Prophylactic Neck Dissection in Differentiated Thyroid Cancer

Differentiated thyroid cancer is increasing in incidence, and the frequency of cervical-lymph-node metastases is common, occurring in approximately 40 to 60% of patients (1-5). The basic tenets of treatment for differentiated thyroid cancer typically include a thyroidectomy, radioactive iodine therapy, and close monitoring with periodic serum thyroid-function tests, measurements of thyroglobulin levels, and neck sonography (6). However, following surgery and radioactive iodine therapy, many patients will still have detectable serum thyroglobulin levels with cervical adenopathy detected on sonography. The aspect of this issue on which we have chosen to focus relates to whether prophylactic cervical- or lateral-lymph-node dissection at the time of the original thyroidectomy is beneficial and will reduce the likelihood of the patient having residual disease when monitored. The definition of compartments and surgery type is as defined by Carty et al (7). Although cervical-lymph-node metastasis may occur in as many as 40 to 60% of patients (8, 9), preoperative sonography, even when meticulously performed, will detect only perhaps 50% of central-node involvement, and even less frequently detects disease in the lateral compartments (10, 11). Given these observations, it is hypothesized that a more thorough neck dissection at the time of the original thyroidectomy will decrease the likelihood of cervical disease remaining (or occurring).

These studies must be considered in relationship to the recently revised ATA guidelines (6). These guidelines recommend, unless there is a specific contraindication, that an initial near-total or total thyroidectomy be performed when the thyroidal papillary thyroid cancer is larger than 1 cm. A patient with a smaller tumor and no worrisome risk factors (e.g., history of head and neck irradiation) may have a lobectomy alone (Recommendation level A). Many (but not all) studies have suggested that the presence of cervical-node metastases, especially in patients over 45 years of age, portends a higher risk of recurrence and even mortality. They also note that if central-compartment pathologic adenopathy is identified by the prophylactic removal of nodes, the pathologic classification may increase from N0 to N1a, thus increasing the stage in patients older than age 45 from 1 to 3 (6). It is controversial whether prophylactic central- or lateral-compartment dissection decreases the risk of cervical recurrences. The ATA guidelines recommend that a prophylactic central-compartment neck dissection (ipsilateral or bilateral) "may be performed in patients with papillary thyroid carcinoma with clinically uninvolved central neck lymph nodes, especially for advanced primary tumors (T3 or T4). Recommendation rating: C" (6). Of relevance to our discussion, the ATA guidelines note that patients with papillary thyroid cancer with T1 or T2 lesions without apparent invasion and negative cervical nodes (and most follicular thyroid cancers) may not require prophylactic central neck dissection (Recommendation rating: C) (6). Similar recommendations are made for lateral-compartment dissection. If there is evidence of adenopathy then surgical dissection is recommended (Recommendation rating: B). There is no specific comment regarding prophylactic lateral neck dissection (6).

Bonnet et al. (12) performed a retrospective review of 115 patients who had a small focus of differentiated thyroid cancer less than 2 cm without apparent cervical adenopathy on preoperative ultrasound. Specifically, patients were selected for neck compartment surgery only if the primary tumor was <1 to 2 cm and had no obvious lymph-node metastases on neck ultrasonography. Surgery consisted of a total thyroidectomy, level VI central neck dissection, and ipsilateral jugulocarotid supraclavicular and supraomohyoid compartment dissection (levels III and IV). Baseline demographic analysis revealed that the mean age was 48.5 years and the mean tumor size on ultrasound was 13.1 mm (range, 1 to 19). The mean tumor size pathologically was 12.5 mm (range, 1 to 19), with 44.3% of patients having tumor sizes less than 10 mm; 63.5% of tumors were single, 21.8% were bilateral multifocal, 14.8% were unilateral multifocal, 28.7% extended beyond the capsule, and 6.1% had vascular invasion. Thyroid tumor sizes of 1 to 10 and 10 to 20 mm in 66.7% and 51.6% of patients, respectively, had no evidence of tumor in both their central and lateral compartments. Papillary cancer adenopathy in both central and lateral compartments was present in 43.7% of patients with tumor sizes of 1 to 20 mm, whereas only 12.5% had negative central nodes with positive lateral adenopathy. Younger age (<50 years) and tumor extension beyond the capsule were both associated with cervical-node metastases, whereas sex, tumor size larger or smaller than 10 mm, and vascular invasion were not significantly associated with cervical-lymph-node pathology. It should also be mentioned that the size of the lymph-node metastases was not reported, and it is currently believed that patients with microscopic lymph-node metastases have an improved outcome as compared with macroscopic lymph-node metastases (13,14).

This study seems contradictory to the present guidelines, which indicate that prophylactic central- and lateral-compartment dissections are not indicated in patients with small papillary thyroid cancers without evidence of cervical-node involvement on sonography or at the time of surgery. In the study by Bonnet et al. (12), cervical-node metastasis was observed in approximately 42% of patients who had thyroid cancers 1 to 20 mm. They make the argument that the detection of previously unrecognized positive cervical adenopathy frequently changes the tumor stage and also increases the frequency of 131I therapy. More than 97% of their patients had an undetectable baseline or recombinant human thyrotropin–stimulated thyroglobulin level 1 year after surgery.

Machens et al. (15) have recently published their retrospective analysis of 251 patients with thyroid cancer who underwent surgery, 69 of whom had a total thyroidectomy with central-neck cervical-node dissection performed for confirmed or suspected central-compartment disease. A total of 88 patients had their initial total thyroidectomy performed in conjunction with central ipsilateral-compartment dissection because of

evidence of disease on preoperative or intraoperative analysis. These patients also had a lateral-neck dissection. A total of 56 of these patients had only an ipsilateral lateral-compartment dissection, and 43 (77%) had lateral-neck involvement with papillary thyroid cancer. A total of 32 patients had a bilateral lateral-neck dissection, and 24 of these (75%) had evidence of node involvement. In addition, the greater the number of involved central-compartment nodes the more likely there were positive nodes in the ipsilateral and contralateral areas. In fact, if there were more than five positive nodes in the central compartment, positive nodes were also identified in the ipsilateral compartment 100% of the time and approximately 70% in the contralateral neck.

Counterbalanced against the view of Bonnet et al. (12) are the potential complications of original central- and lateral-neck dissections (16). Roh et al. (8) observed temporary or permanent hypocalcemia in 23.6% and 1.4% of patients, respectively, and transient vocal-fold paralysis in 1.4%. Inadvertent incision of the thoracic duct may cause a chyle leak; other rare complications include development of a seroma, Horner's syndrome, and brachial plexus or accessory-nerve injury or local infection (17). It is possible that the complication rates may even be higher in less experienced hands.

Shaha (16,17) suggests that in most patients with differentiated thyroid cancer, an elective node dissection is not indicated if the surgeon does not identify pathology in this compartment at the time of surgery. However, if there is obvious pathologic adenopathy, especially if confirmed on frozen section, then a careful dissection of the involved compartment is indicated. It is generally agreed, however, that the surgeon's intraoperative impression may not be as accurate as the detection of cervical adenopathy by preoperative or intraoperative radiologic techniques.

Sadowski et al. (18) performed routine prophylactic central-compartment dissection in 169 patients with differentiated thyroid cancer (average tumor size, 1.26 cm); 25.5% had positive ipsilateral and contralateral adenopathy, while 4.7% had positive contralateral adenopathy and negative ipsilateral adenopathy. Davidson et al. (19) observed that pathologic adenopathy occurred in 12 of 19 patients (63.2%) with a central-compartment neck dissection, in 61 of 73 (83.6%) with a lateral-neck dissection, and in 11 of 14 (78.6%) with combined central and lateral dissections. Sywak et al. (20) studied patients with papillary thyroid cancer (>1 cm) who did not have clinical evidence of adenopathy. A total of 56 patients had an initial total thyroidectomy with central-compartment dissection (average tumor size, 20 mm) and 391 had a total thyroidectomy alone (average tumor size, 23 mm). Following surgery and subsequent 131I therapy at approximately 6 months of follow-up, the average serum thyroglobulin level during levothyroxine withdrawal was lower (0.4 ng/ml vs. 9.3 ng/ml), and more patients had an undetectable serum thyroglobulin level (72% vs. 43%) in the patients who had a total thyroidectomy and central-compartment dissection as compared with a total thyroidectomy alone. The rate of recurrence between the two groups, although not statistically significant, was 3.6% versus 5.6%. White et al. (21) reviewed the literature regarding the utility of routine prophylactic neck dissection in patients with papillary thyroid cancer and concluded that a systematic central-compartment dissection may decrease the chance of recurrence, but there are very limited data suggesting a survival benefit. However, as noted above, this procedure may increase the likelihood of the patient having a lower serum thyroglobulin level when monitored.

It is, therefore, controversial, whether central and ipsilateral lateral-compartment dissection should be performed at the time of the original thyroidectomy, especially in patients with thyroid nodules less than 2 cm and in whom thyroid ultrasound does not reveal cervical adenopathy. Moreover, the controversy extends to whether the surgeon can accurately identify tumor and pathologic adenopathy at the time of surgery. Given the often subjective nature of being able to identify pathologic adenopathy during surgery, it then becomes problematic that central- and lateral-compartment dissections should be performed only when there are abnormalities noted during the operation.

My view is that the high frequency of cervical-node pathologic adenopathy even in small original thyroid cancers suggests that there is utility of prophylactic central dissection for all tumors. Patients with small thyroid cancers may have their treatment plan modified by identifying positive cervical nodes, and older patients will have their stage changed. Central-neck dissection, performed during the initial thyroidectomy, may increase the likelihood of hypocalcemia, but, in general, is a relatively safe procedure. Reoperation in a central compartment may be more problematic than when performed during the initial procedure. Lateral dissection is a more complex, potentially serious issue. Additional complications possibly associated with lateral dissection include neck discomfort, recovery time, and cosmetic issues. Based on the studies noted, it seems reasonable to perform a prophylactic central-neck dissection with the initial thyroidectomy in patients with known papillary thyroid cancer, but further studies are warranted prior to routinely recommending a prophylactic lateral-neck dissection. Of course, individual recommendations must be tempered by the experience of the surgeon in the context of the entire clinical and surgical situation.

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