

Predictive factors of contralateral paratracheal lymph node metastasis in unilateral papillary thyroid carcinoma



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Abstract

Background: Most of unilateral papillary thyroid carcinoma (PTC) metastasize to ipsilateral paratracheal lymph nodes (LNs) while some had contralateral paratracheal LN involved. The aim of this study was to analyze the predictive factors of contralateral paratracheal LN metastasis in unilateral PTC.

Methods: Data on 332 patients with unilateral PTC who underwent total/near total thyroidectomy and bilateral central neck dissection (CND) with/without lateral neck dissection were collected retrospectively. Patients' demographics, the extent of surgeries, and the pathological status of LNs and primary tumor were analyzed.

Results: A total of 332 patients (67 male and 265 female) were included. Contralateral paratracheal LN metastasis was found in 68 (68/332, 20.5%) patients. Tumor size (>1 cm) ($P < .001$), capsular/extracapsular invasion ($P < .001$), pretracheal/prelaryngeal LN metastasis ($P < .001$), lateral neck LN metastasis ($P < .001$) and ipsilateral paratracheal LN metastasis ($P < .001$) was significantly associated with contralateral paratracheal LN metastasis on univariate analysis. Multivariate analysis showed that tumor size (>1 cm) ($P = .013$), capsular/extracapsular invasion ($P = .009$), pretracheal/prelaryngeal LN metastasis ($P = .021$) and lateral neck LN metastasis ($P = .002$) were independent risk factors of contralateral paratracheal LN metastasis.

Conclusion: Primary tumor size >1 cm, capsular/extracapsular invasion, pretracheal/prelaryngeal LN metastasis and lateral neck LN metastasis are predictive factors of contralateral paratracheal LN metastasis in unilateral PTC, which may help to determine the optimal extent of CND in patients with PTC.

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Keywords: Papillary; Thyroid carcinoma; Central neck dissection; Lateral neck dissection; Predictive factor; Lymph node

Introduction

Regional lymph node (LN) metastases develop in 20–90% of patients with papillary thyroid carcinoma (PTC).^{1–4} There is a consensus on performing central neck dissection (CND) for patients with central neck lymph node (CNLN) metastases.^{5,6} CND may convert some patients from clinical N0 to pathologic N1a, upstaging patients over age 45 from American Joint Committee on Cancer (AJCC) stage I to III.⁷ The useful pathologic N

staging information may guide subsequent treatment and follow-up. For those patients with bilateral CNLN metastases, comprehensive bilateral CND may improve survival and reduce risk of nodal recurrence,⁸ while bilateral CND demonstrated higher rates of transient hypoparathyroidism compared to unilateral dissection.⁹ Most of unilateral PTC metastasize to ipsilateral paratracheal LNs, therefore, to balance the benefits and risks of CND, careful consideration of treatment options for central LN compartments is needed. In many patients, however, lymph node metastases in the central compartment¹⁰ do not appear abnormal preoperatively with imaging¹¹ or by inspection at the time of surgery. Significant predictive factors of contralateral paratracheal LN metastasis in unilateral PTC may guide the procedure of CND. The aim of this study was to analyze

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the predictive factors of contralateral paratracheal LN metastasis in unilateral PTC.

Patients and methods

Three hundred and thirty-two patients with PTC who underwent total/near total thyroidectomy (TT/NTT) and bilateral CND with/without lateral neck dissection (LND) at the Department of Thyroid and Breast Surgery of West China Hospital between June, 2008 and June, 2011 were included retrospectively. Patients enrolled in the study should meet the criteria: histologically proven PTC; no history of thyroid or neck surgery; underwent TT/NTT and bilateral CND as the smallest extent of surgery; tumor was confined in one lobe of thyroid; tumor was not in isthmus.

All patients underwent fine needle aspiration of thyroid nodule and had cytological diagnosis of PTC or suspicious for PTC preoperatively. For suspicious cases, intraoperative frozen section was performed. TT/NTT was performed for confirmed PTC. Bilateral CND was routinely performed for patients with PTC in our institution before 2012. Patients with clinically positive lateral neck lymph nodes would undergo concurrent unilateral or bilateral functional LND. Every patient with proven PTC would undergo careful neck ultrasound to evaluate lateral neck lymph node preoperatively. If macro LNs metastasis was found in central neck compartment intra-operatively, level III–IV lymph node biopsy was performed and lateral neck dissection would follow if metastasis was confirmed by frozen section.

CND was performed according to the method described by Pai et al.¹² To minimize morbidity and ensure comprehensive removal of LNs in the central compartment, a standardized surgical approach was used in our institution. The recurrent laryngeal nerve was identified and preserved in the aid of the intraoperative nerve monitoring. Parathyroid gland was routinely identified and preserved in situ. Auto-transplantation was performed when devascularization occurred or accidental parathyroidectomy. Compartment of the central neck is bounded superiorly by the thyroid cartilage, inferiorly by the innominate artery, and laterally by the carotid artery and dorsally by the prevertebral fascia (level VI–VII). In our institution, this compartment was further divided into prelaryngeal/pretracheal, ipsilateral/contralateral paratracheal regions. Prelaryngeal LNs were demarcated superiorly by the inferior border of the hyoid bone and inferiorly by the inferior border of the cricoid cartilage. Ipsilateral/contralateral paratracheal LNs were demarcated laterally by the carotid artery and medially by the trachea. Pretracheal LNs were demarcated superiorly by the inferior border of the thyroid and inferiorly by the innominate artery. The lateral borders of pretracheal LNs were defined as the tangent of the lateral wall of trachea. For accurate compartmentalization, the location of LN subsites were marked using marking suture prior to CND. Specimens were separated and marked according to

location within the central compartment and sent for histopathologic examination along with the thyroid specimens.

The sites and number of LNs, the site of the primary tumor, and the presence of capsular/extracapsular invasion by the tumor were examined. If tumor was present only in the lobe with clinical disease, the tumor was unilateral. The frequency of LN metastasis was analyzed with respect to the aforementioned subsites.

SPSS 20.0 (SPSS Statistics 20.0) was used for data analysis. Continuous variables are represented as mean \pm standard deviation. T-test was used to compare continuous variables, while Chi-square test or Fisher's exact test was used for categorical variables. Logistic regression was used for multivariable analysis. Statistical significance was defined as a *p* value of <0.05 .

Results

A total of 332 patients, including 67 males and 265 females, were included in the study. The mean age of all the patients was 43.3 ± 12.7 (range 8–79 year). All of them underwent TT/NTT and bilateral CND. Among them, 160 patients underwent functional lateral neck dissection concurrently including 21 bilateral LND and 139 ipsilateral LND. The extent of lateral neck dissection included II–V levels. One hundred and ninety-one (191/332, 57.5%) patients had positive CNLN. Among them, 165 (165/332, 49.7%) had ipsilateral paratracheal LN metastasis, and 68 (68/332, 20.5%) had positive LN in contralateral paratracheal region. Additionally, 66 (66/332, 19.9%) patients had positive LN in pretracheal/prelaryngeal region. Each patient with contralateral paratracheal LN metastasis had more than one positive ipsilateral paratracheal LN. A total of 103 (103/332, 31.0%) patients had positive LNs in both the central compartment and the lateral compartment. Capsular/extracapsular invasion was found in 30.1% (100/332) of patients (Table 1).

In the univariate analysis, the contralateral paratracheal LN metastasis was greater in patients with the size of primary tumor (>1 cm) ($P < .001$), capsular/extracapsular invasion ($P < .001$), pretracheal/prelaryngeal LN metastasis ($P < .001$), lateral LN metastasis ($P < .001$) and ipsilateral paratracheal LN metastasis ($P < .001$). Age, sex and tumor site were not found to be associated with contralateral paratracheal LN metastasis (Table 2). In multivariate analysis, tumor size >1 cm ($P = .013$, OR = 3.292), capsular/extracapsular invasion ($P = .009$, OR = 2.631), pretracheal/prelaryngeal LN metastasis ($P = .021$, OR = 2.312) and lateral LN metastasis ($P = .002$, OR = 3.295) were independent predictive factors of contralateral paratracheal LN metastasis (Table 3).

Discussion

In this retrospective study, we evaluated the predictive factors of contralateral paratracheal LN metastasis in 332

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