Comparing Heart Rate and Mean Arterial Blood Pressure as Surrogates in the Assessment of Cerebrovascular Autoregulation in Preterm Infants

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Introduction

Cerebrovascular autoregulation (CAR) is often impaired in preterm infants but requires invasive mean arterial blood pressure (MABP) measurements for continuous assessment.

Aim: To assess whether using heart rate (HR) as alternative surrogate for cerebral perfusion pressure results in different CAR assessment compared with using MABP.

Methods

- Extremely preterm infants of <30 weeks GA and <1000 grams BW (2021-2023)
- Moving window correlation-coefficients:
  - r_cSO_2 and MABP (**COx**)
  - r_cSO_2 and HR (**TOHRx**)
- %Time with impaired CAR
  - COx >0.3, TOHRx <-0.3
- Short-term cerebral injury on ultrasound < 10 days
  - Severe IVH (grade III or PVHI)
  - Worsening IVH in any grade on any site
  - Development of PVL

Cerebrovascular autoregulation measures per day			
Measurement variables	Day 1 (n= 32)	Day 2 (n= 24)	Day 3 (n= 28)
Mean COx	0.07 ± 0.11*	0.06 ± 0.12*	0.02 ± 0.15
Mean TOHRx	-0.03 ± 0.11	-0.05 ± 0.10	-0.01 ± 0.11
Agreement on impaired CAR (%)	69.6 ± 12.5	65.7 ± 12.3	69.4 ± 12.1

Table 1. *Mean COx and TOHRx differed during the initial two days after birth (day 1 p= 0.003, day 2 p= 0.004).

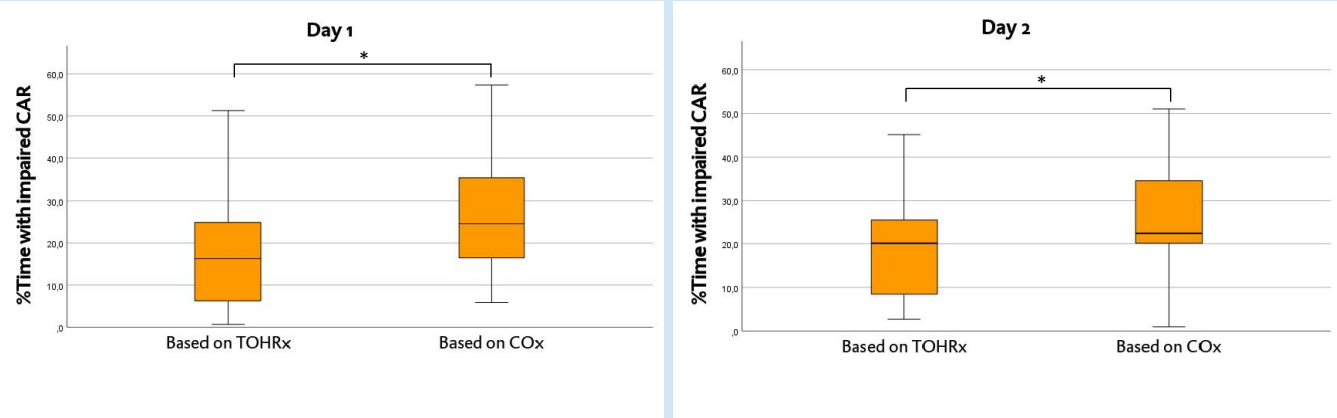

Figure 1. %Time impaired CAR using MABP, appeared higher on day 1 (p=0.003), and day 3 (p=0.019) compared to using HR. * Indicates p < 0.05

Results

- 32 Infants, mean GA 25.0 weeks (24.3-27.0) and BW 901 ± 244 grams.
- Both methods simultaneously indicated impaired CAR during 65.7%-69.6% of the monitoring period (Table 1).
- %Time impaired CAR using MABP appeared higher on day 1 and day 3 (Figure 1).
- Both measurements were not associated with early cerebral injury.

Conclusion

- **HR and MABP seem not interchangeable when assessing CAR in preterm infants.**
- Further investigation is warranted to explore the utility of HR as an alternative measure for identifying impaired CAR and its relationship with short-term cerebral injury.

References

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Beatrix Children's Hospital

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Authors have nothing to disclose

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