

CASE REPORTS

A 60 YEARS OLD LADY WITH OSTEOMALACIA DUE TO DEFICIENCY OF VITAMIN D

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Abstract:

Osteomalacia is characterized by defective bone mineralization, bone pain, increased bone fragility and fracture. Full blown Osteomalacia is now relatively rare in developed countries but sub clinical disease is still common especially in people who have a poor diet or limited sunlight exposure such as elderly housebound individuals. Here is a case of a 60 years old married, Muslim lady, housewife with history of generalized bodyache for 4 years and deformity of both upper limbs for 1 year. On examination, a hard circumscribed swelling was found over each deformity. After exclusion of other possible pathological conditions and on laboratory criteria, we diagnosed the case as osteomalacia due to Vitamin D deficiency. She was treated with intramuscular Vitamin D₃ injection for 6 weeks. After that the patient was clinically improved which was also evident by laboratory profile.

Key words: Osteomalacia, vitamin D, bone fragility and fracture.

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Introduction :

Osteomalacia is the softening of bones due to defective mineralization. It is derived from Greek words 'Osteo' (bones) and 'malacia' (softness). In the past, it was also known as malacosteon and its latin derived equivalent mollities ossium.

A common cause of the disease is a deficiency in Vit-D due to insufficient sunlight exposure². Use of the term Osteomalacia is often restricted to the milder, adult form of the disease and it is commonly prevalent in confined dark skinned or diet disbalanced subjects. Other causes include renal tubular acidosis, malnutrition during pregnancy, malabsorption syndrome & in some form of cancers. Vitamin D occurs in only small quantities in most foods except oily fish. So maintenance of normal level depends on ultraviolet sun light exposure which permits formation of cholecalciferol in the skin from 7-dehydrocholesterol followed by synthesis of 25-(OH)D₃ in the liver & production

of biologically active metabolite 1,25-(OH)₂D₃ in the kidney; under influence of which absorption of calcium from intestine & maintenance of serum calcium level to the normal level occurs.

Inadequate sunlight exposure, dietary deficiency, malabsorption or a combination of these factors is accompanied by a reduction in 25(OH)D₃ synthesis and ultimately low serum calcium. This stimulates parathormone hormone secretion resulting in secondary hyperparathyroidism and progressive loss of serum calcium and phosphate from bone and defective mineralization. It is thought that hyperparathyroidism does not occur until and unless levels of 25(OH)D falls below 37nmol/L(15ng/mg).

Osteomalacia starts insidiously as diffuse body pain, muscle weakness and fragility of the bone³. Pathological fracture due to weight bearing may also develop. Biochemical findings are low serum and urinary Ca⁺⁺, phosphate but

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high serum alkaline phosphatase & increased activity in technetium bone scan.

Nutritional Osteomalacia responds well to administration of vitamin D 10000 intravenous injection weekly within few weeks.

Case Report:

A 60 years old lady, controlled hypertensive and diabetic, housewife, hailing from Madaripur district attended medicine outpatient department of Dhaka Medical College Hospital with history of generalized bodyache for 4 years, which was more marked in lower back with subsequent involvement of chest, both arms and thighs over the span of few months. The progression of the pain was so severe that she performed her daily works with difficulties even lifting weight above the chest level. One year ago, she noticed deformity of both arms & 6 months later she became unable to walk, even standing from sitting or supine position without any aids. There is no association of trauma, morning stiffness, joint pain or swelling. Also there was no history of significant weight loss, fever, rash, cough, urinary or foecal incontinence. She took various analgesics without significant improvement of pain. Her diabetes and hypertension were controlled by pioglitazone (15 mg/d) and losartan Potassium (50 mg/d) respectively. 2 years back she was treated with Prednisolone 10 mg daily for 6 months, Methotrexate 7.5 mg weekly for 3 months and Vitamin D₃ intramuscular weekly for 6 weeks. She is on menopause for last 14 years, coming from low socio-economic condition. She is non-smoker, non-alcoholic, but occasionally chews betel nuts. No significant family history or allergic history.

On examination, the patient was found to be mildly pale with average body built and nutrition. Bony tenderness was present with gross deformity of both upper arms bowing outwards. A palpable, tender, circumferential hard swelling was present over each deformity. There was no restriction of motion of joints but both the active and passive movements were painful. The rate and volume of distal pulses were normal. There was no redness or swelling of joints and no muscle wasting. The tone,

power of the muscle and all reflexes of upper and lower limbs were normal. Sensory system was intact Examination of other systems revealed normal findings.

On Investigations, complete blood count and blood film revealed mild anemia (Hemoglobin 9.7 gm/dl) with normal ESR (5 mm in 1st hour) with normal total and differential count. Peripheral blood film showed normocytic monochromic anemia with mature WBC with normal platelet count. Serum creatinine level was 0.7 mg/dl and urinalysis was also normal. Protein electrophoresis showed no abnormal accumulation of IG molecule. Bone marrow study showed normal active marrow. Further investigations revealed the following status:

Serum Ca⁺⁺ : 7.56 mg/dl [normal 8.1 – 10.4 mg/dl]

Serum PO₄ : 1.8 mg/dl [normal range 2.5-5 mg/dl]

Serum PTH : 20.10 pg/ml (normal range-0-65 pg/ml)

Serum alkaline phosphatase : 663U/L [normal range-40-125U/L]

Serum Mg⁺⁺ : 2.00 mg/dl [normal level 1.82 : 2.43 mg/dl]

Radiography of chest, skull, both upper arms and sacroiliac joint revealed diffuse osteopenia in skull, clavicles, ribs, both humerus & femur. There was pathological old non-uniting fracture in upper 1/3 rd of both humerus & Right femur. Whole body bone scan showed increased tracer uptake in anterior end of left 3rd rib, shaft of both humerus and trochanteric region of both femur. Her serum electrolytes and ECG were normal. Echocardiography showed concentric left ventricular hypertrophy with good systolic Functions (EF 61%). Thyroid function test was also found normal.

Discussion:

Initially in this case we had some differentials considering the history and clinical examinations like multiple myeloma, leukaemia or secondary metastasis to bone. Early in presentation, patient had bone pain with generalized body ache. She was elderly and anaemic which made it a possibility of multiple myeloma in context of our country. But normal ESR, normal findings in protein

Electrophoresis, normal bone marrow study, renal function test and decreased Ca^{++} & increased alkaline phosphatase level excluded the diagnosis of multiple myeloma. Leukaemia was another possibility, but lack of other clinical features except bone pain, weakness, anaemia & normal lab findings eg, normal matured WBC, normal platelet count and normal bone marrow study virtually excluded the diagnosis. Secondary metastasis to bone was another possibility but long history of illness with absence of suggestive clinical features for any possible primary tumour, lack of muscle wasting & whole body bone scan showing increased tracer uptake also made the diagnosis very unlikely.

Then after doing initial investigation we considered additional differentials e.g. osteomalacia, osteoporosis and hyperparathyroidism.

Clinically patient had bone pain from early presentation, later on fracture developed. Furthermore low serum Ca^{++} level, low phosphate level & increased alkaline phosphatase made diagnosis of osteoporosis unlikely. Low serum Ca^{++} & phosphate concentration might be due to CKD, hypo parathyroidism, hypomagnesaemia & also in Vit-D deficiency. Further investigation showing normal PTH level, normal RFT & normal Mg^{++} level excluded all above except vitamin D deficiency. Then we decided to measure the 25(OH)-D status and it showed decreased level (43.52 nmol/l).

Therefore, finally we diagnosed our case as osteomalacia either due to Vit-D deficiency or Vit-D resistance. We treated our case with injection vitamin D_3 for 6 weeks. After getting that injection the Patient gradually showed signs of improvement clinically; patient could sit and could move her limbs and she could be touched by the physicians. There was an improvement of laboratory profile. With these observations, we diagnosed our case as osteomalacia due to vitamin D deficiency. The diagnosis of osteomalacia could be confirmed by bone biopsy, which would show the pathognomonic features of increased thickness and extent of osteoid seams.

However, for her being elderly and having a poor physical condition, the orthopedic consultants suggested that there might be increased chance of fracture, if biopsy was taken. Hence, we did not go for bone biopsy.

Osteomalacia due to vitamin D deficiency responds rapidly to treatment with 25(OH)D (50 μgm daily) or active vitamin D metabolites 1-2 μgm daily and calcium supplementation (500-1000 mg daily). Healing of bone disease was accompanied by rapid clinical improvement, normalization of biochemical abnormalities and radiographic improvement. After 3-4 months treatment can generally be stopped or the dose of vitamin D reduced to a maintenance level.

We also treated our patient with intramuscular injection of vitamin D_3 for 6 weeks and discharged with the advice of oral active vitamin D_3 twice daily for 6 weeks. Patient came to follow up after one month & showed clinical improvement as well as improved serum level of calcium 10.1 mg/dl (previous: 7.56 mg/dl), and phosphate 2.8 mg/dl (previous: 1.8 mg/dl). The patient was advised to continue the drug and to come to follow up again with laboratory report of serum calcium, phosphate, alkaline phosphatase and 24 hours urinary calcium level.

Conclusion:

It is important to keep in mind that undiagnosed vitamin D deficiency is not uncommon and 25-hydroxy vitamin D is the barometer for vitamin D status. The 1,25-dihydroxy vitamin D assay should never be used for detecting vitamin D deficiency because levels will be normal or even elevated as a result of secondary hyper parathyroidism⁴. Much evidence suggests that the recommended adequate is taken are actually inadequate. Hence, eating oily fish frequently, sensible sun exposure (ultraviolet B irradiation) and the use of supplements are needed to fulfill the body's vitamin D requirement.

During treatment of osteomalacia it is also important to measure serum calcium, alkaline phosphatase and renal function on a regular basis to screen for development of

hypercalcaemia⁵. Healing of osteomalacia is reflected by a return of alkaline phosphatase values to normal and 24 hours urinary calcium excretion should be in the range of 100-250 mg/24 hours. Lower level suggests problems with adherence to the treatment regimen or with absorption of calcium and vitamin D supplements. Levels >250 mg/24 hour predispose to nephrolithiasis and should lead to a reduction in vitamin D dosage and/or calcium supplementation.

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