

## CASE REPORT

# Fibro-hyaline involution of a papillary thyroid carcinoma metastasis in a lymph node, consecutive to radioiodine therapy, mimicking a parathyroid adenoma. A case presentation

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## Abstract

**Objective:** The aim of the study is to present the unusual changes that a lymph node metastasis of papillary thyroid carcinoma (PTC) underwent after radioiodine therapy, leading to the confusion with a parathyroid adenoma (PA). **Patient and Methods:** Eight years after a total thyroidectomy and radioiodine ablation with 73.35 mCurie <sup>131</sup>I for PTC, a 67-year-old female presented with an enlarged, painless, nodular mass in the left lateral neck region. Clinical examination revealed a firm nodule located on the site of the left inferior parathyroid gland. Elevated serum parathyroid hormone level (120 pg/mL) and parathyroid scintigraphy led to a suspicion of PA. A minimally invasive surgical procedure was performed to remove the mass, which was sent to the Department of Pathology, Emergency County Hospital, Tirgu Mures, Romania, as left PA. It was fixed and processed for microscopic evaluation. **Results:** On macroscopic examination, the surgical specimen was oval; it had 13 mm at the largest diameter and weighted 2 g. On microscopy, the lesion appeared as a fibro-hyaline, intensely acidophilic, acellular mass, with calcifications. It was limited by a delicate capsule in which one typical psammoma body was present. At the periphery, on one single level, a small mass of cells of indefinite origin was noticed. Immunohistochemistry (IHC) was done to ascertain the origin of these cells: they were negative for Pan-Cytokeratin AE1/AE2, Parathormone and Thyroglobulin antibodies, but positive for Leukocyte Common Antigen (LCA) antibody, proving that they were lymphocytes, most likely residual from a lymph node. **Conclusions:** These IHC data, together with the microscopic feature, the presence of the psammoma body and the patient's history, excluded a PA and led to a diagnosis of fibro-hyaline involution of a PTC metastasis in a lymph node, consecutive to radioiodine therapy. Without careful microscopic examination and accurate clinical information, this lesion could represent a real diagnostic challenge.

**Keywords:** papillary thyroid carcinoma, psammoma body, radioiodine ablation, parathyroid adenoma, metastases.

## Introduction

Although a rare disease, accounting for only 1% of all malignancies [1], an increasing incidence of thyroid cancer has been reported by many countries [2, 3], including Romania [4], in the last 30 years. Papillary thyroid carcinoma (PTC) represents the most common type of thyroid malignancy (85%) and it is characterized by a “distinctive set of nuclear features” [1].

All PTCs, including the conventional type and its histological variants, except the follicular-variant of PTC, can be associated with local aggressiveness represented by lymph node involvement [5]. The presence of lymph node involvement is usually detected by ultrasound scan of the latero-cervical region and requires central node dissection apart from total thyroidectomy. Lymph node metastases of PTC are not always detected, either

because of their small size or because the ultrasound examination was not performed. According to the accepted treatment protocol [6], total thyroidectomy is always followed by radioiodine ablation, which will complete the thyroidectomy. The radioiodine administration is supposed to destroy the remaining normal thyroid tissue, but also the undetected small lymph node metastases [7].

The aim of this paper is to present the morphological changes that a lymph node metastasis of PTC underwent after radioiodine therapy. Due to the morphological changes that induced hardness to its latero-cervical location on the site of the left inferior parathyroid gland and due to a slightly elevated serum parathyroid hormone level, this lymph node was mistaken for a parathyroid adenoma (PA).

## ☞ Patient and Methods

We present the case of a 67-year-old female admitted to the Department of Endocrinology, University of Medicine and Pharmacy of Tîrgu Mureş, Romania, for a painless, nodular mass in the left lateral neck region, eight years after a total thyroidectomy and radioiodine ablation with 73.35 mCurie  $^{131}\text{I}$  for PTC.

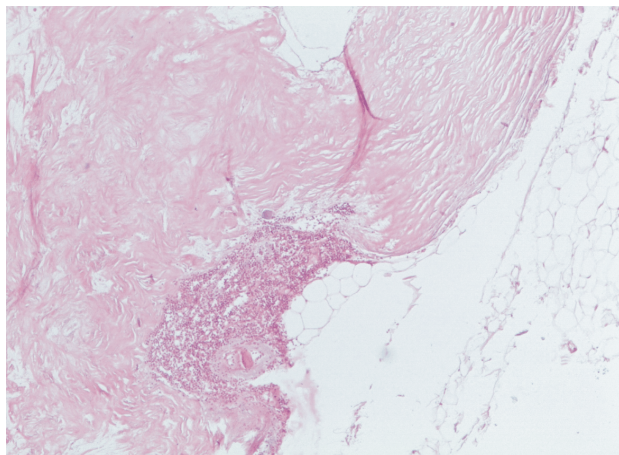
Clinical examination revealed a firm nodule, located on the site of the left inferior parathyroid gland. Ultrasound examination described a compact, hyperechogenic, nodular enlargement without cystic degeneration, with areas of calcification and minimal vascular activity at the periphery. Elevated serum parathyroid hormone level (120 pg/mL) and parathyroid scintigraphy led to a suspicion of PA.

A minimally invasive surgical procedure was performed

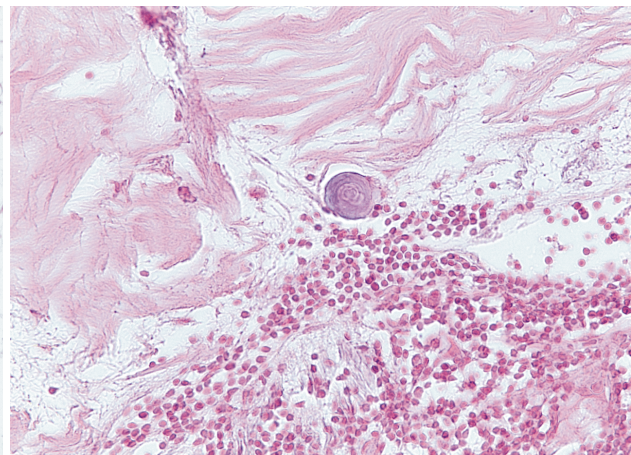
to remove the mass, which was sent to the Department of Pathology, Emergency County Hospital, Tîrgu Mureş, as left PA. It was fixed in formalin and processed for microscopic examination.

## ☞ Results

On gross examination, the specimen was oval, sized 13×12×4 mm and weighed 2 g. The cut section was grey-white, firm and compact. On microscopy, in conventional Hematoxylin–Eosin (HE) staining, the lesion appeared as a fibro-hyaline, intensely acidophilic acellular mass with calcifications. It was limited by a delicate capsule in which one typical psammoma body was found (Figures 1 and 2).

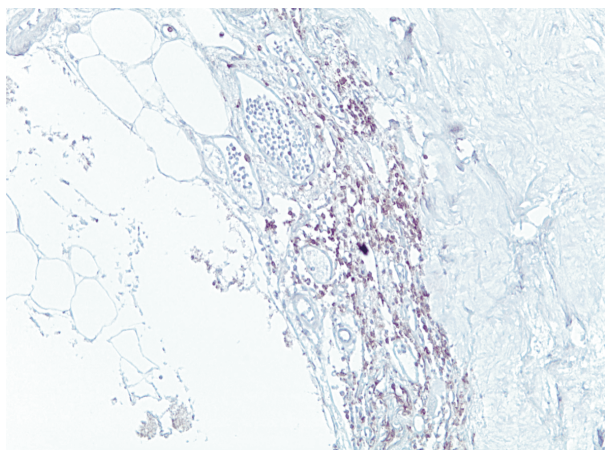


**Figure 1** – General view of the lymph node with fibro-hyaline degeneration, few residual lymphocytes and a psammoma body at the periphery (HE staining, ob. ×4).



**Figure 2** – Psammoma body, high-power field (HE staining, ob. ×20).

At the periphery, a small mass of cells of indefinite origin was noticed on one single level. Immunohistochemistry (IHC) was performed to ascertain the origin of these cells: they did not express Thyroglobulin, Parathormone or Chromogranin and Pan-Cytokeratin AE1/AE3, thereby their thyroid, parathyroid or even epithelial origin was excluded. However, these cells were positive for Leukocyte Common Antigen (LCA) antibody (Figure 3), proving that they were lymphocytes, most likely residual from a lymph node.



**Figure 3** – Residual lymphocytes in subcapsular sinus positive for LCA, ob. ×10.

## ☞ Discussion

PTC has a tendency to spread through lymphatic channels into the lymph nodes and hence clinically detectable regional lymph node metastases at first presentation are found in a significant number of cases [8, 9]. Sometimes, lymph node involvement can be the first sign of the disease, or, more often, a silent, incidental finding at the microscopic examination performed for other conditions.

In patients with a prior diagnosis of malignancy on the cytological specimen, the preoperative assessment of lymph node involvement is crucial for an adequate treatment and management of these patients.

If clinical and ultrasound preoperative examination are highly suggestive for lymph node involvement, a compartment-orientated lymph node dissection (central ± latero-cervical compartments) is performed in addition to the total thyroidectomy. In the absence of any pre- or intra-operative evidence of nodal disease, the value of prophylactic central lymph node dissection is controversial [6, 10]. There is no evidence that it improves recurrence or mortality rate, but it permits an accurate staging of the disease that may guide subsequent treatment and follow-up [6].

Postoperative, current guidelines for PTC treatment

include radioiodine ablation to complete the total thyroidectomy [6]. This therapy aims to destroy the residual normal thyroid tissue and the microscopic tumor masses, which cannot be identified on ultrasound scans, clinical examinations or during surgery [7].

This protocol is applied in order to reduce the risk of loco-regional recurrences, distant metastases and tumor-related mortality. It also facilitates the long-term surveillance based on the serum thyroglobulin measurement, neck ultrasound and whole-body radioiodine scanning [6, 11].

In our case, we could analyze the morphological consequences and the effects of the radioiodine therapy in a lymph node with PTC metastasis, not detected on the initial, pre-operative examination. The destructive effect of the radioiodine therapy induced significant changes, altering the metastatic tumor deposits and transforming the whole structure into a fibro-hyaline mass, with some calcified areas. The typical psammoma body, visible near the sub-capsular sinus suggested the possibility of a lymph node metastasis of a PTC.

The presence of lymphocytes at the periphery of this encapsulated structure certified the fact that it is a lymph node in a fibro-hyaline involution.

Psammoma bodies are pathognomonic for PTC. They are rounded and concentrically laminated calcifications, found in approximately half of the PTC cases [12].

The mechanism of psammoma bodies' formation is not fully elucidated. One presumed mechanism is necrosis and calcification of intravascular and intralymphatic tumor thrombi [13]. Psammoma bodies are also believed to be formed by focal areas of infarction of the tips of the papillae, probably because of its delicate vessels thrombosis or minimal trauma [14]. True psammomas bodies must be differentiated from dystrophic calcifications, which are irregular and rarely show lamellations [12].

The presence of psammoma bodies may also be useful in predicting aggressive tumor behavior in PTC patients. The study performed by Pyo JS *et al.* on the prognostic relevance of psammoma bodies in 258 PTC cases revealed a significant correlation with tumor multifocality, extra-thyroidal extension and lymph node metastasis [15].

Psammoma bodies may be found adjacent to the tumor cells, but also isolated, marking the site of prior viable tumor cells [13]. Their presence in a lymph node or in the normal thyroid tissue confirms the presence of a PTC in the vicinity or at distance [16].

In our case, radioiodine therapy had destroyed the malignant metastatic follicular cells, but it had no influence on the calcified structure of the psammoma body. Instead, its presence was extremely helpful for the correct diagnosis.

The identification of LCA positive lymphocytic elements at the periphery of the nodule, and at a closer look, the presence of the subcapsular sinus of the lymph node, were supplementary elements which helped in deciding on the final diagnosis.

A differential diagnosis of PA was further excluded based on the negative Parathormone immunoreactivity of the residual cells.

## Conclusions

Based on the patient's medical history, the microscopic features with the presence of psammoma body, and the results of the IHC staining panel, a diagnosis of fibro-hyaline involution after radioiodine therapy of a PTC metastasis in a lymph node was set. Without careful microscopic examination and accurate clinical information, this lesion could represent a real diagnostic challenge.

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