

Rib metastasis of clear cell renal cell carcinoma: an isolated and unusual localisation

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Section: Chest imaging

Area of Interest: Thorax Thoracic wall Spine Abdomen

Procedure: Diagnostic procedure

Procedure: Computer Applications-3D

Procedure: Computer Applications-Detection, diagnosis

Procedure: Computer Applications-General

Procedure: Contrast agent-intravenous

Imaging Technique: Conventional radiography

Imaging Technique: Image manipulation /
Reconstruction

Imaging Technique: CT

Imaging Technique: MR

Special Focus: Acute Metastases Embolism /
Thrombosis Case Type: Clinical Cases

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Patient: 82 years, male

Clinical History:

An 82-year-old male patient was referred to the Emergency Department for left inter-scapular pain, lasting for one week.

His medical history included hypertension under treatment and right occipital haemorrhage.

Imaging Findings:

Chest X-ray showed left pleural thickening and soft tissue injury on the fifth left rib (Fig. 1). Non-enhanced CT scan was performed to gain further information about the lungs. CT showed lesions involving the fifth left rib for its entire length and D3-D4 vertebrae with spinal cord invasion (Fig. 2).

CT images showed left pleural effusion but no pulmonary parenchymal abnormalities. To investigate the neoplastic origin of the lesion, the observation was also extended to the abdomen and completed with contrast agent. We observed a large mass involving the mid-lower pole of the left kidney, showing heterogeneous enhancement with peripheral hypervascular areas and thrombosis with filling defect involving the left renal vein (Fig. 3-4). An MRI was acquired to better characterise the spinal cord involvement (Fig. 5).

Ultrasound-guided biopsy of renal and rib lesion revealed the diagnosis: clear cell renal cell carcinoma.

Discussion:

The prevalence of the malignant costal lesions is about 3-8%, and the most commonly found are metastasis and myeloma. They are usually associated with primary neoplasm like breast cancer, prostate gland, lung and kidney cancer (RCC) [2], as in this case, and they may be osteolytic, sclerotic or mixed [3].

Rib metastases are generally multiple and small: isolated ones are rare (0.7-2.5 %) [1], mainly in RCC, and they are hardly bigger than 5 cm. They can be considered an atypical primary cancer presentation, otherwise the classical presentation of RCC is haematuria (55%), abdominal pain (40%), and palpable abdominal mass (35%).

Conventional chest radiograph and CT scanning represent the best method for rib lesions evaluation. At imaging, they have blurred outlines and can break the cortical bone, and occupy near soft tissue [3].

Bone scintigraphy is widely accepted as the standard test to evaluate bone metastasis. Although highly sensitive, bone scintigraphy lacks specificity, while CT improves specificity [2]. Surgical treatment represents the best approach for isolated rib metastasis, requiring wide resection including the rib below and the one under the metastatic one [1].

Written informed patient consent for publication has been obtained.

Differential Diagnosis List: Rib metastasis of clear cell renal cell carcinoma, Myeloma, Chondrosarcoma, Aneurysmal bone cyst, Lymphoma, Tuberculosis

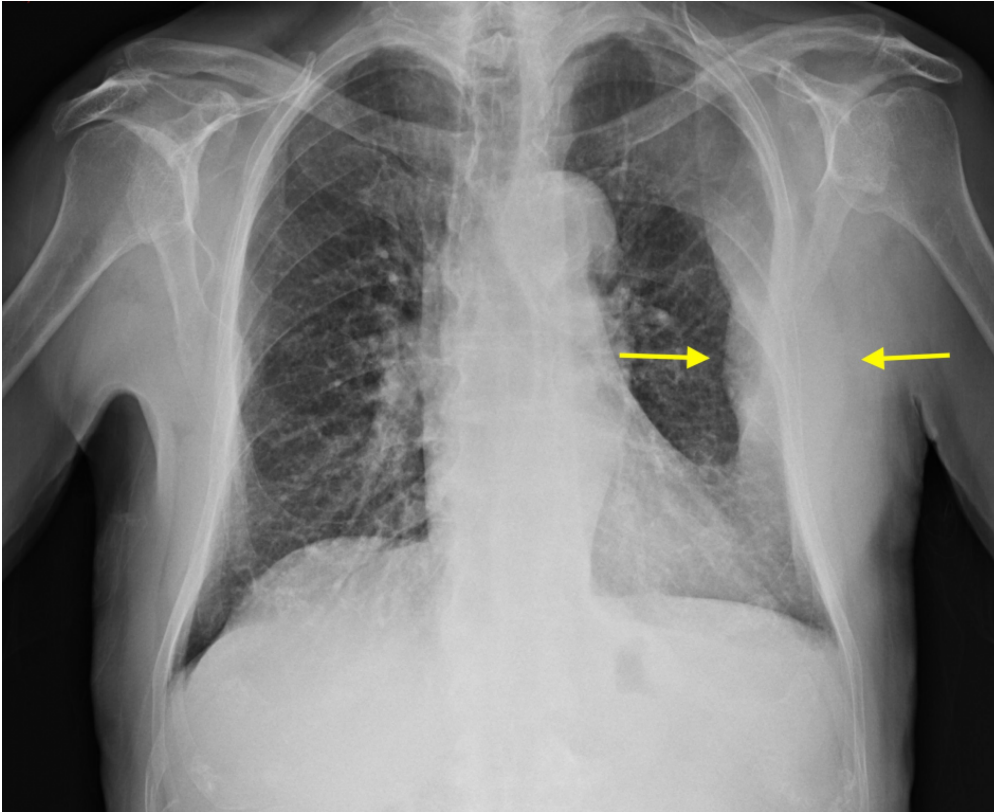
Final Diagnosis: Rib metastasis of clear cell renal cell carcinoma

References:

- Assouad J, Masmoudi H, Berna P (2009) Isolated rib metastases from renal cell carcinoma. Interactive CardioVascular and Thoracic Surgery 10: 172-175 (PMID: [19805505](#))
- Levine B, Motamedi K, Chow K (2009) CT of Rib Lesions. American Journal of Roentgenology 193: 5-13
- Zarqane H, Viala P, Dallaudière B (2013) Tumors of the rib. Diagnostic and Interventional Imaging 94(11):1095-108 (PMID: [24007770](#))

Figure 1

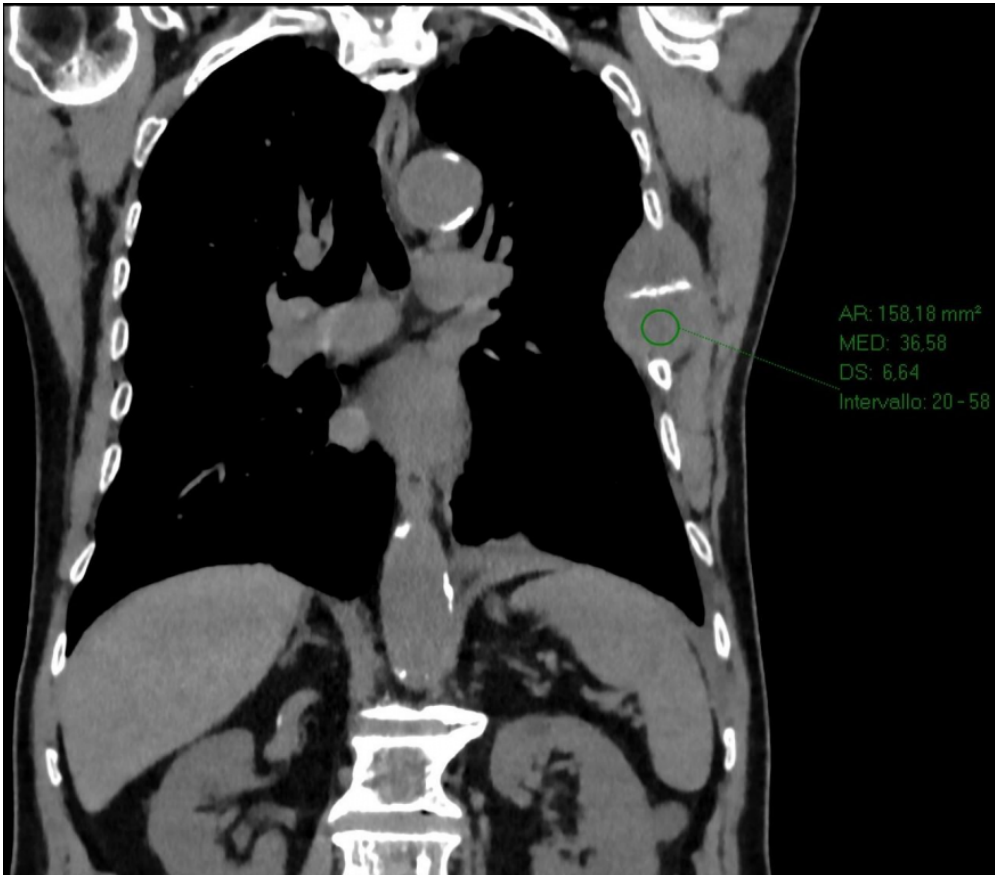
a



Description: AP projection – Pleural thickening on left middle lung zone and soft tissue swelling (yellow arrows) with small effusion. **Origin:** Department of Radiology Sant'Anna Hospital, Ferrara, Italy

Figure 2

a



Description: Coronal view image showing the lesion of the fifth rib with an attenuation of soft tissue (37 HU) and its own calcifications. **Origin:** Department of Radiology Sant'Anna Hospital, Ferrara, Italy

Figure 3

a



Description: Axial view of the lesion (red arrow) showing strong and heterogeneous enhancement.

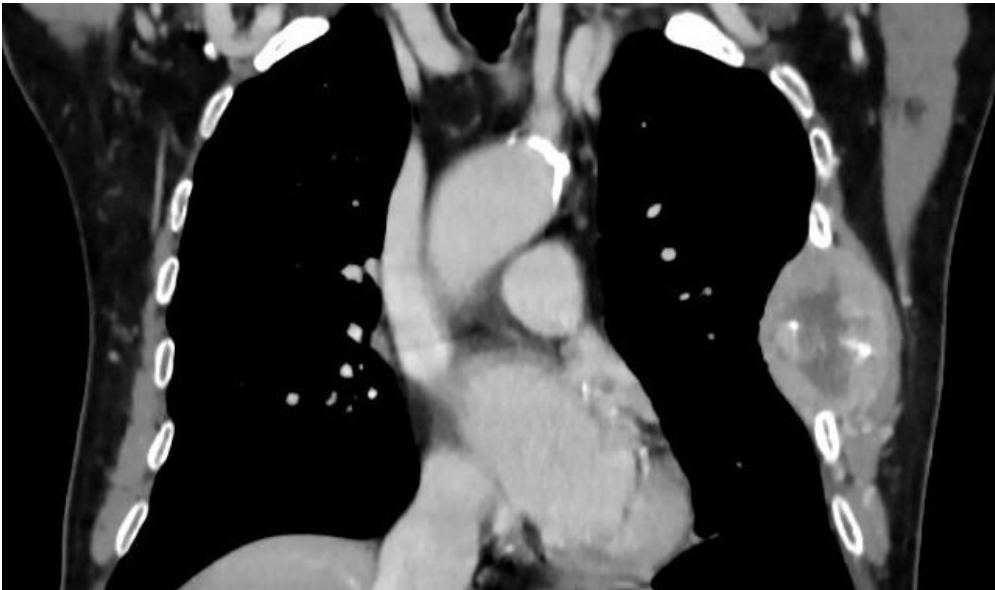
Origin: Department of Radiology Sant'Anna Hospital, Ferrara, Italy

b



Description: Coronal view: left kidney lower pole mass showing peripheral contrast enhancement and well-defined central area of low density without enhancement. A filling defect (yellow arrow) involving the left renal vein, likely as thrombosis. **Origin:** Department of Radiology Sant'Anna Hospital, Ferrara, Italy

c



Description: Coronal view: In thorax field, the contrast-enhanced injury of the fifth rib like renal mass. **Origin:** Department of Radiology Sant'Anna Hospital, Ferrara, Italy

Figure 4

a



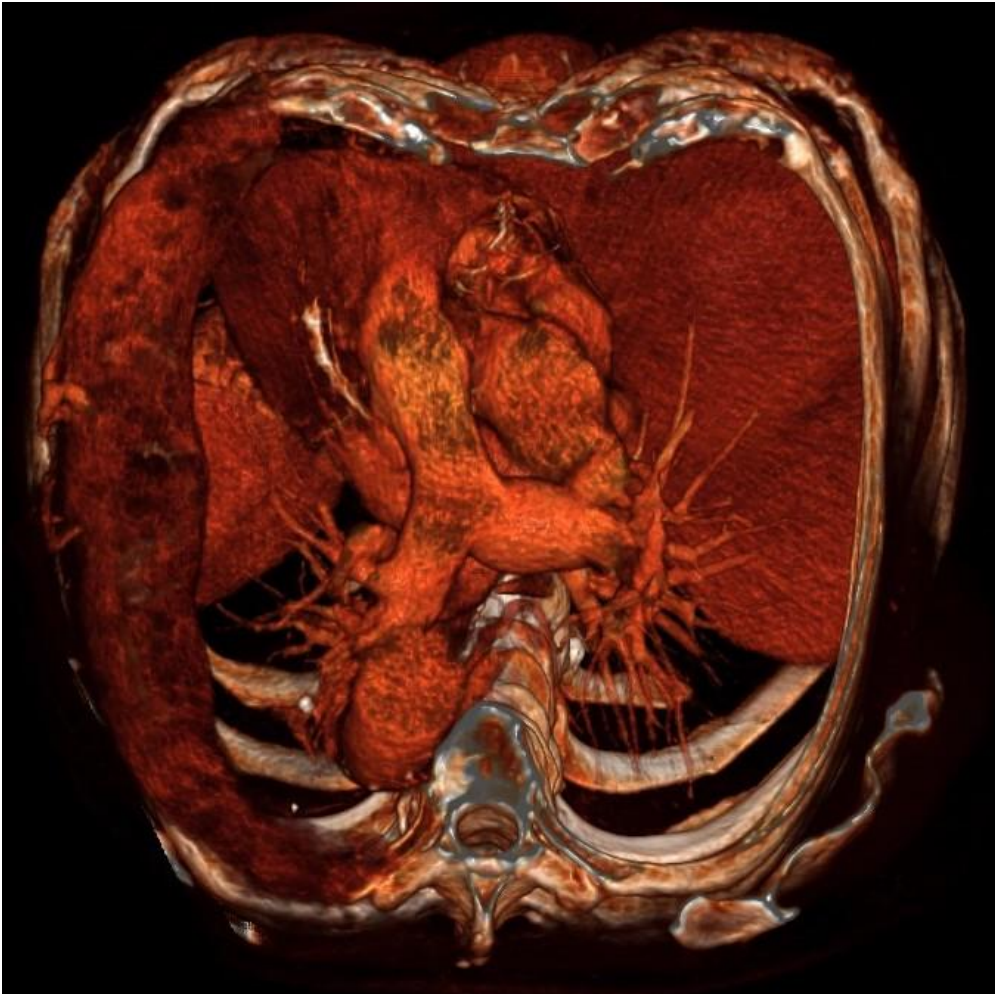
Description: Lateral view: 3D reconstruction better shows the complete alteration of the fifth rib, involving its entire length. **Origin:** Department of Radiology Sant'Anna Hospital, Ferrara, Italy

b



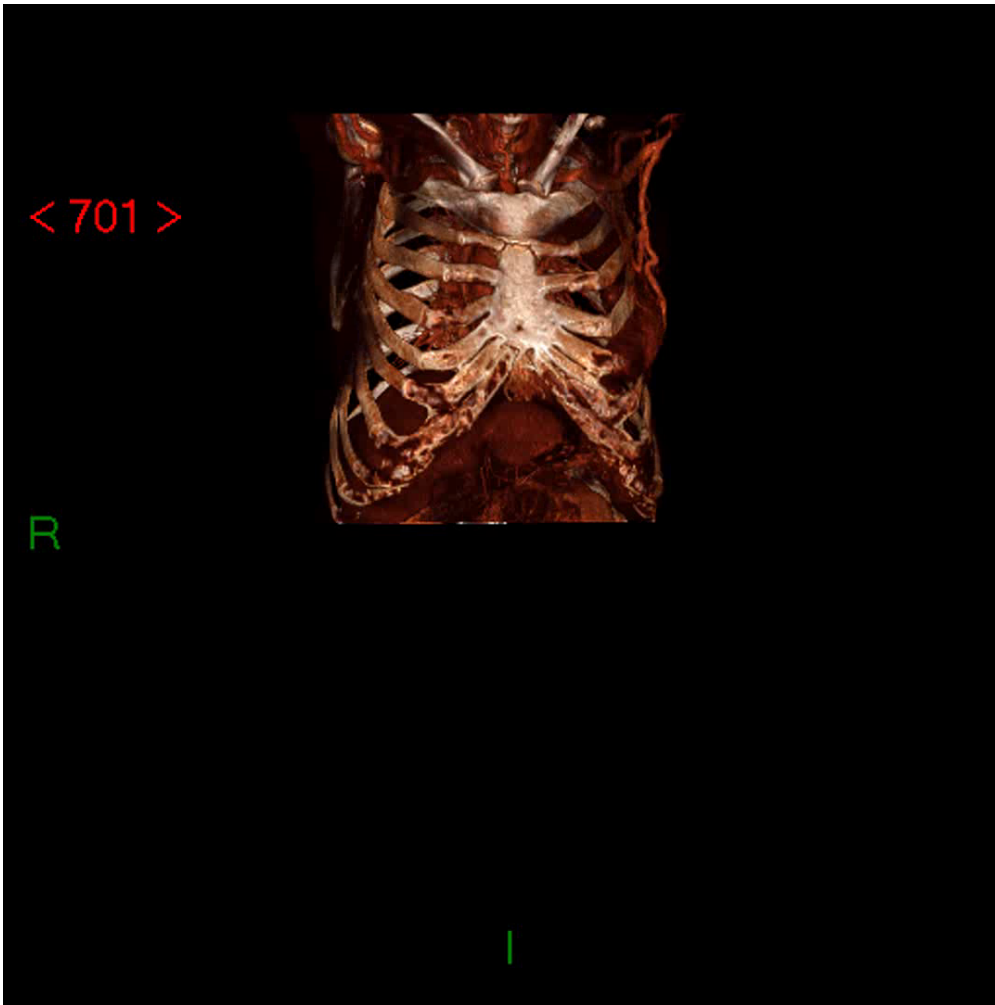
Description: 3D reconstruction. Oblique view. **Origin:** Department of Radiology Sant'Anna Hospital, Ferrara, Italy

c



Description: 3D reconstruction. Superior view. **Origin:** Department of Radiology Sant'Anna Hospital, Ferrara, Italy

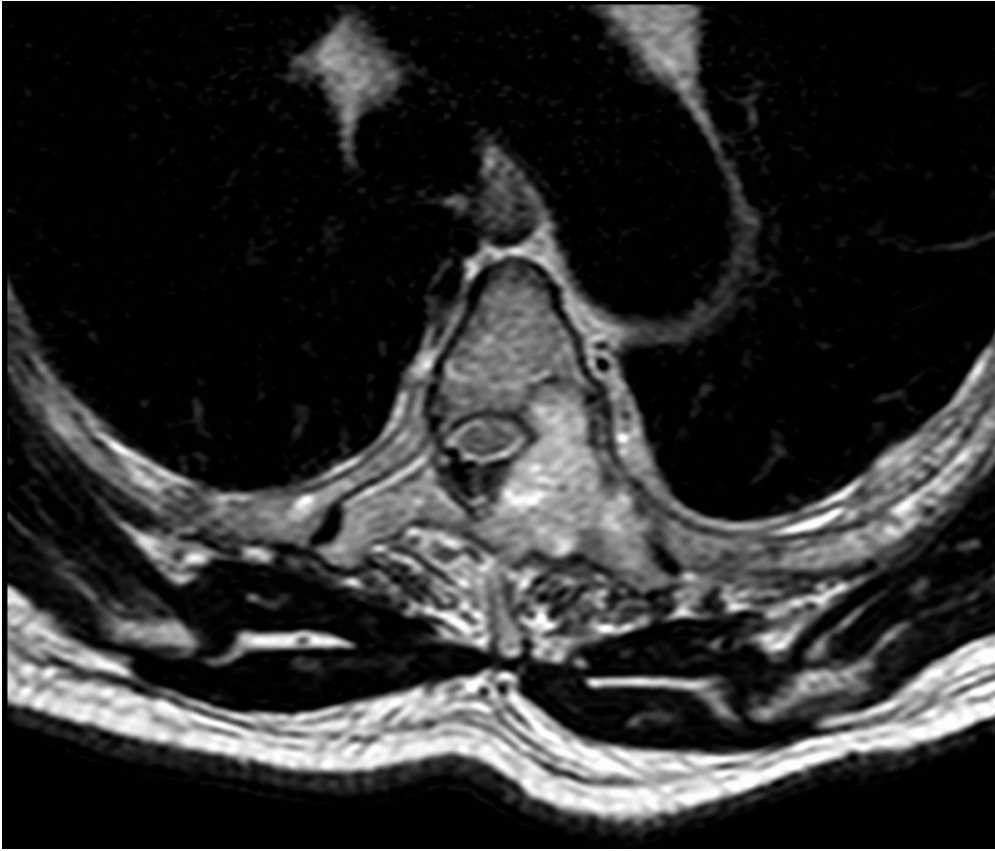
d



Description: VRT rotation **Origin:** Department of Radiology Sant'Anna Hospital, Ferrara, Italy

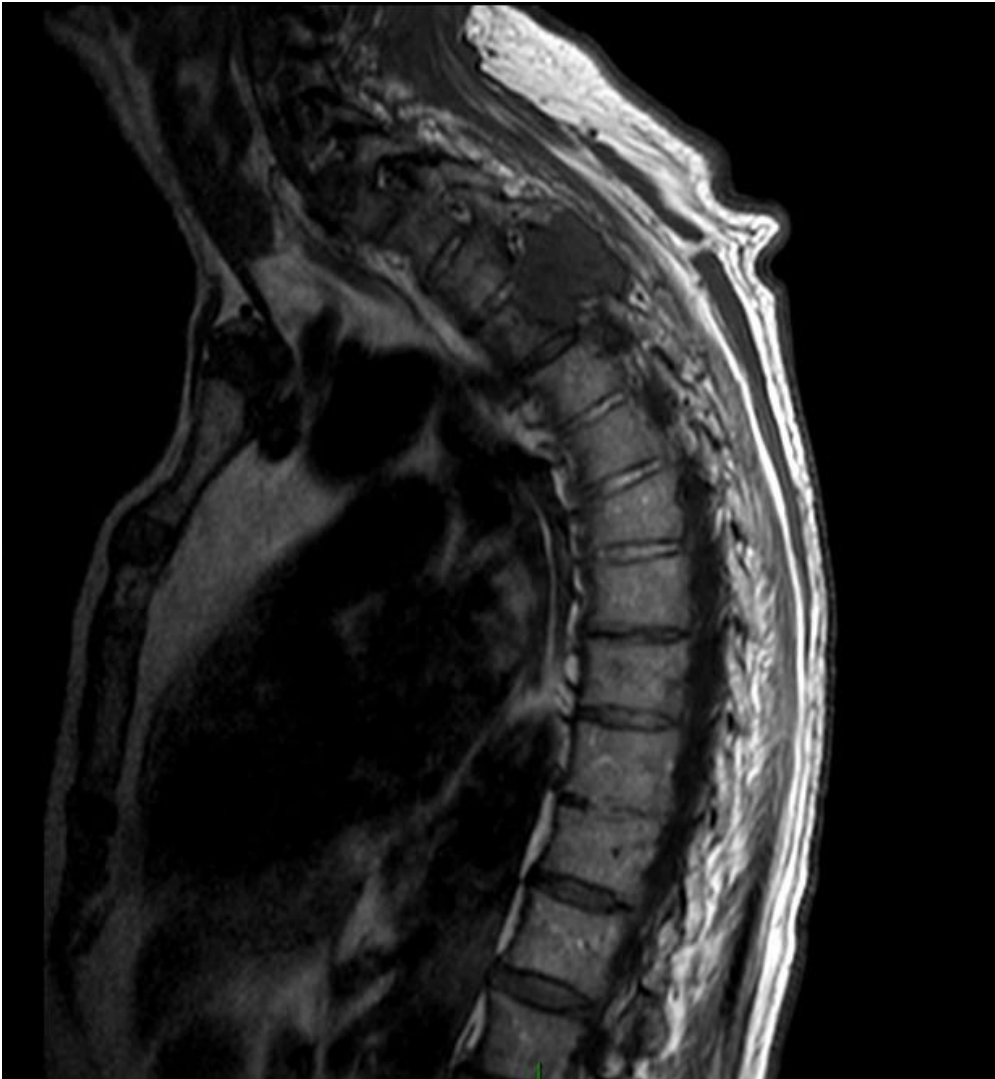
Figure 5

a



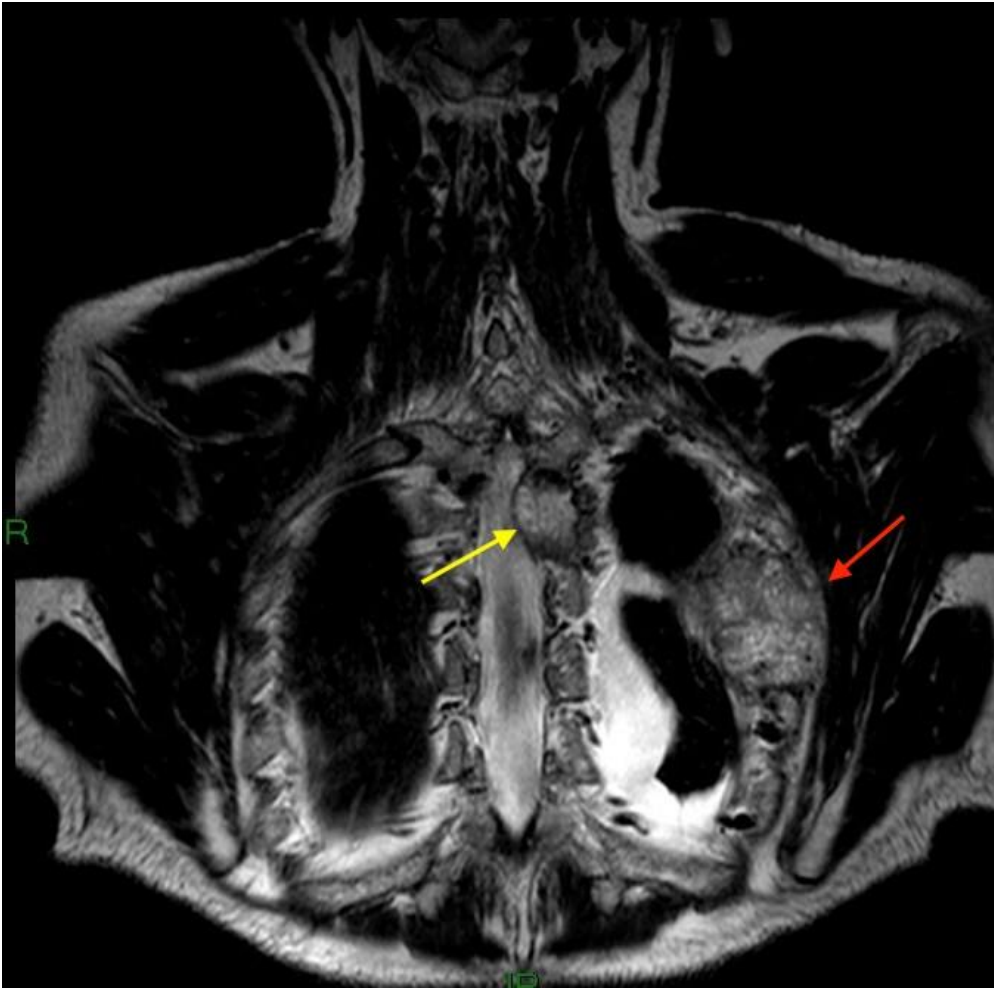
Description: D3-vertebra lesion's heterogeneous hyperintensity on FSE T2-weighted axial image: it spreads to vertebra's pedicle, transverse process and left lamina; the mass invades the spinal cord and it leaves an imprint on the latter. **Origin:** Department of Radiology Sant'Anna Hospital, Ferrara, Italy

b



Description: MRI sagittal FSE T1-weighted image shows the same lesion with hypointensity. **Origin:** Department of Radiology Sant'Anna Hospital, Ferrara, Italy

c



Description: Coronal FSE T2w image: heterogeneous hyperintensity D3-vertebra mass localisation (yellow arrow) similar to the rib lesion (red arrow). **Origin:** Department of Radiology Sant'Anna Hospital, Ferrara, Italy