Introduction:
Guidelines for management of pediatric traumatic brain injury recommend maintaining intracranial pressure (ICP) <20 mmHg [1]. Use of 23.4% sodium chloride (NaCl) is considered safe and effective for management of ICP in adults, but evidence for concentrations >3% in pediatrics is limited. This study will describe the safety and efficacy of 23.4% NaCl in reducing ICP among pediatric patients.

Methods:
This retrospective study evaluated patients ≤18 years old who received 23.4% NaCl and had continuous ICP monitoring. Cerebral perfusion pressure (CPP), mean arterial pressure (MAP), ICP, and brain tissue oxygenation (PbtO₂) were recorded hourly and were compared to baseline for 6 hours after each dose. Safety outcomes included peak serum sodium, peak serum chloride, and the incidence of stage 1 acute kidney injury (AKI) (serum creatinine elevation ≥0.3 mg/dL or ≥50%) [2].

Results:
Between August 2007 and July 2017, 45 eligible pediatric patients received 235 doses of 23.4% NaCl; 215 doses were included in the analysis of perfusion parameters. Mean age was 11.6 +/- 6 years (2 months to 18 years), and the median initial Glasgow Coma Scale score was 4. Subjects received a median of four 23.4% NaCl boluses, with a mean dose of 0.5 +/- 0.18 mL/kg. Significantly lower ICP and higher CPP (p<0.001) were observed at all post-treatment time points (Figure 1); PbtO₂ was also significantly increased during 3 of the 6 hours recorded (p<0.05). There was no difference in MAP. Peak post-treatment serum sodium and chloride were 157 +/- 6 mEq/L and 122 +/- 7 mEq/L, respectively (Figure 2). Stage 1 AKI was observed in 15.6% of patients, and in-hospital mortality was 24.4%.

Conclusion:
Our data suggests that 23.4% NaCl is a safe and effective therapy for elevated ICP in pediatric patients.

References:

Image 1:

Image 2:
Figure 2. Serum Sodium & Chloride after 23.4% NaCl Boluses

**n = 235 doses**

- Sodium
- Chloride

**Baseline**
**Peak post-treatment**

**p < 0.001**

Figure 2. Serum Sodium & Chloride After 23.4% NaCl Boluses