

ECTOPIC PARATHYROID ADENOMA IN THE UPPER ANTERIOR MEDIASTINUM

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Background: A 66-year-old man, known with nephrocalcinosis in his medical history, was complaining of weight loss, pain at the level of the kidneys and at the right hip. Clinical examination revealed no additional abnormalities. The initial laboratory results showed high calcium (3,5 mmol/L), and normal phosphate (1,07 mmol/L) levels. Alkalic phosphatase in blood was 681 U/L, and PTH levels were high (1788 pg/ml).

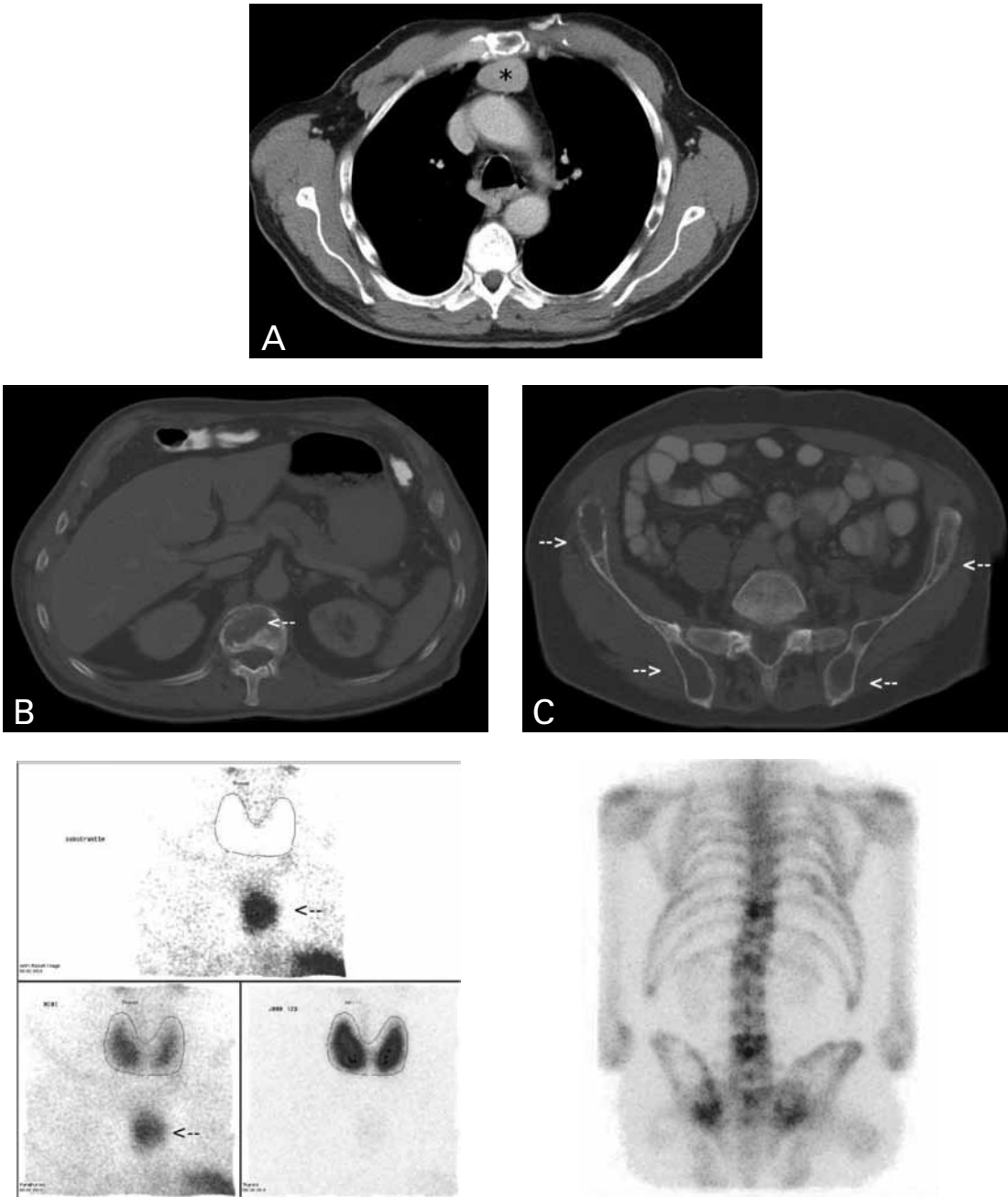


Fig. 1A
1B 1C
2 3

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Work-up

Contrast-enhanced CT scan (Fig. 1) of the thorax at the level of the upper mediastinum (A) shows a large, sharply marginated mass in the upper-anterior mediastinum is seen (asterisk). On CT scan at the level of the upper abdomen (bone window setting) (B) an expansile osteolytic lesion is present in the vertebral body (arrow). There are no reactive changes in the surrounding bone. CT scan at the level of the pelvis (bone window setting) (C), multiple expansile osteolytic lesions in the area of the sacroiliac joints and iliac bone are visualized (arrows). No reactive changes in the surrounding bone.

Double window parathyroid scintigraphy with I123 and MIBI (Fig. 2) shows the presence of a mass in the upper mediastinum that is only capturing MIBI (arrow).

On 99mTc bone scintigraphy (Fig. 3) there is tracer hypercaptation at the location of the osteolytic lesions, as seen on CT scan.

Radiological diagnosis

Double window parathyroid scintigraphy with I123 and MIBI revealed the diagnosis of *ectopic parathyroid adenoma in the upper anterior mediastinum*, leading to secondary bone density loss, and formation of brown tumors (osteolytic lesions) due to primary hyperparathyroidism. Osteolytic lesions caused by multiple myeloma are photopenic on bone scintigraphy, unless pathologic fracture is present, which was not the case in this patient.

Discussion

For a brown tumor to develop a hyperparathyroid condition has to be present. This can only be diagnosed by laboratory results. Therefore the role of radiological examinations does not lie in the initial diagnosis, but in revealing the severity of the condition. Standard radiography can also be used in the follow-up of these patients.

There are three types of hyperparathyroidism: primary, secondary, and tertiary. In primary hyperparathyroidism pathology lies within the parathyroid itself. Adenoma (80%), hyperplasia (15%), or even in rare cases carcinoma, can lead to hypersecretion of parathormone (PTH). Adenomas are mostly located in one of the parathyroid glands, but can be ectopic. Most often they are seen in women (3:1) between the ages of 40-80 years. On ultrasonography adenoma present as solid hypo-

echogenic masses with cystic components in 2% of the cases. 99mTc 2-methoxyisobutyl-isonitrile (MIBI) scintigraphy has a high sensitivity and positive predictive value in the detection of (ectopic) parathyroid adenoma, even after surgery.

The net effect of PTH is to augment serum calcium concentrations, and at the level of the skeleton it does so by stimulating osteoclasts, promoting bone destruction. This process can lead to microfractures of the bone followed by hemorrhage, fibrous tissue growth, and macrophage influx. The resulting masses are called brown tumors (osteitis fibrosa cystica), and are thereby benign reparative processes.

They typically occur at places where bone loss is extensive. Sometimes biopsy is necessary for definite diagnosis. Brown tumors are hypercaptive on bone scintigraphy and even though they can grow rapidly, under treatment they heal in a sclerotic manner. Compared to secondary hyperparathyroidism brown tumors are more frequent in primary hyperparathyroidism (3% versus 2%).

On standard radiography hyperparathyroidism can manifest itself in different ways: loss of bone density, pathognomonic subperiosteal bone resorption (most prominent at the radial side of the second and third intermediate phalanx), acro-osteolysis, subchondral, subligamentous, and subtendinous bone resorption, "Pepper pot skull" (multiple small osteolytic areas over the skull), brown tumor (sharp bordered osteolytic lesion with few surrounding reactive bone and a thin expansile cortex), and soft tissue calcifications.

On CT scan brown tumors present as osteolytic lesions with a thin expansile cortex, without cortex interruption, or surrounding reactive bone. CT has higher sensitivity and allows better localization of the lesion.

Considering treatment in primary hyperparathyroidism, parathyroidectomy is performed and careful follow-up of the patient is necessary.

Bibliography

1. Chew F.S., Huang-Hellinger F: Brown tumor. *AJR*, 1993, 160: 752.
2. Phitayakorn R., McHenry C.R.: Incidence and location of ectopic abnormal parathyroid glands. *Am J Surg*, 2006, 191: 418-423.
3. Sharma P., Parikh K., Chhabra A.P., et al.: Classical case of primary hyperparathyroidism. *Indian J Radiol Imaging*, 2005, 4: 485-487.
4. www.uptodate.com: "Parathyroid hormone secretion and action"