Pseudotumoral vertebral body enhancement

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Clinical description

This 52-year-old male patient was diagnosed positive for HIV 14 years previously and showed a high viral load due to non-compliance with antiretroviral treatment. The patient presented with terminal-phase chronic renal insufficiency treated by dialysis, full remission from diffuse large B-cell lymphoma with lymph node and intestinal (small intestine) involvement, and EBV-associated multifocal leiomyosarcoma (rectal, arm and thigh localisation) treated by surgical resection. The patient also reported having, three years before, multiple episodes of thrombosis of the left subclavian vein extending to its junction with the superior vena cava treated using a Canaud catheter.

A thoracoabdominal CT examination (Fig. 1) was performed as part of routine follow-up of the patient’s two neoplastic diseases (B-cell lymphoma and leiomyosarcoma).

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\textsuperscript{*} Here is the answer to the case Multiple osteosclerotic foci in vertebral bodies previously published. As a reminder we publish again the entire case with the response following.

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What is your diagnosis?

Among the following possibilities, what would your diagnosis be after observation?
• Secondary lymphoma of the bone;
• Osteoblastic metastases;
• Notochordal remnants;
• Pseudotumoral vertebral body enhancement;
• AIDS-related bacillary angiomatosis of the bone.

Diagnosis

Multifocal pseudotumoral vertebral body enhancement secondary to thrombosis of the brachiocephalic vein.

Comments

On the thoracoabdominopelvic CT examination obtained after intravenous administration of iodinated contrast material the central portion of thoracic vertebrae T2 to T4 appeared dense and layered (Fig. 2). This pattern was also observed in vertebrae T5 to T9 but to a lesser degree. These abnormal features were not found on control CT examination obtained without contrast agent (Fig. 3).

These imaging features reflect an increase in vertebral density resulting from greater capillary opacity within the thoracic vertebrae subsequent to vascular redistribution and development of collateral circulation. This collateral vascularization is due to chronic thrombosis of the brachiocephalic vein extending to its junction with the superior vena cava.

It is important not to mistake this vertebral enhancement pattern, sometimes pseudonodular, with osteoblastic metastases.

Diagnostic is based on the absence of such abnormal features on plain CT examination, and/or evidence of an increased collateral flow between the basivertebral and dilated paravertebral veins (Fig. 2). This disappearance on plain CT examination has led to the term “vanishing bone metastases” that is sometimes used to designate such features (Fig. 3).

An 18-FDG PET scan without administration of iodinated contrast agent, performed as part of routine follow-up of the patient’s neoplastic diseases (lymphoma and leiomyosarcoma), did not show any hypermetabolic foci, even in the thoracic vertebrae (Fig. 4).

Discussion

Together with the internal mammary, lateral thoracic and thoraco-abdominal venous networks, the paravertebral venous plexuses represent the main supra-diaphragm channels of collateral circulation that develop from the azygos and hemi-azygos systems in the event of SVC thrombosis [1–3]. The number and distribution of such collateral circulation paths depend on anatomical variations, the time elapsed since obstruction and the thrombosis site.

Neither the internal and external paravertebral venous networks have valves that control the flow of blood. For this reason when venous pressure is increased following thrombosis, retrograde opacification of the azygos system, paravertebral plexuses, basi-vertebral vein and interosseous capillary network can be observed.

Although the development of alternative venous paths following SVC thrombosis has been extensively described in the literature, pseudotumoral vertebral body enhancement secondary to mediastinal venous obstruction is rarely mentioned [4,5] Besides, all reported cases of pseudotumoral vertebral body enhancement were associated with
mediastinal venous thrombosis, while the opposite is not true: most mediastinal venous thromboses/obstructions, are not associated with pseudotumoral vertebral enhancement.

In the majority of cases (64%), pseudotumoral vertebral enhancement occurs in thoracic vertebrae and is found in the central portion of the vertebral body (where the basivertebral vein is located) [6]. Enhancement patterns are variable and can be nodular, polygonal, or even pseudonodular [6].

Diagnosis is confirmed by disappearance of vertebral body enhancement when contrast agent is administered via the contralateral side, pseudotumoral enhancement of

Figure 2. Bone window, venous phase, thoracic CT scan in the sagittal (A) and axial (B) planes. A. Dense and layered appearance of the central portion of thoracic vertebrae T2-T4. The same pattern is observed in vertebrae T5-T9 but to a lesser degree (arrowheads). B. Thrombosis of the brachiocephalic vein (dotted arrow). Dilation of the azygos system (thick arrow) and extensive development of paravertebral veins (arrow) suggest a vascular origin. No connections between the paravertebral venous plexuses and the basivertebral vein are observed.

Figure 3. Bone window thoracic CT scan without administration of contrast agent in the sagittal (A) and axial (B) planes. The enhanced vertebral density is no longer observed confirming its vascular origin; hence the expression "vanishing bone metastases". Numbered vertebrae are those showing pseudotumoral enhancement on the venous phase CT scan.
Disclosure of interest

The authors declare that they have no conflicts of interest concerning this article.

References