Management of Hypernatremic Dehydration due to Insufficient Lactation

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Critical malnutrition and hypernatremic dehydration resulting from inadequate breast-feeding have previously been reported; the finding of elevated sodium concentration in expressed samples of mother's milk from these infants is found concurrently. This is the first case report describing successful relactation following management of hypernatremic dehydration in a breast-fed infant. Mother's milk was of inadequate volume and had a high sodium content. Treatment of the primary cause of this disorder, insufficient lactation, was effective in allowing successful relactation; a nursing supplementer is described.

CERTAIN MOTHERS perceive that something is inherently "wrong" with their milk or with their ability to lactate. This perception is dramatically confirmed in the clinical entity, neonatal hypernatremia in breast-fed infants.¹⁻³ There may be a delay in recognition of this disorder at an early stage because most of the infants reported have nursed well and are happy, comfortable babies.⁴ Similarly, their mothers are described as well motivated and educated.⁵ Therefore, these infants come to medical attention late, possibly in extremis, with severe dehydration, and usually greater than 10 percent below their birth weight. This article reports the management of this disorder directed at its primary cause, insufficient lactation.

Case Report

Case 1, a 14-day-old white male, was admitted to Wake Medical Center, Raleigh, NC, to rule out sepsis. At his first postnatal visit at 2 weeks of age, his pediatrician found him jaundiced, mottled, and 600 g (>15 percent) below his birth weight. Reportedly, he had been well since discharge until 1 day before his scheduled checkup. His parents became concerned that he had only wet one diaper the previous day and was noted on a home scale to have lost weight. The past history was significant only for prematurity. Case 1 was a 36-week gestation, 2,040-g infant born to a 26-year-old primiparous mother after 10 hours of rupture of membranes. He adapted well to extrauterine life (APGAR score of 9 at 1 minute, 9 at 5 minutes) and had a benign neonatal course. He was discharged on the 5th day of life. The nursing notes stated that the mother's milk was in and the baby was feeding well.

The physical examination revealed a severely icteric and markedly emaciated infant. His mucous membranes were parched, skin turgor was poor, eyeballs were sunken, and the anterior fontanelle was depressed. He was hypothermic (35.5°C rectally), tachycardiac (160/min), and hypotensive (54 mm Hg systolic by Doppler). Blood chemistries, urinalyses, and cultures were obtained immediately. Fluid resus-
citations with plasmamine and normal saline was begun. Subsequent laboratory investigations revealed a urine specific gravity of 1.025 and a hematocrit of 55 percent. His BUN and creatinine were 55 mg/100 ml and 1.8 mg/100 ml, respectively. Cultures of the blood and cerebrospinal fluid were sterile. His serum sodium was 189 mEq/l. Acute treatment of hypernatremic dehydration commenced. A sample of mother's milk (pumped with an electric pump over 15 minutes) showed a scant volume (2 ml) with a high sodium content (74 mEq/l) (Fig. 1). The etiology of the hypernatremic dehydration was presumed to be inadequate lactation.

Hypernatremic dehydration was treated with slow rehydration using 0.5 normal saline. Correction of his clinical and laboratory abnormalities occurred within 3 days. During the infant's rehydration period, the mother was instructed on the use of an electric breast pump (Egnell, Cary, IL). She expressed her milk every 2-3 hours during the day, resulting in an increase in her milk volume and a concomitant decrease in the breast milk sodium content (Fig. 1). The etiology of the hypernatremic dehydration was presumed to be inadequate lactation.

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Follow-up at 2 weeks, 6 weeks, and 12 months revealed normal growth and development. His Bayley Scales of Infant Mental and Motor Development at an adjusted age of 11 months were above the mean (MDI = 101, PDI = 107). The mother continued to breast-feed for 10 months. Maternal-infant interaction and attachment appear to be enduring.

**Discussion**

The breast-fed infant who is below birth weight, who is not gaining weight, or who is gaining weight poorly may be exhibiting symptoms of hypernatremic dehydration and its attendant cardiovascular, renal, and central nervous system sequelae. These may not be the crying or fussy babies from mothers who perceive their milk as insufficient but quiet, seemingly contented infants. The diagnosis, therefore, may be difficult early in the course of the disease.

Two-week-old breast-fed infants who present with azotemia, hypothermia, and malnutrition are often admitted in shock and to rule out septicemia. Acute management consists of restoration of intravascular volume and obtaining appropriate cultures and laboratory studies. Hypernatremic dehydration is best managed by slow rehydration using 0.5 normal saline over 48 hours. Analysis of breast milk for volume and sodium content may aid in the diagnosis and subsequent management of hypernatremia caused by inadequate lactation. The sodium content of human breast milk has been studied by many investigators. Koo and Gupta measured total sodium content in mother's milk of term and preterm babies. They compared the difference in sodium from milk obtained before and after feedings, from either breast, and among milks at various times of the day. They reported sodium concentration of colostrum of both term and preterm mother's (22 ± 12 mEq/l) to be consistently higher than sodium concentration in transitional milk (13 ± mEq/l) and mature milk at 2 to 3 weeks (7 ± 1 mEq/l) (Fig. 1).

Because the primary cause of this disorder is probably insufficient lactation and not elevated sodium in the breast milk, therapy should include supporting the mother and giving her the opportunity to successfully relactate. To compound the physiologic derangements of electrolyte imbalance in the body, a
mother's inability to nourish her infant may influence her level of confidence in her ability to care for her infant. Stating that the milk is salty or toxic, and/or placing the baby on formula without counseling or without a trial of relactation may be detrimental to the mother–infant dyad even if the medical outcome is good. Relactation can be accomplished physiologically through frequent breast pumping and supplementation using a nursing supplementer while the infant provides sucking stimulation to the breasts. This approach is the most holistic, and it requires a motivated mother and psychologic support by the nursing and medical staff.

This case addresses the importance of adequate breast-feeding information and support. Lactation counseling should begin in the hospital and continue in the pediatrician's office or clinic for approximately 2 weeks after discharge. Whether hypernatremia in a breast-fed infant can be prevented by closer follow-up is unknown. Certainly, it should serve as a reminder to all pediatricians that some systematic approach to early follow-up of breast-fed babies is prudent.

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References