RCT of 20% Mannitol Versus 3% Hypertonic Saline in Children with Raised ICP due to Acute CNS Infections.

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Background & Objectives:

- Mannitol is commonly used osmotherapy agent in raised ICP. However, the side-effects are significant.
- **This study compared the effects of 3% hypertonic saline versus 20% mannitol (using common dosing strategies) on raised ICP in pediatric acute CNS infections.**

Methods: Prospective open labelled, randomized clinical trial conducted in the PICU of a quaternary care referral hospital of North India. All children 1-12 years old, with acute CNS infections (≤ 7 d), clinical or radiological evidence of raised ICP and mGCS score ≤ 8 were enrolled. Children with malaria, contraindication to ICP catheter insertion, neurodevelopmental delay, and chronic neurologic illness, already received Mannitol and/ or HTS, and clinical brain deaths were excluded. Patients were randomly assigned to 20% mannitol (n = 28), 0.5 gram/kg/dose versus 3%-hypertonic saline (n = 29), 10mL/kg loading followed by 0.5–1mL/kg/hr infusion. An intraparenchymal catheter was used to monitor the intracranial pressure. The primary outcome was the proportion of patients achieved target average intracranial pressure less than 20mm Hg during 72 hours. Secondary outcomes were interventions, morbidity, and mortality.

ACADEMIC P.E.A.R.L.S

Pediatric Evidence And Research Learning Snippet

Mannitol vs HTS in children with acute CNS Infection : Which is better?

Results:

- The proportion of patients with target average ICP (<20mmHg) was higher in HTS group as compared to mannitol group (79.3% vs 53.6%; adjusted hazard ratio 2.63; 95%CI 1.23-5.61).
- Mean reduction of ICP(-14.3 ±1.7 vs -5.4 ±1.7 mmHg; p<0.001) and elevation of CPP ((15.4±2.4 vs 6±2.4mm Hg; p = 0.007) from baseline were significant in hypertonic saline-group.
- Mean (± se) intracranial pressure over 72 hours was lower (14±2 vs 22±2mm Hg; p = 0.009), and cerebral perfusion pressure was higher (65±2.2 vs 58±2.2; p = 0.032) in hypertonic saline-group.
- Hypertonic saline-group had higher modified-Glasgow Coma Scale score at 72 hours (median, interquartile range 10; 7–11 vs 7; 3–9; p = 0.003), lower mortality (20.7% vs 35.7%; p = 0.21), shorter duration of mechanical ventilation (5 vs 15 d; p = 0.002), and PICU stay (11 vs 19 d; p = 0.016) and less severe neurodisability at discharge (31% vs 61%; p = 0.049).

Conclusions: In paediatric acute CNS infections, 3%-hypertonic saline was associated with a greater reduction of intracranial pressure as compared to 20% mannitol.

Key message: Acute CNS infections are usually associated with diffuse cerebral edema, and HTS may have better outcomes in these patients.

EXPERT COMMENT

“Given the side-effect profile of mannitol, HTS can be used effectively in lowering ICP as long as serum sodium levels can be maintained below 160mEq/L. HTS also expands intravascular volume and increases cardiac output, hence augmenting CPP with a positive inotropic effect. This study shows the efficacy of HTS in raised ICP in acute infections, which constitute the major proportion in pediatric cases with raised ICP.”

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With warm regards,

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Reference

Ramesh kumar Ramachandran; Bansal Arun; Singhi Sunit; Singhi Pratibha; Jayashree Muralidharan. Randomized Clinical Trial of 20% Mannitol Versus 3% Hypertonic Saline in Children With Raised Intracranial Pressure Due to Acute CNS Infections*, Pediatric Critical Care Medicine: December 2020 - Volume 21 - Issue 12 - p 1071-1080. doi: 10.1097/PCC.0000000000002557