Case Report

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Dorsal Vertebral Enhancement Mimicking Sclerosing Metastases in Lung Cancer

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ABSTRACT

We report cases of vertebral body enhancement in patients with superior vena cava and brachiocephalic venous obstruction appearing as sclerotic metastases in post-contrast CT.A 58-year-old male presented with right lung mass compressing the superior vena cava.Sclerotic areas seen involving few vertebrae in post-contrast scans.Another patient, 64-year-old female with right lung mass and narrowing of left brachiocephalic vein, sclerosis of lower cervical and upper dorsal vertebrae were seen in contrast studies. In both cases after resolution of pathology following treatment showed no enhancement in post contrast scan which was attributed to the collaterals arising due to obstruction, obviously not seen in metastases.

Keywords: Brachiocephalic vein obstruction; computed tomography CT; superior vena cava SVC; vertebral enhancement; venous collaterals

INTRODUCTION

In known malignancy patients, multiple sclerotic vertebral lesions raise the possibility of metastases. If reporting done based on contrast enhanced CT scan, the vertebral enhancement may be mis-interpreted as sclerotic lesions. The hyperdense lesions in the vertebral bodies will be absent in pre-contrast CT scans of such cases.Vertebral enhancement is uncommon phenomenon, and occurs due to several causes, SVC obstruction being one of them. SVC obstruction can show vertebral contrast enhancement owing to the collateral venous blood flow.[1] We present here two such cases of pseudopathologic vertebral enhancement in the setting of SVC obstruction in patients with lung cancer.

CASE REPORT

The first case, a 58-year-old male presented with cough and hemoptysis for the last 4 months, along with chest pain, shortness of breath, loss of appetite and weight, blackouts while coughing. Patient was a smoker with chronic obstructive pulmonary disease as comorbidity. CT scan of the thorax was done on the Siemens Biograph 64-slice PET-CT with Iohexol 300mg/ml 3ml/sec as IV contrast medium and right lung mass with mediastinal infiltration was seen.There was significant compression of the SVC and encasement of the right pulmonary artery, right brachiocephalic artery and right main bronchus with pulmonary embolism [Figure 1].Hepatic metastasis and mediastinal, cervical and perigastric lymphadenopathy was seen. Sclerotic areas noted in first to fourth dorsal vertebral bodies and pedicles in post contrast CT scan, but on comparison with pre contrast CT scan these were detected as enhancement instead of sclerosis [Figure 2].The patient was diagnosed with small cell lung cancer and received chemotherapy, radiation therapy with palliative intent. Follow up CT scan of the thorax, abdomen and pelvis showed partial response with significant reduction in size of the lung mass and the degree of SVC obstruction (Figure 1). The enhancing lesions noted previously in D1 to D4 vertebrae were no longer seen (Figure 2). The appearance of other sclerotic lesions in bones in the response scan as response to treatment of previous bony lesions with the disappearance of the D1-D4 vertebral enhancement supports our hypothesis of this being a benign phenomenon and not the response of a malignant lesion to treatment.

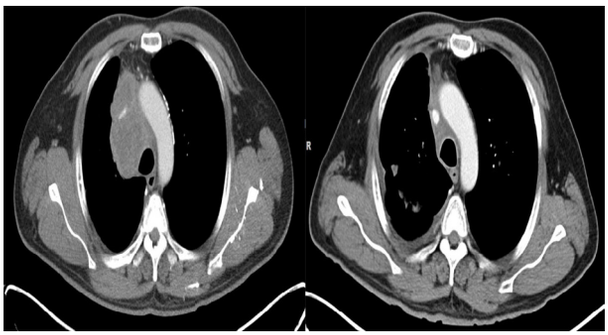

Figure 1. Right lung mass with SVC compression and relief of obstruction after treatment.

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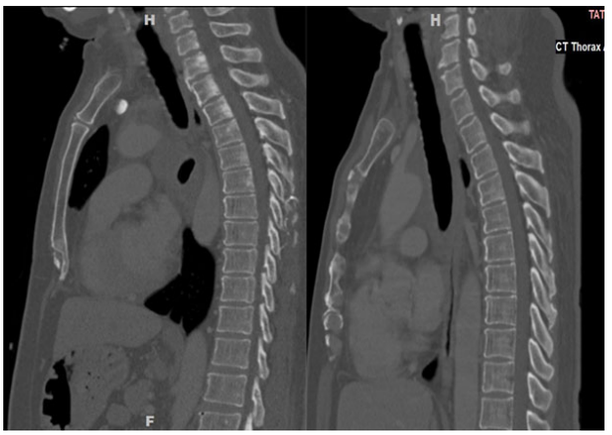

Figure 2. Pre-treatment and post treatment sagittal bone window post contrast CT scan images.

The second case, 64-year-old female, with previous history of carcinoma endometrium and breast, presenting with non-small cell lung cancer. The CT scan of thorax and abdomen showed right lung mass, bilateral lung metastases, significant narrowing of left brachiocephalic vein.The upper thoracic vertebrae appeared normal in non- contrast CT, with enhancement in the post contrast study, mimicking vertebral metastases (Figure 3).

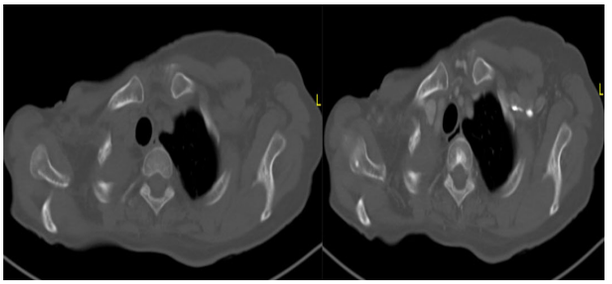

Figure 3. Pre and post contrast CT scan bone window images showing enhancement of upper thoracic vertebra mimicking sclerosing metastases in patient with left brachiocephalic vein obstruction.

DISCUSSION

Superior vena caval obstruction in most cases is the result of mediastinal or lung mass with mediastinal extension. Common malignancies are small cell and non-small cell lung cancers, lymphoma, metastatic lymphadenopathy from intrathoracic and extrathoracic malignancies, and tracheal malignancies.[2] Other rare causes may be trauma, fibrosing mediastinitis, granulomatous diseases.[3] Both of our cases were lung malignancies with metastases.

SVC obstruction has been extensively studied in literature, but few cases and studies of vertebral body enhancement have been published, the first case report being published in 2011.[3-5] Not much is known how exactly the vertebral body enhancement occurs, however the knowledge of the venous pathway might enlighten us about possible rationale. For this reason the superior vena caval obstruction and the pathophysiology that follows needs to be understood.[5]

There are four pathways namely internal mammary, azygous, hemiazygos, lateral thoracic, superior thoraco-abdominal and vertebral venous plexus pathways.[3-6] There is no straight forward rule as to what kind of collateral will form but several pathways might occur simultaneously which again varies according to the etiology, patient condition and duration of the obstruction.[5,6]

In our cases, the involved pathway is vertebral venous plexus pathway, as several enhancing collaterals were seen surrounding the upper thoracic vertebrae and chest wall. Due to obstruction of the SVC, blood from the subclavian veins flowed to the vertebral venous plexus through mediastinal and left chest wall collaterals. Venous pressure was likely to be sufficient enough to produce enhancement of intravertebral veins and capillaries resulting in increase in vertebral density which mimicked bony metastases. The vertebral venous plexus is valveless network of veins extending along the length of spinal column. The internal venous plexus of Batson receives blood from vertebral bodies through basivertebral veins. There is communication with the external paravertebral venous plexus via multiple intervertebral veins. The paravertebral plexus makes anastomoses via segmental veins remaining in communication with left brachiocephalic, azygous, hemiazygous and left renal veins or inferior venacava.[3-8]

Some of the studies report certain patterns in imaging which might help us to differentiate between vertebral body enhancement in venous congestion, and vertebral sclerotic metastases. One of the studies reports vertebral enhancement to be more common in the central portion and middle one-third [5] and few cases report common enhancement at the posterior aspect of vertebral body.[3] Thoracic vertebral enhancement is thought to be most common, followed by cervical and lumbar vertebrae.[5] The study by Kim et al has tried to characterize pattern of enhancement as focal nodular occupying less than one-third of the vertebral body, or polygonal pattern occupying greater than or equal to one-third of the vertebral body.[1,5] In both of our cases, enhancement was mostly at the posterior half of the vertebral bodies surrounding the basivertebral veins, and thoracic vertebrae were involved. No pattern as such could be established.

CONCLUSIONS

The significance of the correct identification of vertebral body enhancement is high, as it can present with diagnostic dilemmas, change the prognosis and management. Vertebrae are common sites of metastases in malignancies such as lung and breast carcinoma, and the resemblance to sclerotic metastatic lesions is a diagnostic pitfall during contrast enhanced chest CT evaluations in cases of venous obstruction. We would like to emphasize on the awareness of this finding of vertebral enhancement in cases of vertebral congestion and the importance of reviewing pre-contrast CT images for confirmation whenever doubt arises.

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