

Introduction

Human albumin (HA) use in aneurysmal SAH (aSAH) is controversial^{1,2}. There is some evidence that HA may exert neuroprotection and may provide hemodynamic stability³⁻⁵. In December 2013 we adopted a new clinical protocol for aSAH treatment, including continuous administration of 5% albumin and a high level of cardiovascular monitoring. The aim of this work is to evaluate the impact of this protocol on the incidence of medical complications, serum sodium levels and neurologic outcome in aSAH patients.

Methods

After IRB approval, we reviewed retrospectively medical records of aSAH patients from 2011-2013 (pre-albumin) and 2014-April 2015 (albumin). According to the new protocol, adults within 3 days of aSAH received continuous infusion of 5% albumin (60 g/day). Hemodynamic evaluation included Troponin I, ProBNP, Echocardiogram and cardiac output monitoring. All patients had routine Trans-cranial Doppler (TCD) in both periods. Vasospasm was diagnosed by TCD criteria.

We used X² or Fisher's exact test for categorical variables and Wilcoxon test for continuous variables.

References

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Results

We found 26 patients that were treated in the first period and 24 in the second. Most cases were female (80.8% vs 54.2%); age was similar in both groups (median 57 vs 58 years); WFNS score showed a tendency to more severe cases in albumin group; Apache-II score was similar in both groups; and there was no difference in aneurysm treatment modality and timing after bleeding.

TCD vasospasm occurred in similar proportions in both groups, but Delayed Neurologic Deficit (DND) and ischemia in CT scan showed a tendency towards a lower frequency in the albumin group.

Baseline characteristics

	Albumin n (%)	No albumin n (%)	Total n (%)
n	24	26	50
Age median (IQR)	58 (50 – 63)	57 (48 – 67)	58 (49 – 66)
Female	13 (54.2)	21 (80.8)	34 (68.0)
Fisher's score			
1 & 2	2 (8.3%)	1 (3.8%)	3 (6.0%)
3	4 (16.7%)	10 (38.5%)	14 (28.0%)
4	18 (75.0%)	15 (57.7%)	33 (66.0%)
WFNS score			
1	5 (20.8%)	11 (42.3%)	16 (32.0%)
2	7 (29.2%)	3 (11.5%)	10 (10.0%)
3	2 (8.3%)	5 (19.2%)	7 (14.0%)
4	10 (41.7%)	7 (26.6%)	17 (34.0%)
APACHE II	11.5 (7 – 13.5)	11 (7 – 16)	11 (7 – 15)
Aneurysm treatment			
Surgery	8 (33.3%)	10 (38.5%)	18 (36.0%)
Endovascular	13 (54.2%)	11 (42.3%)	24 (40.0%)
None	3 (12.5%)	5 (19.2%)	8 (16.0%)
Aneurysm occlusion	21	21	42
Day median (IQR)	2 (2 – 5)	1 (1 -2)	2 (1 – 3)

P=0.04

P=0.03

Serum sodium concentrations were very unstable in both groups with a high incidence of dysnatremia in similar proportions. By contrast dysmagnesemia was higher in the albumin group, although magnesium levels were measured more often in the albumin group..

Nosocomial infection developed in similar proportions despite a trend toward higher incidence of pneumonia in the albumin group. Pulmonary edema was more frequent in the albumin group, especially in the early patients who received a higher dose of albumin. Mortality rate was similar in both groups

Outcomes

Variable	Albumin n (%)	No albumin n (%)	O.R (C.I 95%) n (%)
n	24	26	50
Vasospasm (ultrasound)	14 (58.9)	12 (46.5)	1.6 (0.46 – 5.80)
Day of vasospasm	8 (4 – 10)	7 (3 – 9)	
Delayed Neurologic Deficit	7 (29.7)	14 (53.9)	0.35 (0.09 – 1.30)
Day of DND	7 (5 – 9)	9.5 (6 -12)	
Ischemia (CT Scan)	5 (20.8)	12 (46.2)	3.2 (0.8 – 14.3)
Hydrocephalus	10 (41.7)	10 (38.5)	1.14 (0.32 – 4.11)
Rebleeding	3 (12.5)	4 (15.4)	0.79 (0.10 – 5.28)
Dysnatremia	18 (75.0)	17 (65.4)	1.59 (0.39 – 6.64)
Hyponatremia	14 (58.3)	11 (42.3)	
Hyponatremia	4 (16.7)	6 (23.1)	
Dysmagnesemia	12 (41.7)	4 (15.4)	4.71 (1.1 - 23.46)
Hypermagnesemia	6 (25.0)	2 (7.7)	
Hypomagnesemia	4 (16.7)	2 (7.7)	
Pulmonary Edema	8 (33.3)	1 (3.9)	12.5 (1.38 – 576.17)
Nosocomial Infection	11 (42.3)	10 (41.7)	0.97 (0.27 – 3.46)
Pneumonia	6 (25.0)	3 (11.5)	2.56 (0.46 – 17.7)
Death	6 (25.0)	7 (26.9)	0.90 (0.21 – 3.85%)

Conclusion

Our findings suggest that continuous administration of HA may be associated with decreased neurologic damage, despite a similar incidence of TCD vasospasm, and other neurological complications . However, HA administration may be associated with increased medical complications and caution should be taken to avoid fluid overload and pulmonary edema.

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