Dissection of Levels II Through V Is Required for Optimal Outcomes in Patients with Lateral Neck Lymph Node Metastasis from Papillary Thyroid Carcinoma

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BACKGROUND: Completeness of surgical resection is an important determinant of outcomes in patients with papillary thyroid carcinoma and regional lymph node metastasis. The extent of therapeutic lateral neck dissection remains controversial. This study aims to assess the impact of modified radical neck dissection of levels II to V in a large patient series.

STUDY DESIGN: Retrospective analysis of consecutive patients with papillary thyroid carcinoma who underwent lateral neck dissection at a single institution from June 1, 2006 to December 31, 2014 was performed.

RESULTS: A total of 241 lateral neck dissections were performed in 191 patients (118 [62%] women; median age 46 years [range 6 to 87 years]; median follow-up 14.3 months [range 0.1 to 107 months]). Overall, 202 initial neck dissections (195 modified radical neck dissections and 7 less extensive dissections) were performed. Among these initial dissections, 137 (68.8%), 132 (65.7%), 105 (52.0%), and 33 (16.9%) had positive lymph nodes in levels II, III, IV, and V, respectively. Ipsilateral lymph node persistence or recurrence occurred after 22 (10.9%) initial dissections, at level II in 10 (45.5%), level III in 8 (36.4%), level IV in 7 (31.8%), and level V in 3 (13.6%). Thirty-nine reoperative lateral neck dissection were performed, including 18 cases of persistence and recurrence after our initial dissections. In reoperative dissections, positive lymph nodes were confirmed in levels II, III, IV, and V in 18 (46.2%), 10 (25.6%), 13 (33.3%), and 5 (12.8%) dissections, respectively. Temporary nerve injury occurred in 6 (3.0%) initial and 4 (10.3%) reoperative dissections, respectively. There were no permanent nerve injuries.

CONCLUSIONS: Omitting levels II and V during lateral neck dissection for papillary thyroid carcinoma potentially misses level II disease in two-thirds of patients and level V disease in one-fifth of patients. Formal modified radical neck dissection is necessary to avoid the morbidity of reoperative surgery. (J Am Coll Surg 2016;222:1066−1073. © 2016 by the American College of Surgeons. Published by Elsevier Inc. All rights reserved.)

The rising prevalence of thyroid cancer and the inadequacy of predicting aggressive tumor behavior have led to a conundrum in its management. Thyroid cancer is among the 10 most common malignancies in the population and epidemiologic data from the United States show that the rate of new cases has risen a mean of 5% each year for the past 10 years.[1] The question of how aggressively to pursue treatment for patients with thyroid cancer centers around the relative morbidity and mortality associated with the biologic behavior and natural history of the tumor compared with its clinical management. This is of

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Abbreviations and Acronyms

FNA = fine-needle aspiration
LN = lymph node
MRND = modified radical neck dissection
PTC = papillary thyroid cancer
SLND = selective lymph node dissection

particular interest in papillary thyroid cancers (PTC), which arise from thyroid follicular epithelial cells and account for the vast majority of thyroid cancers. Some maintain that the rising incidence is due to overdiagnosis of indolent PTCs that are being unnecessarily treated.[2-4] However, the death rate from thyroid cancer has increased by a mean of 0.8% per year in a decade,[5] and PTCs are a heterogeneous group with varying tumor biology and clinical outcomes.

The most common route of spread of PTC is to the cervical lymph nodes (LNs), in the central compartment of the neck (levels VI and VII) or in the lateral neck (levels II to V). Cervical LN metastases are present in 30% to 90% of patients with PTC at the time of diagnosis, although they might not be apparent on preoperative imaging or by inspection at the time of surgery.[6,7] The presence of cervical LN metastases confers an independent risk of decreased survival in patients older than 45 years of age with PTC.[8] Lateral neck LN metastasis confers a worse prognosis than central compartment disease, with higher recurrence rates, shorter time to recurrence, and decreased disease-free survival.[9] Lymph node ratio is strongly associated with recurrence and disease-specific mortality.[10-12] Residual metastatic LNs represent the most common site of disease persistence and recurrence after surgical treatment.[7] In PTC, the most important determinant of outcomes is the completeness of the initial surgical resection.[7] National guidelines suggest that therapeutic lateral neck compartment LN dissection should be performed for patients with biopsy-proven metastatic lateral cervical lymphadenopathy.[13] However, the extent of this dissection is still controversial and varies among surgeons. This is partly due to the lack of evidence that LN metastases impact overall patient survival, and partly due to the desire to reduce postoperative complications, particularly nerve injury. Two main approaches to lateral neck dissection for metastatic PTC to lateral cervical LNs are modified radical neck dissection (MRND) and selective LN dissection (SLND). Modified radical neck dissection is the comprehensive removal of nodal basins in the lateral neck compartment with preservation of one or more of the nonlymphatic structures, that is, the spinal accessory nerve, the internal jugular vein, and the sternocleidomastoid muscle.[14] Selective LN dissection is removal of less than all nodal levels, and preserving the nonlymphatic structures.[14] The most common levels to be dissected in SLND for metastatic PTC are levels III to IV. Some argue that formal MRND of levels II to V is too aggressive and SLND, particularly of levels III to IV, suffices. Earlier data suggest that the incidence of involved LNs is lower in levels II and V than in levels III and IV.[15] The published studies, however, have small to moderate numbers of patients and might not be sufficient to adequately assess the impact of formal MRND. This study aims to assess in a large series whether formal MRND is necessary for patients with PTC with proven lateral neck involvement to reduce persistent and recurrent disease.

METHODS

After approval from the IRB, a retrospective analysis was performed of consecutive patients with PTC who underwent lateral neck dissection at our tertiary care referral center from June 1, 2006 to December 31, 2014. Preoperative, intraoperative, and follow-up data were collected. Inclusion criteria were an initial diagnosis of PTC, preoperative neck mapping with positive fine-needle aspiration (FNA) biopsy of one or more lateral neck LNs, lateral neck dissection by 1 of 6 endocrine surgeons at our institution during the time period of the study, dissection of surgical specimen into designated levels—each level having a separate container—by the surgeon intraoperatively, and confirmed malignancy in lateral neck dissection on final pathology. Patients were classified as those who had formal dissection of levels II through V (modified radical neck dissection), less-extensive initial dissections (selective lateral neck dissection), or reoperative lateral neck surgery as MRND, SLND, and reoperative, respectively. Patients were excluded from the study if the incidence of positive LNs at each level, details of the operative procedure, or follow-up data were unknown.

Persistence was defined as a positive result on ultrasound or FNA biopsy in the ipsilateral neck in the first 6 months after surgery. Ultrasound features of malignant LNs were loss of hilar architecture, presence of intranodal necrosis and calcification, eccentric cortical hypertrophy, hyperechoic component, and the presence of peripheral vascularity on Doppler imaging. Fine-needle aspiration was routinely performed for LNs showing a combination of these features and cytology confirmed the presence of LN metastasis. Recurrence was defined as negative thyroglobulin, radioactive iodine scan, and neck ultrasound at 6 months after surgery, followed by a positive ipsilateral FNA biopsy or radiologic study more than 6 months after