

Level IIb lymph node metastasis in thyroid papillary carcinoma

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Abstract The objective of the study was to evaluate the incidence of level IIb lymph node metastases in neck dissections for thyroid papillary carcinoma (TPC) patients. 47 neck dissections of 33 patients with TPC were prospectively evaluated. Selective neck dissections (levels II, III, IV, and V) were performed in all cases. If level I lymph node metastasis was suspected during the procedure, level I dissection was also performed. All level IIb specimens were sent separately from the remainder of the neck dissection for the pathological examination. The number of dissected and metastatic lymph nodes in each specimen was recorded. Twenty-two of 47 neck dissections (46.8%) were positive for the lymph node metastasis. Among 47 neck dissection specimens, the incidence of lymph node metastasis at level II was 12.7% (6 of 47) and level IIb was 2.1% (1 of 47). The rate of level IIb lymph node involvement among patients with metastatic cervical lymph nodes was 4.5% (1 of 22). The specimen with metastatic lymph node at level IIb had also metastasis at levels IIa, III, IV, and V. The results of the present study suggested that lymph node metastases in level IIb are rare in patients with TPC undergoing neck dissection.

Keywords Papillary thyroid cancer · Lymph node · Neck dissection · Level IIb · Metastasis

Introduction

Thyroid papillary carcinoma (TPC) is the most common thyroid malignancy. It constitutes 80% of all the thyroid carcinomas. The rate of nodal metastases in TPC has been reported to be within the range of 30–90% [1, 2]. Elective neck dissection is generally recommended if the risk of occult neck metastasis is higher than 20% in head and neck squamous cell carcinomas [3]. However, the role of elective neck dissection in TPC has not been clearly defined yet. The prognostic role of nodal involvement in TPC is controversial. Some studies suggest that the neck metastases have no adverse effect on neither the recurrence nor the survival [4, 5]. However, some recent articles showed that lymph node metastases were associated with an increase in recurrence rates and have a negative impact on survival [6, 7]. Neck dissections in the clinically involved lateral cervical lymph nodes are generally well-accepted procedures for TPC. However, the extent of the neck dissection necessary for oncologic management for positive lateral neck nodes is still debated [8, 9].

The most common morbidities associated with neck dissections are spinal accessory nerve dysfunction and related shoulder disabilities. Shoulder dysfunction is due to traction injury or interruption of blood supply of the spinal accessory nerve during dissection of level IIb [10]. This dysfunction may be avoided by preserving the level IIb lymph nodes during neck dissection in selected patients [11]. Level IIb is rarely involved in patients with a metastatic neck disease. Metastases at level IIb are not expected in patients with N0 neck. Koybasioglu et al. [12] showed

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no metastases at level IIb in dissection specimens of patients with laryngeal cancer. Silverman et al. [13] reported a 1.6% incidence of metastases at level IIb for N0 necks, 1.1% for N1 cases, and total incidence was 4.4% in cases with head and neck cancers. Similarly, Sezen et al. [14] reported that routine level IIb dissection was not necessary in N0 necks. According to them, if the level IIa showed positive metastatic changes, preoperative pathologic examination by frozen section that includes level IIb could be an alternative approach. Recently, similarly reports have been shown for TPC [15–17].

The aim of this study was to determine the incidence of lymph node metastases in the level IIb in neck dissections for TPC.

Patients and methods

This prospective study enrolled 33 patients who underwent a selective neck dissection for TPC at the departments of otorhinolaryngology and general surgery at Mersin University Hospital from January 2006 to June 2009. The patients with other types of thyroid carcinomas, such as follicular, medullary, and anaplastic types, were excluded from the study. Preoperative assessment for cervical lymph node metastasis included palpation, neck ultrasonography, and computed tomography (CT). The decision to perform a neck dissection was made preoperatively by clinical or radiological evidence of lymph node involvement or intraoperatively if involved lymph nodes in the neck were suspected. Procedures included unilateral or bilateral selective neck dissection (levels II, III, IV, and V) performed in addition to total thyroidectomy and central compartment dissection (level VI). If level I lymph node metastases were suspected during surgery, level I was added to dissection. Selective neck dissection (levels II, III, IV, and V), total thyroidectomy, and central compartment neck dissection were performed using an apron flap incision in all cases. Bilateral neck dissection was performed if the patient had bilateral lymph node involvement clinically or radiologically. The lymph node regions of the neck were divided into six levels (levels I–VI) [18]. Level II is divided into two parts known as levels IIa and IIb. Level IIb is also known as the submuscular recess or suprascapular recess. It comprises level II nodes that lay superficial to the fascia on the splenius capitis and levator scapulae muscles, superior to the spinal accessory nerve and bordered by the posterior belly of the digastric muscle superiolaterally, the skull base by superiorly and the sternocleidomastoid by muscle posterolaterally [13, 19]. In our study, the fibro-fatty tissues of the level IIb were dissected separately and

detached from the neck dissection specimen. The remaining neck specimen was labeled as levels I, IIa, III, IV, V, and VI. The specimens were processed, and the lymph nodes were noted as positive and reactive for the tumor by the pathology department.

Results

The study group consisted of 20 women and 13 men (33 patients) with a mean age of 40.2 years (range 20–73 years). Forty-seven neck dissections were performed on 33 consecutive patients with TPC. Thirty patients underwent total thyroidectomy and selective neck dissection (levels II, III, IV and V) and central neck dissection. Three patients underwent only selective neck dissection since they previously have had total thyroidectomy. Fourteen patients required bilateral neck dissection. Selective neck dissection was performed in 29 patients. Level I was added to dissection in four patients because suspected lymph node involvement was detected during the surgery. The spinal accessory nerve, the sternocleidomastoid muscle, and the internal jugular vein were preserved in all neck dissections. The largest primary tumors ranged in size from 0.2 to 6.0 cm, with a mean of 1.3 cm.

Twenty-two of 47 neck dissections (46.8%) were positive for the cervical lymph nodes metastasis. The mean total number of lymph nodes dissected at each neck dissection was 27.4 (16–45). The mean number of metastatic lymph nodes in each specimen was 2.9 (1–24). The results showed that the lateral group lymph nodes (levels II, III, IV) were at the greatest risk for metastasis. Within the lateral cervical lymph nodes, level IV nodes were the most frequently involved lymph nodes. Among all neck dissection specimens, the incidence of lymph node metastasis at levels II, III, IV, and V were 12.7, 25.5, 38.2, and 8.5%, respectively. Among neck dissections with metastatic lymph nodes, the incidence of lymph node metastasis at levels II, III, IV, and V were 27.2, 54.5, 81.8, and 18%, respectively. Lymph nodes metastases were not observed in patients who had been performed level I dissections. All patients with posterolateral lymph node metastases had involvement of central compartment (level VI).

Among 47 neck dissection specimens, the incidence of lymph node metastasis at level IIa was 12.7% (6 of 47) and level IIb was 2.1% (1 of 47). The neck dissection specimen with metastatic lymph node at level IIb also had metastasis at levels IIa, III, IV, and V. The rate of level IIb lymph node involvement in patients with metastatic lymph nodes was 4.5% (1 of 22). The rate of cervical lymph node metastasis was shown in Table 1.

Table 1 The incidence of lymph node metastasis in levels I–V

Level	Incidence of metastasis	
	Among all neck dissection specimens (<i>n</i> = 47) (%)	Among metastatic lymph nodes (<i>n</i> = 22) (%)
I	0	0
II	12.7	27.2
Ila	12.7	27.2
Ilb	2.1	4.5
III	25.5	54.5
IV	38.2	81.8
V	8.5	18

Discussion

Although cervical lymph node metastases are common in TPC, the management of lymph nodes in TPC remains controversial. Beside some studies reported no difference in survival between patients with and without lymph node metastases, other studies demonstrated that cervical lymph node metastases have a negative effect on tumor recurrence and survival [1, 4, 20]. Current treatment guidelines of the American Thyroid Association recommended, considering routine central compartment (level VI), neck dissection in patients with TPC regardless of the presence of cervical lymph nodes suspicious for metastatic disease preoperatively. But elective cervical lymph node dissection has not been clearly defined [21]. Generally, selective neck dissection, dissecting levels II–V with preservation of the sternocleidomastoid muscle, spinal accessory nerve, and internal jugular vein, is recommended for patients presenting with clinically palpable cervical lymph nodes or showing pathological appearance seen by imaging studies [22, 23]. In our study, the incidence of negative lymph node metastasis (53.2%) was higher than in previous studies. We speculated that the reason for the higher incidence should be due to our neck dissection criteria. The neck dissection indication in our study was clinically or radiologically lymph node metastasis suspicion. Fine needle aspiration biopsy (FNAB) or intraoperative frozen section usage might be useful reduce the negative neck dissection results. Initial nodal spread from TPC occurs in the central compartment of the ipsilateral neck (level VI) [24, 25]. However, Gimm et al. [26] and Noguchi et al. [7] reported that some patients had posterolateral lymph node metastasis without involvement of the central compartment. In our study, all patients with posterolateral lymph node metastases had involvement of central compartment.

When there is a metastasis in the lymph nodes of the lateral neck, levels II–V are predictably affected, usually with multiple areas of spread in more than one of these levels. As spread of TPC to the level I lymph nodes is so

rare, routine dissection of this area can be omitted [9, 27]. In addition, levels I and V lymph nodes were never found to be involved without lymph node involvement at other lymph nodes level such as levels II, III or IV [28].

In our study, the majority of patients with lateral cervical lymph node metastasis had multiple involved lymph node levels. The lateral cervical lymph nodes (levels II, III, and IV) are at the greatest risk for metastasis in TPC patients. The results of this study were in accordance with prior studies. It has been reported that lateral nodes were commonly involved, and level III nodes were the most common sites for metastasis [15, 17, 27]. In contrast to these studies, level IV lymph nodes were the most frequently involved in our patients. Roh et al. [9] also reported that level IV nodes were the most common sites for metastasis.

The most common morbidities due to the neck dissection are spinal accessory nerve dysfunction and shoulder disability. Shoulder dysfunction is due to the traction injury or interruption of blood supply to the spinal accessory nerve during dissection of level IIb. This dysfunction may be avoided by preserving the level IIb lymph nodes during neck dissection [10, 11]. However, some studies have shown temporary functional deterioration of the spinal accessory nerve even when level IIb is not dissected [29]. Although level IIb lymph nodes dissection has been routinely included in lateral neck dissection performed for metastatic neck disease with TPC, the incidence of nodal metastasis in this area has not been well established. Recently, some studies investigated the frequency and pattern of level IIb lymph node metastasis for TPC. Pingpank et al. reported that level IIb lymph node metastases were common. Therefore, they suggested that neck dissection should include all lymph nodes of levels I–V [30]. In contrast, some studies suggested that level IIb dissection would probably not be necessary in the absence of level IIa involvement because the incidence of metastasis to level IIb has been low if level IIa has not been involved. Koo et al. reported that 11.8% (9 of 76) of the patients had level IIb lymph nodes metastases in TPC patients. Only one of these patients was positive for level IIa. They all had primary tumors of >1 cm, as well as lymphovascular invasion, capsular invasion, or multilevel involvement of metastatic nodes. They suggested that level IIb lymph node dissection might not be necessary in TPC patients with positive lymph nodes in the absence of multilevel involvement [17]. Lee et al. also suggested that level IIb dissection has not been necessary in the absence of level IIa involvement. In their study, the metastasis in levels IIa and IIb were 55.5 and 6.8%, respectively. Also all level IIb lymph node metastasis was accompanied by level IIa metastasis [15]. In another study, it has been reported that the metastasis in level II was 60% (33 specimens) among

55 specimens. The incidence of lymph node metastasis at level IIb was 22% (12 specimens). Of 12 specimens with metastasis at level IIb, 11 specimens also had metastasis at level IIa. Therefore, they suggested that level IIb dissection is probably unnecessary when level IIa lymph nodes are uninvolved [16].

In our study, level IIb metastases were found in only one patient (2.1%), and this patient also had metastasis at levels IIa, III, IV, and V. In five specimens, metastasis was detected at level IIa without level IIb involvement. Our results suggested that level IIb involvement is rare for TPC, and dissection of the level IIb in patients with TPC may be required only in patients with multilevel neck metastasis or if level IIa metastasis is found intraoperatively.

Conclusion

The results of the present study show that nodal metastases in level IIb are rare in patients with TPC undergoing neck dissection. We suggest that level IIb lymph node dissection may be excluded from neck dissection for TPC, which would reduce surgical morbidity. Neck dissection should include the level IIb lymph nodes when level IIa lymph node metastasis or multilevel neck metastasis is found.

Conflict of interest statement The authors declare that they have no conflict of interest.

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