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ORIGINAL ARTICLE

Predictors of metastasis to lymph nodes posterior to the right recurrent laryngeal nerve in differentiated thyroid carcinoma: A prospective study

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differentiated thyroid carcinoma;
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Summary *Objectives:* To study the clinicopathological characteristics and the risk factors of lymph nodes posterior to the right recurrent laryngeal nerve (LN-prRLN) metastasis in differentiated thyroid carcinoma; and to identify the indication for LN-prRLN dissection.
Methods: We treated 145 patients with differentiated thyroid carcinoma with appropriate surgical intervention. The specimens were examined by the pathologists. The right paratracheal lymph nodes were divided into two groups: anterior or posterior to right recurrent laryngeal nerve (VIa or VIp compartment, respectively). We recorded the clinical characteristics, histopathological features of the primary tumors, and lymph node metastasis of the patients. The results were statistically analyzed.
Results: There were 85 patients (58.6%) with central lymph node metastasis, of whom 61 (42.1%) had metastasis in VIa compartment; 16 patients (11.0%) had VIp subdistrict metastasis; and 25 patients had lateral lymph node metastasis. Multiplicity, larger tumor ($\geq$1 cm), and coexistence of central lymph node metastasis, VIa compartment metastasis, and lateral lymph node metastasis were all significantly related with LN-prRLN metastasis, while sex, age, location of the tumor, and extrathyroid extension of the tumor showed no significant relation ($p > 0.05$).
Conclusion: The incidence of LN-prRLN metastasis was lower than other central lymph nodes, as well as lymph nodes anterior to right recurrent laryngeal nerve. When there were multiple

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foci of tumors, or the tumor was larger than 1 cm, or central or lateral LN metastasis was indicated by preoperative ultrasound or confirmed by intraoperative frozen sections, it is strongly recommended that exploration and dissection of the LN-prRLN should only be performed by experienced surgeons.

1. Introduction

Differentiated thyroid carcinoma (DTC) is the most common pathological type of thyroid carcinoma, which includes papillary and follicular thyroid carcinomas. The main metastatic pattern of DTC is lymph node metastasis. It has been reported that up to 36% of cases of papillary thyroid carcinoma and 17% of cases of follicular thyroid carcinoma are accompanied with cervical lymph node (LN) metastasis,[1] and LN metastasis is strongly related to higher incidence of recurrence.[2] Appropriate range of cervical lymph node dissection can effectively reduce the local recurrence and improve the prognosis of DTC. Current guidelines and literature recommend performing prophylactic central LN dissection (CLND) and therapeutic lateral LN dissection in surgical treatment of DTC.[3–6]

The further division of the central LN and the specific range of dissection are still controversial. The LNs posterior to the right recurrent laryngeal nerve (LN-prRLN) was an anatomical concept presented recently which has been overlooked for a long time in DTC surgery.[7] The left and right recurrent laryngeal nerves (RLNs) have slight differences in anatomical position in the neck, and the cervical part of the esophagus located closely next to the left. Therefore, there was a triangular space located posterior to the right recurrent laryngeal nerve, right anterior to the esophagus, and upper to the right brachiocephalic trunk (Figure 1). The lymph tissue in the space is traditionally classified in the right paratracheal lymph nodes.[8] The right paraesophageal lymph nodes described in some literature have similar anatomical position as the LN-prRLN.[9–12] Dissection of LN-prRLN requires dissection, exploration and even slight rising of the nerve, which makes it relatively easy to injure the right RLN. Whether the LN-prRLN should be routinely dissected in prophylactic CLND is still controversial. The purpose of this study is to analyze the clinicopathological characteristics and the risk factors of LN-prRLN metastasis in DTC; and to identify the indication of LN-prRLN dissection.

2. Materials and methods

2.1. Patients

From September 2012 to August 2014, a total number of 145 patients with DTC who received the first operation in Peking Union Medical College Hospital were prospectively enrolled in this study. The preoperative evaluation included medical history, physical examination, thyroid ultrasonography (US), thyroid function tests, antithyroid peroxidase antibody, and antithyroglobulin antibody. Some of the patients underwent US-guided fine-needle aspiration cytology. The objectives of evaluation were to help identify malignancy of the thyroid nodules, to estimate whether there was combined lymph node metastasis or other thyroid diseases, such as hyperthyroidism, hypothyroidism, or Hashimoto thyroiditis. All the patients underwent electronic laryngoscopy to see whether there was RLN paralysis.

All 145 patients underwent intraoperative frozen section pathological examination of the thyroid lesion, and were confirmed to have DTC. They all received the thyroid cancer radical operation. Among them, the patients whose tumor only affected the right lobe and in accordance with the indications of unilateral lobectomy in National Comprehensive Cancer Network guidelines[4,13] underwent right thyroidectomy (including resection of the isthmus, the same as below) and dissection of the right level VI LN (right CLND). The patients whose tumor only affected the right lobe, but not in accordance with the indications above, and with no suggestion of left central or lateral LN metastasis according to the preoperative US, underwent bilateral thyroidectomy and right CLND. Those whose tumor affected bilateral lobes

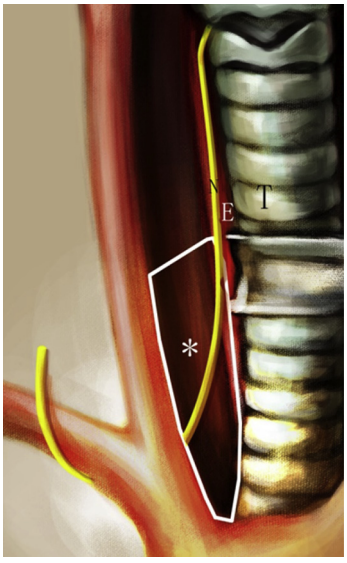

Figure 1 Schematic representation of lymph nodes posterior to the right recurrent laryngeal nerve (VIp compartment). The area in the white line, marked by the asterisk indicates where the lymph nodes posterior to the right recurrent laryngeal nerve is located (with lymph nodes dissected). E = esophagus; N = right recurrent laryngeal nerve; T = trachea.