Case 11018

Eurorad

Parathyroid cystic adenoma causing primary hyperparathyroidism and brown tumours

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ISSN: 1563-4086
Section: Head & neck imaging
Area of Interest: Head and neck Bones
Procedure: Diagnostic procedure
Procedure: Contrast agent-intravenous
Procedure: Barium meal
Imaging Technique: SPECT-CT
Imaging Technique: Conventional radiography
Imaging Technique: CT
Imaging Technique: Fluoroscopy
Special Focus: Cysts Swallowing disorders Case Type:
Clinical Cases
Authors: Scionti A, Fui G, Angeli S, Neri E, Bartolozzi C.
Patient: 53 years, female

Clinical History:

A 53-year-old women presented to her primary care physician because of pain in the left leg, associated with severe polydipsia and polyuria. Laboratory tests showed severe hypercalcaemia (Calcium 16.5 mg/dL, PTH 954 pg/ml) so she was admitted to the ICU where she underwent therapy until the calcium level normalised.
Imaging Findings:

A total body CT scan revealed a 6-cm mass adjacent to the inferior pole of the right thyroid lobe, extending into the posterior mediastinum and deviating the trachea and the oesophagus. The mass was mainly cystic with marginal solid contrast-enhanced portions. (Fig. 1)
Sestamibi scintigraphy revealed an increased activity in the same site and the barium swallow showed an external impression of the oesophagus, resulting in lumen reduction. (Fig. 2-3)
X-ray scans revealed two lesions in the left tibia and the fifth metacarpus of the right hand, bone scintigraphy showed areas of hyperaccumulation in the same spots and the bone biopsy confirmed they were giant cell lesions. (Fig. 4)
Discussion:

Parathyroid cysts (PC) and cystic parathyroid adenomas (CPA) are rare causes of primary hyperparathyroidism (PHPT). The four parathyroid glands are usually located on the rear surface of the thyroid gland, but ectopic glands can be in the chest or within the thyroid gland itself. PC and CPA are fluid-filled lesions >1 cm, classified as non-functional or functional cysts if associated with hypercalcaemia [1]. There are several theories concerning their aetiology: one of the most validated states that they are cystic degeneration of a parathyroid adenoma [2, 3]. This theory is supported by the identification of normal remaining parathyroid glands and tissue within the cyst wall [2]. Additionally, they usually contain haemorrhagic fluid, originating from the bleeding of the pre-existent adenoma [3].

Some authors describe a histologic distinction between the two: CPA has a preponderance of chief cells with multilocular thick-walled cysts and PC consists of a unilocular thin-walled cyst [4].
Most patients are asymptomatic or paucisymptomatic. Diagnosis is established with two main laboratory findings: hypercalcaemia and elevated PTH [5]. PHPT is associated with renal, bone, cardiovascular and neurologic symptoms. The bone shows osteopenia or osteoporosis for which bone-mineral densitometry is mandatory. In severe cases, osteitis fibrosa cystica or brown tumours might develop. Given that these two conditions are rare, skeletal radiographs are not routinely performed [5].
Both functional and morphological imaging studies are required to find the aetiology. Scintigraphy with Tc-99m Sestamibi is the best test for gland localisation because the marker accumulates in hyperfunctioning parathyroid cells. Ultrasonography, CT, or MRI are useful for preoperative evaluation, even if parathyroid glands are visible only if increased in volume [6], and they are also used to find ectopic glands, to study their nature, size and the relationship with other organs.
Three characteristics help identify a parathyroid adenoma with CT scan: predictable location on the basis of migration patterns, small size and contrast enhancement. Most adenomas show strong enhancement in the arterial phase, simplifying the differentiation with lymph nodes [7].
CPA shows atypical CT features such as large size, faint enhancement only at the periphery, cystic appearance with higher attenuation due to the protein content of the fluid, and possibly a solid marginal appearance [1, 4].
Confirmation is obtained with evidence of high PTH levels and parathyroid cells in the aspirate obtained by needle biopsy. Treatment is surgical and the brown tumours usually yield to treatment of the underlying PHPT with a sustained increase in bone density. Initially calcium supplementation might be needed to avoid hungry bone disease [8].
Differential Diagnosis List: Cystic parathyroid adenoma causing primary hyperparathyroidism., Thyroid colloid cyst, Thymic cyst, Branchial cleft cyst, Bronchogenic cyst

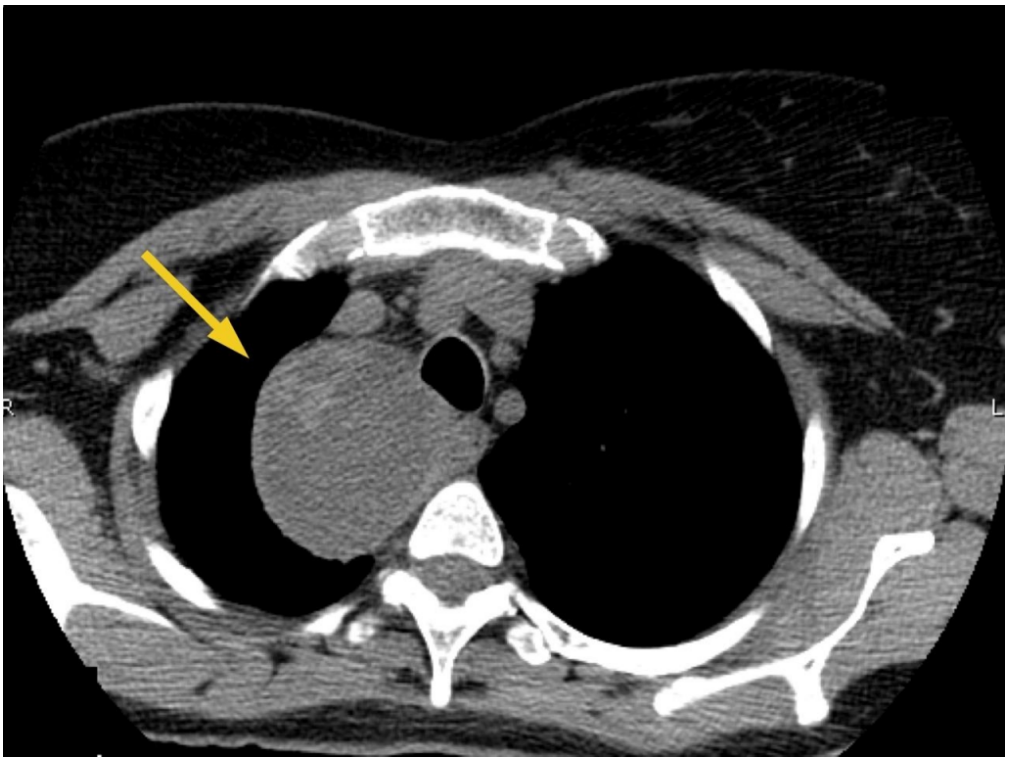
Final Diagnosis: Cystic parathyroid adenoma causing primary hyperparathyroidism.

References:

Gurbuz AT, Peetz ME (1996) Giant mediastinal parathyroid cyst: an unusual cause of hypercalcemic crisis--case report and review of the literature. Surgery 120(5):795–800 (PMID: 8909513)
Oh A, Mojica P, Sullivan M, Tan D, Hicks W Jr, Loree T, et al. (2006) Malignant hypercalcemia associated with a parathyroid macrocyst and the early genesis of a giant cell tumor. Am J Otolaryngol 27(1):54–7 (PMID: 16360825)
Serra Soler G, García Fernández H, Quevedo Juanals J, Argüelles Jiménez I, Carrillo García P. (2011) Parathyroid crisis due to a cystic parathyroid adenoma. Endocrinol Nutr 58(3):148–50 (PMID: 21345753)
Sillery JC, DeLone DR, Welker KM. (2011) Cystic parathyroid adenomas on dynamic CT. AJNR Am J Neuroradiol 32(6):E107–109 (PMID: 20595367)
Silverberg SJ, Bilezikian JP. (2004) Asymptomatic primary hyperparathyroidism: a medical perspective. Surg. Clin. North Am 84(3):787–801 (PMID: 15145235)
Saeed S, Yao M, Philip B, Blend M. (2006) Localizing hyperfunctioning parathyroid tissue: MRI or nuclear study or both?. Clin Imaging 30(4):257–65. (PMID: 16814142)
Randall GJ, Zald PB, Cohen JI, Hamilton BE. (2009) Contrast-enhanced MDCT characteristics of parathyroid adenomas. AJR Am J Roentgenol 193(2):W139–143 (PMID: 19620416)
Marcocci, C., Cianferotti, L., and Cetani, F. (2012) Bone disease in primary hyperparathyrodism. Ther Adv Musculoskelet Dis 4, 357–368 (PMID: 23024712)

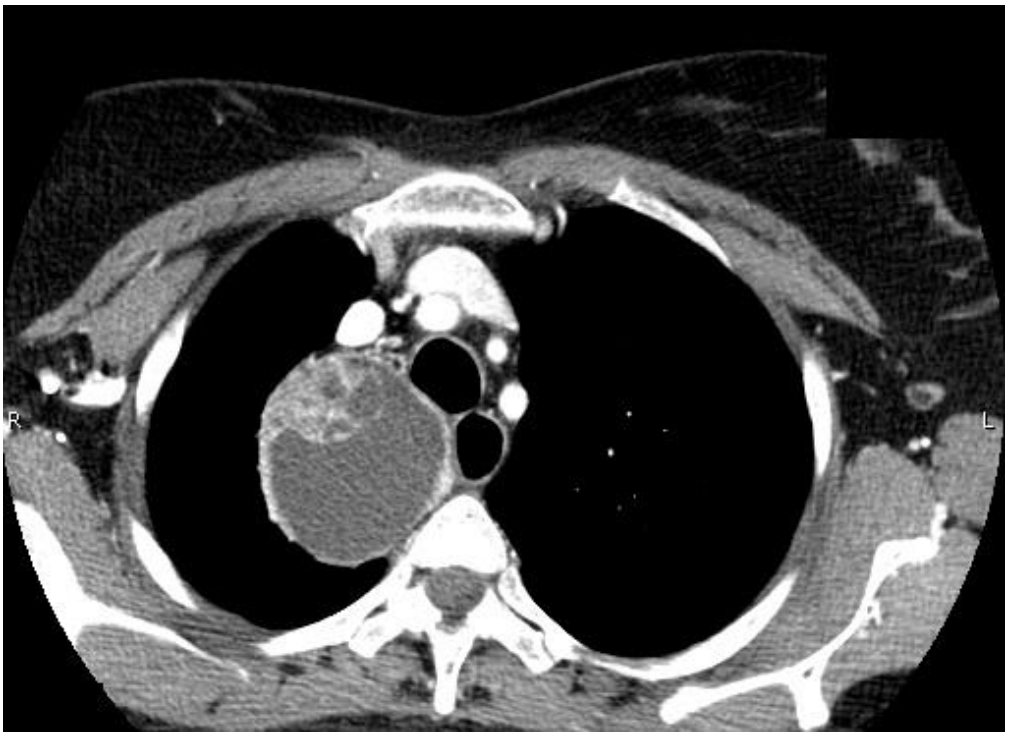
Figure 1

a



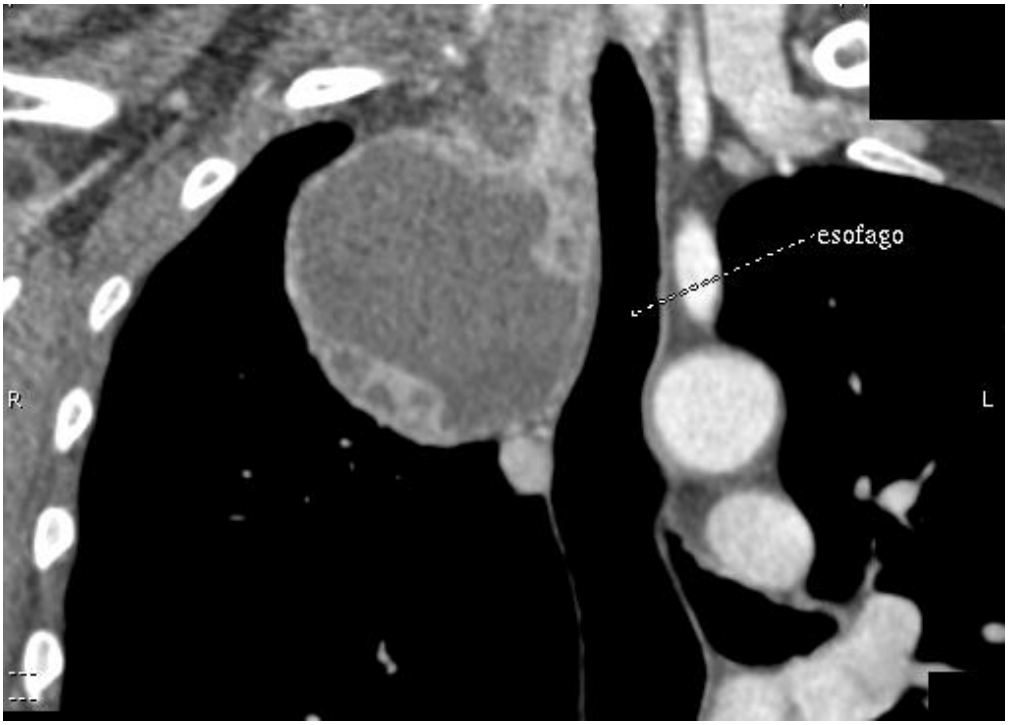
Description: Cystic mass (64x56mm) **Origin:** Department of Radiology, University of Pisa, Italy

b



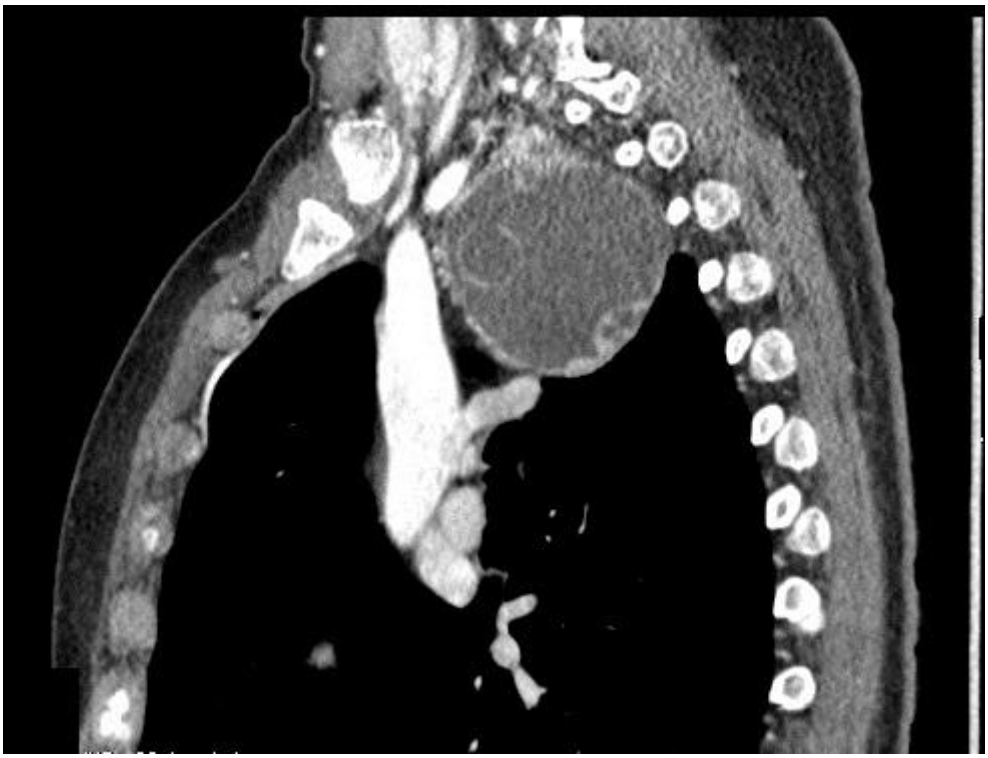
Description: Contrast-enhanced images show the marginal solid portion and the cystic features.
Origin: Department of Radiology, University of Pisa, Italy

c



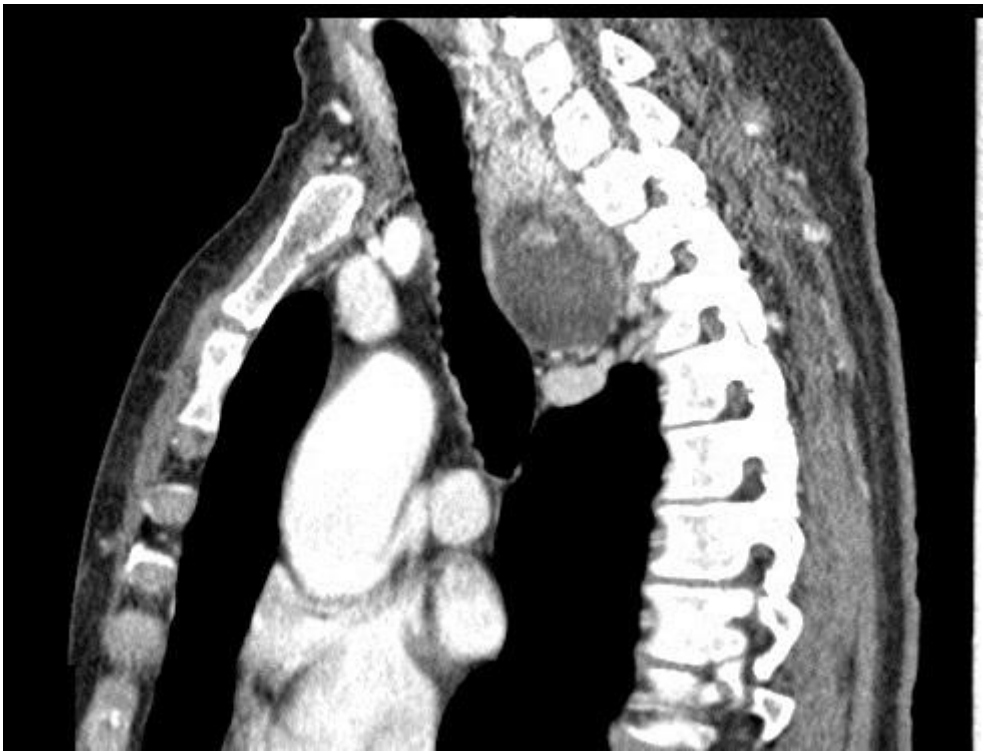
Description: MPR coronal plane **Origin:** Department of Radiology, University of Pisa, Italy

d



Description: MPR sagittal plane **Origin:** Department of Radiology, University of Pisa, Italy

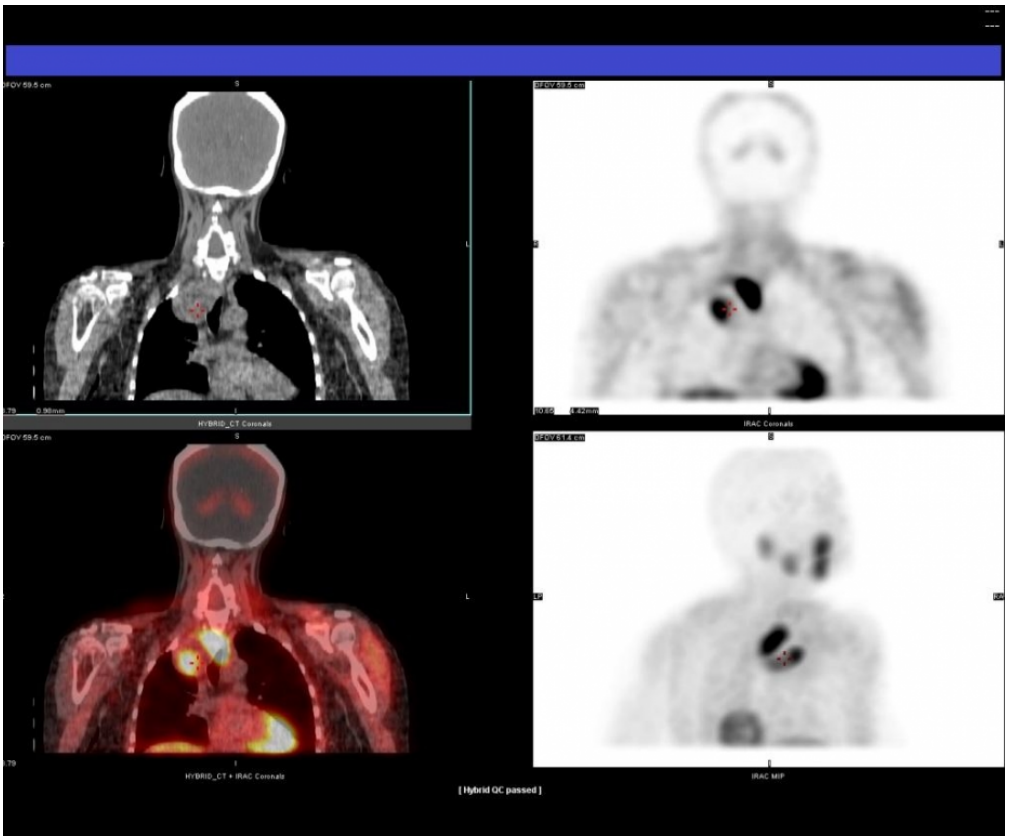
e



Description: MPR sagittal plane showing the lesion\'s relationship with the oesophagus **Origin:** Department of Radiology, University of Pisa, Italy

Figure 2

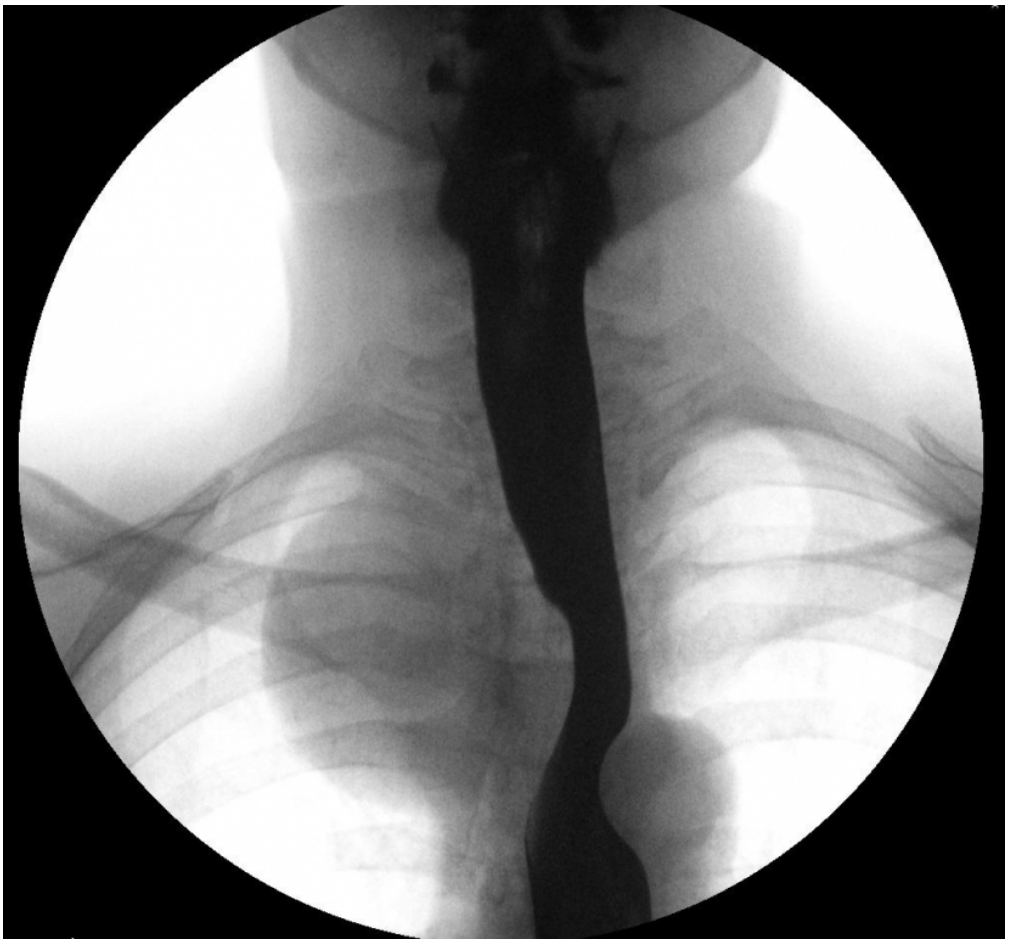
a



Description: SPECT image shows increased uptake of Sestamibi in the same lesions site as revealed by CT. **Origin:** Department of Radiology, University of Pisa, Italy

Figure 3

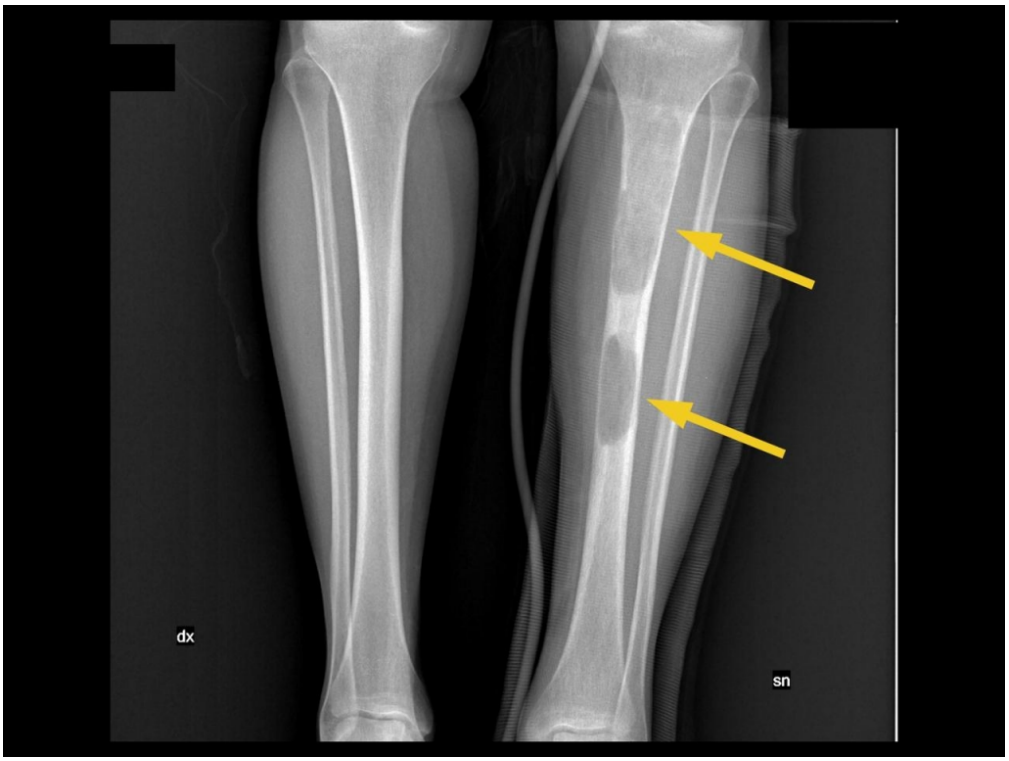
a



Description: Barium swallow shows an external impression of the oesophagus, resulting in lumen reduction. **Origin:** Department of Radiology, University of Pisa, Italy

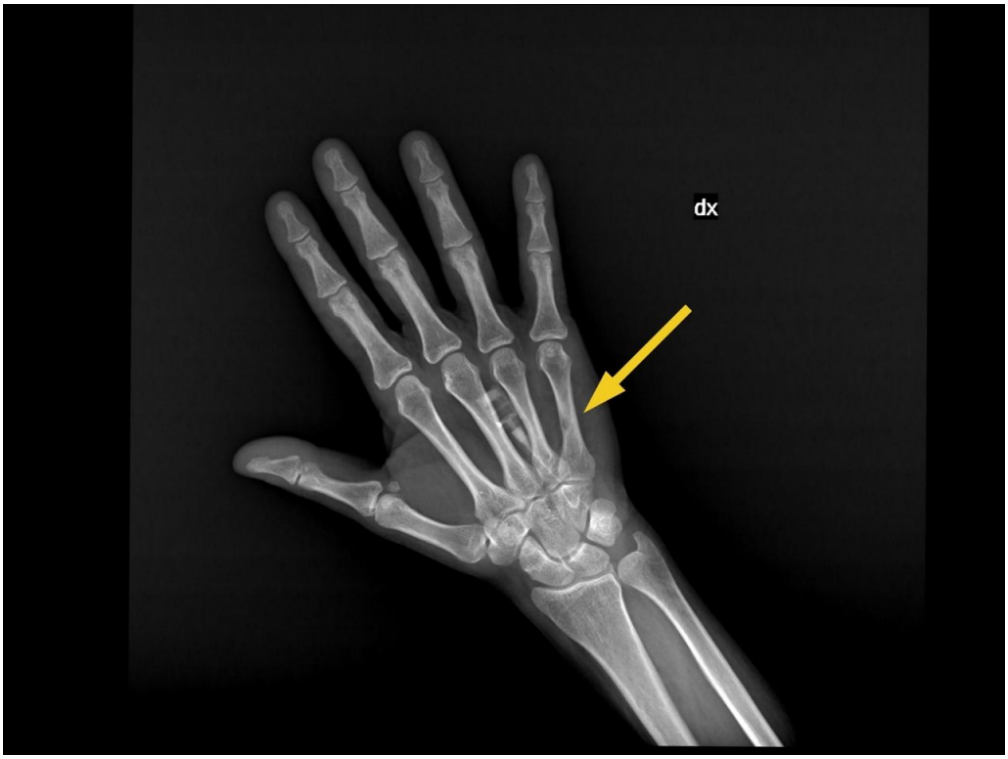
Figure 4

a



Description: X-ray of the left tibia revealing two lesions **Origin:** Department of Radiology, University of Pisa, Italy

b



Description: X-ray of the fifth metacarpus revealing one lesion. **Origin:** Department of Radiology, University of Pisa, Italy