
Prophylactic Central Neck Dissection Might Not Be Necessary in Papillary Thyroid Carcinoma: Analysis of 11,569 Cases from a Single Institution



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- BACKGROUND:** The benefits of prophylactic central neck dissection (pCND) remain controversial in clinically node-negative (cN0) papillary thyroid carcinoma (PTC). The purpose of this study was to investigate the clinical impact of pCND with a large group of cN0 PTC patients.
- STUDY DESIGN:** A total of 11,569 cN0 PTC patients who underwent thyroidectomy between January 1997 and June 2015 were investigated. Using Cox multivariate analysis, the prognostic impact of pCND was assessed using subset analyses according to various clinicopathologic conditions. Using propensity score matching, various surgical morbidities were assessed under adjusted conditions.
- RESULTS:** Of 11,569 cN0 PTC patients, 8,735 (75.5%) underwent pCND. Prophylactic CND did not significantly decrease the risk of locoregional recurrence in cN0 PTC patients (adjusted hazard ratio [HR] = 0.874; $p = 0.392$). In addition, pCND did not significantly decrease the risk of locoregional recurrence in various surgical extents (lobectomy and ipsilateral pCND [adjusted HR = 0.636; $p = 0.131$], total thyroidectomy and ipsilateral pCND [adjusted HR = 0.775; $p = 0.164$], and total thyroidectomy and bilateral pCND [adjusted HR = 1.041; $p = 0.821$]). However, surgical morbidities, such as temporary vocal cord palsy (5.6% vs 2.5%; $p = 0.001$), temporary hypoparathyroidism (30.8% vs 16.7%; $p < 0.001$), and permanent hypoparathyroidism (3.5% vs 1.7%; $p < 0.001$) were significantly more frequent in the pCND(+) group.
- CONCLUSIONS:** Given the lack of proven benefits and the clear evidence of morbidities, pCND cannot be recommended as a routine procedure. We suggest that CND be reserved for therapeutic situations. (J Am Coll Surg 2016;222:853–864. © 2016 by the American College of Surgeons. Published by Elsevier Inc. All rights reserved.)
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Papillary thyroid carcinoma (PTC) represents the majority of thyroid cancers, and its incidence has increased rapidly worldwide.¹ Although most PTC patients show an indolent disease course,² morbidity from metastasis

or recurrence remains an important issue.^{3,4} Regional lymph node (LN) metastasis is present at the time of diagnosis in 20% to 90% of PTC patients,^{5,6} and this most commonly involves the central neck compartment.^{7,8} In addition, regional LN metastasis is an independent risk factor of locoregional recurrence (LRR)^{9,10} and mortality in PTC patients.¹¹

Because of difficulties in preoperative detection of central LN metastasis (CLNM),^{12,13} a considerable number of PTC patients are eventually found to have CLNM at the time of surgery or in pathology specimens.¹⁴ Therefore, some potential benefits of prophylactic central neck dissection (pCND) have been suggested.¹⁵ First, pCND enables removal of subclinical metastasis and a reduction of LRR. Second, pCND prevents reoperation in the central neck compartment, which has considerable risk of morbidities. Third, pCND provides accurate staging,

Disclosure Information: Nothing to disclose.

Received December 11, 2015; Revised February 1, 2016; Accepted February 2, 2016.

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Abbreviations and Acronyms

| | |
|------|--|
| CLN | = central lymph node |
| CLNM | = central lymph node metastasis |
| CLT | = chronic lymphocytic thyroiditis |
| cN0 | = clinically node-negative |
| ETE | = extrathyroidal extension |
| HR | = hazard ratio |
| LRR | = locoregional recurrence |
| LT | = lobectomy |
| PTC | = papillary thyroid carcinoma |
| pCND | = prophylactic central neck dissection |
| RAI | = radioactive iodine |
| TT | = total thyroidectomy |

which is helpful for predicting prognosis and determining radioactive iodine (RAI) therapy.

The American Thyroid Association management guidelines recommend pCND in clinically node-negative (cN0) PTC patients, particularly those with a tumor size >4 cm or extrathyroidal extension (ETE).¹⁶ Previous studies have emphasized the prognostic benefits of pCND in patients with clinically uninvolved CLNM.¹⁷⁻²⁴ However, a recently conducted meta-analysis²⁵ and many other retrospective studies²⁶⁻²⁸ have shown no substantial reduction in LRR after pCND. These studies also identified considerably higher morbidities with pCND, including recurrent laryngeal nerve injury and hypoparathyroidism.

There are still pitfalls to assess the prognostic impact of pCND. First, the prevalence of mortality is extremely low in PTC.²⁹ Second, a prospective randomized controlled trial of pCND in PTC is not readily feasible because a prohibitively large sample size is required to reveal statistically significant differences.³⁰ To resolve the controversy about pCND, a large-group retrospective cohort study was conducted with LRR as the primary end point. Because a previous study demonstrated the prognostic advantage in a comparison between lobectomy (LT) and ipsilateral pCND and LT alone,³¹ this study reviewed both LT cases and total thyroidectomy (TT) cases.

METHODS**Patient selection**

This study was approved by the IRB at Samsung Medical Center. A retrospective cohort study was conducted at a single institution. Between January 1997 and June 2015, a total of 20,030 patients underwent thyroidectomy with or without neck dissection at the Thyroid Cancer Center of Samsung Medical Center, a tertiary referral center in Korea (Fig. 1). A total of 8,451 patients with the following conditions were excluded: previous history of thyroidectomy, age younger than 18 years, non-PTCs

(follicular/medullary/anaplastic), mixed-type PTC, clinical evidence of LN metastasis, minor variants of PTC (including diffuse sclerosing, oncocytic, tall cell, cribriform morular, solid, oxyphilic, columnar, insular, and clear type), presence of distant metastasis, history of lateral neck dissection, or follow-up duration less than 6 months (residual tumor or LN was detected within 6 months after initial surgery, underwent reoperation within 6 months after initial surgery, or lost to follow-up within 6 months). Finally, 11,569 cN0 PTC patients were included for analysis. Clinical evidence of LN metastasis was determined using preoperative ultrasonography and intraoperative findings. The results of other imaging modalities were not considered in patient selection.

Surgical strategy

Following American Thyroid Association guidelines,¹⁶ TT was performed with tumor size >1 cm and/or when multifocality, bilaterality, or ETE was detected during the preoperative or intraoperative examination. Central neck dissection was defined as level VI dissection, and all pCNDs were carried out in accordance with anatomical landmarks described by the American Thyroid Association.³² All pCNDs were performed immediately after completion of the thyroidectomy. The procedure comprised removal of all nodes and fibrofatty tissue extending vertically from the hyoid bone to the thoracic inlet, and laterally from the medial border of the common carotid artery to the midline of the trachea. The ipsilateral recurrent laryngeal nerve was mobilized and skeletonized along its entire cervical course. Prophylactic pCND was performed on cN0 PTC patients based on the recommended indications¹⁶ or the surgeon's personal preference at the time of operation. Cases that met the criteria were assigned to the pCND(+) group, and all others were assigned to the pCND(-) group.

Histopathologic examination of surgical specimens

Surgical specimens were microscopically examined by 2 or more experienced pathologists, and the following histopathologic factors were assessed: cell type of main lesion, primary tumor size (measured as the longest diameter of the largest lesion), location, multifocality, ETE, lymphovascular invasion, margin involvement, LN metastasis, and underlying thyroid conditions, such as chronic lymphocytic thyroiditis (CLT). Some cases showing LNs in specimens that were removed en bloc (eg Delphian LNs) with the thyroid from unintended pCND (incidental pCND) were initially assigned to the pCND(-) group. Thereafter, subgroup analysis that considered "incidental pCND" as the pCND(+) group was conducted to assess the additional impact of LNs that were

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