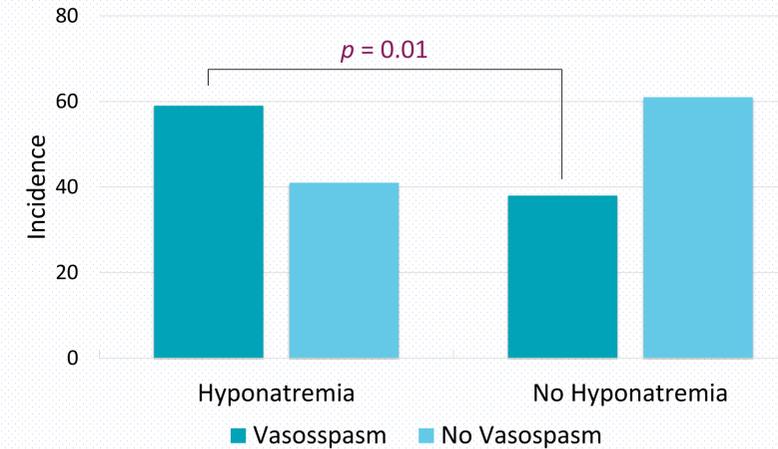


Figure 2. Incidence of vasospasm compared between hyponatremic and eunatremic groups.

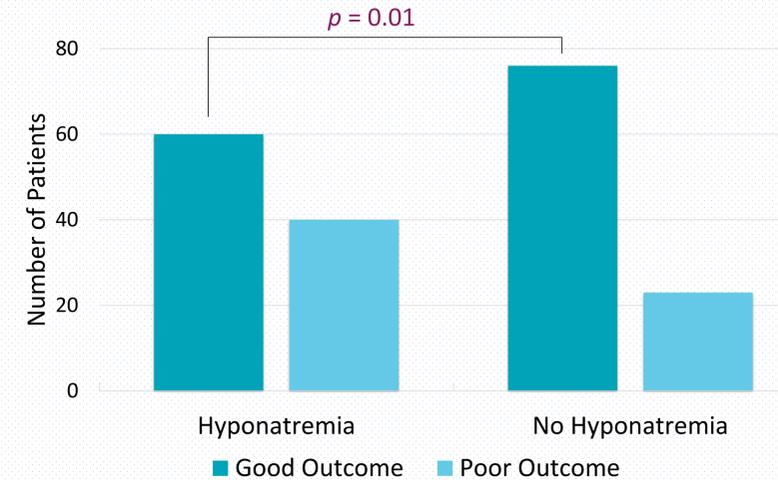


Figure 3. Outcome (GOS) comparison in hyponatremic and eunatremic.

Results

- 164 patients with SAH included (78% female).
- Hyponatremia identified in 66 patients (20%), CVS in 73 subjects (44%) (Table 1).
- Incidence of CVS was higher in the hyponatremic group compared to the normonatremic group, 59% vs. 38% respectively (Figure 2).
- All hyponatremia episodes preceded the date of CVS (mean 2.6 days).
- GOS at discharge was significantly higher in patients without hyponatremia compared to patients with hyponatremia (Figure 3).
- In the hyponatremia group there were 60 patients with good outcome (GOS 4 or 5) and 40 patients with poor outcome (GOS 3 or less).
- The normonatremia group included 75 patients with good outcome and 23 patients with poor outcome.

Conclusions

- Our cohort shows a significant association between hyponatremia and CVS.
- We additionally demonstrated that for all of our cases hyponatremia preceded CVS.
- Vasospasm events occurred shortly after the hyponatremia (mean 2.6 days).
- Outcome at discharge was better for normonatremic subjects compared to hyponatremia.
- Further large prospective studies are required.

Our findings imply a possible use of serum sodium as an additional predictor for developing CVS.

"Incidence of vasospasm was higher in the hyponatremia group compared to eunatremic group."



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