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Introduction

Malignant cerebral edema, present in many conditions, is of particular interest in the treatment of acute stroke. Usually peaking around three days after a large volume stroke, cytotoxic edema can produce significant mass effect for up to ten days. Hyperosmolar therapy is the primary medical management, but is often looked upon as a temporizing measure. Several studies have indicated early decompressive craniectomy provides better outcomes. We sought to analyze the effects of aggressive medical management with hypertonic saline therapy on morbidity, mortality, length of stay, and frequency of surgical intervention.

Methods

A retrospective chart analysis was performed for patients at a single institution from November 2014 to May 2017. Variables included demographics, GCS and NIH upon ED presentation, type of hypertonic used (continuous infusion or 23.4% bolus), sodium value on arrival, target sodium, length of time to achieve target sodium, requirement of surgical intervention, and mortality. Statistical comparison made between variables using Students' T-Test.

Results

Data from 108 patients were collected. 11 patients were excluded due to incomplete records. There were 65 males and 43 females with an age range of 25 to 92 years old. Regarding mortality, NIH (p=.0014) scores were found to be of clinical significance. Interestingly, GCS on presentation was not statistically significant (p=.0795). Further analysis showed that no variables exhibited statistical significance when determining which patients required surgical intervention throughout their stay.

Conclusions

Our results show the most important factors necessitating surgical intervention and mortality was NIH scores upon presentation, serving as a surrogate marker for patient mortality before therapy initiation.

- GCS at presentation was not an accurate marker for in house mortality.
- Both GCS and NIH were not successful in predicting if surgical intervention was necessary.
- Hypertonic therapy did not reduce the number of patients requiring decompressive craniectomy and did not affect overall mortality.

Additional analysis regarding individualized care, including individualized sodium goals and bolus or continuous hypertonic treatment might elucidate a more effective nonsurgical treatment regimen.

T-Test for continuous variables across variable OR

Obs	Variable	no (MEAN& SD)	yes (MEAN& SD)	t Value	DF	Pr>F*	significant
1	Baseline Na	139.03(3.28)	139.04(2.23)	-0.02	59.863	0.9803	
2	Highest Na	149.69(8.12)	153.28(7.16)	-2.11	45.461	0.0406	*
3	Difference between baseline to highest sodium	10.67(7.57)	14.24(7.89)	-1.99	39.178	0.0536	
4	Age	62.47(13.92)	55.88(15.28)	1.92	37.632	0.0627	
5	GCS	12.04(3.41)	11.25(3.39)	0.99	38.454	0.3262	
6	Worst GCS	8.90(4.36)	5.00(2.30)	5.72	74.53	<.0001	*
7	NIH	13.61(7.84)	15.72(6.75)	-1.30	47.04	0.1989	
8	Time to Na Goal of 145__hours	68.18(71.69)	127.05(141.33)	-1.73	21.69	0.0976	

*P-value is given by the t test based on the unequal variance assumption.

T-Test for continuous variables across variable In House Mortality

Obs	Variable	no (MEAN& SD)	yes (MEAN& SD)	t Value	DF	Pr>F*	significant
1	Baseline Na	139.09(2.84)	138.91(3.49)	0.25	52.732	0.8004	
2	Highest Na	149.74(7.21)	152.30(9.38)	-1.39	50.506	0.1718	
3	Difference between baseline to highest sodium	10.66(7.14)	13.39(8.76)	-1.57	52.787	0.1235	
4	Age	59.19(14.98)	64.45(12.79)	-1.84	72.677	0.0692	
5	GCS	12.26(3.40)	11.00(3.32)	1.78	64.545	0.0795	
6	Worst GCS throughout stay	9.61(4.06)	4.58(2.33)	7.92	96.568	<.0001	*
7	NIH	12.69(7.88)	17.39(5.87)	-3.33	75.958	0.0014	*
8	Time to Na Goal of 145 __hours	86.10(104.48)	81.75(88.68)	0.18	51.363	0.8579	

*P-value is given by the t test based on the unequal variance assumption.