

# Comparative Study of Performing Versus Sparing of Level VB Neck Dissection in Low-risk Papillary thyroid carcinoma patients with lateral neck metastasis to levels II, III, and IV

## Original Article

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## ABSTRACT

**Background:** Papillary thyroid carcinoma (PTC) is the most prevalent malignant thyroid neoplasm with a favorable prognosis. It tends to metastasize via the lymphatic system, which is an important risk factor for locoregional recurrence and disease-free survival. The standard treatment for affected lateral cervical lymph nodes is therapeutic lateral neck dissection; however, the accurate definition of the extent of dissection is widely debated.

**Aim:** To compare between levels II–III–IV–VB and levels II–III–IV modified radical neck dissection in low-risk PTC patients (<45 years old, T1, T2, M0) with lymph node metastasis in groups II–IV and absent level V lymph node metastasis as regards locoregional recurrence and postoperative complications including shoulder dysfunction, supraclavicular numbness, and neuropathic pain.

**Patients and Methods:** A total of 40 individuals were enrolled in this randomized, comparative, prospective clinical trial, divided into two groups, 20 patients each. We performed level VB dissection in group A in addition to levels II, III, and IV, while we preserved level VB in group B. Patients were followed up every 3 months for a year postoperatively to record postoperative complications and locoregional recurrence.

**Results:** Receiver Although there was a higher incidence of locoregional recurrence in group B, the difference was statistically nonsignificant. The incidence of shoulder dysfunction was higher in group A, but the difference was statistically nonsignificant. There were no significant variations between both groups as regards supraclavicular numbness and neuropathic pain.

**Conclusion:** Sparing level VB in lateral neck dissection in low-risk PTC increased the rate of locoregional recurrence though statistically nonsignificant; however, it reduced the incidence of postoperative shoulder dysfunction as compared with level VB dissection.

**Key Words:** Lateral neck dissection, Level VB dissection, Modified radical neck dissection, Papillary thyroid carcinoma, Selective lateral neck dissection.

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## INTRODUCTION

Papillary thyroid carcinoma (PTC) is the most prevalent malignant thyroid tumor, with a favorable prognosis reaching up to a 98% 10-year overall survival rate [1].

Nonetheless, 23–56% of patients diagnosed with PTC present with palpable neck nodes, and the disease tends to spread to the lymphatic system [2].

Lateral lymph node metastasis is shown to be a risk factor for both disease-free survival and local recurrence in a number of retrospective investigations and meta-

analyses. To increase the regional control rate, it is agreed that patients with lateral cervical lymph node affection should be managed with therapeutic lateral neck dissection, particularly modified radical neck dissection [4].

Typically, the procedure of modified radical neck dissection involves levels II–III–IV–VB. As the risk of lymph node affection in level VB is much lower than that of levels II–III–IV, it is still debatable whether level VB should be dissected routinely or not [5].

Furthermore, complications such as shoulder dysfunction, neuropathic pain, and supraclavicular numbness can occur as a sequelae of level VB dissection despite attempts to preserve the cervical plexus and spinal accessory nerve during lateral cervical lymph node dissection [6,7]. The scope of this study is to determine the importance of level VB dissection in low-risk PTC patients who have lateral neck nodal metastases in levels II–III–IV and absent level VB cervical lymph node affection.

### Aim

To compare between levels (II–III–IV–VB) and levels (II–III–IV) modified radical neck dissection in low-risk PTC patients (<45 years old, T1, T2, M0) with lymph node metastases in lateral neck levels II–III–IV and absent level V lymph node affection, as regards locoregional recurrence, and postoperative complications including shoulder dysfunction, supraclavicular numbness, and neuropathic pain.

## PATIENTS AND METHODS:

### Study design

Randomized comparative prospective clinical trial.

### Study population

In all, 40 patients were subdivided into two groups: group A and group B, 20 patients in each group.

In group A, we performed standard modified radical neck dissection with dissection of lateral neck levels II–III–IV–VB lymph nodes.

In group B, we performed modified radical neck dissection of lateral neck levels II–III–IV with preservation of level VB lymph nodes.

Patients in the low-risk group (<45 years old, T1, T2, M0), diagnosed pathologically with PTC with levels II–III–IV cervical lymph node metastases were included in the study.

Patients with any other type of thyroid carcinoma, poorly differentiated types, who have distant metastasis, level V lymph node affection, and patients with contralateral cervical lymph node affection were excluded from the study.

### Study procedure

Between November 2022 and November 2024, 40 patients had elective modified radical neck dissection in the operating theater of Ain Shams Hospitals under general anesthesia and aseptic conditions. Patients were randomly assigned to groups A and B using a computer. When

clinical examination and ultrasound revealed metastatic neck nodes in the lateral neck, other than level VB, lateral neck dissection was carried out. Therapeutic central and lateral neck dissections were done simultaneously with total thyroidectomy for all patients in the study.

All patients had central neck dissection, the hyoid bone, suprasternal notch, and common carotid artery form its superior, inferior, and lateral boundaries, respectively. Ipsilateral lateral neck dissection was performed for all patients, and it included levels II–III–IV–VB in group A and levels II–III–IV with sparing of level VB in group B. The mandible and skull base form its superior boundary. In contrast, the subclavian vein and the sternocleidomastoid muscle form the inferior and lateral boundaries, respectively. The internal jugular vein, sternomastoid muscle, and the spinal accessory nerve are spared during neck dissection.

Specimens were labeled while being dissected. They were tagged appropriately after being cut along this landmark. The same surgical team carried out every surgical procedure. Patients' approval to participate in the study was obtained. Administrative and ethics committee approval were obtained, and data confidentiality was guaranteed. Depending on their postoperative condition, all patients were discharged as soon as possible. They were also evaluated at the clinic periodically every 3 months for a year after surgery to document any postoperative complications (shoulder dysfunction, supraclavicular numbness, and neuropathic pain) and locoregional recurrence using clinical examination, neck ultrasound, or possibly a computed tomography scan of the neck when indicated.

Following surgery, all patients had RAI ablation and thyroid hormone suppression treatment. Obtaining patient contact information assured follow-up.

### Statistical analysis

The Statistical Package for the Social Sciences (Statistical analysis was done using IBM SPSS statistics for windows, Version 25.0. Armonk, NY: IBM Corp) was used to enter all the data. The data was compiled using descriptive statistics. Each quantitative variable's, mean±SD were determined. For qualitative variables, percentages and frequencies were computed.

## RESULTS:

Age of patients, sex, size, location, and size of the primary tumor were well-matched between both groups; there were no significant demographic variations between both groups.

Regarding regional neck lymph node metastases: all cases had lateral lymph node involvement according to our

study's inclusion criteria, but we observed three cases of skip metastasis (absent central group involvement), two cases in group A, and one case in group B. There were no significant statistical variations between both groups as regards the prevalence of central and lateral lymph node involvement.

In group A, the prevalence of metastasis in levels II, III, IV are 13(65%), 11(55%), and 13(65%) patients, respectively. Single-level involvement was seen in eight (40%) patients, and multiple group involvement was seen in 12(60%) patients. In group B, the prevalence of metastasis in levels II, III, and IV are 12(60%), 10(50%), and 12(60%) patients, respectively. Single-level involvement was seen in eight (40%) patients, and multiple group involvement was seen in 12(60%) patients.

Regarding operative time, there was a statistically significant increase in mean operative time in group A compared with group B.

As regards early postoperative complications: there was an equal incidence of transient hypocalcemia and postoperative wound infection between both groups.

Although, there was an increase in the incidence of permanent hypocalcemia and chyle leak in group A, the difference was statistically nonsignificant.

As regards postoperative recurrence, there is a statistically nonsignificant increase in the incidence of recurrence in group B (preservation of level VB) as compared with group A (dissection of level VB). Three patients were documented with recurrence out of 40 cases in both groups, one (5%) case in group A and two(10%) cases in group B.

We noticed that all recurrent cases are males older than 40 years despite the predominance of the female population in our study as mentioned above. We also noticed that all recurrent cases had multilevel lateral cervical lymph node involvement.

As regards shoulder dysfunction, there is a statistically nonsignificant increase in the incidence of shoulder dysfunction, either transient or permanent in group A (dissection of level VB) compared with group B (preservation of level VB).

As regards supraclavicular numbness and neuropathic pain, there was no significant statistical variations between both groups (Tables 1–4 and Figs 1–3).

**Table 1:** Comparison of demographic data between both groups.

	Group A	Group B	P value
Age (years)			
Range	29–44	29–45	0.744
Mean±SD	36.950±5.104	37.500±5.472	
X <sup>2</sup>	<i>n</i> (%)	<i>n</i> (%)	<i>P</i> value
Sex			
Females	14(70.00)	13(65.00)	0.736
Males	6(30.00)	7(35.00)	
Size of the primary tumor			
T1A	5(25.00)	6(30.00)	0.928
T1B	6(30.00)	6(30.00)	
T2	9(45.00)	8(40.00)	
Side of the primary tumor			
Right lobe	8(40.00)	7(35.00)	0.744
Left lobe	12(60.00)	13(65.00)	
Location of the primary tumor			
Solitary	14(70.00)	15(75.00)	0.723
Multifocal	6(30.00)	5(25.00)	

T1A: Tumors less than 1cm; T1B: Tumors more than or equal to 1cm and less than or equal to 2cm; T2: Tumors ranging from 2 to 4cm; *P*: value less than or equal to 0.05 is considered significant.

**Table 2:** Comparison of the extent of regional lymph node involvement between both groups.

	Group A [ <i>n</i> (%)]	Group B [ <i>n</i> (%)]	<i>P</i> value
Regional lymph node involvement			
Central LN	18(90.00)	19(95.00)	0.548
Lateral LN	20(100.00)	20(100.00)	–
Skip metastasis	2(10.00)	1(5.00)	0.548
Lateral lymph node group involvement			
Group II	13(65.00)	12(60.00)	0.744
Group III	11(55.00)	10(50.00)	0.752
Group IV	13(65.00)	12(60.00)	0.744
Multilevel involvement	12(60.00)	12(60.00)	1.000

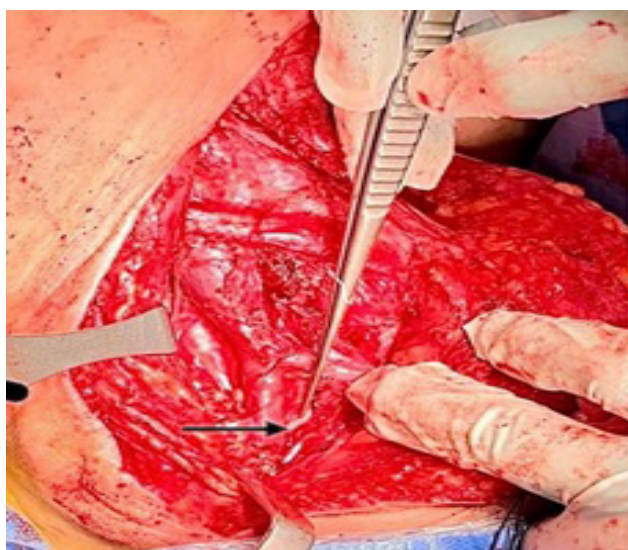
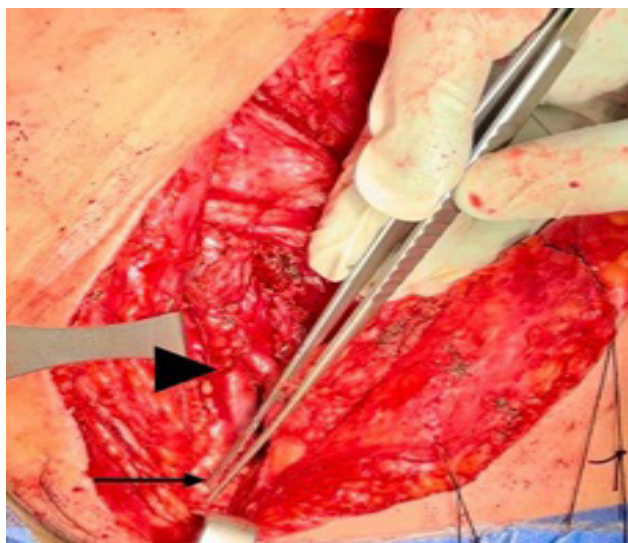
**Table 3:** Comparison of early postoperative complications between both groups.

	Group A	Group B	<i>P</i> value
Operative time (min)			
Range	180–233	166–240	0.041*
Mean±SD	209.200±15.686	195.950±23.171	
X <sup>2</sup>	<i>n</i> (%)	<i>n</i> (%)	<i>P</i> value
Transient hypocalcemia	4(20.00)	4(20.00)	1.000
Permanent hypocalcemia	1(5.00)	0	0.311
Permanent RLN palsy	0	0	1.000
Chyle leak	2(10.00)	1(5.00)	0.548
Wound infection	1(5.00)	1(5.00)	1.000



**Table 4:** Comparison of late postoperative complications between both groups.

	Group A [n (%)]	Group B [n (%)]	P value
Recurrence	1(5.00)	2(10.00)	0.548
Transient shoulder dysfunction	3(15.00)	1(5.00)	0.292
Permanent shoulder dysfunction	1(5.00)	0	0.311
Supraclavicular numbness	3(15.00)	4(20.00)	0.677
Neuropathic pain	4(20.00)	3(15.00)	0.677

**Figure 1:** Arrow points to the hypoglossal nerve.**Figure 2:** Arrow points to the spinal accessory nerve in level II, arrowhead points to the internal jugular vein.**Figure 3:** Arrow head points to the spinal accessory nerve in level V.

## DISCUSSION

According to American Thyroid Association (ATA) recommendations, central plus lateral cervical lymph node dissection is recommended in case of lateral cervical lymph node affection [8].

These recommendations accurately define the central neck compartment as a level VI cervical lymph node, but for the lateral compartment, it is unclear which levels need to be addressed [8].

Although there are no official management guidelines, modified (including levels II, III, IV, VB) versus selective (including levels II, III, IV) radical neck dissection was suggested and debated.

The aim of this debate on routine level VB neck dissection is to perhaps reduce the complications and morbidity from iatrogenic injuries of the cervical nerve plexus and spinal accessory nerve during this nodal basin dissection.

Given the well-established fact that PTC metastases most frequently affect levels II, III, and IV, selective lateral neck dissection was recommended in cases of metastatic PTC [9].

However, the standard selective lateral neck dissection does not address level VB, which is affected by metastasis in a significant percentage of patients [10].

In 2006, a study discussed the need for routine level VB dissection in metastatic PTC. They concluded that

there was no difference in the rate of locoregional recurrence between patients who had routine level VB resection and patients who did not. Therefore, they advised against performing routine level VB lymph node dissection [11].

However, according to research from the MD Anderson Cancer Centre, 53% of patients with lateral neck nodal affection had a pathological diagnosis of level V. Because of these findings, it is suggested that all patients with metastatic PTC should have elective dissection of levels II–V [10].

In a retrospective study, Farrag and colleagues examined the need for routine dissection of level VB by observation of the frequency of each level involvement. Level V was involved in 40% of the 60 specimens, so they recommended elective dissection of level VB in all cases [12].

Despite attempts to preserve the cervical nervous plexus and spinal accessory nerve during neck dissections, level V dissection increases the incidence of postoperative morbidity, resulting in shoulder dysfunction, neck numbness, and neuropathic pain, and negatively affects the quality of life of many patients [6,7].

Terrell *et al.*, [7] revealed that neck dissections preserving level V and securing spinal accessory nerves had led to fewer postoperative complications and a better quality of life for the patients.

In our study, there is an increase in the incidence of locoregional recurrence in group B (level VB preserved) as compared with group A (level VB dissection), but the difference is statistically nonsignificant.

We observed that all the recurrent cases in both groups belong to the male population older than 40 years, despite the predominance of the female population in our study. Also, we observed that all recurrent cases had multilevel lateral group involvement.

Both observations should be evaluated on a wider scale to evaluate the role of male sex, age, and multilevel lateral group involvement as a risk for increasing the incidence of locoregional recurrence after lateral neck dissection and whether it can affect or predict the extent of lateral neck dissection.

In the case with documented postoperative recurrence in group A (level VB was dissected), the recurrence was documented pathologically in the level III lateral neck group. In contrast, in the two recurrent cases in group B (level VB was preserved), the

recurrence was documented pathologically in group VB and in group III.

It has to be noted that, there is a difference in terms of clinical (cN1b) versus pathological diagnosis of lymph node metastasis (pN1b).

Clinically positive lymph node metastasis includes the nodes detected by palpation and ultrasonography (cN1b), while pathological metastasis is detected only on postoperative specimens' pathological examination (pN1b).

In this study, we excluded all clinically evident patients with metastasis in level V, but this does not exclude micrometastasis, which can be encountered in pathological examination of specimens postoperatively. In our study, among the 20 patients in group A with level VB dissection, we documented four cases with pN1b (20%).

Regarding shoulder dysfunction, there is a statistically nonsignificant increase in the incidence of permanent and transient shoulder dysfunction in group A (dissection of level VB) compared with group B (preservation of level VB).

This can be explained by a higher rate of traction injuries to the spinal accessory nerve during its course in the posterior neck.

In our study, we preserved the spinal accessory nerve in all cases. We did not face any indication to sacrifice of this nerve, such as invasion of the nerve. However, there are several patients who developed shoulder dysfunction postoperatively, possibly due to traction injury to the spinal accessory nerve. Most of the cases improved clinically on subsequent follow-up after 3–6 months, indicating neuroparesis.

As regards supraclavicular numbness and neuropathic pain, there were no significant variations between both groups.

## CONCLUSION

Sparing level VB in lateral neck dissection in low-risk PTC patients increased the rate of locoregional recurrence, though statistically nonsignificant; however, it reduced the incidence of postoperative shoulder dysfunction (statistically nonsignificant) as compared with level VB dissection.

## Limitations

This study is limited mainly by two factors: the small sample size and the short period of follow-up.

We need further studies, with more sample sizes and for a longer duration of follow-up to obtain better statistical outcomes.

### CONFLICT OF INTEREST

There are no conflicts of interest.

### REFERENCES

1. Nikiforov YE, Nikiforova MN. Molecular genetics and diagnosis of thyroid cancer. *Nat Rev Endocrinol* 2011; 7:569–580.
2. Wang TS, Dubner S, Szynter LA, Heller KS. Incidence of metastatic well-differentiated thyroid cancer in cervical lymph nodes. *Arch Otolaryngol Head Neck Surg* 2004; 130:110–113.
3. De Meer SGA, Dauwan M, De Keizer B, Valk GD, Borel Rinkes IHM, Vriens MR. Not the number but the location of lymph nodes matters for recurrence rate and disease-free survival in patients with differentiated thyroid cancer. *World J Surg* 2012; 36:1262–1267.
4. Haugen BR, Alexander EK, Bible KC, Doherty GM, Mandel SJ, Nikiforov YE, et al. 2015 American Thyroid Association management guidelines for adult patients with thyroid nodules and differentiated thyroid cancer: the American Thyroid Association guidelines task force on thyroid nodules and differentiated thyroid cancer. *Thyroid* 2016; 26:1–133.
5. Eskander A, Merdad M, Freeman JL, Witterick IJ. Pattern of spread to the lateral neck in metastatic well-differentiated thyroid cancer: a systematic review and meta-analysis. *Thyroid* 2013; 23:583–592.
6. Cappiello J, Piazza C, Giudice M, De Maria G, Nicolai P. Shoulder disability after different selective neck dissections (levels II–IV versus levels II–V): a comparative study. *Laryngoscope* 2005; 115:259–263.
7. Terrell JE, Welsh DE, Bradford CR, Chepeha DB, Esclamado RM, Hogikyan ND, et al. Pain, quality of life, and spinal accessory nerve status after neck dissection. *Laryngoscope* 2000; 110:620–626.
8. Cooper DS, Doherty GM, Haugen BR, Kloos RT, Lee SL, Mandel SJ, et al. Revised American Thyroid Association management guidelines for patients with thyroid nodules and differentiated thyroid cancer: the American Thyroid Association (ATA) guidelines taskforce on thyroid nodules and differentiated thyroid cancer. *Thyroid* 2009; 19:1167–1214.
9. Kupferman ME, Patterson M, Mandel SJ, LiVolsi V, Weber RS. Patterns of lateral neck metastasis in papillary thyroid carcinoma. *Arch Otolaryngol Head Neck surgery* 2004; 130:857–860.
10. Kupferman ME, Weinstock YE, Santillan AA, Mishra A, Roberts D, Clayman GL, et al. Predictors of level V metastasis in well-differentiated thyroid cancer. *Head Neck J Sci Specialt Head Neck* 2008; 30:1469–1474.
11. Caron NR, Tan YY, Ogilvie JB, Triponez F, Reiff ES, Kebebew E, et al. Selective modified radical neck dissection for papillary thyroid cancer—is level I, II and V dissection always necessary?. *World J Surg* 2006; 30:833–840.
12. Farrag T, Lin F, Brownlee N, Kim M, Sheth S, Tufano RP. Is routine dissection of level II-B and V-A necessary in patients with papillary thyroid cancer undergoing lateral neck dissection for FNA-confirmed metastases in other levels. *World J Surg* 2009; 33:1680–1683.