Bradycardia in a Term Newborn

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Bradycardia, vagal innervation, parasympathetic control

A reportedly healthy Hispanic male infant was scheduled for a routine discharge examination at 52 hours of life from a newborn nursery. The infant had been rooming in with his mother since 4 hours of life and was exclusively breastfeeding. His mother verbalized no concerns and was prepared to take the baby home.

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CASE PRESENTATION

The infant's medical history was significant for a spontaneous vaginal delivery to a 37-year-old gravida 4, para 4 woman, who had a history of gestational diabetes controlled by diet. One hour before delivery, meconium was noted in the amniotic fluid after artificial rupture of the membranes. No intrauterine exposure to medications occurred, and the mother denied use of recreational drugs, alcohol, or tobacco. A review of her electronic medical record revealed negative results of tests for human immunodeficiency virus, syphilis, and hepatitis B. Her previous three pregnancies and deliveries were uneventful. There was no family history of cardiac or autoimmune diseases.

The infant's family consisted of his 37-year-old mother, 39-year-old father, 12- and 3-year-old sisters, and 7-year-old brother. His father was employed in construction, and his mother did not work outside the home; neither parent completed high school. Spanish was their preferred language. The infant's mother and father had a large network of extended family.

A pediatrician attended the delivery because of the risk of neonatal hypoglycemia and the risk of respiratory depression because of the presence of meconium. The baby was vigorous at birth with a lusty cry and no signs of hypoglycemia or meconium aspiration. He immediately was placed across his mother's bare chest and covered with warm blankets. The Apgar scores were 9 and 9 at 1 and 5 minutes, respectively. The baby fed for 5 to 10 minutes on each breast at approximately 1 hour of life. At 2 hours of life, he was transferred to a newborn nursery for assessment while his mother was transferred to a postpartum floor. The infant's vital signs and laboratory evaluations are listed in Table 1, and the nurse's assessment and routine medications are listed in Table 2.

TABLE 1. Vital signs and laboratory evaluations

Time since birth	Temperature	Heart rate (bpm)	Respiratory rate[a]	Blood glucose (milligrams per deciliter)[b]	Hematocrit[c]
30 min	36.4°C	136	60	68	–
60 min	37.1°C	120	42	–	–
90 min	36.8°C	132	50	75	–
120 min	36.5°C	128	56	–	–
150 min	36.7°C	128	42	63	57.7%/59.7%
Birth	Umbilical cord pH	7.25[d]			
36 hr	Newborn Screen	Normal			

Note. *Heart rate and respiratory rate were measured over a 1-minute count. bpm = beats per minute.*
[a]*Normal respiratory rate is 40 to 60 breaths per minute.*
[b]*Normal blood glucose value is greater than 40 mg per deciliter.*
[c]*Normal hematocrit value is between 40% and 60%.*
[d]*Less than 7.0 indicates a risk for intrapartum anoxia (Thilo & Rosenberg, 2012).*

At 8½ hours of life, the infant had an initial examination in his mother's room. His heart rate (HR) was in the 130s with a regular rate and rhythm, and no murmurs were appreciated. Respirations were unlabored at 42 breaths per minute. The remainder of the examination was unremarkable.

An interim examination completed at 32 hours of life was normal except for the finding of a short tongue frenulum, or mild ankyloglossia. A lactation consultant and speech therapist evaluated the baby using the Hazelbaker Assessment Tool for Lingual Frenulum Function (Segal, Stephenson, & Feldman, 2007) and determined that the baby was not a candidate for a frenulectomy. The baby did achieve a nutritive suck with intervention by the lactation consultant. For the previous 24-hour period, the neonate's HR had been recorded in the 130s. A routine oxygen saturation value of 96% was obtained at 24 hours of life.

At discharge, the infant was noted to have an HR of 87 beats per minute (bpm) with approximately seven to eight skipped beats; however, no murmurs were identified. Brachial and femoral pulses were equal and symmetrical. The infant was pink and appeared to be in no distress; the lung fields were clear to auscultation. He exhibited normal reflex activity and good muscle tone. The HR rose to the upper 90s with gentle stimulation, and the skipped beats decreased. This finding was concerning and warranted additional evaluation, because 99% of newborns achieve an HR greater than 100 beats per minute (bpm; Dawson et al., 2009; Miller, Shannon, & Wetzel, 2000; Verklan, 2002).

A full cardiac evaluation was initiated, and four extremity blood pressures revealed the following normal results: right arm, 58/31 mmHg; right calf, 75/51 mmHg; left arm, 66/37 mmHg; and left calf, 59/37 mmHg. A chest radiograph indicated normal cardiac contours, size, and normal bone structure, with no infiltrates of the lungs, pleural effusion, or pneumothorax. An electrocardiogram was obtained while the baby was in an alert state; a 2-minute rhythm strip indicated an HR of 105 bpm and normal sinus rhythm. The QT interval and the QRS were normal, indicating no heart block.

A comprehensive review of the mother's prenatal record was performed. Using a Spanish interpreter, the mother was questioned to ascertain that there was no previously unrecorded history of syphilis. The mother denied any complications in previous pregnancies and confirmed that her other children were

TABLE 2. Nurse's assessment and routine medications

Assessment/medication	Value
Weight	2670 g (20th percentile)
Length	46 cm (20th percentile)
Frontal occipital circumference	34.5 cm (70th percentile)
Ballard score for newborn maturation	39-40 weeks
Vitamin K	1 mg, intramuscular injection
Penicillin G	60,000 Units, intramuscular injection
Erythromycin eye ointment	½-inch ribbon to each eye
Hepatitis B vaccine (Engerix-B®)	10 μg, intramuscular injection

Note. *Percentiles for weight, length, and frontal occipital circumference and the Ballard score for newborn maturation are from Thilo, E., & Rosenberg, A. (2012). The newborn infant. In W. Hay, M. Levin, R. Deterding, M. Abzug, & J. Sondheimer (Eds.),* Current diagnosis and treatment: Pediatrics *(21st ed.). New York NY: McGraw Hill Companies, Inc.*