INCIDENTAL DIAGNOSTIC OF A RIM-LIKE ADRENAL CALCIFICATION WITHOUT TUBERCULOSIS OR ADRENAL INSUFFICIENCY

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A 75 years old woman was referred to abdominal echography for pain related to biliary-duodenal motriceal dysfunction. The ultrasound discovered a dense (hyperechogenic) image under (posterior of) the 8th segment of the liver. The dense process was supposed to be a calcification situated medial from the right kidney in the cranial 1/3 length of it. Specific clinical and biological data related to possible adrenal destruction were analyzed: the patient was in good condition, body mass index was 29. She had no tuberculosis during her life. The current arterial pressure was 145/80 mm Hg. All laboratory data, including basal cortisol were normal. Cortisolemia at 8 a.m. was 523 nmol/l. The diagnosis was made by CT scan: clear and only organ-disseminated calcification in adrenals appeared as a rim. The management of this case was related to follow-up of adrenal lesions by abdominal ultrasound.

The calcification of one adrenal raised several issues for discussion: the role of ultrasound vs CT in adrenal lesions, the prevalence of calcifications in adrenal glands, the importance of the calcification process.

Calcifications of adrenals are seldom found in primary autoimmune cortical atrophy associated with Addison’s disease, but they are supposed to be more frequent in adrenal tuberculosis; calcification suggests a former local tuberculosis process, associated with pulmonary tuberculosis and with borderline adrenal insufficiency. Various etiologies and mechanisms for adrenal calcifications (infectious, tumor, hemorrhage, parasitic) are discussed. To our knowledge, the rim-like appearance of the adrenal calcification was described only in one patient.

In conclusion, incidental diagnostic of adrenal gland calcifications was reported in patients without adrenal insufficiency, signaled by ultrasound and detailed by CT, associated with normal adrenal function. Therefore, we consider that calcifications in the right adrenal in our patient could mean a process of cicatrisation or healing after an autoimmune aggression, only on the right adrenal gland.

Key words: adrenal calcification, tumor, Addison, tuberculosis, computed tomography, abdominal ultrasound.

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INTRODUCTION

The phenomenon of calcifications in tissues was described as calciphylaxia in the years 1950 by Selye, as a condition related to the tissues hypersensitivity to calcium, linked to a morbid process (1). Most frequently, calcifications, even in endocrine glands, are related to hyperparathyroidism (2). However, calcifications in endocrine glands seem to be more related to local conditions, probably related to inflammations and/or cicatrisation (3).

We present a patient without any sign of endocrine disease, any inflammatory disease, in which a calcification of the adrenal rim was discovered accidentally.

Case presentation
A 75 years old woman was sent for a routine abdominal ultrasound investigation, as she was accusing pains in the right hypochondrial area. The pain was supposed to be related to biliary-duodenal motriceal dysfunction.

The ultrasound discovered a dense (hyperechogenic) image under (posterior of) the 8th segment of the liver (Fig. 1). The dense process was supposed to be a calcification situated medial from the right kidney in the cranial 1/3 length of it (Fig. 2).

Laboratory data were all normal, including glycemia, creatininemia, BUN, ESR, haemoglobin, transaminases, calceemia and magnesiemia, total lipids, HDL and LDL - cholesterolemia and triglyceridemia.

The patient was in good condition, body mass index was 29. She had no any form of tuberculosis during her life. The current arterial pressure was 145/80 mm Hg.

Figure 1. Hyperechogenic image under (posterior of) the 8th liver segment.
Based on the ultrasound view, the patient was referred to a CT scan. The diagnosis was based on that scan of the area: clear and only organ-disseminated calcification in adrenals (Fig. 3 a-c).
Specific analysis related directly to adrenals was normal, too:
Cortisolemia at 8 a.m. was 523 nmol/l (laboratory normal: 171-563 nmol/l).

**DISCUSSION**

**The role of ultrasound vs CT in adrenal lesions**
Our patient was referred to the CT scan after a routine abdominal ultrasound. From this statement results that adrenal ultrasound has no diagnostic value or prognosis. That was set up even by others (4). Even so, in some patients, a routine ultrasound could detect strange images which led to a CT scan referral.

**The prevalence of calcifications in adrenal gland**
Over the time, a “Medline” search from 1950 - October 2006, around 300 papers which have as key words both “calcification” and “adrenal gland” have been published.

With the widespread use of computed tomography, these days, it is not unusual to find calcifications within the adrenal glands (5). In all the journals from Medline search, it could be observed there are many varieties of adrenal lesions that may calcify. The specificity is not the current issue of these calcifications.
THE PATHOPHYSIOLOGICAL IMPORTANCE OF THE CALCIFICATION PROCESS

Calcifications have been described in many glands and endocrine diseases for many years. However, no unification pathology for these calcifications exists.

For example, after puberty epiphyses begin to deposit calcium (6), without changing their function, and in the elderly most of the epiphyses are entirely calcified. Most of craniopharyngiomas have calcifications (7), but their significance was not explored. The triad “pancreatic calcification, steatorrhea and diabetes mellitus” was found in less than 1/3 patient with chronic pancreatitis (8).
We consider that calcification in endocrine glands represents a process of cicatrisation, especially in the thyroid (9).

**The types of adrenals calcification**

Early studies suggested that calcification in adrenals mended haemorrhage (10), arterial infarction (11) or adrenal vein thrombosis (12), even in recent AIDS patients (13). In those times, the calcifications were considered as a main pathological process which leads to adrenal insufficiency (14) and which could be used for Addison’s disease (15) diagnostic.

However, some authors presented that adrenals calcification are never found in primary cortical atrophy associated with Addison’s disease (16,17), but are supposed to be more presented (from rarely (17) to around 50% (18) or 62.5% (19)) in adrenal tuberculosis; they said that calcification in adrenal areas suggests a former local tuberculosis process, associated with pulmonary tuberculosis and with adrenal insufficiency.

Another pathological process with calcification is encountered in adrenal tumours. So far (see Medline), more than 50 papers on this subject have been published. In many adrenals carcinomas (20, 21), adrenal myelolipomas and seldom in adenomas associated with Cushing’s syndrome (20), calcifications were described. On the other hand, in large non-functioning adenomas calcifications were also recorded in 30% patients, one with calcification of the rim of the tumour (21), not of the rim of the gland itself! The difference between tuberculosis and tumours, as phenotypical appearance, is the prevalence of bilateralism (22) (tuberculosis 91% vs. tumours 9%) and the low attenuation in the centre with peripheral rim enhancement which was more commonly seen in tuberculosis (47%) than in primary tumours (9%).

A special sort of adrenal calcification was recorded in Wolman disease (23): lack of lysosomal lipase, accumulation of LDL, peroxidation, cytolysis and necrosis, followed by calcification of dead adrenal cells. Therefore, some (23) consider that calcification in adrenals means accumulation in a dead cell of free cytosolic Ca2+.

This later analysis leads to the hypothesis that calcium is involved somehow in adrenal cytolysis. Indeed, calcium (in many experimental conditions) is involved in lymphocyte Tc apoptosis (24) when the antigenic-ligand bridge between the cytotoxic lymphocyte and the antigen (the cell) is realised in a calcium medium. However, the lysis does not depend on calcium, but on magnesium, and the lethal hit is calcium-magnesium independent. Thus, the presence of calcium in a cell lysis medium should suggest other pathophysiological implications.

The rim-like appearance of the adrenal was described only in one patient. The first patient, recorded in Medline, was a newborn with bilateral involvement (25).

In fact, most of the authors described the calcifications as non occupying only the cortex; they described the calcification as occupying the whole gland (17), including the medulla or with speck calcification (in myelolipoma) or disseminated calcification in carcinomas, (20) or as irregularly shaped regions of various sizes.
scattered throughout the tumours (21, 22). More, even medulla tumours with pheochromocytoma presented disseminated calcifications (21). Calcification may be seen in all types of neurogenic tumours (27), including all medullo-adrenal tumours, described as central small punctate calcifications or as dense intratumoural calcifications.

These pathological changes were viewed as “degenerative changes” (21).

**Conclusions**

Incidental diagnostic of adrenal gland was also reported (28) in patients without adrenal insufficiency, but there was no report as isolated adrenal process. In our patient, it is clear that calcification is presented only at the cortex, medulla is not involved, appearing different from those CT adrenals seen and described as atrophic Addison’s disease (29).

Therefore, we consider that calcifications in our patient could mean a process of cicatrisation or healing on the right adrenal gland.

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**References**

Calcification in adrenal glands