

Low Radioiodine Uptake and High Serum PBI Levels from Hemorrhage into Thyroid Adenoma¹

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Hemorrhage into a large follicular adenoma of the thyroid increased a patient's serum-protein-bound iodine (PBI) level to more than twice the normal value. Moreover, radioiodine studies showed a much diminished ¹³¹I uptake. The patient was restless, had tachycardia, a fine digital tremor, and a high basal metabolic rate. Since she had not taken iodine-containing drugs or iodine-containing radiographic contrast media, these findings probably reflected temporarily increased levels of circulating thyroid hormone and temporarily decreased hormonal biosynthesis (1, 2, 3).

CASE REPORT

This well-developed, 41-year-old spinster entered the hospital because of a large, firm tumor in the right lobe of the thyroid gland. She had noticed a mass in the right side of the neck about six weeks before. Three weeks later the mass suddenly enlarged and became tender.

Except for recurrent urticaria she had been in good health. Her weight, 131 pounds, had not varied appreciably during the past five years. She had not taken iodine-containing drugs or iodine-containing radiographic contrast media.

In the hospital the temperature ranged between 98 and 98.6 degrees F. oral; the pulse rate, between 84 and 120 beats per minute. The blood pressure was 135/80 mm Mercury. The hemoglobin was 13.1 /100 ml.; the hematocrit, 41 per cent. The white blood cell count was 6300, with a differential count of 61 per cent neutrophils, 31 per cent lymphocytes, and 8 per cent monocytes. The total serum cholesterol was 185 mg/100 ml. An electrocardiogram was interpreted as suggestive of hyperthyroidism (Fig 1).

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A firm, round tender mass, about 4 cm in diameter, was in the right lobe of the thyroid gland. The left lobe was not enlarged. No thrill or bruit was elicited over the tumor; there was no exophthalmos; and the result of a T-3 test (^{131}I -labeled triiodothyronine-resin-sponge uptake; control, 23-35 per cent) was 34.5 per cent.

The patient was nervous and apprehensive, and had a fine digital tremor. The basal metabolic rate was + 22 per cent. The serum PBI (control, 4 – 8 mCg/100 ml) was 16.9 mCg/100 ml; a repeat determination gave a similar result. The 24-hour radioiodine uptake was less than five per cent of the administered dose of 100 μC of iodine-131. High-contrast photoscanning over the thyroid gland confirmed the low ^{131}I uptake, and showed almost no ^{131}I in the region of the tumor (Fig 2).

Operation exposed a large, round, cystic tumor in the right lobe of the thyroid gland near the isthmus. The surface of the rest of the lobe was uneven because of several small nodules, each about 6 mm in diameter.

After resection of the right lobe and isthmus of the thyroid, examinations of the resected specimens showed the tumor to be a benign follicular adenoma, 3 cm in diameter, which had recently undergone hemorrhagic degeneration (Fig 3). The adjacent thyroid tissue was histologically normal, consisting of colloid-containing acini lined by flattened epithelial cells.

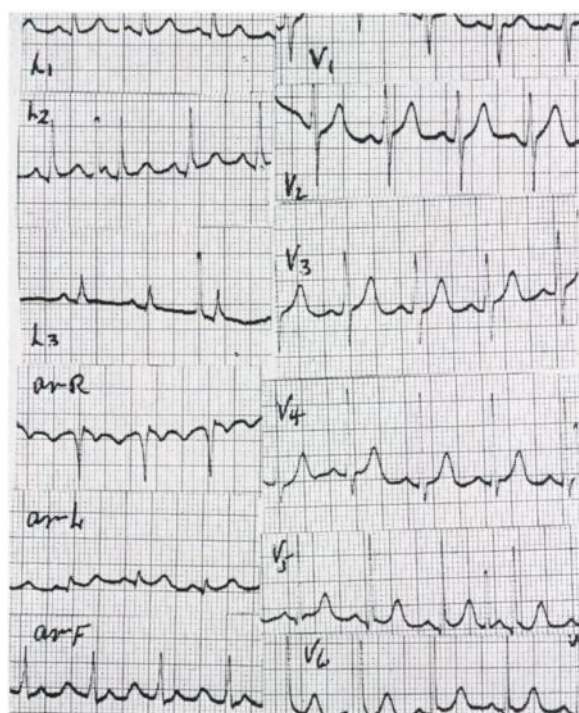


Fig. 1. In this electrocardiogram the heart rate is 115 beats per minute, the QRS complexes have liberal voltage, the P waves are prominent in lead 2, and the T waves are high and peaked in the precordial leads.

The patient recovered and left the hospital a week after the operation. Three weeks later her serum PBI level was normal, 7.2 mCg/100 ml.

COMMENT

After hemorrhagic degeneration caused a follicular adenoma in her thyroid to enlarge and become tender, this patient's basal metabolic rate rose, a fine digital tremor appeared, and tachycardia developed. The serum PBI levels were high, but the thyroidal radioiodine uptake was severely depressed. After 24 hours the thyroid contained less than five per cent of the test dose of 100 μ C of iodine-131. High-contrast photoscanning over the thyroid confirmed the low ^{131}I uptake, and showed almost no ^{131}I activity in the region of the adenoma. These clinical and laboratory findings were indistinguishable from those reported to occur in some patients with subacute thyroiditis (4). In fact, the diagnosis in this patient depended on resection of the affected lobe and on examination of the resected specimen.

The patient's high serum PBI levels were attributed to the passage of pre-formed hormone and hormonally-active iodinated proteins, and their partly-hydrolyzed products, through disrupted follicular walls into the blood stream (5) (6). The low ^{131}I uptake was also attributed to the high levels of circulating hormone that suppressed elaboration of thyroid-stimulating hormone (TSH) by the pituitary (7).

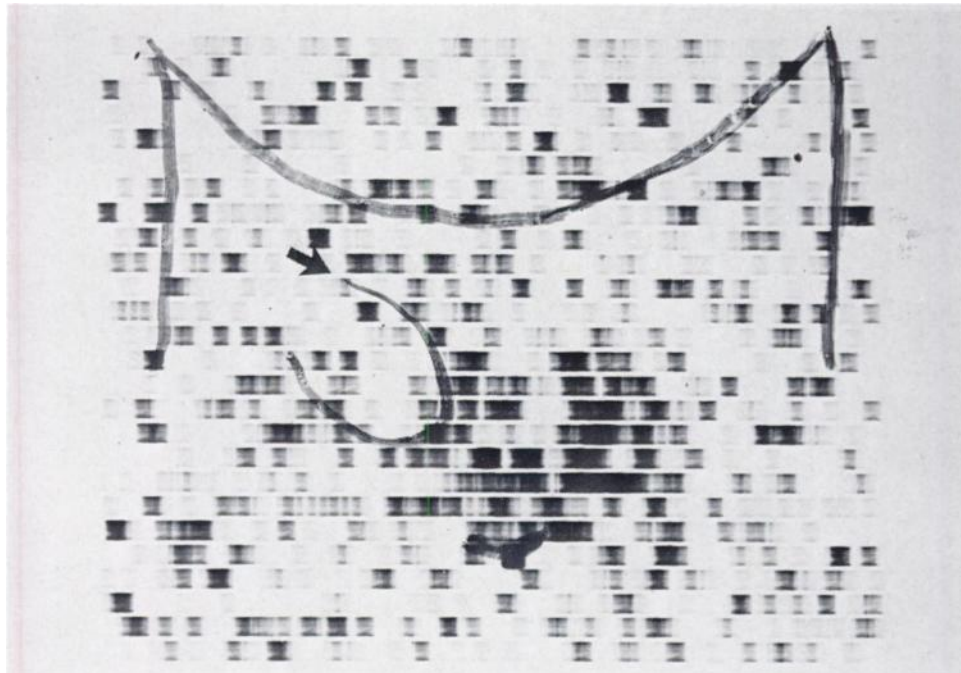


Fig. 2. This photo scan was taken 24 hours after a test dose of 100 μ of iodine-131. The ^{131}I uptake was depressed, and almost no ^{131}I was in the region of the adenoma (designated by arrow).

An alternative explanation should, of course, be mentioned: an adenomatous goiter with hyperthyroidism (Plummer's disease) which was spontaneously cured by hemorrhage into the hyperfunctioning adenoma. The lack of ^{131}I uptake by the adenoma perhaps mitigates against the Plummer's disease concept.

Ordinarily thyroxine and triiodothyronine are liberated into the blood stream by proteolytic hydrolysis of thyroglobulin which does not enter the circulation because of its large molecular size, about 675,000 (8). But thyroglobulin, mono and diiodotyrosine, and other iodinated amino acids have been identified in the blood after radiation injury, and after thyroiditis (9). In 1950, Crile and Ramsey (10) reported that rapid absorption of stored colloid that had escaped from injured thyroid follicles produced a picture similar to that caused by the ingestion of dessicated thyroid. In such cases, Czernaik and Harell-Steinberg (11) and Volpe and associates (12) observed high serum PBI levels, depressed TSH secretion, low thyroidal ^{131}I uptake, and high urinary ^{131}I secretion.

SUMMARY

After hemorrhagic degeneration of a large follicular adenoma of the thyroid, a patient's serum PBI level was more than twice the normal value. The 24-hour radioiodine uptake was less than five per cent of the administered dose of 100 μC of iodine-131. High-contrast photoscanning over the thyroid confirmed the

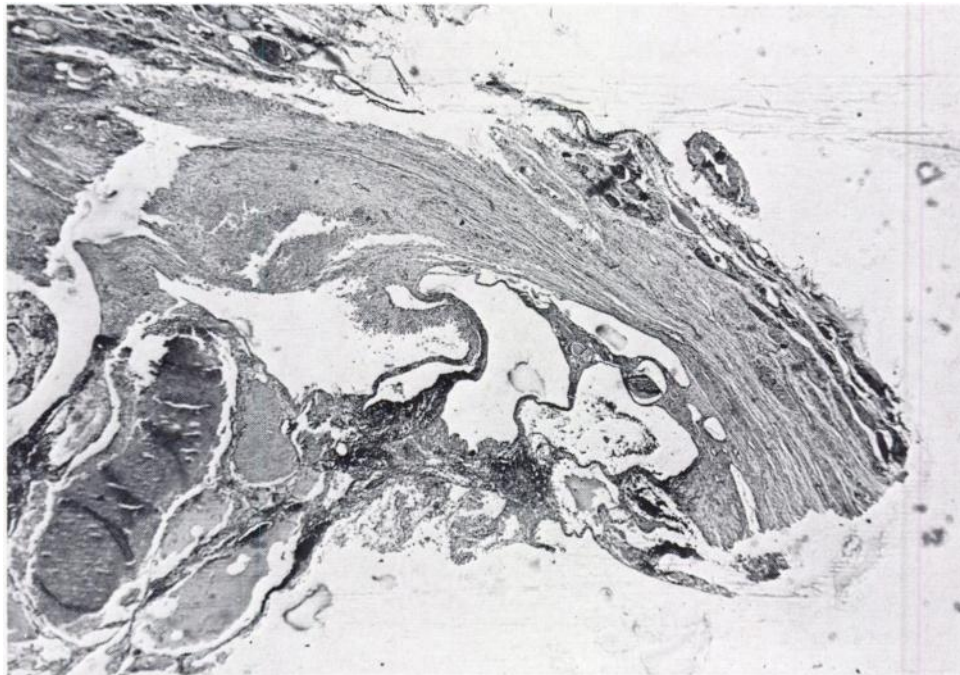


Fig. 3. This photomicrograph of section through thyroid adenoma (hematoxylin and eosin stain; X 95, reduced $\frac{1}{3}$) shows recent hemorrhagic degeneration: necrotic acini and regions of recent hemorrhage.

low ^{131}I uptake, and showed almost no ^{131}I in the region of the adenoma. The high serum PBI levels were attributed to the passage of preformed hormone and hormonally-active iodinated amino acids from injured follicles into the circulation. The low ^{131}I uptake was attributed to depressed secretion of thyroid stimulating hormone.

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