A Severe Neonatal Hypercalcemia Case due to Maternal High Dose Vitamin D Usage

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Abstract

Hypercalcemia cases determined in neonatal period commonly develop due to iatrogenic reasons. In this study we have studied to determine the hypercalcemia etiology in a newborn that was only fed by breast milk, and we have established the development of hypervitaminosis D and associated hypercalcemia clinic in breast feeding period in a baby of a mother who used high dose of vitamin D in prenatal period.

Keywords: Hypercalcemia, vitamin D, newborn

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Introduction

Hypercalcemia is defined as the ionized calcium levels of higher than 5.4mg/dl and/or total serum calcium levels of higher than 10.8 mg/dl. Since this picture may result in severe morbidity and mortality, it should be recognized early. Moderately or rigorously increased serum calcium levels may cause lethargy, hypotonia, dehydration and diminished suction in a baby. The most common causes of hypercalcemia determined in this period are parenteral high dose calcium apply, idiopathic infantile hypercalcemia and Williams syndrome (1).

Subcutaneous fat necrosis, feeding with low phosphorus formula and high dose oral vitamin D treatments may also cause hypervitaminosis D and hypercalcemia in newborns (1,2). High dose vitamin D treatment in pregnancy does not cause any toxicity in newborn, since transplacental passage is not allowed (3). Another way of a mother to transfer vitamin D to her baby is the breast milk, however to the best of our knowledge there is no reports in literature dealing with the passage of vitamin D by breast milk and causing toxicity. Herein we will report a case of development of toxicity signs both in a mother and her baby, who used high dose vitamin D in her pregnancy and by this study we especially want to attract attention to this subject.

Case

A Nine-day-old male baby was admitted with fever, diminished suction, vomiting and weight loss. In his history, it was learnt that he was born with normal vaginal delivery from 25 years old mother, in her 39th week of pregnancy, with 2900 gram weight and fed only with breast milk after birth. He had never used any drugs before. In his physical examination, his weight was 2350 grams, body temperature was 37.8°C, he was hypotonic, lethargic, his suction was diminished and he had severe dehydration. While his hemoglobin, hematocrite, platelet and blood leukocyte levels were in normal ranges according to his age, his C-reactive protein level was 0.3 mg/dl. Moreover serum sodium level was 156 mEq/L, potassium 3.6 mEq/L, total calcium 19.2 mg/dl (9-10.6), phosphorus 2.8 mg/dl (3.8-6.5), alkaline phosphatase 66 IU/L (145-420), magnesium 2.3 mg/dl (1.6-2.6), blood urea nitrogen 32 mg/dl (3-12), creatinine 1.5 mg/dl (0.3-1), albumin 3.9 mg/dl (3.8-5.4), urinary calcium/creatinine ratio was 0.85 (<0.8) and in his urinary microscopy 10-15 erythrocytes were determined in every field. His renal ultrasound was compatible with nefrocalcinosis. With all these findings, the patient was diagnosed with severe hypercalcemia and resulted dehydration. Intravenous fluid replacement, 1 mg/kg furosemid and 2 mg/kg prednisolone treatments were started; his control calcium level was reported as 10.5 mg/dl. However after breast feeding has been started, serum total calcium level increased to 16.8 mg/dl once more; and because of this reason breast feeding was cessated and formula has been started. After infant formula, serum total calcium levels has never been increased again. After that we dealt with mother to find the reason of neonatal hypercalcemia. Since in her laboratory, her serum total calcium was 13.6 mg/dl, serum phosphorus 2.7 mg/dl and alkaline phosphatase was 82 IU/L; the history was deepened. Then it was learnt that the mother was taking 1 ampule (300,000 U) oral vitamin D every each week from the last 40...
days of her pregnancy. The parathyroid hormone level of the baby was 2.4 pg/ml (9-65), while the parathyroid hormone level of the mother was 2.9 pg/ml (12-72), and the 25(OH) Vitamin D level of the baby was 480 ng/ml (10-80) while the 25(OH) vitamin D level of the mother was 430 ng/ml (20-80). The baby was diagnosed with vitamin D intoxication due to the maternal high dose vitamin D intake and the breast milk was stopped for a while. In his follow-up, hypercalcemia did not develop again.

Discussion

25(OH) Vitamin D is transferred into its active form of 1,25 (OH)2 Vitamin D in kidneys by 1-α hydroxylase enzyme. Among pregnant, 1,25 (OH)2 Vitamin D level is increased 3-4 times compared with non-pregnants; however, it’s turned into 24-25 (OH)2 vitamin D by placental 24-hydroxylase enzyme and its passage to the fetal circulation is averted (3). In postnatal period, breast-feeding mother may rapidly turn 1,25 (OH)2 vitamin D into 25 (OH) vitamin D daily and may transfer a low amount of vitamin D into her baby by the way of breast milk (4).

In an adult, it has been determined as safe to use 10,000 IU vitamin D daily for 5 months (5), however daily 60,000 IU usage has been explored to cause toxicity (6). In none of the breast feeding mothers themselves and their babies who used vitamin D 4000 IU daily (7) or 60,000 IU monthly (8) for 3 months, any of the toxicity signs were established. However, we could not come across with any reports in literature about the conditions that can take place above these values.

In mild hypercalcemia, serum calcium level is below the 12 mg/dl, in moderate hypercalcemia it is between 12-15 mg/dl and in severe hypercalcemia it is above the 15 mg/dl (9). Mild hypercalcemia does not cause any clinical signs in general. Nevertheless, moderately or severely increased serum calcium levels result in lethargy, hypotonia, dehydration, fever, impaired weight gain, constipation, polyuria, hematuria and nephrocalcinosis (10). In these cases together with hypercalcemia, hypophosphatemia, hypercalcuria, low serum PTH levels and high serum 25 (OH) vitamin D levels are determined (1,11). At the time of diagnosis, the etiologic factor causing this situation should be cessated, IV sodium chloride should be started to be given, furosemid should be given for the calciuric effect, and steroid should be used in order to decrease intestinal calcium absorption and bone resorption. Among cases that do not give answer to these treatments, pamidronate or hemodialysis may be the choice of treatment (1). The correction of hypervitaminosis D may take 6 weeks to 6 months (11).

Conclusion

In conclusion, in investigation of etiology of neonatal hypercalcemia, prenatal and/or postnatal maternal vitamin D usage should always be interrogated.

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