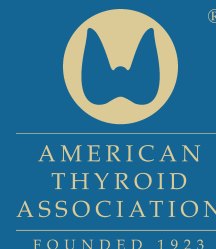


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Clinical Thyroidology

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Iodine Supplementation in Euthyroid Pregnant Women Does Not Alter Maternal Free T₄ Levels

Elizabeth N. Pearce

Brucker-Davis F, Panaia-Ferrari P, Gal J, Fénichel P, Hiéronimus S. Iodine supplementation throughout pregnancy does not prevent the drop in FT₄ in the second and thirds trimesters in women with normal initial thyroid function. Eur Thyroid J 2013;2:187-194.

SUMMARY

Background

Observational studies have demonstrated that maternal hypothyroxinemia is associated with adverse neurodevelopmental outcomes in offspring (1,2). Hypothyroxinemia may result from iodine deficiency, but there are also physiologic alterations in free T₄ levels throughout pregnancy, and normal trimester-specific ranges for free T₄ are not well defined. The aim of this study was to determine how much of the decrease in maternal free T₄ after the first trimester of pregnancy is mediated by iodine deficiency. Mildly iodine-deficient, euthyroid pregnant women were randomly assigned to receive iodine supplementation and compared with a control group receiving no supplementation. Thyroid function was assessed throughout gestation.

Methods

This was a prospective, randomized trial in pregnant women. Women with a singleton pregnancy, with normal baseline thyroid-function tests (TSH <2.5 mIU/L and FT₄ above the 10th percentile) and negative TPO antibodies were enrolled between July 2007 and July 2008. All women were enrolled before 12 weeks of gestation. Women with baseline urine iodine concentrations ≥400 µg/L and women taking iodine supplements before the start of the study were excluded. A total of 111 women were randomly assigned to receive prenatal multivitamins with or without 150 µg/day of potassium iodide. All women received dietary instructions about optimizing iodine intake. Treatment was started at enrollment (median, 10 weeks of gestation) and continued through 3 months post partum. Pill counts were obtained at each visit. Thyroid-function tests, urinary iodine measurements, TPO antibodies, thyroglobulin anti-

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Iodine Supplementation in Euthyroid Pregnant Women Does Not Alter Maternal Free T₄ Levels

Elizabeth N. Pearce

bodies, thyroxine-binding globulin (TBG), and serum thyroglobulin were obtained at enrollment, week 22, week 33, and 3 months postpartum. Thyroid ultrasound was performed at baseline, at week 33, and at the postpartum visit. Comparisons between groups were performed using χ^2 and Fisher's exact tests for categorical data and Mann-Whitney testing for continuous data.

Results

A total of 86 of the 111 women were followed until delivery, and 36 were followed to 3 months postpartum. Ten women taking iodine-containing supplements and only one woman in the control group dropped out because of nausea and vomiting. Median urinary iodine excretion was similar in the treatment and control groups at baseline (111 $\mu\text{g/L}$ vs. 103 $\mu\text{g/L}$), and 84% of

women in both groups reported using iodized salt. In the treatment group, urinary iodine increased to 161 $\mu\text{g/L}$ by the third trimester, whereas in the controls the urinary iodine concentration decreased to 76 $\mu\text{g/L}$ ($P < 0.001$). Free T₄ decreased by 15% in treated women and 21.6% in the controls between the first and second trimesters ($P = 0.27$), and then remained stable in the third trimester. Total T₄, free T₄, free T₃, TSH, TBG, and thyroid volume did not differ between groups at any time point. Serum thyroglobulin was lower in the treated group than in controls at the second-trimester and postpartum visits ($P < 0.01$).

Conclusions

Iodine supplementation in mildly iodine-deficient, antithyroid antibody-negative, euthyroid pregnant women did not alter maternal free T₄ levels.

ANALYSIS AND COMMENTARY ● ● ● ● ●

Serum free T₄ and free T₃ concentrations typically decrease after the first trimester of pregnancy. This is due, at least in part, to the fall in serum level of human chorionic gonadotropin (hCG), a stimulator of the thyroidal TSH receptor, after weeks 8 to 10 of gestation. In this study, an decrease of approximately 20% in free peripheral thyroid hormone levels was observed in both groups between the first and second trimesters, with no concomitant increase in TSH. The ratio of total T₄ to TBG followed the same pattern as free T₄, arguing against free T₄ assay artifact as a reason for the observed decline in free T₄. These data suggest that the free T₄ decline after the first trimester is physiologic, not pathologic, and is not the result of mild iodine deficiency. There is a need for trimester-specific, assay-specific reference ranges for free T₄ to guide clinical decision-making.

Strengths of the study include its randomized, prospective design and the fact that iodine supplementation was started relatively early in gestation. The supplementation dose of 150 μg of iodine daily is in agreement with ATA and Endocrine Society guide-

lines (3,4). However, results may not be generalizable to antithyroid antibody-positive women or to those with baseline hypothyroxinemia or TSH elevations, who might be more susceptible to the development or worsening of thyroid hypofunction in the setting of iodine deficiency. There was more gastrointestinal intolerance of iodine-containing prenatal multivitamins, leading to differential dropout, in the treatment group. It is important to note that effects of iodine supplementation on fetal and neonatal thyroid function and developmental outcomes were not assessed.

These data should not be interpreted as a reason to avoid iodine supplementation for iodine-deficient pregnant women. Even mild maternal iodine deficiency in pregnancy has been associated with deleterious effects on child cognition (5,6). In the present study, iodine supplementation prevented a rise in serum thyroglobulin levels, a marker for iodine deficiency, and normalized urinary iodine concentrations. Supplementation with 150 μg of iodine daily in mildly deficient regions has been demonstrated to be safe; supplementation should optimally be started before a woman conceives.

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Iodine Supplementation in Euthyroid Pregnant Women Does Not Alter Maternal Free T₄ Levels

Elizabeth N. Pearce

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Some Dental Materials Cause Hot Spots in the Oral Region When Whole Body I¹³¹I Scans Are Done after Thyroidectomy

Stephen W. Spaulding

Conclusions

The authors postulate that the negatively charged ¹³¹I ion can form a permanent or semipermanent bond with positively charged ions on dental materials

containing gold, silver, palladium, or mercury. The bond formed with titanium seems weaker. Most of the uptake detected in the mouth on postthyroidectomy scans appears to be due to this benign cause.

ANALYSIS AND COMMENTARY ● ● ● ● ●

The authors had no information about the actual dental materials that they found to be correlated with the SPECT/CT foci, and the patients did not undergo dental examination to look for evidence of subclinical gingivitis or dental abscess associated with the dental materials. The phantom model study showed clear-cut interactions of a tracer dose of ¹³¹I with several virgin dental metals, but the results might have been somewhat different if saliva had been used to soak the dental phantoms instead of distilled water. (Saliva contains substantial amounts of nonradioactive iodide, and the iodine level does not differ

between euthyroid and hypothyroid subjects [1]). Interestingly, no uptake was found on the dental phantom containing a mercury/silver amalgam filling, although iodides of mercury and silver have been well characterized. A prospective study is now needed to correlate such oral foci of ¹³¹I with the specific dental materials present in each patient, the length of time those materials have been in place, plus other clinical (and metallurgical) parameters. Nonetheless, previous clinical studies concerning the kinetics of radioiodine in the salivary glands, and on salivary-gland function in patients treated with ¹³¹I may need to be reinterpreted.

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Differentiated Thyroid Cancers in the Wake of the Chernobyl Nuclear Accident May Be Efficiently Treated with I-131 Even in Patients with Disseminated Pulmonary Metastases

Albert G. Burger

was considered in patients with thyroglobulin measurements $>10 \mu\text{g/L}$ with a response of the tumor to treatment and a progressive decline of serum thyroglobulin values. The remaining patients were considered to be suffering from progressive disease.

Results

In 134 children without distant metastases the cumulative high ^{131}I doses varied between 1 and 25 GBq (27 and 675 mCi). Obviously, 100 patients with distant metastases received higher cumulative doses (4 to 63.6 GBq [100 to 1700 mCi]; median, 16.9 GBq [450 mCi]). Note that because of local circumstances, in some instances the interval between surgery and the first RIT treatment was as long as several years.

Complete remission was achieved in 64% of the 134 children, nearly complete remission in 30%, and partial remission in 4.8%; there was no relapse. The follow-up between the last ^{131}I therapy and the latest examination ranged from 7.4 to 13.9 years. Most importantly, there were no local or distant DTC recurrences in incomplete responders or any sign of disease progression in nearly complete responders. One patient died of advanced pulmonary fibrosis 19 years after diagnosis and 17 years after treatment. Two other patients died of causes unrelated to DTC. No patient died of DTC. As expected, complete remissions were more frequent in patients in whom the disease was discovered long after 1986 and in

those with low initial serum thyroglobulin levels. Pulmonary fibrosis was not limited to the one patient who died of it: seven other patients showed persistence or transient evidence of lung fibrosis. All these cases had diffuse pulmonary metastases with high initial TG levels (290 to 9760 $\mu\text{g/L}$).

Clinical follow-up indicates that reproductive function was impaired in males, since only 24% of the affected men have children while 51% of the women have children.

Conclusions

This cohort of patients with DTC with local invasion and/or distant metastases is a selected group of patients at increased risk. The follow-up, which now extends over 11 years after RIT, is very encouraging; none of the patients died of progressive thyroid cancer; the majority (64%) were in complete remission, and some (4.8%) had partial remission, with clinical follow-up indicating an improvement of their health status because thyroglobulin levels tended to decrease over years with suppressive doses of thyroxine alone. In some cases, the ^{131}I doses that had to be given were very high, but on the average dose of 141 MBq/kg (3.8 mCi/kg) was still acceptable. Lung fibrosis was seen in several cases, but only in patients initially presenting with pulmonary metastases. One of these patients died of pulmonary insufficiency.

ANALYSIS AND COMMENTARY ● ● ● ● ●

Among the 5127 young patients with papillary thyroid carcinoma in the Chernobyl area, no aggressive forms (e.g., tall-cell, insular, or columnar-cell carcinoma) were found; therefore, the prognosis of these tumors is essentially good, provided the children have access to adequate treatment (3). In control populations, the more aggressive forms are also extremely rare, so it is premature to conclude that aggressive forms do not

occur after incidents like that in Chernobyl. Although, the increased cancer risk was limited to children and adolescents below 14 years of age in 1986, the whole population continues to be surveyed.

The results of this study are highly encouraging. Some patients had very advanced disease with disseminated miliary pulmonary metastases. Following repeat treatments with radioactive iodine, the pulmonary

continued on next page

Differentiated Thyroid Cancers in the Wake of the Chernobyl Nuclear Accident May Be Efficiently Treated with I-131 Even in Patients with Disseminated Pulmonary Metastases

Albert G. Burger

seeding disappeared or was markedly reduced. This experience certainly contrasts with the rare success rate in sporadic DTC with pulmonary involvement in adults.


The most difficult question is with regard to the balance between treatment and secondary effects of treatment, particularly pulmonary fibrosis. In this

context, it would be interesting to know the cumulative dose of ^{131}I in the patient who died of pulmonary fibrosis. Also, we do not know the incidence of secondary tumors that have been reported in the adult DTC population treated with ^{131}I . For the moment, however, there is no alternative way of treating these cancers.


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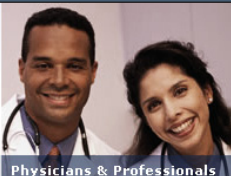
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Patients with Differentiated Thyroid Cancer and Coexistent Hashimoto's Thyroiditis Have a Better Prognosis Than Those without Thyroiditis

Jerome M. Hershman

ANALYSIS AND COMMENTARY ● ● ● ● ●

Patients with HT are not predisposed to the development of DTC (1). However, in patients with HT who also have DTC, the cancer is less aggressive and the prognosis is better than in those without DTC, as shown in this study. This conclusion is in agreement with some other studies (2-4), but other reports do not substantiate the beneficial effect of HT on the outcome of DTC (5-7). Based on their conclusion that DTC in the presence of HT follows a less aggressive course, the authors of the present report recommend that this concept should be included in tailoring therapy. In an effort to relieve the stress of

the disorder, it is reasonable to tell patients with DTC and Hashimoto's or focal lymphocytic infiltration that this is a favorable host response to the tumor.

One limitation of the study is that the authors do not clearly state how many patients with HT were diagnosed by clinical criteria and how many were diagnosed by histopathology or how many with clinical criteria did not have typical histopathology.

What is the possible mechanism whereby HT may ameliorate DTC? Infiltration by cytotoxic T cells may kill carcinoma cells.

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Is Long-Term Follow-up Necessary for Benign Thyroid Nodules?

Jerome M. Hershman

ANALYSIS AND COMMENTARY ● ● ● ● ●

This interesting study considers the problem of how frequently and how long to follow thyroid nodules that are benign. Although the ATA guideline that is described in the introduction is open-ended, it does not specify the absolute length of follow-up, but it does state that longer follow-up of nodules thought to be stable at earlier intervals should be carried out, perhaps at intervals of 3 to 5 years.

The current study has serious flaws. First it is retrospective. Second, perhaps because MD Anderson Cancer Center is a referral center, 43% (280 of 646) of patients did not undergo follow-up there, and no follow-up data are provided on these patients. The authors point out that there were no clear clinical differences in the remaining patients who underwent either short-term or long-term follow-up. On that basis, their conclusions may be considered valid. Of course, what is needed is a prospective study with nearly 100% follow-up to determine whether there is a significant yield of new findings suggestive of

malignancy in patients who are followed for longer than 3 years.

Continued growth of cytologically benign nodules may be worrisome and justify another FNA. Another concern is false negative FNA results. In the case of small nodules, it is possible that the sampling included mainly the benign tissue surrounding the nodule. In the case of larger nodules, the possibility of heterogeneity has been raised as a basis for false negative cytology, but a recent study from the Walter Reed National Military Medical Center showed that false negative cytology was not more common in nodules larger than 4 cm as compared with smaller nodules (2). Nevertheless, the rate of false negatives in that series was 7%.

For the above reasons, it seems reasonable to follow patients with benign thyroid nodules by ultrasound for 3 years and at much longer intervals after that. Additional studies will be needed to justify stopping follow-up at 3 years when there is no growth of the nodule in order to reduce costs of follow-up.

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Complete Cervical Sonography Is Essential for Operative Planning in Differentiated Thyroid Cancer

Cord Sturgeon

longitudinal care algorithms, both the ATA and NCCN guidelines recommend periodic ultrasound (1,2). Physical examination is not sensitive for the presence of cervical-node metastases, and postoperative patients will be subjected to rigorous surveillance, including cervical ultrasound. Therefore, it behooves the surgeon to have knowledge of sonographically detectable metastases prior to the index operation for thyroid cancer, so that a complete resection, including appropriate lymph-node clearance, can be performed. Theoretically, this should lead to better locoregional control of disease, and may decrease recurrence (3), and possibly the need for radioiodine or reoperation.

In a prior study, a group from MD Anderson Cancer Center found that cervical ultrasound detected additional sites of metastatic disease not found on physical exam in 20% of patients undergoing an index operation for thyroid cancer, in 32% undergoing reoperation for persistent disease, and in 68% undergoing reoperation for recurrent disease (4). The operation performed was altered by the sonographic data in 39% of these patients. In a study from the University of Miami, surgeon-performed preoperative

ultrasound identified nonpalpable metastatic lymph nodes in 24% of patients (5). In a study from the Mayo Clinic of over 700 patients with PTC, preoperative ultrasound detected nonpalpable nodal metastases in 32.9% (6). Preoperative ultrasound findings altered the operation in 40.5% of index cases and in 42.9% of reoperative cases.

In this contribution by O'Connell et al., 23% of the total group had findings from the preoperative ultrasound that changed the operative management. These findings are similar to those of other researchers who have studied the subject and underscore the importance of preoperative high-resolution sonographic imaging for patients with thyroid cancer. Taken together, these studies indicate that preoperative ultrasound has a high sensitivity for nodal disease and will detect nonpalpable nodal metastases in roughly 20% to 40% of patients with DTC and will alter the index operation in a similar percentage of patients. For these reasons, complete cervical sonography is an essential component of the preoperative workup and operative planning for patients with thyroid cancer.

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BRAF Mutation Is Not an Independent Predictor of Central-Lymph-Node Metastases in the Classical Variant of Papillary Thyroid Cancer

When the bivariate analysis was performed for only the 315 classic variant PTCs, there was no significant association between BRAF mutation and lymph-node metastases or any of the other tumor variables. Multivariate logistic-regression analysis found that only age >45, tumor size >2 cm, and extrathyroidal extension were independent predictors of lymph-node metastases. There was no significant association between BRAF mutation status and lymph-node metastases in this group.

Conclusions

Although BRAF mutation was found to be an independent predictor of central-lymph-node metastases in the overall cohort of patients with PTC, this relationship lost significance when only classical variant PTC was included in the analysis. Prospective studies are needed before BRAF mutation can be considered a reliable factor to guide the treatment of patients with PTC with regard to performing prophylactic central-lymph-node dissection.

ANALYSIS AND COMMENTARY ● ● ● ● ●

This interesting study, concluding that BRAF mutation status is not a predictor of lymph-node metastasis for the classical variant of PTC, which occurred in 81% of the patients, is somewhat heretical with regard to the recent concern about the ominous prognostic value of this mutation. The finding that the BRAF mutation does not correlate with lymph-node metastasis is supported by a Japanese study of 613 patients with PTC of whom 38% had the BRAF mutation (2). In a meta-analysis of 32 studies including 6372 patients (written by some authors of the current study), BRAF mutation was associated with lymph-node metastases (3), but only 2 of the studies included prophylactic lymph-node dissection.

How can the contrary findings be reconciled? First, PTC has a very good prognosis in about 90% of patients, making it difficult to believe that the BRAF mutation indicates an ominous prognosis when it is currently found in such a high prevalence of PTC

patients. The finding that 80% of the classical variant PTCs had the mutation makes the statistical comparisons somewhat lopsided. If the large majority of patients with PTC have the BRAF mutation, then it becomes tough to prove that it predicts a poor outcome, including lymph-node metastases that correlates with more recurrence.

Second, the introduction of the current paper contains an excellent discussion about the controversial benefit of prophylactic central-lymph-node dissection, although it does not highlight the downside of the procedure, namely a higher incidence of surgical complications. It states that “most occult nodal micro-metastases, although they occur in 31% to 62% of patients with PTC, remain clinically insignificant.” Perhaps the use of the BRAF mutation will be as a marker of more aggressive PTC that should be treated more aggressively in patients who have gross lymph-node macrometastases that have been detected pre-operatively. These patients are probably more likely to benefit from central-lymph-node dissection.

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THYROID CANCER TUMOR BOARD

Lymph Node Metastases Can Have a Significant Impact on Recurrence of Thyroid Cancer

Wendy Sacks and Pouyan Famini

CASE PRESENTATION ● ● ● ● ● ● ● ● ● ●

In April 2012, a 28-year-old woman at 5 weeks postpartum presented to her obstetrician because she felt a new lump in the right side of her neck. She was referred to an endocrinologist for further evaluation. Neck ultrasound demonstrated a 4.1-cm nodule in the right thyroid lobe; the nodule had irregular borders and microcalcifications. In addition, multiple enlarged, abnormal, cystic lymph nodes were visualized in the central and lateral neck at levels III, IV, and VI, ranging from 1.5 to 3.5 cm (Figures 1 and 2). Fine-needle aspiration (FNA) of the right thyroid nodule and a right level IV lymph node confirmed papillary thyroid cancer (PTC) with lymph-node metastasis.

In May 2012, the patient underwent subtotal thyroidectomy with central compartment and right modified neck dissection. Surgical pathology demonstrated multifocal classic variant PTC involving the entire right lobe, with the largest nodule in the isthmus measuring 2.4 cm. The tumor extended beyond the

thyroid and into the soft tissue and fibrous connective tissue of the neck. Eighteen of 18 central compartment lymph nodes and 8 of 12 level III/IV lymph nodes were involved, with extranodal extension (pT3, pN1b, pMX). In June, 2012, she received 155 mCi of ¹³¹I following recombinant human TSH (rhTSH) stimulation. The 7-day posttreatment whole-body scan (WBS) demonstrated focal intensive activity in both sides of the thyroid bed, focally increased activity in the superior mediastinum, and low-grade, nonspecific uptake in the high posterior right neck. Further imaging with CT or MRI was recommended. Her thyroglobulin (Tg) was 6 ng/ml on thyroid hormone suppression prior to ¹³¹I treatment.

In September 2012, with TSH <0.01 mU/L, her Tg was 5.4 ng/ml. Six months after RAI treatment, the patient underwent thyroid ultrasonography, which showed two oval, circumscribed, avascular nodules in the left thyroid bed and no irregular lateral neck lymph nodes; however, a neck MRI

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Figure 1. Transverse view of 4.1-cm right-lobe nodule with microcalcifications.



Figure 2. Two cystic level IV nodes. The larger node measures 3.5 by 2.8 by 2.0 cm.

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performed to evaluate right-salivary-gland enlargement showed a 2-cm mass in the right posterior triangle, level II, just posterior and medial to the tail of the parotid gland but deep to the sternocleidomastoid muscle. FNA of this right level II lymph node demonstrated metastatic PTC. A chest CT (without contrast material) demonstrated a 6-mm nodular area on each side of the trachea in the region of the thyroid bed, possibly corresponding to the focal intense uptake seen on the prior WBS. There was no evidence of pulmonary metastases. In April 2013, she underwent resection of this biopsy-proven metastatic lymph node as well as four adjacent benign lymph nodes. Current thyroglobulin remains elevated, at 4.2 ng/ml with TSH <0.01 mU/L, and the thyroid-bed ultrasound shows stability in size of the 0.6- and 0.8-cm left thyroid bed nodules, but now there are cystic changes and microcalcifications in these lesions (Figure 3).



Figure 3. Two left-thyroid-bed nodules with microcalcification and cystic change in the thyroid bed.

ANALYSIS AND COMMENTARY ● ● ● ● ●

Despite the extensive locoregional tumor involvement with extrathyroidal extension, lateral lymph-node metastases, and extranodal extension, most would agree that this patient's overall disease-specific survival is still excellent as prognosticated by various staging systems: Stage I by AJCC/UICC, MACIS score <6 ("low risk"), and low risk by AGES. What is the prognostic impact and the risk for recurrence of overt lymph-node metastases?

There are several prognostic factors for persistent or recurrent PTC with cervical lymph-node metastases. These include a high number of lymph nodes with metastatic disease at presentation (more than 10), number of lymph nodes with extracapsular invasion (more than 3), and elevated Tg at 6 to 12 months after levothyroxine withdrawal. Furthermore, the impact of nodal metastases depends on age, with a negative impact on outcome seen mainly in older patients.

In addition, the number of nodes, their location and size, and the presence of extracapsular extension are important prognostic factors for patients with PTC (1-3). At postoperative follow-up, patients who achieve undetectable serum Tg levels can expect a high rate of disease-free survival with a low risk for recurrent disease up to 10 years after initial treatment. However, patients with elevated serum Tg levels and a higher number of metastatic lymph nodes at presentation are at greater risk for recurrence or persistent disease. This latter group of patients should therefore be more closely monitored (1).

A recent review of prospectively maintained surgical databases at the University of Sydney and University of Wisconsin endocrine surgical units between 2000 and 2010 identified 121 patients with PTC and lateral neck nodal metastases who underwent concurrent total thyroidectomy and central and lateral compartment neck dissections (4). Ninety-eight percent also

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received postoperative RAI ablation. At a median follow-up of 31 months (2.6 years; range, 12 to 140 months), 66% had disease-free survival (N = 76). Approximately one third of the patients had recurrence of lymph-node metastases (4). In 2010, Tuttle et al. (5) published the Memorial Sloan-Kettering risk-adapted approach for estimating the risk of recurrence in patients risk-stratified by ATA criteria (6). Focusing on the intermediate-risk patients, as in our case, persistent structural disease or recurrence was identified in 21%. If the Tg was <1 ng/ml without structural evidence of disease within 2 years after initial treatment, the recurrence risk dropped to 2%. However, with an incomplete response to initial therapy (suppressed Tg >1 ng/ml and structural disease identification within the first 2 years of follow-up), the likelihood of persistent structural disease or recurrence was 41%. Our patient falls in the latter category, with high risk for additional treatments including repeat surgery, radioiodine treatment, or both. Occasionally, external-beam radiation is used, particularly in older patients for locoregional control. Because morbidity is high for these procedures, the

completeness of initial surgical resection is crucial. In hindsight, perhaps our patient's initial surgery should have included a level II dissection. At least one study has demonstrated that patients with lateral neck lymph-node metastases in levels III and IV have occult disease in level II almost 20% of the time (7).

Conclusions

The patient's clinical data were reviewed by our multidisciplinary institutional Thyroid Cancer Tumor Board. Questions posed to the group included whether the patient would benefit from a second dose of ¹³¹I versus continued monitoring with tumor markers and neck ultrasound. Consideration was also given to repeat left central neck dissection if the lesions in the left thyroid bed are confirmed to be cancer; however, the risk of surgical complications is high for a second surgery in this location. While there are no data to suggest that another dose of RAI will improve her overall survival, perhaps it may decrease her risk for further recurrence. The majority of the group recommended a second dose of ¹³¹I for ablation. To date, the patient has refused further treatment.

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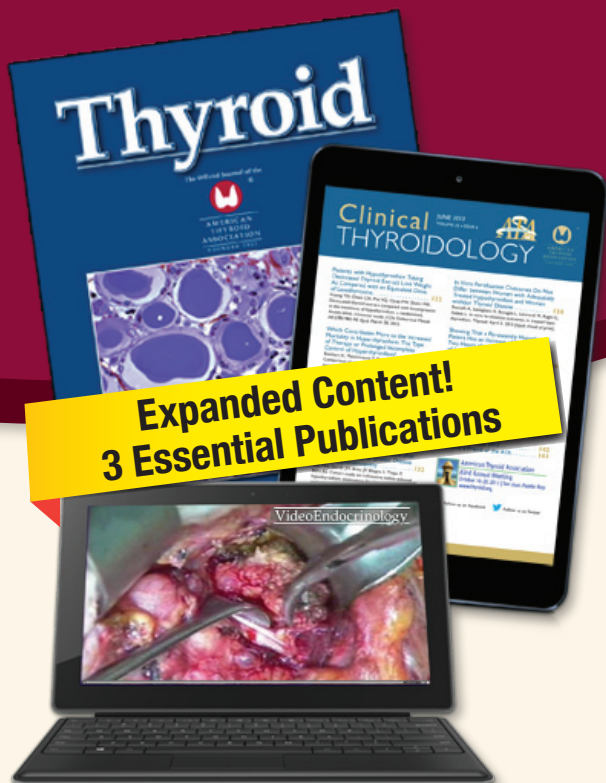
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