Evaluation of Continuous Morphine Versus Dexmedetomidine in Neonates with Encephalopathy Undergoing Therapeutic Hypothermia

Jayla Jack, PharmD Candidate 2022, Brandy Zeller, PharmD, BCPPS.

Background

Morphine has been used as the agent of choice for sedation and analgesia in newborns undergoing therapeutic hypothermia despite the risk of significant adverse effects. Dexmedetomidine is a sedative analgesic medication that works as a selective central alpha-2 adrenergic agonist. Unlike opioids, dexmedetomidine does not cause respiratory depression or decreased gastrointestinal motility. This could benefit newborns undergoing therapeutic hypothermia, as many of them require mechanical ventilation and have difficulties tolerating feeds. St. Louis Children's Hospital changes its therapeutic hypothermia protocol from using continuous morphine to continuous dexmedetomidine in October of 2020.

Objective

The purpose of this study was to evaluate if the change in the sedation agent to continuous dexmedetomidine infusion within the therapeutic hypothermia protocol affected the adverse effects previously seen with the use of morphine.

Methods

Design: Retrospective, observational chart review conducted through St. Louis Children's Hospital.
Collection Period: October 2018 through May 2021.
Inclusion Criteria: Neonates undergoing therapeutic hypothermia procedure (qualifications included gestational age ≥ 35 weeks, ≤ 6 hours of life, APGAR score of ≤ 5 at 10 minutes of life, or prolonged resuscitation required at birth).
Primary Outcome: The effect of the change in sedation agent on safety adverse effects including decreased respiratory drive and gastrointestinal motility.
Secondary Outcomes: Requirement of morphine boluses to maintain sedation and the overall length of hospital stay.

Results

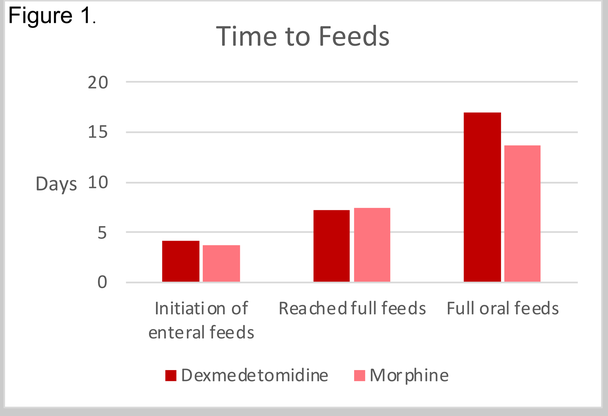
Table 1. Demographics

	Dexmedetomidine (N=27)	Morphine (N=107)
Birth GA (weeks)	36.9 ± 2.9	37.7 ± 1.8
Birth weight (kg)	3.15 ± 0.63	3.13 ± 0.67
Gender, male, n (%)	19 (70.4)	68 (63.6)
Inborn, n (%)	15 (55.5)	62 (57.9)
Mortality, n (%)	2 (11.1)	3 (2.8)
Ethnicity, n (%)		
Caucasian	14 (51.9)	57 (53.3)
African American	11 (40.7)	40 (37.4)
Hispanic	0 (0)	6 (5.6)
Asian	2 (7.4)	4 (3.7)
Delivery, n (%)		
Vaginal	14 (51.9)	46 (43.0)
Cesarean	13 (48.1)	61 (57.0)

Table 2. Mechanical Ventilation

	Dexmedetomidine	Morphine
Requiring Mechanical Ventilation (%)	10 (37)	58 (54.2)
Time on Mechanical Ventilation (hours)	115.4 ± 69.5	68.2 ± 84.6

Figure 1.



Results

Figure 2.

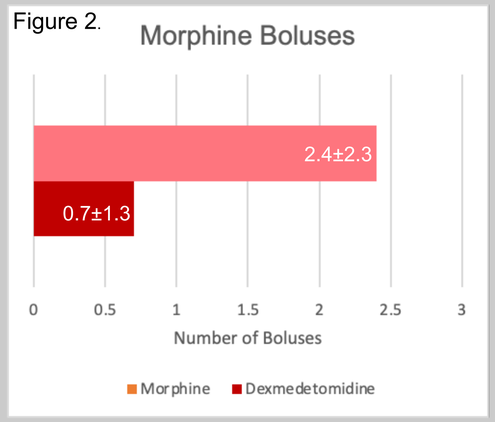
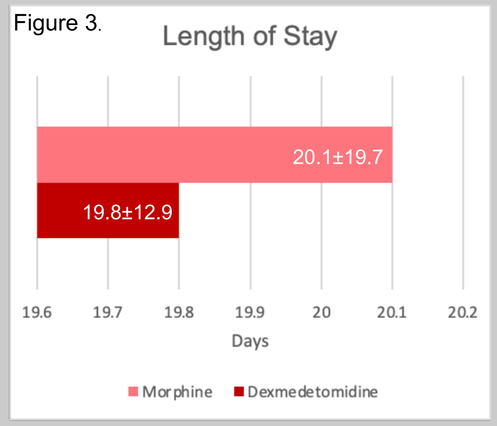


Figure 3.



Conclusion

The average time needed to reach full feeds was similar between the morphine and dexmedetomidine groups. Dexmedetomidine was associated with less neonates requiring mechanical ventilation, but of those requiring ventilation, dexmedetomidine was associated with a longer average time spent on mechanical ventilation. The clinical significance of these safety adverse effects must be determined in larger, future studies.

Presented at Midyear 2021 by jjack@siue.edu