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LETTER – ENDOCRINE TUMORS

Completion Thyroidectomy: Revisited a Quarter of a Century Later

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The excellent outcome for patients with thyroid cancer is increasingly recognized, with Japan and the United States considerably interested in observing selected microcarcinomas.[1,2] In the last decade, our experience has shown that most thyroid microcarcinomas can be observed safely.[3] It therefore is understandable why the potential overtreatment of thyroid cancer has been debated, not only among professionals, but also in the media and general public.

The complications of thyroidectomy may be worse than the thyroid cancer itself, and the complications are directly related to the extent of surgery. Even experienced surgeons report a 1% rate of permanent hypoparathyroidism when both thyroid lobes are removed.[4–7] Conversely, this complication is virtually unknown after thyroid lobectomy. Some patients may require thyroid hormone supplementation after thyroid lobectomy, but it appears to be tolerated much better than full replacement, which is needed after total thyroidectomy. Certain patients, particularly young women, appear never to reach their prior quality of life despite achieving a normal level of thyroid-stimulating hormone.

The philosophy of "let the punishment fit the crime" or "let the treatment not be worse than the disease" is critical in the management of thyroid cancer. In 1992, we published a paper, "Completion Thyroidectomy: A Critical Appraisal" in *Surgery* defining the role of completion thyroidectomy for selected patients.[8] In this report, we reviewed the evolution of the thought process regarding restrictive use of contralateral thyroid lobectomy as a secondary surgical procedure for differentiated thyroid cancer.

No level 1 evidence exists to provide a clear answer regarding the adequate extent of surgery for thyroid cancer. Both national database studies and single-institution retrospective studies give somewhat mixed results,[9–12] with more recent studies demonstrating no effect of surgery extent on survival.

Conceptually, how would the removal of the contralateral lobe have a positive effect on either patient survival or recurrence of differentiated thyroid cancer? The argument can be summarized into three assumptions: (1) total thyroidectomy enables use of serum thyroglobulin (Tg) levels in surveillance; (2) total thyroidectomy prevents development of contralateral malignancy; and (3) total thyroidectomy allows for the administration of radioactive iodine (RAI).

The correlation between the Tg level and the risk of persistent or recurrent disease has been documented,[13] but it is unknown whether Tg level alone would substantially change management strategy or result in improved patient outcome. Subjecting a patient to the additional morbidity of a total thyroidectomy to achieve more sensitive biochemical surveillance has questionable scientific foundations. As our understanding of malignancy risk in thyroid nodules improves, so does our ability to stratify risk noninvasively (or at least with minimal invasiveness). With that ability and routine preoperative ultrasound, the same approach to stratifying malignancy risk can be applied to both thyroid lobes, independently of contralateral findings. Ongoing surveillance can be advised if it is supported by history (no family history of thyroid cancer or neck radiation) or sonographic, and/or fine-needle aspiration biopsy

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findings within the ipsilateral thyroid lobe. The concept of risk-reducing contralateral thyroid lobectomy appears to be obsolete in this era of modern imaging.

During the last 50 years in the United States, the entire philosophy of managing thyroid cancer has revolved around routine use of RAI.[14] More recently, it has been recognized that a subset of patients may not benefit from RAI, and some large tertiary referral centers have started to advocate for selective use of RAI.[15,16] The decision to administer RAI is based on the anticipated aggressive biology of the tumor rather than direct evidence of the benefit RAI offers for a particular subgroup of patients.

Our ability to predict the biologic behavior of the tumor has evolved with the development of risk stratification models at Mayo Clinic (MACIS), Lahey Clinic (AIMS), and Memorial Sloan Kettering Cancer Center (GAMES).[17–20] In general, markers of more aggressive tumor biology include older patient age, greater tumor size, gross extrathyroidal extension, bulky nodal metastases, and higher grade of tumor or aggressive histologic subtype. Four of these factors often can be diagnosed or strongly suspected preoperatively.

Certain features previously popularized as an indication for completion thyroidectomy have been recognized as poor predictors of aggressive tumor biology: (1) central compartment micrometastases have a questionable effect on prognosis;[21] (2) the presence of multifocality of micropapillary carcinoma has very little implication in the overall management of thyroid cancer;[22] and (3) minimally invasive follicular carcinoma with few foci of vascular invasion or capsular invasion, as noted by van Heerden,[18] can be considered a "nonthreatening malignancy". Moreover, individuals with these features do not appear to exhibit a strong indication for completion thyroidectomy.

In essentially two clinical scenarios a surgeon faces a dilemma whether to perform completion thyroidectomy: (1) a patient with known malignancy but new pathologic findings that could indicate an RAI; and (2) a patient with a diagnosis of malignancy after a diagnostic lobectomy. Considering the abilities for preoperative risk stratification offered by current imaging technology and the tendency of a more aggressive cancer to present such a situation early on,[23] the first scenario should be infrequent. Intraoperative, frozen-section pathology can be particularly helpful in the second scenario, not only by establishing the diagnosis of malignancy, but also by providing the information needed to decide between lobectomy and total thyroidectomy (e.g., presence of extensive vascular invasion in follicular thyroid cancer or a more aggressive histologic variant of papillary thyroid carcinoma). However, the use of frozen-section pathology appears to be highly institution dependent, with conflicting reports regarding reliability and cost effectiveness.[24,25] In either situation, as nicely summarized by the American Thyroid Association almost 10 years ago, this question can be answered simply: completion thyroidectomy should be offered to patients for whom a near-total or total thyroidectomy would have been recommended had the diagnosis been available before the initial surgery,[26] with some relatively minor caveats. Completion thyroidectomy is not simply a total thyroidectomy in stages, and a valid question can be raised if completion thyroidectomy, performed as a "redo operation," carries a higher risk. For all practical purposes, the risks of technical complications are likely equivalent because most of the operation is performed in essentially virgin planes, particularly the critical portions of the operation.

Finally, it should be remembered that RAI rather than removal of the contralateral thyroid lobe may provide the benefit for the patient. Total thyroidectomy only paves the way for it. Therefore, the main question for a surgeon considering completion thyroidectomy is will the patient benefit from RAI? However, answering this question may not be straightforward. Although different risk stratification models exist, these systems have limitations, including the relatively low quality of data supporting their role in decision-making. Therefore, institutions that treat patients with thyroid cancer use multidisciplinary input from surgeons, endocrinologists, nuclear medicine specialists, pathologists, radiation oncologists, and medical oncologists. Although the decision regarding completion thyroidectomy may be guided by risk stratification models, the choice should be made in cooperation with the multidisciplinary team and the patient.

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