Clinical Brief

Bone Disease in Preterm

V.V. Khadilkar, A.V. Khadilkar and S.S. Joshi[1]

Growth and Pediatric Endocrine Unit, Hirabai Cowasji Jehangir Medical Research Institute, Jehangir Hospital, 32, Sassoon Road, Pune and [1]ACPM Medical College, Dhule, India

ABSTRACT

The survival rate of premature infants has significantly increased during the last few decades. As a consequence, new disorders such as osteopenia of prematurity have been emerging. We report 6 month evolution from diagnosis to recovery of a patient with metabolic bone disease of prematurity who showed a remarkable improvement on therapy with phosphate, calcium and vitamin D. **[Indian J Pediatr 2007; 74(10) : 945-946]** *E-mail: akhadilkar@vsnl.net, vkhadilk@vsnl.com*

Key words : *Premature; Osteopenia; Phosphate*

The survival rate of premature infants has significantly increased during the last few decades.[1] As a consequence, new disorders such as osteopenia of prematurity have been emerging. The incidence of osteopenia among infants born before 28 week of gestational age is as high as 30 % in the Western world.[2] We report 6 month evolution from diagnosis to recovery of a case with metabolic bone disease of prematurity that showed a remarkable improvement on therapy with high phosphate, calcium and vitamin D.

CASE REPORT

Three mth-old male child fifth issue of a non consanguineous marriage born prematurely at 30 week of gestation with a birth weight of 1.1 Kg presented with multiple fractures of the femurs, tibia and the fibulae. Past history revealed that baby had been admitted to a neonatal intensive care unit and was discharged home on day 28 of life. In the neonatal period baby had mild jaundice for which he received phototherapy. He was fed expressed breast milk from the beginning and no human milk fortifier was added. Rest of the course in the neonatal period was uneventful. At presentation to our tertiary level care center (3 month of age) baby's length was 52 cms, weight was 2.5 Kgs, head circumference was 35 cms and baby was very irritable. His sclerae were mildly blue and nose was upturned. Roentgenograms showed widening and flaring at the end of the long bones, there was evidence of osteopenia (Fig. 1), and there were multiple fractures of bones of both the legs with periosteal reaction. A provisional diagnosis of Metabolic Bone Disease of Prematurity (MBDP) was made with a differential diagnosis of Osteogenesis imperfecta. Hearing was normal on BERA and skin biopsy was not done.

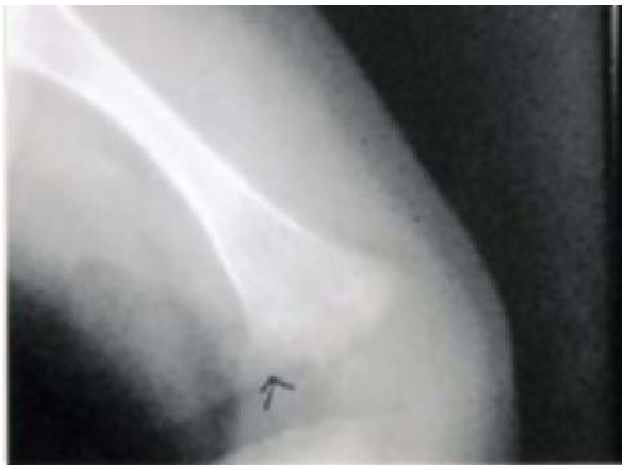

Fig 1. Roentgenogram showing widening and fraying at the end of the long bones and osteopenia.

Investigations showed that alkaline phosphatase was 4450 IU/Lit (upto 825 IU/Lit), S. calcium was 7.3 mg/dl (8.4-10.2), and phosphorous was 3.27 mg/dl (4.5- 7.5), 25 Hydroxy Vitamin D3 (Radio Immuno Assay) was 29 ng/ml (10-60), parathyroid hormone (CLIA) was 905 pg/ml (12-72). Hemoglobin was 10.40 gm/dl (11-13gm/dl). The baby was treated with Calcium in the dose of 200 mg/Kg/day, 1-25$(OH)_2$ vitamin D3 0.25 microgram three times per day, and phosphate solution to give a total

Correspondence and Reprint requests : Dr. Vaman Khadilkar, Consultant Pediatric Endocrinologist, Hirabai Cowasji Jehangir Medical Research Institute, Jehangir Hospital, 32, Sassoon Road, Pune-411001. Phone(020) 26141340 Fax: (020) 26137617

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phosphate of 100 mg/Kg/day. After 6 weeks of therapy the Alkaline phosphatase was 2270 IU/Lit, calcium was 9.9 mg/dl, phosphorous was 5.57 mg/dl and parathyroid hormone was 59 pg/ml.

At 6-month of age (3 months of therapy) patient's irritability had disappeared, he was moving all limbs freely and was developing normally. Repeat investigations showed a parathyroid hormone of 28.8 pg/dl, alkaline phosphatase of 1066 IU/Lit, calcium of 9.6 mg/dl (ionic calcium 1.42 mmol/Lit [1.12-1.32]), and phosphorous of 4.94 mg/dl. A repeat X-ray showed complete disappearance of fraying and widening, all fractures had healed and osteopenia had reduced (Fig 2).

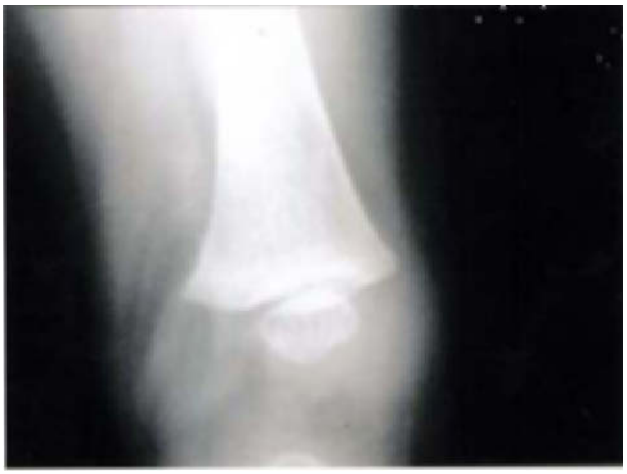

Fig 2. Repeat X-ray at 3 months showing complete disappearance of fraying and widening.

DISCUSSION

Improved nutritional practices and proper use of intravenous alimentation in the neonatal care units has reduced the incidence of MBDP in most parts of the developed world. In countries like India there is lack of appropriate facilities for total parental nutrition and metabolic disease of prematurity can still be a serious problem. MBDP which is a combination of rickets, osteomalacia and osteoporosis is a common disease in preterm infants. Between 24 week gestation and term, the fetus accrues approximately 80% of body calcium, phosphorous and magnesium. Thus the fetus accrues about 140 mg calcium/day which the preterm infant misses out on due to early birth.[3] Human milk provides about 25mg/dl calcium and 14 mg/dl phosphorous. Concentrations of Vitamin D in the human milk are low (12-50 u/l) with 90% being used for soft tissue growth and metabolism in the body rather than for skeletal mineralization.[4,5] These amounts although adequate for a term infant are not sufficient for the premature infant who is grossly depleted.

MBDP is predominantly a phosphate deficiency but other factors such as frusemide therapy, ventilator treatment, intravenous alimentation, cholestasis, pre-eclampsia of the mother and aluminum loading may contribute to the condition.[6,7]

Currently, the diagnosis of MBDP is based on clinical and radiological signs and measurements of biochemical markers. Routine calcium and phosphate supplementation of human milk fed to infants of less than 1000 gms birth weight is now recommended (70-90 mg/dl and 35-45 mg/dl respectively.[8] Calcium intake of 200mg/Kg/day and phosphorus intake of 100 mg/Kg/day is recommended in preterm babies < 1500 gms by the American Academy of pediatrics. Vitamin D 400 IU (Not more than 1000 iu/day) in addition to that in the feeds is also recommended. This increased supplementation is recommended until baby reaches a weight of 2.5 Kgs.[9] Our patient had severe osteopenia, rickets and multiple fractures. All features reverted to normal over a span of 3 months, suggesting that MBDP is a reversible condition and does not leave behind deformity.

While the potential for long-term consequences on peak bone mass are still unclear at the moment, the short-term benefits of treatment of MBDP include the avoidance of fractures; less marked dolicocephaly and improved linear growth.

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