Clinical Trial Of Fluid Infusion Rates For Pediatric Diabetic Ketoacidosis  

SUMMARY

• Cerebral edema (CE) in children with DKA is the worst outcome.

• Traditionally rapid infusion of fluids has been thought to result in rapid reduction of serum osmolality leading to CE.

• Many of the studies done looking at the association between CE and fluids were retrospective and were unable to demonstrate causation.

• This study asked the question: Does rate of fluid infusion in pediatric DKA affect CE? This was a prospective RCT looking at rate of fluid administration in 1,255 pediatric patients with DKA ages 0-18.

• The study was conducted in a 2x2 factorial design--0.45% NS and 0.9% NS, fast (fluid resuscitation over 36 hrs) and slow (fluid resuscitation over 48 hrs). The primary outcome was deterioration of mental status (GCS <14) and secondary outcomes were clinically apparent brain injury (e.g., cognitive tests).

• Overall, GCS dropped below 14 in 3.5% of cases and 1.6% of cases got mannitol for suspected CE, and 0.9% (12 cases) had clinically apparent brain injury.

• There was no difference between groups in percent of patients whose GCS dropped below 14, magnitude of drop of GCS, time GCS was <14, clinically apparent brain injury, or long term cognitive tests like IQ and memory scores.

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EDITOR'S COMMENTARY: This was a prospective study looking at the association of CE in DKA and rate of fluid administration. The authors found no difference in GCS scores and long-term cognitive tests between groups with different fluid infusion rates. Some things to consider: 1) The rates of infusion were done based on upper and lower limits of what was set by medical community as reasonable 2) Clinically apparent brain injury was very rare so impossible to really power and design a trial to see differences 3) They relied heavily on changes in GCS, but this may not really represent the right thing to look at for patients who are going to progress to CE and 4) they did not look at or report the impact of total volume of fluid given. In sum I think they do a nice job of showing that the rate and type of fluid given do not impact bad neurologic outcomes and CE as long as your “fast” and “slow” rates are in the currently accepted very conservative levels. Importantly, based on the extreme rarity of terrible outcomes (only 1 death), I think this study validates our current way of practicing and rehydrating DKA in kids with the addition that if your local guidelines offer a range of rehydration options, I would choose the faster of these.