Severe congestive heart failure in elderly patient with Paget's disease

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Abstract

Paget's disease of bone is characterized by focal areas of increased bone turnover, affecting one or several bones throughout the skeleton. Paget's disease is often asymptomatic, but can be associated with bone pain and other skeletal and non-skeletal complications. We report a case of a 84-year old woman who presented a clinical condition suggesting Paget's disease of bone complicated by congestive heart failure.

Introduction

Paget's disease of bone (*osteitis deformans*) is a metabolic bone disease that usually begins after the fourth decade and affects bone remodeling and is characterized by the excessive bone resorption followed by abnormal bone formation, affecting one or several bones throughout the skeleton.[1,2] Excessive osteoclastic bone resorption followed by a secondary increase in osteoblastic activity leads to replacement of the normal bone by a disorganized, enlarged, and weakened osseous structure that is prone to deformities and fractures.

Paget's disease (PD) probably occurs equally often in men and women and clearly increases in prevalence with age. Genetic factors have an important role in this disease, and environmental factors are involved too.[1,2]

Bisphosphonates, structural stable analogs of pyrophosphate, are potent inhibitors of bone resorption and have been used successfully for the treatment of Paget's disease.[3,4]

We describe a case of PD of bone in a 84-year old woman.

Case Report

An 84-year old woman was admitted to geriatric unit from the emergency room for severe pain in multiple vertebral fractures, left ilio and ischio-pubic branches fracture and sacral fracture. She had history of arterial hypertension, severe osteoporosis, cognitive impairment with behavioral and psychological symptoms of dementia (BPSD).

At the time of admission she was taking verapamil 80 mg/die, lisinopril 20 mg/die, alendronate 70 mg/week, vitamin D 25,000 UI/week.

Routine laboratory analyses were normal except for a slight reduction in hemoglobin (10.8 g/dL), in serum calcium (7.9 mg/dL) and in albumin (2.65 g/dL) levels. Serum alkaline phosphatase (ALP) level was 67.56 IU/L (reference range, 3-15 µg/L). Tumor markers (CA 125, CA 15.3, CA 19.9, CEA, NSE) and parathyroid hormone (PTH) were normal. Total body scan, made in the suspicion of metastatic cancer, confirmed skeletal metastatic disease with pathological fractures of ribs, sternum, lumbar vertebrae (L1-L2), left ilio and ischio-pubic branches (Figure 1).

During hospitalization the patient became dyspneic and the electrocardiogram revealed atrial fibrillation which was treated with amiodarone, but the patient got worse and was admitted to cardiac care unit for acute pulmonary edema. The electrocardiogram showed sinus rhythm and left bundle branch block. Troponin increased. Echocardiography revealed left ventricular hypertrophy and reduced left ventricular function (E.F. 30%). The patient was treated with non-invasive ventilation, diuretics, nitrate.

After four days the patient improved and was transferred back to geriatrics care unit, where the bone biopsy was performed, because of the suspicion of metastatic cancer.

The histological examinations showed a bone remodeling with localized excess of osteoclastic bone resorption and osteoblasts on surfaces of new bone formation. There were not invasive tumor cells.

Diagnosed with Paget bone disease the patient was discharged with oral residronate 35 mg once daily for 3 months and vitamin D 25,000 UI once a week. When patient came back home, she had a severe limitation of physical activity and was dyspneic at rest (NHYA IV). Mini-mental state examination (MMSE) revealed a moderately severe cognitive impairment (MMSE: 19/30), furthermore the assessment of daily routine activity showed a functional disability (ADL 1/6, IADL 0/8).

The follow-up visit, three months after oral treatment of residronate, showed improving patient's clinical conditions, disappearing of severe pain, blood pressure at 120/60 mmHg and an electrocardiogram indicating sinus rhythm heart rate at 62 bpm. The patient had a slight limitation of the ordinary physical activity (NYHA II) due to the onset of dyspnea during the course of the said activity. Serum alkaline phosphatase (AP) decreased (15.7 IU/L). The echocardiography showed a left atrial enlargement without ventricular hypertrophy and normal left ventricular function (E.F. 55%).

Discussion

In Western Countries, Paget's bone disease is one of the priorities in differential diagnosis for elderly patients who present osteoblastic lesions. Most patients had polyostotic disease (72%), and the pelvis (67%), vertebra (41%), and femur (31%) were the most common sites of involvement. Skeletal complications attributable to Paget's disease included bowing deformities (7.6%), fracture of pagetic bone (9.7%), and osteosarcoma (0.4%). Osteoarthritis was observed in 73% of patients, and 11% had a hip or knee replacement. Non-skeletal complications related to Paget's disease included cranial nerve (0.4%), peripheral nerve (1.7%), and nerve root (3.8%) compression, basilar invagination (2.1%), hypercalcemia (5.2%), and congestive heart failure (3.0%) and hearing loss (61%).[5,6]

The diagnosis of Paget's disease require a high index of suspicion and conditions which could cause sclerosis of the bone like metastasis from solid tumors like breast, prostate and lung need to be excluded.[7]

Three tests (an X-ray, a blood test, and

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a bone scan) are commonly used to discover Paget's disease. X-rays are used to determine the final diagnosis. In X-ray images, bones affected by Paget's disease have a particular appearance. Radiographs include both lytic (early) and sclerotic findings, osteoporosis circumscripta in skull, bowed limbs, and flame-shaped lesions in long bones. Many patients are diagnosed incidentally in the asymptomatic phase through plain radiographs that show localized enlargement of bone. These radiographs often have a high specificity because of their classic nature, but a low sensitivity. In a blood test, a higher level of serum AP is a sign that the disease may be present. An AP level greater than twice the usual level strongly suggests Paget's disease, especially if the patient's serum calcium level, phosphorus level, PTH level and kidney function are normal. Increased bone turnover and remodeling is associated with elevated levels of serum AP. Such a marker allows an earlier diagnostic and assessment of the activity of Paget's disease and monitoring of the effectiveness of the medical treatment by bisphosphonates.[8,9]

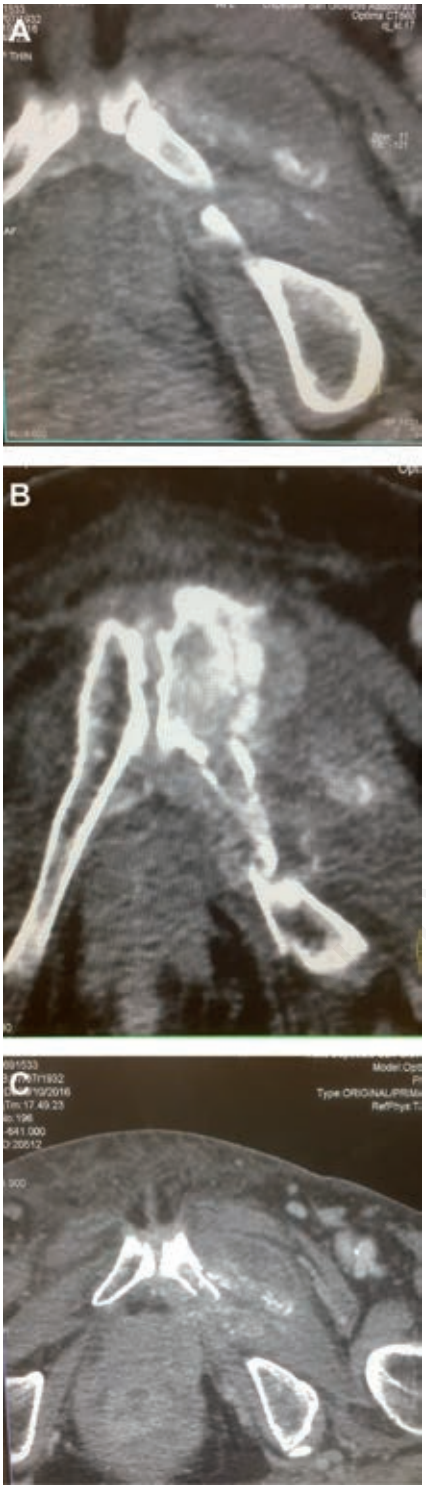

Figure 1. Pathological fractures of pelvis.

A bone scan helps identify which bones have been affected by Paget's disease. Furthermore, bone scans can be used to increase diagnostic sensitivity in patients suspected of having Paget's disease, although this method is less specific and should be interpreted cautiously.

A hallmark of the pathology of Paget's disease is the increased vascularity of affected bones. Further evidence for this has been documented by demonstration of an increase in blood flow to the extremities,[10] although it has been suggested that this is mainly caused by cutaneous vasodilation.[11] An echocardiographic study of cardiac function in Paget's disease found that patients with more severe disease had lower peripheral vascular resistance and higher stroke volume.[12] These observations help account for the finding that patients with 15% or more of their skeleton affected by Paget's disease have increased cardiac output.[13]

High-output heart failure (HF) is characterized by an elevated resting cardiac index beyond the normal range of 2.5 to 4 L/min per m^2. Ineffective blood volume and pressure, chronic activation of the sympathetic nervous system and renin-angiotensin-aldosterone axis, increased serum vasopressin (antidiuretic hormone) concentrations, and chronic volume overload gradually cause ventricular enlargement, remodeling, and HF.[14] A number of conditions lead to an obligatory increase in cardiac output, which can be associated with HF in some patients.

In most patients with high-output HF, high cardiac output provokes HF in the setting of reduced ventricular reserve from some underlying cardiac problem.[14,15]

Concerning our patient case study we assumed that congestive HF with a low cardiac output was occasioned by an underlying coronary artery disease and atrial fibrillation in circumstance of high-output heart failure. Unfortunately we did not perform an echocardiography before the hospitalization, consequently we could not observe the hemodynamic parameters before the occurrence of acute pulmonary edema.

Furthermore, following the oral treatment of risedronate, patients' health status and physical performance improved, as a matter of fact the new echocardiography showed a significant regression of heart failure symptoms. Finally, our patient did not experienced any side effects after three months of therapy.

Medical management of Paget's disease of bone is based on giving inhibitors of osteoclastic bone resorption, and bisphosphonates are the treatment of first choice[16]. Bisphosphonate therapy is primarily indicated for patients who have bone pain arising from increased metabolic activity in affected bones.[16] Bisphosphonate therapy is highly effective at reducing bone turnover, and it has been shown to heal radiological lesions and restore normal histology.[17,18]

Conclusions

In conclusion this case demonstrated an older patient with Paget's disease, complicated by congestive heart failure, who had been effectively treated with oral bisphosphonates.

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