

Thyroid C-Cell Hyperplasia Shown by Combined In-111 Pentetreotide, Tc-99m Pertechnetate, and Tc-99m MIBI Scintigraphy

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Abstract: A patient with a previous diagnosis of colorectal adenocarcinoma presented with increased chromogranin A. In-111 pentetreotide whole body scan revealed an area of intense homogeneous uptake in the right thyroid lobe. A “cold” area, corresponding to the nodule was detected by Tc-99m pertechnetate thyroid scintigraphy (PTS). Two US-guided FNA biopsies indicated that the lesion was benign, whereas it appeared to have a malignant potential in functional imaging studies. Tc-99m Sestamibi thyroid scintigraphy was indicative of cellularity increasing the likelihood of malignancy. Calcitonin-specific stain on the removed nodule revealed some strongly-stained parafollicular elements. Final diagnosis was neoplastic C-cell hyperplasia, which is thought to precede sporadic medullary thyroid carcinoma.

Key Words: C-cell Hyperplasia, thyroid tumors, thyroid scintigraphy, In-111 pentetreotide, Tc-99m MIBI, Tc-99m pertechnetate

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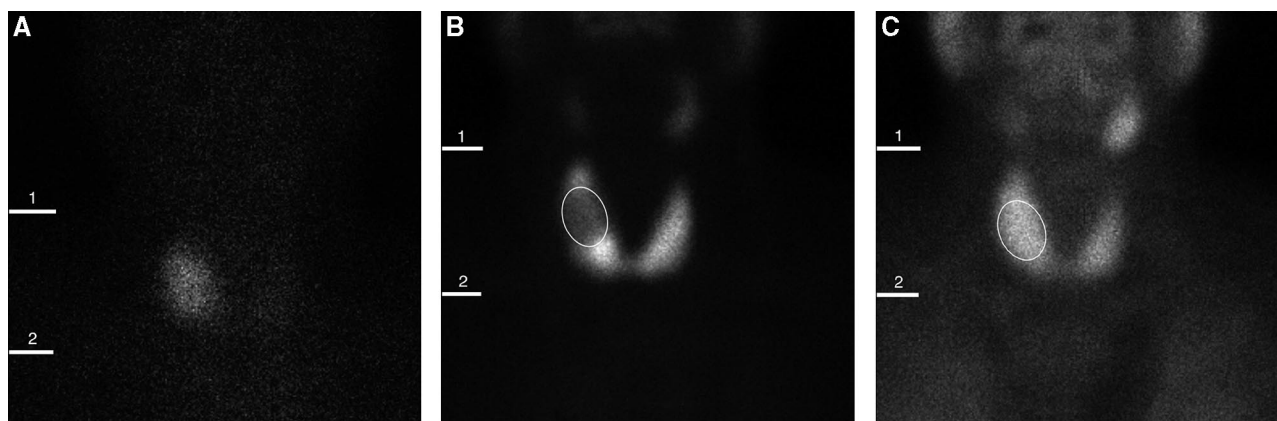


FIGURE 1. A 62-year-old patient who underwent left hemicolectomy presented, 2 years later, with chromogranin A (CgA), higher than 6 months previously (123 vs. 61 ng/mL). Somatostatin receptor (SR) single photon emission computed tomography (SPECT) and whole body scan (acquired 4 and 24 hours after i.v. injection) revealed no abdominal signs of malignancy, while a large area of intense, homogeneous In-111 pentetreotide (PT) uptake was visible in the right thyroid lobe (A, left). A high PT uptake is known to be potentially related to nonmedullary differentiated thyroid carcinoma (DTC)¹ or medullary thyroid carcinoma (MTC),² but PT uptake has also been reported in benign conditions such as Graves' disease.³ Ultrasound (US) and power-Doppler with a high-frequency transducer (10 MHz - linear probe) revealed a large (35 × 18 × 25 mm), iso-echoic, nonhomogeneous area with sharp edges and rich peripheral vascularization in the right thyroid lobe, with only poorly represented central vascularization, (pattern usually associated with benign lesions⁴). Fine needle aspiration (FNA) biopsy (double-checked with a second US-guided FNA) suggested a hyperplastic benign adenoma. Immunocytochemical staining of the specimen was negative for calcitonin antigen.

A "cold" area (corresponding to the solid node shown by SR scintigraphy) was detected by thyroid scintigraphy after the injection of 140 MBq (3.8 mCi) Tc-99m pertechnetate (PTS) (B, middle). Although PTS cannot differentiate benign from malignant nodes, this pattern is suggestive of a malignancy.⁵ Surgical removal of the node was recommended, given the associated initial tracheal compression, but the patient refused and asked for further diagnostic investigations. After injection of Tc-99m Sestamibi (MIBI), which is reportedly taken up by thyroid cancers,⁶⁻⁷ planar and SPECT delayed images⁸ were obtained. The thyroid node demonstrated moderate MIBI uptake (C, right), indicative of cellularity, thus increasing the likelihood of malignancy. The patient consequently underwent right hemithyroidectomy.

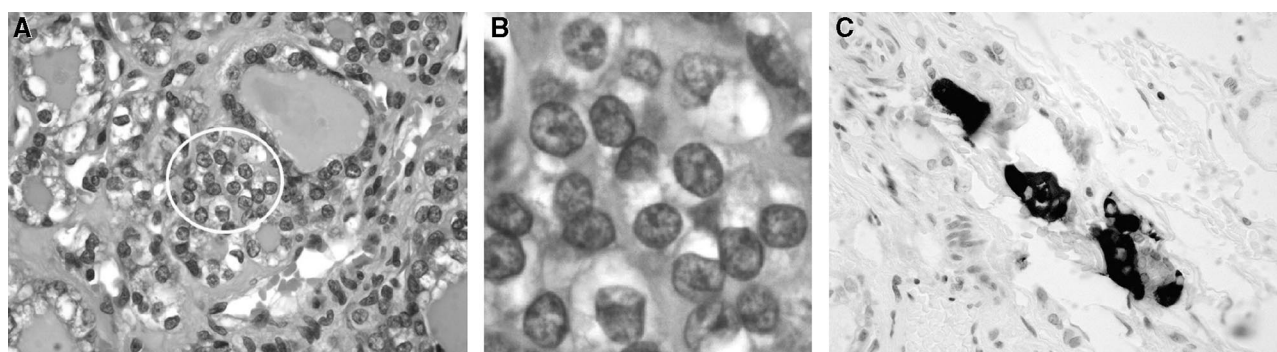


FIGURE 2. Hematoxylin & eosin (H&E) stained sections revealed (A, left at 200× and B, middle at 600×) a micromacro follicular adenoma and C-cell hyperplasia (CCH). C-cells were characterized by enlargement, eccentric nuclei, "neuroendocrine-type" chromatin, and clear nucleoli. A calcitonin-specific stain (calcitonin monoclonal mouse anticalcitonin antibodies—Clone Cal3-F5 Isotype IgG2a) revealed some strongly-stained parafollicular elements (C, right), which confirmed the diagnosis of CCH.

C-cell proliferation may be associated with various physiological conditions and some nonthyroid diseases.⁹ When H&E-stained sections reveal some atypical C-cells, cytologically resembling MTC cells, the C-cell proliferation can be termed as neoplastic CCH (NCCH), which is sometimes thought to precede sporadic MTC.¹⁰ The nodule was thus classified as NCCH. This seems to indicate that a node seen as "cold" at PTS, but PT-concentrating at SR scintigraphy should arouse the suspicion of sporadic MTC or, as in our case, of NCCH.