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Case Report - Rickets Mimicking Osteogenesis Imperfecta and Battered Baby Syndrome

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Abstract: ***A 15 month old female child came to Kurla Babha Hospital with chief complaints of fever and breathlessness since 2 days and failure to gain weight with bowing of legs since 3 months. She is diagnosed with pneumonia and severe acute malnutrition after routine workup by the pediatric residents. Reference was given to orthopaedic department in view of low Vit d and bowing of legs. A diagnosis of nutritional vitamin D deficiency (rickets) was made and supplementation was initiated.***

Keywords: Rickets mimicking osteogenesis imperfect, battered baby syndrome, poor nutrition

1. Introduction

Rickets is a metabolic bone disease caused by a defect in mineralization of osteoid matrix that occurs prior to closure of the physes. Primarily due to Vit D deficiency or a disturbance in its metabolism. Vitamin D helps the child's body absorb calcium and phosphorus from food. Not enough vitamin D makes it difficult to maintain proper calcium and phosphorus levels in bones, which can cause rickets.

Patients present with clinical features such as frontal bossing, bowing of long bones, brittle bones and enlargement of costal cartilage. Diagnosis is made based on a thorough evaluation of serum labs, clinical features, and radiographic findings. Adding vitamin D or calcium to the diet generally corrects the bone problems associated with rickets. When rickets is due to another underlying medical problem, the child may need additional medications or other treatment. Some skeletal deformities caused by rickets may require corrective surgery.

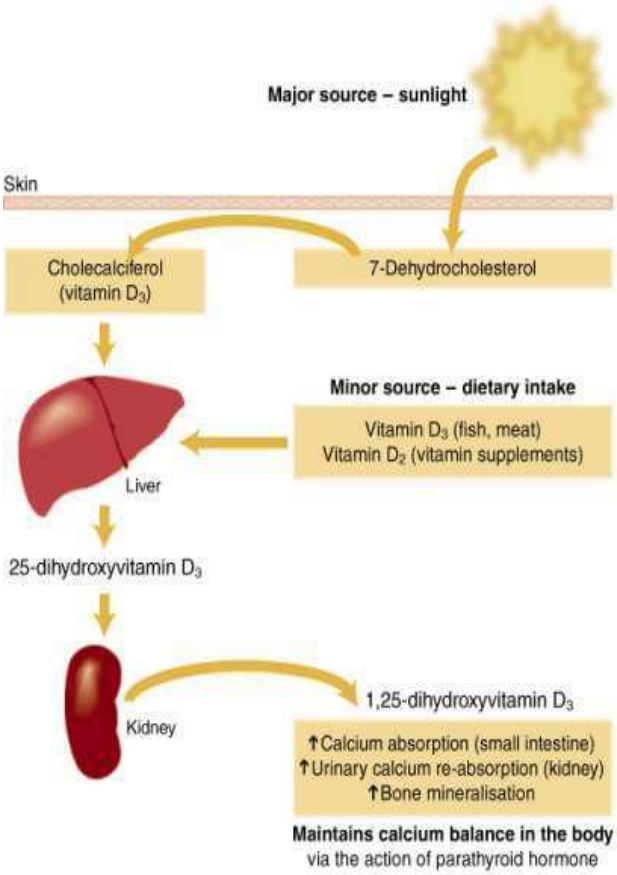


Figure 1: Formation of Vit D

Pathophysiology

Vitamin D and PTH play an important role in calcium homeostasis

- Disruption of calcium/phosphate homeostasis
- Poor calcification of cartilage matrix of growing long bones

- Occurs at zone of provisional calcification
- Leads to increased physeal width and cortical thinning/bowing.

Causes of nutritional rickets

a) Vit D Deficiency
   - 3-18 MONTHS
   - LACK OF SUNLIGHT EXPOSURE & NODIETARY SUPPLEMENTATION.
     - **Sunlight.** The child's skin produces vitamin D when it's exposed to sunlight. But children nowadays tend to spend less time outdoors.
     - **Food.** Fish oil, egg yolks and fatty fish such as salmon and mackerel contain vitamin D. Vitamin D has also been added to some foods and beverages, such as milk, cereal and some fruit juices.
   - PROLONGED BREAST FEEDING

b) B) Calcium Deficient Diet

c) C) Both

d) D) Vegetarians Who Avoid Dairy products.

2. Case Report

We present a 15 month old female child weighing 5kgs admitted in Kurla Babha Hospital with complaints of Fever and breathlessness since 2 days and poor growth. Mother also noticed bowing of both the legs since past 3months.

The child is a full term baby, born by spontaneous vaginal delivery. There were no complications during the pregnancy or labour. There is no history of NICU admission. She is on no medications. She has an elder sister who is normal, and her mother has no substance abuse issues. The child's parents are of normal stature.

She had no history suggestive of chronic malabsorption, repeated acute illnesses or frequent injuries or fractures.

On general examination following findings were noted:

1) FRONTAL BOSSING.
2) PECTUS CARINATUM,RACHITIC ROSARY
3) POT BELLY
4) BROADENING OF WRIST AND ANKLE
5) ANTEROLATERAL BOWING OF BOTH TIBIA (R>L) and
6) BLUE SCLERA

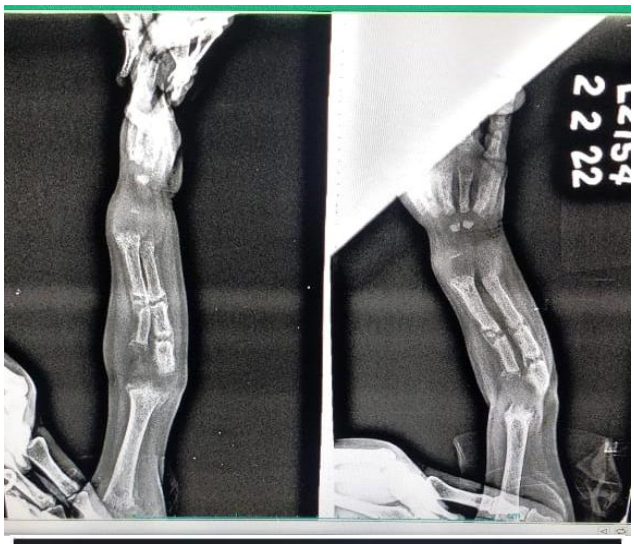
So the child had findings which were suggestive of rickets or osteogenesis imperfecta. On concluding the general examination and history we had arrived on a differential diagnosis of rickets and osteogenesis imperfecta. Blood investigations were carried out and imaging studies were undertaken.

Blood Investigations

The child's liver function, renal function and complete blood count were in normal range. ALK PHOSPHATASE was elevated up to 2984.CALCIUM was low at 6.5, PHOSPHOROUS was low at 2.4 (normal 3.0-4.5)CRP was 7.98,ESR was normal, 25OHD was low at 3.06ng/ml (45-50ng/ml).

Radiographs

X RAYS of both upper limb and lower limb were suggestive of multiple fractures in different stages of healing. Additionally there was metaphyseal cupping, fraying and splaying at the ends of bones suggestive of rickets. After 3 months of VIT D supplementation signs of healing rickets can be seen radiologically.



After reviewing the blood investigations and radiographs a diagnosis of nutritional rickets was made. However radiographs were also mimicking battered baby syndrome but there was no history of trauma given by the mother. It is common to have multiple healing fractures due to battered baby in rickets as the bones are weak. The child was then started on oral vit D supplementations.

3. Discussion

Rickets is common in Infants and adolescent age group. In this age group there is rapid bone growth requiring more of calcium and phosphate. Lack of sunlight exposure further increases the risk of rickets. Solely breastfed infants and prematurity are the other causes of defective mineralisation. As a result there should be proper screening to diagnose rickets early because it is an easily treatable condition if diagnosed early and prevents any further complications. Nutritional rickets may not occur with very low 25OHDconcentrations but is more likely to occur with deficiency sustained over time, i.e. chronic deficiency--------Duration is important.

Risk factors

Factors that can increase a child's risk of rickets include:

- **Dark skin.** Dark skin has more of the pigment melanin, which lowers the skin's ability to produce vitamin D from sunlight.
- **Mother's vitamin D deficiency during pregnancy.** A baby born to a mother with severe vitamin D deficiency can be born with signs of rickets or develop them within a few months after birth.
- **Northern latitudes.** Children who live in geographical locations where there is less sunshine are at higher risk of rickets.
- **Premature birth.** Babies born before their due dates tend have lower levels of vitamin D because they had less time to receive the vitamin from their mothers in the womb.
- **Medications.** Certain types of anti-seizure medications and antiretroviral medications, used to treat HIV infections, appear to interfere with the body's ability to use vitamin D.
- **Exclusive breast-feeding.** Breast milk doesn't contain enough vitamin D to prevent rickets. Babies who are exclusively breast-fed should receive vitamin D drops.

Complications

Left untreated, rickets can lead to:

- Failure to grow
- An abnormally curved spine
- Bone deformities
- Dental defects
- Seizures

The newer recommendations is to maintain a minimum level of 400 IU/day, especially in deeply pigmented breastfed infants . Our patient had low levels of Vit D because of poor oral intake.

25OHD level at 30–34 nmol/l is the critical cut off below which rickets is more likely to occur.

It is recommended that the child should have adequate sunlight exposure. In addition to that vit D can be supplemented orally. The oral intake varies according to the age. The minimal recommended dose of vitamin D is 2,000 IU/day (50 μg) for a minimum of 3 months. For prevention>600 IU daily for 3 months is suggested for toddlers greater than 12 months of age. In younger infants (1–12 months) 400 IU daily has been suggested. “Among infants and toddlers with 25OHD levels < 50 nmol/L for whom daily vitamin D supplementation may not be ideal, intermittent bolus doses of 50 to 100 000 IU every 3 months hold promise. In cases where compliance is a concern a one time treatment with high dose oral formulation is appropriate (100,000–600,000 IU) over 1–5 days.

4. Conclusions

Rickets is a common metabolic condition in children who are from a low socio economic group and those who are premature at birth. It is still a relatively common nutritional deficiency. Proper education of the cause and prevention is necessary to decrease its incidence. It is an easily treatable condition so timely diagnosis is a must before any

complications arise. In our case study we found features which were mimicking rickets, osteogenesis imperfect a and battered baby syndrome, So it is important to have a detailed history, various blood investigations to rule out differentials and radiograhs which help us to form a correct diagnosis and treat accordingly.

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