Case 10956

Dilatation of basivertebral veins mimicking osteoblastic lesions on contrast enhanced CT.
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Section: Musculoskeletal system
Area of Interest: Musculoskeletal spine Thorax
Procedure: Contrast agent-intravenous
Procedure: Diagnostic procedure
Imaging Technique: CT
Imaging Technique: MR
Special Focus: Haemodynamics / Flow dynamics Case
Type: Clinical Cases
Authors: Bagetakos I, Syrogiannopoulou A
Patient: 56 years, male

Clinical History:
A 56-year-old man with a history of left pneumonectomy for suspicion of a tumour of the left upper and lower pulmonary lobe, with post-operative histology disproving neoplasia and being positive for fibrotic tissue with chronic inflammation signs, presented with thoracic back pain without neurological deficit. PSA level was normal.

Imaging Findings:
A contrast enhanced thoraco-abdominal CT was performed demonstrating left brachiocephalic vein stenosis due to left mediastinal deviation post left pneumonectomy with collateral vessels of the left chest wall. In addition, it showed sclerotic lesions with symmetric localisation at the posterior part of the vertebral bodies T2 to T7, corresponding to basivertebral vein distribution.

On MRI the sclerotic lesions at the posterior part of the vertebral bodies T2 to T7 described at the CT were not found, especially on T1 weighted sequences that are very sensitive to sclerotic lesions.

Furthermore, a contrast-enhanced cervical CT (covering the upper thoracic spine) with early acquisition time effectuated just a few days later showed no evidence of sclerotic vertebral lesions at the same locations.

Discussion:
Pneumonectomy is the treatment of choice for bronchogenic carcinoma and intractable end-stage lung diseases [1]. It involves reasonable anatomic changes and a number of potential complications concerning the respiratory system, the cardiovascular system, and the pleural space [2]. In the post pneumonectomy period, the mediastinum either remains stationary or gradually shifts toward the postpneumonectomy space as a result of hyperextension of the remaining lung [1]. After left pneumonectomy, the heart rotates counterclockwise into the vacant left pleural space [3].

In the above case, left brachiocephalic vein stenosis occurred in the post-operative period due to the left mediastinal deviation post pneumonectomy. As a result a collateral venous circulation via the vertebral pathway and left chest wall veins was developed. In brachiocephalic vein stenosis there are the following options for the development of a
collateral circulation: 1) Collateral flow through deep and superficial veins of the back, chest, and neck into the contralateral jugular, subclavian, and brachiocephalic veins or 2) Collateral flow through superficial chest wall veins such as the internal mammary and intercostal veins into the azygos (if right-sided occlusion) or hemiazygos (if left-sided occlusion) or into inferior epigastric veins.

In this case, there is development of left chest wall collaterals with high venous pressure leading to opacification of the dilated basivertebral veins. As a result there is an increase in vertebral density at the posterior middle part of T2 to T7 vertebrae that was mistaken for osteoblastic lesions at the contrast enhanced CT. However the symmetry and location of the sclerotic lesions should raise suspicion of basivertebral vein opacification. MRI excluded the diagnosis of pathologic vertebral lesions. A contrast-enhanced cervical CT (including the upper dorsal spine), performed just a few days after the initial thoraco-abdominal contrast enhanced CT, showed no evidence of osteoblastic vertebral lesions because of the absence of contrast in the basivertebral veins, due to earlier acquisition time post contrast injection.

Our case illustrates that contrast opacification of dilated basivertebral veins can lead to false diagnosis of bone metastases. To our knowledge there has been only one case previously reported in the literature with focal vertebral marrow enhancement due to basivertebral dilatation after superior vena cava obstruction.

**Differential Diagnosis List:** Dilatation of basivertebral veins due to brachiocephalic vein stenosis postpneumonectomy., Metastatic Disease (prostate, breast, other), Bone islands, Hyperparathyroidism

**Final Diagnosis:** Dilatation of basivertebral veins due to brachiocephalic vein stenosis postpneumonectomy.

**References:**


Description: Sagittal contrast enhanced CT image shows sclerotic lesions at the posterior part of the vertebral bodies T2 to T7 (arrows). Origin: Bagetakos I, Department of Radiology, Hôpitaux Universitaires de Genève, Geneva, Switzerland
Description: Axial contrast enhanced CT image shows a sclerotic lesion at the posterior part of T5 (arrow). Origin: Department of Radiology, Hôpitaux Universitaires de Genève, Geneva, Switzerland
Description: Axial contrast enhanced CT image shows a sclerotic lesion at the posterior part of T3 (arrow). Origin: Department of Radiology, Hôpitaux Universitaires de Genève, Geneva, Switzerland
Description: Sagittal T1-weighted MRI sequence shows no evidence of low signal lesions of T2, T3, T4 vertebra and a vertebral haemangioma of T1. Origin: Bagetakos I, Department of Radiology, Hôpitaux Universitaires de Genève, Geneva, Switzerland
Description: Sagittal T1-weighted MRI sequence shows no evidence of low signal lesions of T3, T4, T5 and T7 vertebra and a vertebral haemangioma of T6 and T10. Origin: Bagetakos I, Department of Radiology, Hôpitaux Universitaires de Genève, Geneva, Switzerland
Description: Sagittal STIR MRI sequence shows no lesions of T2, T3, T4; haemangioma of T1 vertebra. Origin: Bagetakos I, Department of Radiology, Hôpitaux Universitaires de Genève, Geneva, Switzerland
Description: Sagittal STIR MRI sequence shows no lesions of T3, T4, T5 and T7; haemangioma of T10. Origin: Bagetakos I, Department of Radiology, Hôpitaux Universitaires de Genève, Geneva, Switzerland
Figure 3

Description: Cervical sagittal contrast enhanced CT effectuated a few days after the initial thoraco-abdominal contrast enhanced CT, shows no evidence of sclerotic vertebral lesions because of the absence of contrast in the basivertebral veins. Origin: Bagetakos I, Department of Radiology, Hôpitaux Universitaires de Genève, Geneva, Switzerland
Description: Axial contrast enhanced CT image with MIP reconstruction shows left brachiocephalic vein stenosis (blue arrow) with collateral vessels of the left chest wall (yellow arrows). Origin: Bagetakos I, Department of Radiology, Hôpitaux Universitaires de Genève, Geneva, Switzerland