

Original Research Article

Pattern of regional metastasis in papillary thyroid cancer: our experience of 86 cases

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Received: 14 June 2019

Revised: 18 July 2019

Accepted: 08 August 2019

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ABSTRACT

Background: Papillary thyroid cancer (PTC) have a high propensity for regional metastasis which ranges from 30-80%. The objective of the study is to assess the pattern of lymph node metastasis and to plan the extent of neck dissection accordingly. Though central neck dissection (CND) is routinely done in PTC but the indication of extent of neck dissection is still controversial.

Methods: The medical records of 86 patients with PTC who underwent total thyroidectomy (TT) and neck dissection at Dr. B. Borooah Cancer Institute(BBCI) from January 2010 to December 2014 were retrospectively reviewed.

Results: Out of 86 patients 22 were males and 64 were females. The median age of presentation was 40.0 years. 43 out of 86 patients (50%) had cervical lymph node metastasis. Ipsilateral nodal metastasis was found in 37 patients (43.0%) and contralateral metastasis was found in only 6 patients (7.0%). Tumors with size more than 3cm had ipsilateral nodal metastasis in 21(56.7%) patients which is statistically significant (p 0.03). A strong association was found between level VI and the ipsilateral group of lymph nodes involving level II,III,IV and V.

Conclusions: Majority of patients present with multiple level nodal metastasis, with the central compartment commonly involved. In view of the high incidence of metastatic lymph nodes in levels II, III, IV and level VI, our study supports the recommendation for posterolateral and anterior neck dissection in patients with clinically positive neck nodes and tumor with aggressive criteria.

Keywords: Central neck dissection, Neck dissection, Nodal metastasis, Papillary Thyroid Cancer, Pattern

INTRODUCTION

Thyroid carcinoma is the most common malignancy of the endocrine system. PTC is the most common histological variant accounting for 70-90% of all cases.¹ Regional lymph node metastasis is common in PTC which is in between 15-40%, and up to 90% may have occult metastasis.² Central compartment (level VI) nodes were most commonly metastasized. However, studies has

reported that skip metastasis to lateral nodes (LNN) without CNN has been documented in 6% to 19.7% of PTC.³ PTC shows an indolent biological behaviour and has an overall 10 year survival rate of over 90%. Machens et al has postulated that there is an association between the LNN and the number of positive CNN.⁴ Nodal metastasis in PTC does not have any prognostic influence on survival rate; but it is associated with significant probability for loco regional recurrences.^{5,6}

METHODS

Nature of the study

The study included all patients who underwent total thyroidectomy along with neck dissection for the treatment of multifocal thyroid nodule and clinically positive neck nodes in the Head and Neck Oncology Department of Dr. B. Borooah Cancer Institute, Assam between January 2010 to December 2015. The medical records and the final histopathological reports were reviewed retrospectively. The clinical TNM staging for thyroid cancer were done according to the 7th edition of American Joint Commission on Cancer (AJCC). 40 patients had stage 3 and 46 patients had stage 4 disease.

Inclusion criteria

- Patients diagnosed as PTC by fine needle aspiration cytology (FNAC) preoperatively.
- Ultrasonography(USG) and Computed tomography (CT Scan) of the thyroid with calcified nodules done preoperatively.

Exclusion criteria

- Patients who underwent surgery outside the institution or only CND or LND done.
- Poor general condition of the patient where surgery is not feasible.

Statistical Methods

Data was analyzed using IBM SPSS Advanced Statistics version 19 (SPSS Inc., Chicago, IL). Chi-square test

(Fisher’s exact test) was used to examine the qualitative variables relation. A p-value <0.05 was considered statistically significant.

RESULTS

A total of 86 patients who underwent total thyroidectomy along with neck dissection were included in the study.

Demographic characteristics

Gender: 22 (25.6%) patients were males and 64(74.4%) were females.

Age: Ranges from 17-75 years with a mean age of 39.76 and a median of 40 years.

Tumour size: Mean size is 3.7cm and 3cm is the median with a range of 0.6- 11.0cm.

Capsular invasion: Patients with capsular invasion were 22(25.6%), whereas those without capsular invasion were 64 patients (74.4%).

Lymph node involvement: Ipsilateral nodal metastasis were found in 34 patients (43.0%) whereas contralateral nodal metastasis was found in only 6 patients (7.0%).The most common level of lymph node (LN) metastasis was level VI found in 17 patients (19.8%) followed by ipsilateral level II,III,IV in 12 patients (14%) (Table 1).

Out of 37 patients with tumor size 3 and above, 21patients (56.7%) had positive ipsilateral lymph node metastasis which is statistically significant (p=0.03).

Table 1: Demographic and clinical parameters of the patients.

Variables	Frequency	
Age(Years)	Mean±SD	39.76±13.2
	Range	17-75
	Median	40.0
Gender	22/64 (25.6%/ 74.4%)	
Tumor size (cm)	Mean	3.7
	Median	3.0
	SD	2.2
	Range	0.6 - 11.0
Lymph node Involvement	Ipsilateral level III	7 (8.1%)
	Ipsilateral level II, III	4 (4.7%)
	Ipsilateral level II, III, IV	12 (14%)
	Ipsilateral level II, III, IV, V	2 (2.3%)
	Ipsilateral level III, IV	5 (5.8%)
	Ipsilateral level III, IV, V	4 (4.7%)
	Contralateral lymph node	6 (7.0%)
Central Compartment	17 (19.8%)	

Thus, the size of the primary tumor with 3cm and above has more chance of ipsilateral lateral neck lymph node metastasis. But, in our present study contralateral lymph node metastasis has not shown any relation with tumor size which is statistically in significant. It was evident from the study that out of 17 patients with level VI (CCN) positivity, 15 patients (88.2%) had ipsilateral LNN and 29.4% had contralateral LNN metastasis which is statistically significant (P0.001). However, the present study also reflects the finding that out of 86 patients, 22 (31.9%) had positive ipsilateral LNN though the CCN were negative (Table 2).

22 patients with ipsilateral nodal metastasis had capsular invasion in 10 patients but only 1 patient with capsular invasion had contralateral nodal metastasis (P 0.789). Ipsilateral level II,III,IV nodal metastasis was significantly associated with level VI nodal metastasis (P 0.002). Similar association was found between levels II,III,IV,V and level VI (P 0.037). (Table 3). 4 patients with multifocal tumor who underwent total thyroidectomy along with neck dissection had clinically negative neck node, but in the final histopathology there is evidence of metastasis to the central and lateral compartment lymph nodes.

Table 2: Relation between Ipsilateral and contralateral lymph node with tumor characteristics and central compartment.

Tumor Characteristics	Ipsilateral node		p value	Contralateral node		p value
	Positive (n=37)	Negative (n=49)		Positive (n=6)	Negative (n=80)	
Tumor Size						
Less than 3 cm	16 (32.6 %)	33 (67.4%)	0.03	2(4.1%)	47(95.9%)	0.395
3 cm and above	21(56.7%)	16(43.3%)		4(10.8%)	33(89.2%)	
Central Compartment						
Positive	15 (88.2%)	2 (11.8%)	<0.05	5(29.4%)	12(70.6%)	<0.05
Negative	22(31.9%)	47(68.1%)		1(1.4%)	68(98.6%)	

Table 3: Relation of central compartment nodal metastasis with tumor characteristics and ipsilateral lymph node levels.

Tumor Characteristics	Positive (n=17)	Negative (n=69)	p value
Capsular invasion			
Positive	4(23.5%)	18(26.1%)	0.93
Negative	13(76.5%)	51(73.9%)	
Tumor size			
Less than 3 cm	7(41.2%)	42(60.8%)	0.176
3 cm and above	10(58.8%)	27(39.2%)	
Ipsilateral level II,III, IV			
Positive	7(41.2%)	5(7.2%)	0.002
Negative	10(58.8%)	64(92.8%)	
Ipsilateral level II,III, IV, V			
Positive	2(11.8%)	0(0.0%)	0.037
Negative	15(88.2%)	69(100%)	
Ipsilateral level III, IV, V			
Positive	1(5.9%)	3(4.3%)	0.71
Negative	16(94.1%)	66(95.7%)	

DISCUSSION

PTC generally has an excellent prognosis with an overall 10 year survival rates exceeding 90%. Majority of the patients in the present study were in the age group 41-60 years which ranges from 17-75 years. Patients were classified into two groups below 45 years and 45 years and above as the risk groups.⁷We have observed in our study that 30(34.9%) patients were above 45 years and

56(65.1%) patients were below 45 years. However, this was in contrast to the study by Tissel et al who found that the older age group had the highest incidence of thyroid malignancy.⁸

In our study 64 patients (74.4%) were females and 22 patients (25.6%) were males. Many other studies had also shown the higher incidence of PTC in females,⁹ which was observed in our study as well. In the present study there was

no relation found between age and the LN metastasis which was similar to the study by Guerrere et al.¹⁰

In our study 49 patients with tumor size less than 3cm had ipsilateral lymph node metastasis in 16 patients (32.6%); whereas 21 patients out of 37 (56.7%) had ipsilateral lymph node metastasis with tumour size 3cm and above which is statistically significant (P 0.03). The size of the primary tumour had a prognostic impact as studied by Machens et al and had a correlation with the lateral lymph node metastasis.¹¹ That finding was similar in our study. The current study demonstrated that patients with capsular invasion were 22(25.6%) and those without capsular invasion were found in 64 patients (74.4%). Our study has shown no relation between capsular invasion and CCN metastasis which does not correlate with the other studies.¹¹ In our study we have observed that out of 37 patients with tumor size 3cm and above 10 patients (58.8%) had metastasis in the central compartment node which was not statistically significant. A small size tumor may also be T3 in the presence of extra- capsular spread. Tumor size can be proposed as a pre- operative criterion to evaluate the risk of lateral neck metastasis.¹¹ It has been shown that central neck dissection (CND) should be routinely combined with thyroidectomy in papillary carcinoma and microcarcinoma with aggressive criteria to decrease the risk of recurrence. However, the indication for lateral neck dissection (LND) still remains controversial, especially in patients with no clinical and radiological evidence of lateral lymph node metastasis.⁴ It has been reported in literature that skip metastases (positive nodes in the LND, and negative nodes in the CND) occurs in 6% to 19.7% of papillary carcinomas and 4.2% to 5.5% of micropapillary carcinoma.³ The present study demonstrates that 69.7% patients (60/86) have lymph node metastasis. Ipsilateral lymph nodes were involved in (34/86) patients (43.0%), 7.0%(6/86) in the contralateral LLN and (17/86) 19.8% in the central compartment. 17 patients with positive nodes in central compartment, ipsilateral level was involved in all patients. These findings are similar to the results found by Wada et al.¹² Our study reveals that level VI is the most common level of metastasis (17/86). Out of 17 patients with level VI (CCN) positive nodes; 15 patients (88.2%) had positive ipsilateral LNN and 5 patients (29.4%) had positive contralateral LNN which is statistically significant (P 0.001). This is similar to the study by Machens et al.¹¹ Our study demonstrates that 22 patients (31.9%) had positive ipsilateral LNN though the CCN were negative. This is similar to study by Machens et al, which postulates the theory of skip metastasis.³ It was evident from the current study that the most common ipsilateral lateral LN(LLN) involved were II,III,IV,V. There is a strong association between CLN metastasis and ipsilateral LLN metastasis. Ipsilateral LLN metastasis in level V along with level II,III and IV was found in 6 patients which correlates with other studies.¹³ When levels II,III,IV are involved there is significant association found for positivity of level V.¹⁴ We comment on performing a level V neck dissection in patients who had clinical positive ipsilateral level V LNs. Ipsilateral level II was involved in 18 out of 86 patients. Solitary ipsilateral level III was involved in only 7 patients.

Both the central and lateral LN metastasis can occur in isolation but multiple level nodal metastasis is more common.¹⁵

CONCLUSION

We conclude from the study that cervical lymph node metastasis is the common feature of PTC. Though LN metastasis does not affect the overall survival but is associated with increased loco- regional recurrences. In view of the high incidence of metastatic lymph nodes in levels II, III, IV and level VI, our study supports the recommendation for posterolateral and anterior neck dissection in patients with clinically positive neck nodes and tumor with aggressive criteria.

ACKNOWLEDGMENT

The authors would like to thank NCDIR, Bengaluru for providing technical support to the Hospital Based Cancer Registry.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Das R, Sharma JD, Katakai AC, Kalita CR, Baishya N. Pattern of regional metastasis in papillary thyroid cancer: our experience of 86 cases. *Int J Res Med Sci* 2019;7:3362-6.