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^{131}I uptake in a benign serous cystadenoma of the ovary

E. Edmund Kim, George Pjura, Allan Gobuty, and R. Verani [1]
Department of Radiology and [1] Pathology, University of Texas Medical School, Houston, Texas 77030, USA

Abstract. A patient with well-differentiated thyroid carcinoma had a whole body scan using 5 mCi ^{131}I which demonstrated abnormal uptake of ^{131}I in a palpable pelvic mass. Approximately 24 years ago the patient had a total thyroidectomy followed by ^{131}I treatment. The histologic examination of the mass was consistent with serous cystadenoma of the ovary. No thyroid tissue or teratoma was identified. The mechanism for the unusual uptake of ^{131}I in a benign ovarian tumor is not clear, and the differential diagnosis of metastatic thyroid cancer is briefly reviewed.

Because of its ready availability, relatively low cost, and long shelf-life, ^{131}I has become the most frequently used radiopharmaceutical for in vivo investigation of thyroid function and morphology. Among these applications, whole body imaging with 2–10 mCi ^{131}I is widely used in the follow-up of thyroid cancer as a method for identifying recurrent or metastatic lesions of follicular and/or papillary functioning thyroid carcinoma. In this context, uptake of ^{131}I in a pelvic mass in a patient with a history of thyroid cancer would be expected to represent struma ovarii or metastatic functioning thyroid carcinoma. Presented here is an interesting case of ^{131}I uptake in a benign serous cystadenoma of the ovary.

Case history

A 71-year-old woman was admitted for removal of a right pelvic mass, which was palpated by her local doctor. The patient had been in relatively good health until several months ago, when she developed excessive weakness and deepening of her voice. She denied any chest symptoms or bone pain. Approximately 24 years ago she had had a total thyroidectomy followed by ^{131}I treatment for a follicular adenocarcinoma. She had been on Synthroid, 0.2 mg daily, and her last thyroid function test performed 1 month prior to admission was normal. The routine laboratory findings on this admission were also within normal limits.

Offprint requests to: E. Edmund Kim, M.D., Department of Radiology, University of Texas Medical School, 6431 Fannin, MSB 2.130, Houston, Texas 77030, USA

The only remarkable physical finding was a palpable mass approximately 8 cm in diameter in the right lower quadrant of the abdomen. A scout film of the abdomen (Fig. 1) showed a large, noncalcified pelvic mass. An excretory urogram demonstrated a urinary bladder flattened by this pelvic mass, which also slightly displaced the distal ureters laterally. A barium enema also demonstrated the mass along with extrinsic compression of the sigmoid colon. The chest radiograph was negative.

Because of her history of follicular thyroid cancer, a 24-h total body scan using 5 mCi ^{131}I was performed. She had received no thyroid hormone for 5 weeks. The scan demonstrated abnormal uptake of ^{131}I in the pelvic mass (Fig. 2), suggesting either struma ovarii or metastatic functional thyroid cancer. There was no abnormal radioactivity

Fig. 1. Scout film of the abdomen shows a large oval shaped mass (*arrows*) in the right pelvis

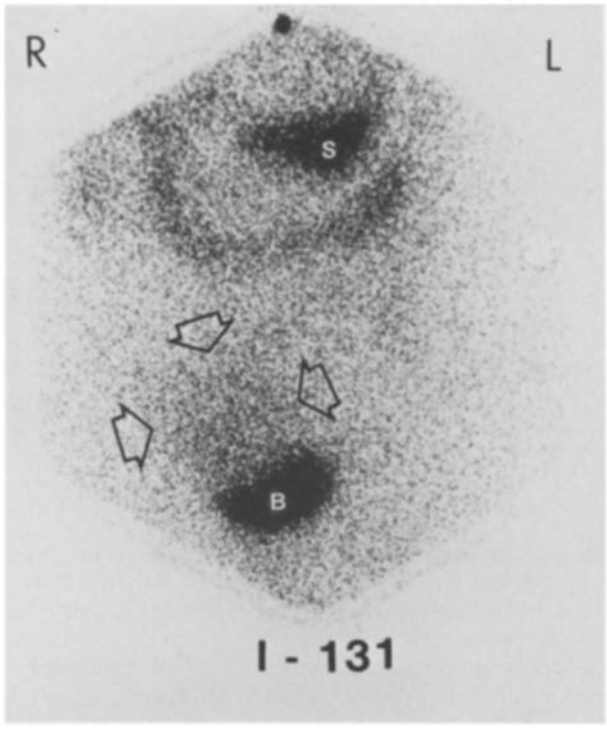

Fig. 2. Anterior abdominal image of 24-h ^{131}I scan shows an abnormal uptake (*arrows*) of radioactivity in the right pelvic mass compressing the urinary bladder (B). S: stomach

in the neck. Abdominal ultrasonography showed a large, fluid-filled mass consistent with a cystic ovarian tumor.

At surgery, a right ovarian cyst measuring $18 \times 13 \times 6$ cm with a smooth glistening capsule was revealed. When bisected, this cyst was found to consist of a single cavity filled with serous fluid. The wall of the cyst was 3–4 mm thick, and the histologic examination was compatible with serous cystadenoma (Fig. 3). No thyroid tissue or teratoma was identified. No postoperative ^{131}I imaging or counting of the pathologic specimen could be obtained.

Discussion

In the postthyroidectomy follow-up of well-differentiated (functional) thyroid carcinoma, the use of ^{131}I represents one of the least invasive, least traumatic, and most effective methods for both the diagnosis and treatment of metastatic disease. In most studies, the incidence of such metastases outside the neck is reported to be between 10%–50% (Woolner 1971; Beierwaltes et al. 1982). One large series reported that in 39.4% of these patients, the average interval between surgery and the appearance of distant metastases was 7.44 years (range 1–25 years) with the recurrent disease in some cases being far advanced and incurable at the time of discovery (Beierwaltes et al. 1982). Indeed, a review of the literature indicated that more than 75% of patients with thyroid cancer and distant metastases died within 5 years after the diagnosis was established (Beierwaltes 1978). The death rate with bone metastases was strikingly higher than with lung metastases (Harness et al. 1974).

It has previously been observed that cervical lymph-nodal, pulmonary, and bony metastases can be detected by ^{131}I scans when the metastases have not yet become palpable or visible radiographically (Beierwaltes 1978; Turner and Weier 1972). It is also important to reiterate that residual normal thyroid tissue must be ablated if functioning metastases are to be discovered and the patient appropriately staged. In general, those tumors exhibiting functioning metastases are either follicular, papillary, or of mixed follicular-papillary in cell type. There is little doubt that patients with distant metastases that concentrate ^{131}I should receive ^{131}I therapy.

Our case demonstrated a focal abnormal uptake of ^{131}I in a large mass lesion in the right pelvis of a patient who had had a total thyroidectomy approximately 24 years ago, followed presumably by ^{131}I ablation therapy, for follicular thyroid cancer. In this clinical setting, the diagnosis implied by ^{131}I uptake in the pelvic mass described was either struma ovarii or metastatic thyroid carcinoma.

Struma ovarii (ovarian goiter) is a teratoma in which thyroid tissue either is present exclusively or forms a grossly recognizable component of a more complex teratoma.

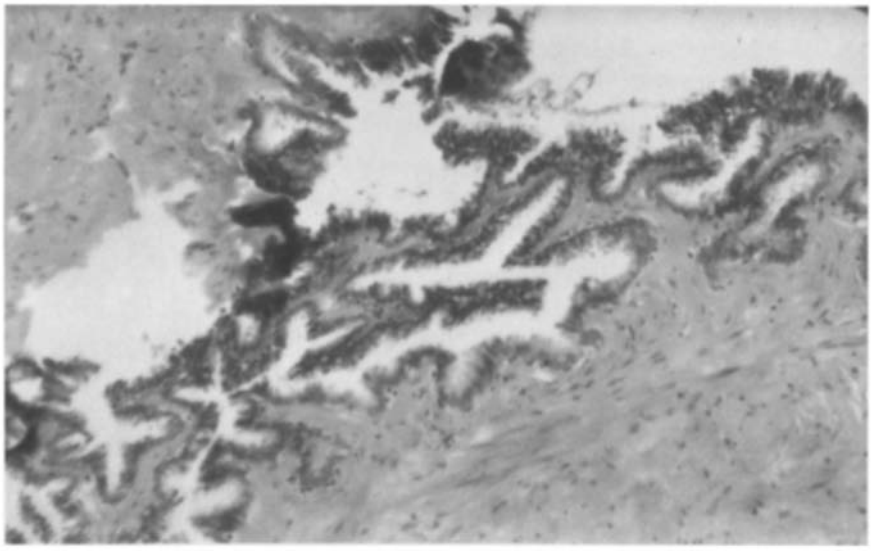

Fig. 3. Benign serous cystadenoma of the ovary, with a single layer of columnar epithelium. No thyroid tissue identified

Cases in which this tissue predominates with associated hormonal effects are extremely rare. In one reported case of struma ovarii, a 24-h ^{131}I scan showed a round area of abnormal uptake in the pelvis associated with ^{131}I uptake of 17% versus thyroid uptake of only 1% (Yeh et al. 1973). Serum T_4 was 40 μg% and T_3 resin uptake was 39%. Pathologically, the tumor was an infarcted teratoma composed mostly of active thyroid tissue. Although there may be histologic evidence of thyroid tissue in 20% of dermoid cysts of the ovary, this component is recognizable grossly in less than 5% (Scully 1978). Metastatic thyroid cancer in the present patient seemed unlikely on the basis of her clinical presentation alone, since the more likely sites for metastatic disease – lung, bone, liver, kidney, and brain – were all apparently uninvolved.

The explanation of this unusual ^{131}I uptake in benign ovarian serous cystadenoma without thyroid tissue is not clear, and an extensive literature search failed to locate any similar report. Benign serous cysts and cystadenomas may form single or multiple loculations, lined by low columnar epithelium, which is sometimes ciliated and often distinctly resembles tubal epithelium. There may be ^{131}I uptake in the epithelial cell or ^{131}I accumulation in the serous fluid secreted by the epithelial cell.

In summary, our experience suggests that it may be useful to include this as yet unexplained uptake of ^{131}I in a benign ovarian serous cystadenoma among the rarer causes of ^{131}I uptake in a pelvic mass occurring in a patient with a history of well-differentiated (functional) thyroid cancer.

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