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Case Study On Osteoporosis

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Abstract: Osteoporosis is a chronic disease that is characterized by a loss of bone density, which mainly affects the microstructure of the bones due to a decrease in bone mass, thereby making them more fragile and susceptible to fractures. The intricate balance of bone remodeling, influenced by hormonal changes, aging, genetics, nutritional deficiencies, and lifestyle factors, plays a pivotal role in the development of osteoporosis. While the condition often progresses silently, leading to fragility fractures, understanding its symptoms, such as back pain, height loss, and fractures, is crucial for early detection. Osteoporosis increases the risk of fracture in our elderly population and increases morbidity. Here, we present a case of osteoporosis with a fracture diagnosed in clinical settings. A 67 years old female patient was admitted in Multispeciality hospital due to dull aching pain in her lower back for the past 6 months and she had hypertension for past 12 years and on investigation, she was diagnosed with Osteoporosis by DEXA scan. After starting the therapy her vitals become normal level and she retained consciousness. On the fifth day she was discharged with the instructions regarding the medications to be followed up.

Index Terms - Osteoporosis, Alendronate, Patient Counselling.

I. INTRODUCTION

Osteoporosis is a disease that is characterized by low bone mass, deterioration of bone tissue, and disruption of bone microarchitecture.^[1] Primary osteoporosis is related to the aging process in conjunction with decreasing sex hormones. The bones demonstrate deterioration in microarchitecture, leading to loss of bone mineral density and increased risk of a fracture. Other diseases or their treatments cause secondary osteoporosis. Men are much more likely than women to have secondary osteoporosis. Medications that can lead to secondary osteoporosis include glucocorticoids and anti-epileptics. Other medications such as chemotherapy agents, proton pump inhibitors, and thiazolidines are less well studied but suspected to also contribute to osteoporosis.^[2]

Primary osteoporosis, the most common form, develops due to aging or menopause-related bone demineralization. In primary osteoporosis, BMD decreases as the age increases. Primary osteoporosis can be divided into two types (postmenopausal and senile). Type I (Postmenopausal Osteoporosis) osteoporosis mainly affects the trabecular bone due to estrogen deficiency. Type II (Senile Osteoporosis) osteoporosis is

seen at age >70 in both sexes. This type occurs as a result of the aging of trabecular and cortical bones and the resulting loss of bone mass and quality.^[3]

II. CASE PRESENTATION

PATIENT DESCRIPTION:

Patient X is a 67-year-old female who presents to the Multispeciality hospital in the southern part of Kerala with complaints of gradual onset of dull aching pain in her lower back for the past 6 months. The pain worsens with prolonged sitting or standing. No history of trauma, but there was a minor slip in bathroom 2 weeks ago at home, which made the pain worse. This patient has a past medical history of hypertension (HTN) for 12 years on T. Myotan CN. Patient X is married and menopause at 49 years. The patient weight 63kg, BP 126/90mmHg, pulse 72/min, peripheral pulse 22/min, and heart sounds S₁, S₂. The patient lungs were clear on auscultation bilaterally. The cardiovascular exam showed a regular rate and rhythm without any murmurs. The blood test was normal in this patient except for low levels of Haemoglobin and Vitamin D. The patient was also asked to get a DEXA scan, which revealed a Lumbar Spine of T score – 3.0 and Femoral neck – 2.8 (less than -2.5 is osteoporosis).

III. INVESTIGATIONS

- Hb (Haemoglobin), Serum calcium and serum vitamin D report had decreased value as compared to the normal value.
- RBC decreased to 4.1million cells/ μ l as compared to normal value of 4.2 to 5.4million cells/ μ l.
- In cholesterol the PCV value showed normal range.
- ESR (Erythrocyte sedimentation rate) which shows increased to 34mmHg as compared to the normal value of 0-30mm/hr.
- The LFT report of CRP had increased to 1.51mg/Dl as compared to the normal value of 0.9mg/Dl it increases.
- Examination on DEXA scan showed that Lumbar spine T score -3.0 and Femoral neck T score -2.8
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IV. DIAGNOSIS

Based on DEXA scan finding was diagnosed having Osteoporosis.

V. TREATMENT

Her treatment includes oral tablets.

- ❖ T. FOSAMAX - Contains Alendronate is used to prevent and treat osteoporosis (thinning of the bone) in women after menopause of 70mg was given once in a week.
- ❖ T. SHELICAL - Contains calcium and Vitamin D₃ is used to treat conditions caused by low calcium levels such as bone loss (osteoporosis), calcium, along with vitamin D, may have benefits beyond bone health of 500mg was given once in a day after breakfast.
- ❖ T. PARATIK – Contains paracetamol which are sometimes used for pain relief in people with osteoporosis, some studies suggest it might slow bone growth or increase fracture risk of 500mg was given whenever needed.
- ❖ T. MYOTAN CN – Contains Azilsartan Medoxomil and Cilnidipine are calcium channel blocker; While these medications do not directly treat osteoporosis but they have a positive effect on bone health of 40/10mg was given once in a day after breakfast.

VI. PROGNOSIS

The patient improved slowly and after 2 days, her vitals such as Blood Pressure, Respiratory Rate, Pulse Rate, Saturation of Peripheral Oxygen, remained stable.

On the fifth day of his admission, he becomes normal and he was discharged on 04-05-2025 with following medications to continue.

Follow-up: He was discharged on 04-05-2025 with following medications.

- ❖ T. Shelcal - Shelcal 500 is a supplement used to manage calcium and vitamin D deficiencies, primarily to support bone health & prevent osteoporosis, and other bone-related disorders of 70mg was given once in a week.

- ❖ T. Paratik - Contain Paracetamol which is used to relieve pain caused by nerve pain, period(menstrual) pains, Arthritis and muscle aches of 500mg was given whenever needed.
- ❖ T. Myotan - Myotan are calcium channel blocker; While these medications do not directly treat osteoporosis but they have a positive effect on bone health of 40/10mg was given once in a day after breakfast.
- ❖ T. Dexorange - Dexorange prevents Iron, Zinc, Folic acid, and Vitamin B12 Deficiencies was given once daily in the morning.

VII. DISCUSSION

PATHOPHYSIOLOGY

The cause of osteoporosis ^[4-6] is an imbalance between bone formation and bone reabsorption. A typical bone is constantly being broken down and reformed. Around 10% of our total bone mass is under constant remodeling at any given time ^[7]. Due to menopause ^[8,9], the amount of estrogen secreted in a woman can decline rapidly ^[8,10]. The lack of estrogen ^[11] will increase the risk of bone reabsorption and decrease the deposition of new bone. Due to menopause, we also see an increase in basic multicellular units made of osteoclasts and osteoblasts cells. These osteoclast and osteoblast cells will sequentially resorb old bone and form new bone. This prolongs the osteoclast resorption time and relative shortening of the time for osteoblastic bone formation. The recent studies ^[9,12,13], both done in vitro and in vivo, show that, in the eugonadal state, estrogen will inhibit receptor activators of nuclear factor- κ B ligand (RANKL). RANKL ^[12,13] is a molecule found on the bone marrow stromal cells/osteoblast precursors and T and B cells. A decrease in the concentration of Vitamin D can also increase the risk of fracture and lower the BMD in the patient's body. The primary source of Vitamin D comes from sunlight and diet. A severe deficiency of Vitamin D levels can lead to osteomalacia (in adults) or rickets (in children). These diseases cause softening of bones and increase the risk of fracture tremendously. The use of anti-acidity medications ^[5] like proton pump inhibitors (PPI) or H2 receptor blockers (Cimetidine) has been shown to increase fracture risk in adults. The increase in the risk of fracture due to anti-acidity medication is that these medications induce hypochlorhydria in the human body. This hypochlorhydria affects the absorption of calcium and therefore leads to a decrease in calcium in the body, increasing the risk of fracture. Any changes in sex hormones ^[11] are the most critical factor which affects bone loss due to aging; however, we still need to recognize the non sex steroid hormonal changes that also occur in the human body. The most important hormone that affects bone physiology is the decrease in growth hormone secretion (as we age) from the pituitary gland. This decrease in growth hormone leads to a decrease in the production of insulin-like growth factors (IGF-1 and IGF-2) ^[7-9] from the liver. These hormones have a role in osteoblast activity and differentiation. A decrease in IGF is also associated with increased IGF inhibitory binding protein (IGFBP-2). An increase in IGFBP-2 in the human body leads to a decrease in BMD in adults ^[9-11].

MANAGEMENT

The most pivotal step in the diagnosis of osteoporosis is a DEXA scan (dual-energy x-ray absorptiometry). This test measures BMD. T score of less than -2.5 is considered a diagnosis of osteoporosis. Whereas a score of -1 to -2.5 is considered osteopenia. The NOF guidelines ^[7-9] state that a patient should undergo osteoporosis treatment not just after a hip/vertebral fracture or with a T- score ≤ -2.5 , but treatment should also be considered in postmenopausal women and men with osteopenia (age > 50). The main goal of osteoporosis treatment is not just to increase BMD but also to prevent fractures in the future. Calcium and Vitamin D deficiency leads to an increase in the risk of bone loss and muscle weakness. This deficiency will, in turn, increase the patient's risk of falling and fracture. By prescribing calcium and Vitamin D supplements to the patient, we can decrease fracture risk by 10% - 15%. Multiple outcomes of the raloxifene evaluation (MORE) study have shown that raloxifene, a SERM, reduces the risk of vertebral fracture by 30% if used continuously for three years. National Institute of Health and Care Excellence (NICE) recommends using raloxifene in postmenopausal women at increased risk for osteoporosis or women intolerant of Bisphosphonates. Bisphosphonate is the class of drugs used for preventing osteoporosis. It has been the best choice for the treatment of osteoporosis since the 1960s. Bisphosphonates and their analogs bind at sites where bone resorption and new bone formation occur. The osteoclasts will ingest bisphosphonates bound to the mineral and therefore inhibit the function of osteoclasts. This will consequently lead to inhibition of bone resorption ^[9,10].

In addition to her past medical history and family history, these findings put this patient at risk of fracture due to osteoporosis because she slips in bathroom 2 weeks ago. The past medical history of patient X (menopause and old age) is consistent with the common risk factors for the development of osteoporosis.

Patient X also went through a thorough neurological examination to rule out any spinal cord or peripheral nerves being compromised. Vitamin D and Calcium supplements will help in increasing the BMD in the bones and decrease the risk of osteoporosis. The patient was also asked to have a good diet and exercise daily to encourage weight loss. The patient must do some weight-bearing exercise as this helps increase the BMD and helps decrease osteoporosis. Due to an increase in fracture risk from falling, the patient was advised to use a walker while walking.

VIII. PATIENT COUNSELLING

Includes modification of general lifestyle factors such as,

- A balanced diet containing calcium and vitamin D.
- Smoking Cessation.
- Avoidance of heavy alcohol use.
- Regular Bone Density scans must monitor to check bone health.
- A regular exercise routine should be encouraged, including weight-bearing and muscle-strengthening exercise.

IX. CONCLUSIONS

Through this case presentation, we realize that patients in our society are not appropriately screened for osteoporosis during their lifetime. This is usually due to a lack of medical knowledge among our patient population and sometimes the cost as well. Osteoporosis remains a public health problem and an economic burden to our society. As the incidence of osteoporosis continues to increase, it is clear that preventive interventions must be considered early on and sometimes as early as in utero. Patient education in primary care should focus on the benefits of a healthy lifestyle, a nutritious, and balanced diet (with Vitamin D and calcium supplements) in preventing the risk of osteoporosis. Patients must also avoid smoking, drinking, and illicit drugs as they have been shown to decrease the BMD and increase the risk of osteoporosis.

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