A Case Report on Zoledronic Acid as Palliative Treatment in Carcinoma of Lung with Bone Metastasis

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Abstract: Bone metastasis is a general complication of advanced carcinomas, usually seen in breast cancer, prostate cancer, non-small cell lung cancer and multiple myeloma. Zoledronic acid, which belongs to bisphosphonates, is indicated for bone metastasis caused due to carcinomas. This case report is about a patient with carcinoma of lung (Stage 4) with bone metastasis who has been provided with zoledronic acid as a palliative treatment. The patient was a 65-year-old male with the known case of type 2 diabetes mellitus (T2DM) and ischemic heart disease (IHD) status post (s/p) coronary artery angiography (CAG) with left ventricular ejection fraction (LVEF) 30% who was on medication. He presented with chest pain and breathlessness nine months prior and his multi-detected computed tomography (MDCT) pulmonary angiography revealed bronchogenic carcinoma. A computed tomography (CT) scan showed a metabolically active lytic lesion involving the left posterior 2nd rib and degenerative changes were noted in the spine. He has now reported upper back pain for three months localised to the left and right inferior scapular region. His pain scored a nine on the Visual Analogue Scale (VAS), and he was prescribed zoledronic acid 5mg/100ml IV infusion once in 3 weeks. On a revisit, the patient was assessed to be symptomatically better, and the pain score was lowered to 6, indicating reduced severity of discomfort. In conclusion, zoledronic acid is effective in the palliative treatment of lung cancer patients with bone metastasis.

Keywords: zoledronic acid • palliative treatment • bone metastasis • lung cancer

1. Introduction

Bone metastasis is typically present in patients with lung cancer (LC). Bone is a frequent site of metastatic spread in LC due to its substantial surface area and highly vascular supply. In bone metastasis, tumour cells invade the bone marrow, creating a cancer niche that interrupts normal bone homeostasis; signals are released from the resorbed bone matrix that encourages the growth of skeletal tumours. Usually, skeletal-related events (SREs) accompany bone metastases and affect a patient’s prognoses and life expectancy by causing bone injuries, hypercalcemia of malignancy, and intense pain. Zoledronic acid, a bisphosphonate, is frequently used in cancer patients with bone metastases to reduce skeletal-related complications. It is an imidazole containing compound, which acts by preventing the loss of bone mass. It reduces osteoclast activity and triggers osteoclast apoptosis in culture. Through its binding to the bone, zoledronic acid also inhibits osteoclast activity and skeletal calcium release brought on by numerous stimulatory substances secreted by tumours. This prevents the resorption of mineralised bone and cartilage.

2. Case Report

A 65-year-old male patient presented with a known case of T2DM, HTN and IHD s/p CAG, LVEF-30% for 10 years and on the following medications: Tab ZAYO (Sacubitril 24mg+valsartan 26mg) 50mg ½-0-½, Tab METAPRO XL (Metoprolol) 25mg 1-0-0, Tab ECOSPIRIN AV 75 (Aspirin 75mg+Atorvastatin 10mg) 0-0-1, Tab RIVAROXABAN 20mg 0-0-1, Tab GLYCOMET TRIO 2 (Glimepride...
2mg+Metformin 500mg+Voglibose 0.2mg) 1-0-1, and Tab TORGET (Torsemide) 0-1-0. 8 months prior the patient was diagnosed with right-sided bronchogenic carcinoma of the lung (Stage 4) with bone metastasis by the evidence of MDCT pulmonary angiography, positron emission tomography (PET-CT) and histopathology reports. The results of MDCT revealed: 1) Ill defined necrotic mass lesion in the epical segment of right upper lobe with mass effect over adjacent mediastinal vascular structures resulting in thrombus in Superior Vena Cava (SVC), right Internal Jugular Vein (IJV), subclavian and axillary vein; 2) No pulmonary thrombo embolism; 3) Pulmonary nodule in superior segment of right lower lobe; 4) Cardiomegaly with dilated left atrium and ventricle; and 5) Anterior wedging of the D12 (thoracic) vertebral body with a reduction of 25-30% in height.

The results of the PET-CT scan from vertex to mid-thigh are as follows:

- **Figure 1a**: PET-CT scan from vertex to mid-thigh.
  - Neck: Thrombosis of right IJV, right subclavian, and axillary veins with adjacent soft tissue standing.
  - Chest: 4.4×3 cm pleural based metabolically active soft tissue in the right upper lobe abutting the adjacent diaphragmatic pleural, likely of neoplastic etiology. Peripheral lung nodule in the apical segment of right lower lobe: metastasis.
  - Musculoskeletal: Metabolically active lytic lesion involving the left posterior 2nd rib. Degenerative changes are noted in spine. Histopathology report: Left rib lesion biopsy. Features are of metastatic squamous cell carcinoma.

He completed his first cycle of chemotherapy 5 months after detection. Recently, the patient reported with complaints of upper back pain and chest pain after 3 months. On assessment of pain with visual analogue rating scale, he scored 9, indicating severe pain (Figure 2). Thus, the patient was administered with zoledronic acid infusion 5mg/100ml IV over 30 minutes and advised to take the same once every 3 weeks. On revisit for administration, the pain score was measured and found to be reduced to 6 and the patient was observed to be symptomatically improved (Figure 3).

### 3. Discussion

The most frequent type of cancer identified globally is lung cancer. It accounts for 6.9% of new instances of cancer and 9.3% of all cancer-related deaths in India, affecting people of both genders. In retrospective research conducted in China, bone metastasis was present in 23.9% of lung cancer patients. Compared to individuals with breast or prostate cancer, people with lung cancer experience bone metastases sooner before experiencing SRE’s. A study conducted by Tassone P et al. stated that zoledronic acid inhibits the proliferation and apoptosis of cancer cells. Zoledronic acid (bisphosphonates) and denozumab (monoclonal antibodies) can decrease and also prolong the incidence of SREs. It has been found that, compared to zoledronic acid, denosumab is more expensive; hence zoledronic acid may be more preferred.

### 4. Conclusion

Zoledronic acid is well tolerated and was found to be effective as a palliative treatment in lung cancer with
bone metastasis and improved patients’ quality of life with a significant reduction in pain. However, further studies are needed to determine the side effects and how zoledronic acid can be used in combination with other treatments.

**Conflict of interest**

The authors declare that there is no conflict of interest to disclose.

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**Author contributions**

SY and SM both contributed in collecting the case and did follow-up, literature review, and writing the original draft. YG and NVT reviewed the written draft.

**References**


