Occurrence of Papillary Carcinoma in Hyperfunctioning Thyroid Nodule
Report of a Case

YOSHIHIDE FUJIMOTO, ATSUSHI OKA AND SHIGENOBU NAGATAKI

Second Department of Surgery and Third Department of Internal Medicine, Faculty of Medicine, University of Tokyo, Tokyo

Synopsis

A female patient with a solitary functioning nodule of the thyroid was operated upon. She had clinical symptoms of thyrotoxicosis and the thyroid scintigram showed a "hot" nodule corresponding to the palpable nodule. A cold area was noted in the "hot" nodule. At operation, a 1.6 by 2 cm papillary carcinoma was found to be embedded within a functioning follicular adenoma, and metastatic foci were detected histologically in the ipsilateral paratracheal lymph nodes.

It has been generally agreed that the presence of a hot nodule on thyroid scintigram practically eliminates the possibility of a carcinoma (Perlmutter and Slater, 1956; Greene, 1957; Beierwaltes, 1958; Groesbeck, 1959; Shimaoka et al., 1962; Kurihara and Katsura, 1967; Harada et al., 1968). However, incidental cancer has been reported in the remnant thyroid tissue suppressed by the hyperfunctioning nodule (Groesbeck, 1959; Meadows, 1961; Miller and Hamburger, 1965; Ishizuki et al., 1969). So far as we have reviewed the literatures, only Weiss (1959), Molner et al. (1958) and Becker et al. (1963) reported patients who had a cancer in a "hot" benign nodule. Recently we encountered a similar case whose scintigram showed a distinct cold area in a "hot" nodule.

Case Report

S. T., a 27-year-old female visited our hospital on June 30, 1971, with the chief complaint of a painless swelling in the neck. The patient was first noted to have the neck tumor six months previously and she lost 6 kg of body weight during the period.

Physical examination revealed a well-nourished female who had a 4 by 3.5 cm, round, easily movable nodule in the left lobe of the thyroid. No cervical lymph nodes were palpable. Blood pressure was 115 mmHg systolic and 75 diastolic with a regular pulse of 144 per minute. Fine tremor was noted in fingers, eye lids and tongue. There was no evidence of exophthalmos or other eye signs of Graves' disease. Thyroid function tests disclosed a serum TSH of 2.5 μU/ml, serum thyroxine of 14.8 μg/dl, T3-resin sponge uptake of 43.2% and thyroidal uptake of 131I in 24 hr of 69%. A scintigram showed the radioiodine uptake almost entirely confined to the left lobe of the thyroid. A cold area was noted in the lateral part of the "hot" nodule (Fig. 1). After stimulation twice with 10 units of TSH, 131I activity in the right lobe increased, keeping the hot nodule in the left lobe as before. TA test and tanned red cell hemagglutination test for the thyroid autoantibodies against thyroglobulin were negative. Soft tissue roentgenograms of the neck revealed no
calcific deposits in the thyroid gland and presented only a deviation of the trachea toward the right. At ultrasonic scanning, the thyroid nodule was shown to be a parenchymatous tumor. Serum cholesterol was 133 mg/dl, alkaline phosphatase 17.5 King Armstrong units, and erythrocyte sedimentation rate 26 mm per hour. Other laboratory examinations including blood cell counts, blood biochemistry and chest x-ray were unremarkable.

The patient was diagnosed to have a toxic nodular goiter and was treated with mercaptoimidazole for two months before operation. She had gained 6 kg of body weight by the admission on November 24, 1971, when she appeared euthyroid. Pulse rate was 90 per minute, body temperature was between 36.3° and 37.0°C, and no hand tremor was noted. An operation was performed two days later.

At operation, the left lobe of the thyroid was enlarged and there was no adhesion to the surrounding structures. The left lobe and the atrophic isthmus were removed without difficulty. On an operating table, the resected specimen was cut through the lateral-to-medial section for a macroscopic examination. On the cut surface, a 4 by 3 cm, semitranslucent, solid tumor replaced almost the entire left lobe of the thyroid and in the mid-lateral portion of the tumor there was an area with a shaggy appearance, measuring 1.5 by 2.3 cm and being outlined irregularly by a fibrous capsule (Fig. 2). The macroscopic feature of the latter area indicated the presence of the papilliferous process and the frozen section revealed the papillary carcinoma. Then the pre- and para-tracheal lymph nodes were resected.

Permanent paraffin sections revealed a follicular adenoma in the left lobe that was made up of columnar and cuboidal epithelium with occasional papillary infoldings and rich in colloid content. There were accumulations of lymphocytes within the adenoma (Fig. 3). The papillary carcinoma reached the thyroid capsule at its postero-lateral part, but the other part was embedded within the adenoma tissue. The cancer cells were cylindrical, and arranged in a papillary fashion (Fig. 4). The nuclei were vesicular and did not show mitosis. The tumor cells had invaded into the fibrous capsule and the adjacent adenoma tissue (Fig. 5). The remnant thyroid tissue in the isthmus appeared atrophic and there was lymphocytic infiltration (Fig. 6). Metastatic foci were recognized in two of the resected paratracheal lymph nodes (Fig. 7).
Postoperative course was uneventful. The patient has been given 50 mg of desiccated thyroid daily and doing well up to now. Serum TSH level has been followed up, the data being 8.6 µU/ml on the 8th postoperative day, 10.1 on the 19th day, and around 1.5 since the 26th day on.

Discussion

An autonomous functioning nodule of the thyroid is a rather rare condition in our country. In 1967, Kurihara and Katsura accumulated 51 cases of functioning nodule from the 33 major hospitals in Japan, the cases being 0.3% of all the thyrotoxic patients and 0.6% of all patients with thyroid nodules. Harada et al. (1968) reported 53 cases of toxic or nontoxic, functioning nodule of the thyroid. Those cases were found among 13,716 instances in which thyroid scintiscanning was carried out during the 8-year period. In both series, there was not any instance that had thyroid cancer incidentally found at operation.

The thyroid scintigram in the present case showed a cold area in the “hot” nodule. The similar scintigraphic finding was described by Miller and Hamburger (1965), but in their case the cold area represented the part of the benign nodule where cystic degeneration had occurred. In the two cases reported by Becker et al. (1963) that had a papillary carcinoma embedded within the functioning nodule, the scintigrams presented almost complete localization of 131I uptake over the involved lobe without demonstrating a clear-cut cold area within the “hot” nodule. It would probably be due to the size of the cancer as small as 1 cm in diameter, in addition to the quality of their scintigrams inferior in image resolution to the gamma camera now available.

The case presented here posed one question whether the papillary carcinoma actually occurred within the benign functioning adenoma. The precise macroscopic and microscopic examination of the resected specimen revealed the part of the carcinoma that was not surrounded by the adenoma tissue, but barely covered by the thyroid capsule. This finding implies that the functioning adenoma and the carcinoma occurred separately in the left lobe of the thyroid and during the course of their development, the cancer invaded into the adenoma.

References

Weiss, H., cited in Groesbeck’s paper. (1959)
Fig. 3. Photomicrograph of the paraffin section showing a functioning follicular adenoma of the thyroid. (H. & E. × 80).

Fig. 4. The papillary carcinoma of the thyroid. (H. & E. × 200).

Fig. 5. Invasive growth of the papillary carcinoma (left) into the fibrous capsule and the adjacent adenoma tissue (right). (H. & E. × 80).

Fig. 6. The atrophic thyroid tissue taken from the isthmus. (H. & E. × 80).

Fig. 7. Metastatic foci in the paratracheal lymph node. (H. & E. × 80).