Pre-hospital hypertonic saline for traumatic brain injury

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INTRODUCTION

- Raised ICP is common following severe TBI.
- Hypertonic saline (HTS) lowers ICP but robust evidence of mortality/morbidity benefit lacking.
- There is very limited data on pre-hospital HTS use and none applicable to HEMS in the UK.
- Despite this, HTS widely used by HEMS as a rescue therapy for impending brain herniation.
- HTS may also have anti-inflammatory properties.
- **We aimed to investigate pre-hospital use of HTS in patients with severe TBI.**

METHODS

- **Design**: retrospective cohort study
- **Setting**: Hampshire & Isle of Wight Air Ambulance
- **Period:** 1st August 2018 to 31st October 2023
- **Inclusion**: ≥16 year olds with blunt TBI requiring Pre-Hospital Emergency Anaesthesia.
- **Exposure Variable**: 50-100ml of 5% HTS given according to clinician discretion.
- **Primary Outcome:** 30-day mortality
- **Secondary Outcomes:** CT head findings serum Na and neutrophil/lymphocyte ratio (NLR, a marker of systematic inflammation).
- **Main Confounders**: GCS, fixed dilated pupils (FDPs), hypotension, hypoxia, time to hospital
- **Analysis**: descriptive, with multivariable logistic and linear regression.

Variable	HTS given (n = 32)	HTS not given (n = 72)	p value
Best GCS	5 (4 – 6)	7 (6 – 10)	<0.001
Any FDPs	30 (94)	17 (24)	<0.001
Any MAP < 80mmHg	19 (59)	33 (46)	0.2881
Any SpO2 < 92%	13 (41)	30 (42)	0.999
30-day mortality	19 (59)	22 (31)	0.009
Herniation on CTH	10 (31)	9 (13)	0.026
1st Sodium (mmol/L)	140 ± 4	137 ± 4	0.008
1st NLR ratio	8.8 ± 4.7	11.5 ± 7.7	0.030

RESULTS

- 104 patients (66% male, median age 53 years), of whom 32 received HTS.
- HTS use independently associated with higher serum sodium and lower NLR.
- **Two or more of GCS ≤ 5, HR ≤ 70 SBP ≥ 180mmHg, or FDPs best predictor of impending herniation (95% sens and 64% spec).**

DISCUSSION

- We show for the first time that pre-hospital HTS use is independently associated with increased Na and better NLR on hospital admission.
- Further work is needed to define optimum dose and administration criteria.

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