Background: The aim of this study was to assess the detection rate and sensitivity of preoperative ultrasonography relative to the size of metastatic foci.

Materials and Methods: Between January 2011 and May 2011, 724 patients with papillary thyroid carcinoma (PTC) who underwent thyroidectomy with routine central neck node dissection were enrolled in this study. All patients underwent preoperative ultrasonography (US) for the evaluation of primary tumor and lymph node metastasis. The accuracy of preoperative US for detecting metastatic central neck nodes was assessed relative to pathologic findings of the surgical specimen.

Results: Of 724 patients, 233 (32.2%) had central neck node metastasis; 112 (15.5%) had metastatic lymph nodes 2-4 mm, 55 (7.6%) had nodes 4-6 mm, 19 (2.6%) had nodes 6-10 mm and 13 (1.8%) nodes >1 cm. The sensitivity of preoperative US for detecting central neck node metastasis was 25.7% for all metastatic foci, including those with psammomatous calcification. The sensitivities of preoperative US for detecting nodes >2 mm, >4 mm, >6 mm, and >1 cm were 40.8%, 52.7%, 68.4%, and 76.9%, respectively.

Conclusion: The sensitivity of preoperative US in detecting central lymph node metastasis increases with increasing node size. However, the sensitivity of US in detecting metastatic lymph nodes <5 mm in size was <20%. Thus, depending on the exact staging of central neck nodes, frozen sections for these nodes may be required to plan the extent of surgery.
Predictive Factors and Pattern of Central Lymph Node Metastasis in Clinically Node Negative Papillary Thyroid Carcinoma

Yong Bae Ji, MD, Chang Myeon Song, MD, Kyung Tae, MD; Departments of Otolaryngology-Head and Neck Surgery, College of Medicine, Hanyang University

Objective: The indication and extent of prophylactic central neck dissection (CND) for papillary thyroid carcinoma (PTC) remains still controversial. The aim of this study is to evaluate the patterns and predictive factors of central lymph node metastasis and to suggest the indication and extent of prophylactic CND in clinically node negative PTC.

Methods: We studied 485 patients who have unilateral PTC without clinical lymph node metastasis and underwent total thyroidectomy and prophylactic bilateral CND from 2003 to 2012, retrospectively. The frequency, subsite and predictive factors of central lymph node metastasis were analyzed.

Results: One hundred-sixty six (32.4%) patients had occult metastases in the central compartment. The most common subsite of central node metastases was ipsilateral paratracheal lymph node (26.5%), and followed by pretracheal (12.5%), prelaryngeal (5.6%), contralateral paratracheal (3.4%) lymph node. The tumor size larger than 1cm (p=0.001), age under 45 (p<0.001) and minimal extrathyroidal extension (p=0.047) were associated with ipsilateral central compartment metastasis in multivariate analysis. Contralateral central node metastasis was associated with tumor size >3cm, age under 45, multifocality and ipsilateral central node metastasis in univariate analysis, but it was associated with only ipsilateral central node metastasis in multivariate analysis (p=0.001).

Conclusion: Prophylactic unilateral CND is recommended for PTC patients with tumor size larger than 1cm, age under 45 and extrathyroidal extension. Bilateral CND can be performed in patients who have positive node on frozen biopsy of ipsilateral central node.

Key words: Thyroid neoplasm, Carcinoma papillary, Lymphatic metastasis, Neck dissection
**S055 LYMPH NODE YIELD IN THE CENTRAL NECK COMPARTMENT: AN ANATOMICAL CADAVERIC STUDY**

E Ofo, BSc, MBBS, FRCS, ORL, HNS, PhD, D Cope, FRACS, ORL, HNS, K Kapoor, FRCS, ORL, HNS, S Thavaraj, PhD, FRCPATH, Jp Jeannon, FRCS, ORL, HNS, R Oakley, FRCS, ORL, HNS, E Odell, PhD, FRCPATH, R Simo, FRCS, ORL, HNS; Guy's & St Thomas' NHS Foundation Trust Intergrated Cancer Centre, London, UK

**Background**

Differentiated thyroid cancer (DTC) accounts for over 90% of thyroid malignancies. Despite a 15-30% risk of nodal metastasis, elective central compartment neck dissection (CCND) for DTC remains controversial.

Current knowledge on the expected lymph node yield from a CCND is limited, compared to the lateral neck. Where CCND is indicated, the surgeon and pathologist must be confident on the adequacy of oncological clearance, for the benefits to outweigh the risks of surgery. This study's aim was to accurately quantify the number of lymph nodes present in the cadaveric central neck compartment, and compare it with the clinical yield from level VI neck dissections.

**Methods**

Twenty-nine cadaveric necks were dissected; one case was excluded due to widespread nodal metastasis by carcinoma. Level VI was subdivided into four compartments for the dissection i.e. pre-cricoid (delphian), pre-tracheal, right and left para-tracheal regions. Each para-tracheal compartment contained thyroid gland, which was removed prior to histological analysis. All other tissue in each compartment was routinely processed and stained with haematoxylin and eosin. Only lymphoid tissue with a defined microscopic fibrous capsule and subcapsular sinus was included in the nodal count. Data analysis was performed using Microsoft Excel (Office) 2008.

**Results**

The median total nodal count per cadaver was four (range: 1-16), with a median of one node present in each para-tracheal and pre-tracheal region (range: 0-7 and 0-8, respectively). The median delphian node count was 0 (range 0-2). The average size of lymph nodes across all compartments was 2.9mm. The cadaveric central neck compartment lymph node yield was similar to the average nodal count from 40 consecutive level VI neck dissections.

**Conclusion**

This is one of the first studies to systematically assess the cadaveric level VI neck lymph nodes and establish baseline counts for lymph node yield. Elective CCND for differentiated thyroid cancer remains controversial. Should elective CCND be performed, those involved in the management of DTC need to recognise the wide range but low median yield of level VI neck lymph nodes.
SOLITARY LATERAL NECK NODE METASTASIS IN PAPILLARY THYROID CARCINOMA

Seok-Mo Kim, MD, Hyeung Kyoo Kim, MD, Ho Jin Chang, MD, Kuk Jin Kim, MD, Bup-Woo Kim, MD, YongSang Lee, MD, Hang-Seok Chang, MD, PhD, FACS, Cheong Soo Park, MDPhDFACS; Thyroid Cancer Center, Gangnam Severance Hospital, Yonsei University College of Medicine, Seoul, Korea

Background: Papillary thyroid carcinoma (PTC) is associated with a high incidence of regional node metastasis, but the patterns of lateral neck node metastasis (LNM) vary. Occasionally, PTC patients have a solitary LNM (SLNM). We assessed whether selective single level node dissection is appropriate in PTC patients with SLNM.

Methods: We retrospectively reviewed the medical records of 241 PTC patients who underwent total thyroidectomy with central neck dissection plus ipsilateral internal jugular node dissection (level II-IV) between January 2010 and December 2011. Of these patients, 51 had SLNM and 190 had multiple LNM (MLNM). The clinicopathologic characteristics of the two groups were compared.

Results: Age, gender ratio, and numbers of lateral neck nodes harvested (29.4 ± 11.0 vs. 30.3 ± 9.5; p = 0.574) were similar in the SLNM and MLNM groups. Mean primary tumor size was significantly smaller in the SLNM than in the MLNM group (1.03 cm vs. 1.35 cm; p = 0.037). The proportion of patients with primary tumor <= 1 cm was significantly higher in the SLNM group (60.8% vs. 38.4%; p = 0.006), whereas the proportions with maximal node size <= 0.7 cm (28.9% vs. 73.3%; p<0.001) and capsular invasion (62.7% vs. 83.7%, p = 0.002) were significantly lower in the SLNM than in the MLNM group.

Conclusion: Selective single level neck dissection can be considered an alternative to systemic lateral neck dissection in PTC patients with SLNM, maximal metastatic node size <= 0.7 cm, and no extrathyroidal invasion.
ANALYSIS OF FACTORS PREDICTING BILATERAL LATERAL NECK METASTASES IN PATIENTS WITH UNILATERAL PAPILLARY THYROID CARCINOMA

Kuk Jin Kim, MD, Seok-Mo Kim, MD, Hyeung Kyoo Kim, MD, Ho Jin Chang, MD, Bup-Woo Kim, MD, Yong Sang Lee, MD, Hang-Seok Chang, MD, PhD, FACS, Cheong Soo Park, MD, PhD, FACS; Thyroid Cancer Center, Gangnam Severance Hospital, Yonsei University College of Medicine, Seoul, Korea

Background: Papillary thyroid carcinoma (PTC) frequently involves lymph nodes in the lateral compartment, but unilateral PTC rarely metastasizes to bilateral lateral nodes. This study analyzed the clinicopathologic features of patients with PTC limited in one lobe showing bilateral lateral neck node metastases (N1b).

Methods: Of 457 patients with unilateral PTC and lateral neck metastasis analyzed between January 2010 and October 2012, 426 had ipsilateral (Group I) and 31 had bilateral (Group II) metastases. The clinicopathologic characteristics of the two groups were evaluated.

Results: Age, thyroiditis, capsular invasion of primary tumor and central neck node metastasis were similar in the two groups. Mean primary tumor size (1.87 ± 1.06 cm vs. 1.31 ± 0.90 cm, p = 0.002) was significantly larger, and male gender (51.6% vs. 25.5%; p=0.001), multifocality (38.7% vs. 21.8% 38.7%, p=0.022) and aggressive PTC subtype (74.2% vs. 8.7%, p=0.005) were significantly more frequent in patients with bilateral than ipsilateral metastases.

Conclusion: Although primary tumors are located in one lobe, male patients and those with multifocal tumors, primary tumors > 1 cm in size, and aggressive PTC subtype should undergo meticulous preoperative evaluation of bilateral lateral neck compartments to determine whether bilateral lateral neck dissection is needed.
OUTCOMES OF PATIENTS WITH PAPILLARY THYROID CANCER AFTER ISOLATED NECK RECURRANCE
Laura Y Wang, MBBS, MS, Frank L Palmer, BA, Iain J Nixon, MBChB, Ashok R Shaha, MD, Jatin P Shah, MD, M R Tuttle, MD, Snehal G Patel, MD, Ian Ganly, MD, PhD; Memorial Sloan-Kettering Cancer Center

Introduction
Cervical lymph node recurrence is reported in up to 30% of patients with papillary thyroid cancer. The aim of this study was to report our incidence of neck recurrence, subsequent salvage treatment and long term outcome.

Methods
An institutional database of 3664 previously untreated patients with DTC operated between 1986 and 2010 was reviewed. One-hundred and twelve (3.1%) patients developed cervical nodal recurrence. Patients with a local or distant recurrence prior to their neck recurrence were excluded from analysis. This left 95 (2.6%) patients who had an isolated neck recurrence. Location of neck recurrence and subsequent salvage surgery and adjuvant therapy were recorded for each patient. Long term disease free survival (DSS) was determined from the date of neck recurrence using the Kaplan Meir method.

Results
The median age at neck recurrence was 44 years (range 7-92). The median time to neck recurrence was 28 months (range 3-264). The median follow up time after the development of neck recurrence was 55 months (range 1-330). Neck recurrence occurred in the central compartment in 18 (19%) patients, lateral compartment in 67 (71%) patients and both compartments in 10 (10%) patients. Salvage treatment was surgery alone in 64 (67%) patients, surgical and adjuvant therapy 22 (23%) patients, non-surgical in 7 (7.4%) patients and 2 (2.1%) patients were observed without treatment. The 5 year DSS was 98.5% from time of neck recurrence.

Conclusion
In our series, isolated neck recurrence is rare, occurring in only 2.6% of patients. Such patients are successfully salvaged with surgery and adjuvant therapy with DSS of 98.5% at 5 years.
POSTEROSUPERIOR LESION HAS A HIGH RISK OF LATERAL AND CENTRAL NODAL METASTASIS IN SOLITARY PAPILLARY THYROID CANCER

Young Soo Rho, MD, Jin Hwan Kim, MD, Dong Jin Lee, MD, Kee Hwan Kwon, MD, Woo Jin Bae, MD; Department of Otolaryngology-Head and neck Surgery, Ilsong Memorial Institute of Head and Neck Cancer, Hallym University College of Medicine, Seoul, South Korea

Background

Preoperative nodal assessment of papillary thyroid cancer (PTC) is very important because 60% to 70% of all disease recurrence in the neck can occur in the lymph nodes. This study explored the association between ultrasonographic intrathyroidal location and the nodal metastasis pattern in solitary PTC.

Methods

Data from 218 patients who underwent total thyroidectomy with or without neck dissection for previously untreated PTC between 2006 and 2010 were retrospectively analyzed. Only patient data for which both preoperative ultrasound findings and postoperative pathologic reports were available were included. Multifocal cases, cases with extrathyroidal extension and distant metastasis were excluded. The association between nodal metastasis pattern and clinical or pathologic features of solitary PTCs was analyzed, as was the association between ultrasonographic intrathyroidal location and central or lateral nodal metastasis in solitary PTC.

Results

Mass size larger than 2 cm (p<0.001, Odds ratio (OR) 4.117) and central nodal metastasis (p<0.001, OR 3.984) were related with lateral neck metastasis in multivariate analysis. Male sex (p=0.001, OR 3.012) and capsular invasion (p<0.001, OR 4.720) were related with central neck metastasis in multivariate analysis. When analyzing ultrasonographic location of intrathyroidal solitary lesion, posterosuperiorly located lesion was strongly associated with both lateral and central neck metastasis. (p<0.001 and p=0.002, respectively)

Conclusions

Posterosuperior location of intrathyroidal solitary PTC has a high risk of lateral and central nodal metastasis when compared to other locations. For such patients, careful preoperative evaluation of nodal status should be done.
IMPACT OF LYMPH NODE RATIO ON THE SURVIVAL OF PATIENTS OLDER THAN 45 YEARS WITH PAPILLARY THYROID CARCINOMA

Luis Quiroa, MD, Joao Goncalves Filho, PhD, Luiz Paulo Kowalski, PhD; Department of Head and Neck Surgery and Otolaryngology, A.C. Camargo Cancer Center, Sao Paulo, Brazil

Background: Papillary thyroid carcinoma is the most common endocrine cancer and its incidence has been continuously increasing within the last three decades. Lymph node metastases occur in 20-50% of patients presenting for initial treatment, and presence of lymph node metastases have been associated with a higher risk for recurrence. Although, the role of the lymph nodes metastases as prognostic factor in patients with papillary thyroid carcinoma is controversial. Yet, the lymph node ratio (LNR) have been shown to be of prognostic implication in numerous human cancers, but the role of the LNR in papillary thyroid cancer (PTC) is unclear.

Objective: The aim of this study was to evaluate to prognostic implications of lymph node ratio (LNR) on the survival of patients older than 45 years with papillary thyroid carcinoma.

Patients and Methods: A retrospective study with 91 consecutive patients older than 45 years with papillary thyroid carcinoma undergoing total thyroidectomy with simultaneous neck dissection between 1980 and 2007 in a single institution. Eighty-one patients had paratracheal neck dissections and 34 lateral neck dissection (levels I to V or II to V). The median lymph yield was 10 (ranging from 2 to 107), median positive lymph node was 1 (ranging from 0(pN0) to 50), mean total LNR (± SEM) 0.25 (± 0.32), mean central LNR (± SEM) 0.23 (± 0.33). Survival estimates were calculated by the Kaplan-Meier method and compared by log rank test.

Results: The LNR > 0.30 was associated with a worse cancer-specific survival. Patients with an LNR of 0.30 or lower had a specific cancer survival in 10 years of 95.2% compared with 71% for patients with LNR > 0.30 (p=0.018). Similarly, patients with an LNR of 0.30 or lower had an 83% chance of remaining disease free during 10 years of follow-up. However, the LNR showed no significant independent effect in recurrence-free survival.

Conclusion: The LNR is an important prognostic factor in patients older than 45 years with papillary thyroid carcinoma, and a threshold LNR of 0.30 can be used to risk-stratify patients with metastatic lymph nodes submitted to neck dissection.
THE IMPACT OF HASHIMOTO THYROIDITIS ON LYMPH NODE YIELD AND METASTATIC LYMPH NODE RATIO IN THYROID MALIGNANCY

Mohammad A Murcy, MD, Mohammed H Alshehri, MD, Emad Kandil, MD, FACS; Department of Surgery, Tulane University School of Medicine

Background: A number of studies have reported the association between thyroid cancer (TC) and Hashimoto's thyroiditis (HT). However, the impact of HT on the number of the dissected lymph nodes; lymph node yield (LNY), or lymph node ratio (LNR) remains uncertain. The aim of this study was to assess this impact.

Methods: A retrospective study for all patients who underwent thyroid surgery at a single North American institution from 1998 to 2013. Patients were evaluated for demographic data, occurrence of HT, presence of malignancy, histological type of malignancy, size of the tumor, presence of multi-focal disease, existence of lymph node metastasis; LNY, LNR and BRAF gene mutation status. Patients were divided according to the occurrence of HT into 2 groups; HT and non-HT patients. Statistical analysis was conducted using Chi-square test, logistic regression and student's t test. Significance was defined as p < 0.05.

Results: A total of 943 patients were included, HT has been diagnosed in 217 of them. There were no differences in patients' demographic among both groups. Patients with HT were more likely to have TC than Non-HT patients (OR 2.12; 95% CI [1.5413-2.9111]; p < 0.0001). However, HT patients were less likely to have metastatic lymph nodes than non-HT patients (OR 0.19; 95% CI [0.0721-0.5110]; p < 0.0001). However, there were no differences in the LNY (6.11 ± 8.16 vs. 8.86 ± 11.22, p = 0.21); or LNR (35.61 % ± 29.5 % vs. 48.77 % ± 33.49 %, p = 0.32) between HT and non-HT patients, respectively. Tumor size, presence of multifocal disease and BRAF gene mutation were similar between HT and Non-HT.

Conclusions: Although HT can be considered as a risk factor for developing TC, the co-existence of HT with TC can lead to a less invasive disease than Non-HT. The presence of HT does not affect either LNY or the LNR, which may warrant continued investigation with larger future studies.