Poster number: 54

Close

Use of a Hypertonic CVVHDF Prescription for the Treatment of Diffuse Cerebral Edema in Patients Refractory to Hypertonic Saline Boluses

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Introduction

Current guidelines support the use of hypertonic saline to treat intracranial hypertension(ICH). Solutions used range from 3% to 23%. Patient's usually demonstrate a rapid increase in serum sodium concentrations and a reduction in ICP which persists over 6 hours. This therapy has demonstrated variability in sodium and chloride concentrations that contributes to a reduction in efficacy. We hypothesize that a hypertonic saline CRRT prescription could have therapeutic efficacy, and maintain a stable hypertonic sodium concentration (while controlling chloride) in patients with ICH that fails conventional osmotic and hyertonic therapy.

CRRT Precription

CVVHDF: Prismaflex
Qb Rate: 150 cc/hr
Anticoagulation:
Sodium Citrate at 150 mEq/hr
Calcium gluconate at 5 mEq/hr

PBP:
Prismasol 4K/0Ca with 14.6% NaCl (Sodium of 160 mEq/L) at 750 cc/hr)

Dialysate:
Plasmalyte with 10cc Sodium Acetate (Sodium of 160 mEq/L) at 500 cc/hr

Replacement Solution:
Prismasol 4K/0Ca with 14.6% NaCl (Sodium of 155 mEq/L) at 500 cc/hr

Monitoring:
ICP or optic nerve diameter Q6
CI, SVV, SVI, MAP
Sodium and pH Q2 via ABG
BMP Q4
TCD Q12

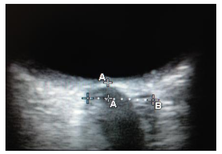
Therapeutic Targets:
sodium 155-165 mEq
serum osmolarity 300-340
chloride <110 mEq
ph 7.3-7.5
ICP < 20 mmHg
CPP > 50 mmHg

Case Series

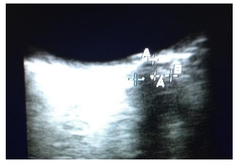
CASE 1

An 18 year old male presented with TBI secondary to MVC. Initial optic sheath diameter was 0.80 cm on right and 0.78 cm on left with a GCS of 6 that was failing to respond to osmotic and hypertonic saline boluses. Hypertonic CRR was initiated. Over 36 hours the patient had a decrease in optic nerve diameter to 0.4 cm on right and 0.34 cm on left and an improvement in GCS from 6 to 11. Target serum sodium was obtained within 2 hours of starting hypertonic CRRT, and was maintained between 155-165mEq/dL over the next 72 hours.

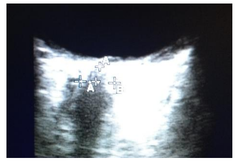
Left eye on initial evaluation 0.68 cm



right eye on initial evaluation 0.75 cm



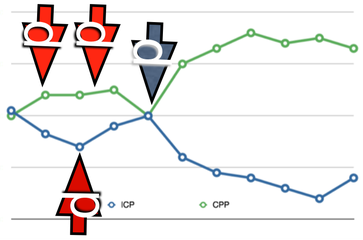
left eye after 38 hours 0.44 cm



right eye after 38 hours 0.41mm cm

CASE 2

A 3 year old male suffered a TBI following an MVC. Initial GCS was 8; CT head demonstrated a parietal subdural hematoma with a midline shift. A decompressive craniotomy was performed and a Codmans catheter placed. Patient was started on intermittent mannitol followed by 7.5% saline, sedated with propofol, and paralyzed. Patient was also initiated on hypothermic protocol(goal temp 32-34 degrees celsius). Despite treatment, the ICP remained >24mmHg. The patient was started on Hypertonic CRRT. ICP decreased to 10mmHg within two hours of treatment. Patient was continued on the hypertonic prescription for 60 hours. Cerebral blood flow was monitored with TCD which demonstrated an improvement in cerebral perfusion following initiation of therapy.



The graph demonstrates the reduction in ICP and increase in CPP after the initiation of hypertonic CRRT. The red arrows represent boluses of mannitol or 7.5% saline.

Conclusions

Hypertonic CRRT offers a method of maintaining stable sodium levels, and therefore hypertonicity, in patients with diffuse cerebral edema that fail to respond to bolus hypertonic saline therapy or mannitol.