PROLONGED BRADYCARDIA DURING THE FIRST FEW MINUTES OF LIFE MAKES THE WORSE OUTCOME OF VERY PREMATURE INFANTS

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Background

The development of heart rate (HR) and oxygen saturation (SpO₂) reflect a dynamics of lung aeration during the first few minutes of life. Prolonged bradycardia and hypoxemia can aggravate a prognosis of very premature infants despite their further recovery.

Aim

Describe the relationship between bradycardia (< 100 bpm) in the first few minutes of life and mortality and severe neonatal morbidity in premature infants born <30 weeks of gestational age.

Primary outcome:

- Death before discharge

Secondary outcomes:

- Severe intraventricular hemorrhage; grade 3 and 4
- Retinopathy of prematurity, grade 3 (or needs for laser surgery)
- Bronchopulmonary dysplasia; moderate and severe grades

Methods and patient

Retrospective analysis of prospectively collected data from 415 premature infants born < 30 weeks of gestational age from January 2010 to July 2017 was performed. All interventions, parameters of ventilatory support, HR and SpO₂ were recorded during the stabilization in the delivery room. All recordings from each infant were reviewed. HR and SpO₂ values were tabled in every 15 seconds.

Resuscitation procedure

Primary settings of T-piece device (Neopuff®)

- Flow 10l/min, PIP 25 cm H₂O, PEEP 6 cm H₂O, fr. 30 - 60/min
- PIP increase to 30 cmH₂O and crossover to bag and mask ventilation were permitted.

Primary setting of FiO₂ was 0.3

- FiO₂ was titrated in 0.10 - 0.20 increments every 30 - 60 secs.

Target time-related SpO₂ ranges

- SpO₂ 60-85% at 2-6 minutes, then between 80 - 93%.

Statistics

A logistic regression model was used for the study population to analyze the impact of bradycardia (HR < 100 bpm) at 180 secs, 240 secs and 300 secs, as well as SpO₂ < 80% and <70% at 300 seconds of life on death and severe neonatal morbidities adjusted to gestational age.

Results

Figure 1.: patients flow diagram.

Results

Baseline characteristics	All infants	HR < 100 /min	HR < 100 /min	HR < 100 /min
		180 sec after birth	240 sec after birth	300 sec after birth
	N=318	N=109	N=59	N=55
Gestational age, mean (±SD), weeks	26,9 (± 1,9)	26,2 (±1,8)	25,8 (±1,7)	26,0 (±1,8)
Birth wight, mean (±SD), g	900 (± 281)	800 (±259)	775 (±218)	786 (±233)
Male gender, n (%)	178 (56)	66 (60)	33 (56)	29 (53)
Any antenatal steroids, n (%)	278 (87)	88 (81)	44 (74)	46 (84)
Cesarean section, n (%)	219 (69)	72 (66)	37 (63)	33 (60)

Figure 2. – Bradycardic preterm infants in the delivery room died more frequently (bradycardia = heart rate < 100 bpm).

Figure 3. – Premature Infants who suffered from bradycardia during the first five minutes of life developed more severe IVH (Bradycardia = Heart Rate < 100 bpm).

Figure 4. – Hypoxemic premature infants at five minutes of life died or suffered from severe IVH and BPD more frequently than normoxemic ones (Hypoxemia = SpO₂ < 70%).

Summary

- The valid data were found in 318 premature infants.
- Bradycardia < 100 bpm at 240 seconds was independently related to higher rate of death (OR 4.56, 95% CI 2.14-9.7, p=0.000).
- Bradycardia < 100 bpm at 300 seconds was independently related to a higher risk of severe IVH (OR 4.29, 95% CI 1.61 - 11.39, p=0.003).
- SpO₂ < 70% at 300 secs was related to moderate or severe form of BPD (OR 2.57, 95% CI 1.42 - 4.63, p=0.002).

Conclusion

Prolonged bradycardia, as well as hypoxemia, should be scrupulously resolved until 4 minutes after delivery to reduce the negative impact on the outcome of very premature infants.

References

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