BRITISH JOURNAL OF HOSPITAL MEDICINE

ARTICLE

Chronic Lymphocytic Thyroiditis is a Protective Factor for Lymph Node Metastasis in Papillary Thyroid Carcinoma: A Propensity Score Matching Analysis

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Abstract

Aims/Background The connection between lymph node (LN) metastases in papillary thyroid carcinoma (PTC) and chronic lymphocytic thyroiditis (CLT) has been examined in a number of prior investigations. However, there is ongoing debate over the effect of CLT on LN metastasis in PTC. In order to explain the relationship between CLT and LN metastasis more convincingly, we aimed to retrospectively review clinical data to investigate the correlation between CLT and LN metastasis in PTC using propensity score matching (PSM).

Methods Data on PTC patients at Wenzhou Central Hospital were collected retrospectively between 1 January 2018, and 31 March 2022. The patients were split into two groups based on whether they had CLT or not. The clinicopathological characteristics of the two groups were compared using a PSM analysis. The relationship between CLT and LN metastases was analyzed using logistic regression analysis.

Results Among the 773 PTC patients collected and examined, 213 showed simultaneous CLT. Prior to PSM, patients with CLT displayed a significantly lower incidence of LN metastasis (34.3% VS 44.8%, $p = 0.008$), a lower metastatic LN ratio (0 (0, 0.17) VS 0 (0, 0.38), $p = 0.011$), and a greater number of LNs dissected (7 (5, 11) VS 5 (3, 7), $p < 0.001$). These differences persisted after the PSM of 208 pairs. After PSM, patients with CLT displayed a significantly lower incidence of LN metastasis (35.0% VS 44.7%, $p = 0.045$), a lower metastatic LN ratio (0 (0, 0.17) VS 0 (0, 0.33), $p = 0.038$), and a higher number of dissected LNs (7 (5, 11) VS 5 (3, 7), $p \leq 0.001$). Additionally, the multivariate logistic regression analysis indicated that CLT had a protective role against LN metastasis in both the matched group (odds ratio (OR), 0.62; 95% confidence interval (CI): 0.39–0.96; $p = 0.032$) and the unmatched group (OR, 0.63; 95% CI: 0.44–0.91; $p = 0.014$).

Conclusion Our data indicate that CLT may protect against LN metastases in patients with PTC. Patients having PTC with coexisting CLT have fewer LN metastases, a greater number of LNs dissected, and a lower metastatic LN ratio.

Key words: papillary thyroid carcinoma; chronic lymphocytic thyroiditis; lymph node metastasis; propensity score matching

Submitted: 5 May 2024 Revised: 3 July 2024 Accepted: 18 July 2024

How to cite this article:
Yu J, Li X, He Z, He J, Rao S. Chronic Lymphocytic Thyroiditis is a Protective Factor for Lymph Node Metastasis in Papillary Thyroid Carcinoma: A Propensity Score Matching Analysis. Br J Hosp Med. 2024. https://doi.org/10.12968/hmed.2024.0235

Introduction

Papillary thyroid carcinoma (PTC) is the most frequent kind of thyroid cancer, representing more than 90% of all thyroid neoplasms (Chen et al, 2009; Chen

et al, 2016). The most prevalent autoimmune thyroid condition is called chronic lymphocytic thyroiditis (CLT), which is characterized by extensive lymphocytic infiltration, fibrosis, and late-stage parenchymal atrophy of thyroid tissue (Antonelli et al, 2015). Since DAILEY et al (1955) first proposed a connection between CLT and PTC in 1955, numerous studies have been conducted to explore the relationship between these two widespread disorders (Anand et al, 2014). Compared to patients without CLT, those with CLT are thought to be more susceptible to PTC (Uhliarova and Hajtman, 2018). Importantly, CLT is believed to be associated with positive outcomes in PTC (Jeong et al, 2012; Liang et al, 2017; Moon et al, 2018; Ryu and Yoon, 2020). Numerous prior investigations revealed the link between CLT and lymph node (LN) metastasis, recognized as a pivotal determinant of patient outcomes (Chistiakov, 2005). Many studies suggested that the presence of CLT in PTC patients is an independent protective prognostic factor for LN metastasis (Kim et al, 2011; Ryu and Yoon, 2020). Conversely, other research has not uncovered any evidence of CLT providing a preventative impact on the occurrence of LN metastasis (Jeong et al, 2012; Song et al, 2018). In a large retrospective analysis involving 9210 patients, logistic regression analysis revealed that CLT did not predict LN metastasis (Xu et al, 2021). The impact of CLT on LN metastasis in PTC, however, remains a subject of ongoing debate. This debate primarily arises from the challenge of carrying out prospective studies; most studies, therefore, focus solely on retrospective data. In retrospective observational studies, variances between test and control groups could stem from confounding factors, and outcome biases might indicate disparities in baseline conditions rather than a real impact.

Propensity score matching (PSM) is a widely used statistical method to assess treatment effects in observational research. PSM estimates propensity scores based on a logistic regression model and matches patients with similar propensity scores, achieving a comparison with reduced selection bias due to confounding factors (Benedetto et al, 2018). As a result, utilizing PSM may improve the degree of evidence in clinical research, as well as the robustness and generalizability of its findings.

In the present study, we retrospectively analyzed clinical data to explore the relationship between CLT and LN metastasis in PTC. To minimize confounding bias, we employed propensity scoring models to achieve meaningful comparisons.

Methods

Patients Cohort

A retrospective study was performed based on patient data from the Wenzhou Central Hospital. All included patients underwent thyroid surgery and were pathologically diagnosed with PTC between 1 January 2018 and 31 March 2022. Inclusion criteria: (1) PTC was confirmed pathologically; (2) Traditional open radical surgery for thyroid cancer was performed. Primary tumour surgery comprised lobectomy and complete thyroidectomy with unilateral or bilateral central lymph node dissection. Therapeutic neck dissection was done in patients with standard symptoms. Those who met any of the following conditions were excluded: (1)

missing data; (2) thyroid dysfunction requiring therapy before surgery; (3) history of neck radiotherapy or surgery. This study, including the experimental procedures was approved by Wenzhou Central Hospital (Approval No. 2022-32). The study adhered to the principles of the Declaration of Helsinki and was approved by the Local Institutional Ethics Review Board. All patients signed informed consent forms.

CLT Definition

The diagnosis of CLT was made based on the examination of the pathological slides by a pathologist. The presence of oxyphilic cells, diffuse lymphoplasmacytic infiltrate, creation of lymphoid follicles with germinal centres, and atrophic alterations in the vicinity of normal thyroid tissue were considered pathologically established cases of CLT. The only condition not classified as CLT was peritumoral lymphocytic infiltration. The presence of serum antithyroid antibodies, including anti-thyroid peroxidase antibodies (anti-TPO) and anti-thyroglobulin, was not a diagnostic criterion.

Data Collection

Patient data were collected through a retrospective evaluation of medical records. The demographics of the patient (age and gender), histopathological data (primary tumour size, extrathyroidal extension, multifocality, bilaterality, intraglandular dissemination, dissected LN number, metastatic LN number, and existence of CLT, and preoperative laboratory results (anti-thyroglobulin antibody (TgAb) and anti-thyroid peroxidase antibody (TPOAb))) were all analyzed. The metastatic LN ratio was calculated as the metastatic LN quantity divided by the dissected LN number. The tumour size, independent of any smaller tumours, was referred to as the primary tumour size. The extrathyroidal extension was defined as microscopic capsule invasion or macroscopic peripheral muscle invasion. Multifocality was defined as two or more tumours (with one or both lobes of thyroid gland). Multifocal occurrence of thyroid tumours in both lobes of the thyroid gland was classified as bilaterality. Intraglandular dissemination was defined as microscopic cancer lesions that were radially distributed and presented a similar histological appearance to the main cancer nodule. TPOAb and TgAb had a standard reference interval of 0 to 9.0 μg/L and 0 to 4.0 μg/L, respectively. If a subject's TPOAb and TgAb levels were greater than 9.0 μg/L and 4.0 μg/L, respectively, they were considered to be positive for the antibodies.

Analysis Procedures

Firstly, patients with less than two dissected LNs were excluded to decrease the bias for the false-negative classification of metastatic LN. Secondly, based on whether PTC and CLT coexisted, the recruited patients were categorized into two groups. A statistical comparison was made of the variations in clinicopathological features between the two groups. Thirdly, PSM was applied to balance potential baseline confounders and biases between the two groups, and the clinicopathological differences between the groups were further verified. Finally, the relationship between CLT and LN metastases was analyzed using multivariate logistic regression analysis.

Statistical Analyses

The statistical analyses were conducted using SPSS (version 26, IBM, Armonk, NY, USA). For continuous variables, normality was tested using probability plots, and normally distributed variables were presented as the mean and standard deviation. Non-normally distributed variables were presented as the median and quartiles (p25, p75). Categorical variables were presented as numbers and percentages and associations between categorical variables were analyzed using a Chi-square test. Group differences for normally distributed continuous variables were compared using a *t*-test, and the Mann-Whitney U test was used to assess group differences for non-normally distributed variables. Multivariate logistic regression analysis was carried out to control for potentially confounding demographic and clinical characteristics. A *p*-value of less than 0.05 was considered statistically significant, and all *p*-values were two-sided. Stata software (version 16, StataCorp, College Station, TX, USA) was used to perform PSM, and logistic regression was used to estimate propensity scores. The propensity score was matched between the groups using Stata's "psmatch2" package. Depending on whether PTC happened with or without CLT, the matching technique was set to the closest neighbour algorithm, the ratio was set at 1:1, and the caliper value was set at 0.02. The following parameters were incorporated in the matching method: age, gender, primary tumour size, extrathyroidal extension, multifocality, intraglandular dissemination, and bilaterality. The standardized mean difference and kernel density were employed to evaluate the covariate balance between the matched groups. Variables with standardized differences of $<10\%$ between the 2 groups were considered well-balanced after PSM.

Results

Patient Characteristics

We identified 881 potentially relevant cases according to the inclusion and exclusion criteria, and data for a total of 773 PTC patients were collected and analyzed. The screening process is shown in Fig. 1. Table 1 shows the clinicopathological characteristics of the patients. Among the 773 patients, 213 (27.6%) had coexistent CLT. There was no significant difference in age or primary tumour size between patients with and without CLT. The female gender was more prevalent in the CLT group. There were slight differences in the incidence of intraglandular dissemination and bilaterality between the two groups, but they were not statistically significant. There was significantly more multifocality and a trend towards less extrathyroidal extension in patients with CLT. There was no significant difference between groups in the number of metastatic LN. However, the incidence of LN metastasis and the metastatic LN ratio were significantly lower, and the number of dissected LNs was significantly higher, in patients with CLT.

PSM Adjustment of Patient Characteristics

Patients with CLT were 1:1 propensity score matched with a caliper value of 0.02 to yield 208 matched pairs. The clinicopathological comparison between the

Table 1. Clinicopathological characteristics of patients with PTC according to presence of coexistent CLT.

	All patients (n = 773)	PTC with CLT (n = 213)	PTC without CLT (n = 560)	*p*-value (t/χ^2/Z)
Age, years	47.98 ± 10.87	47.56 ± 11.18	48.13 ± 10.76	0.516 (0.650)
≥45	595 (77.0%)	127 (59.6%)	368 (65.7%)	0.115 (2.485)
<45	278 (33.0%)	86 (40.4%)	192 (34.3%)	
Gender				<0.001 (24.194)
Male	181 (23.4%)	24 (11.3%)	157 (28.0%)	
Female	592 (76.6%)	189 (88.7%)	403 (72.0%)	
Bilaterality				0.126 (2.336)
Yes	137 (17.7%)	45 (21.1%)	92 (16.4%)	
No	636 (82.3%)	168 (78.9%)	468 (83.6%)	
Extrathyroidal extension				0.079 (3.080)
Yes	159 (20.6%)	35 (16.4%)	124 (23.4%)	
No	614 (79.4%)	178 (83.6%)	436 (76.6%)	
Primary tumour size, cm	0.7 (0.5, 1.1)	0.7 (0.5, 1.1)	0.7 (0.5, 1.1)	0.962 (–0.047)
<1 cm	546 (70.6%)	147 (69.0%)	399 (71.3%)	0.542 (0.372)
≥1 cm	227 (29.4%)	66 (31.0%)	161 (28.7%)	
Intraglandular dissemination				0.584 (0.300)
Yes	38 (4.9%)	9 (4.2%)	29 (5.2%)	
No	735 (95.1%)	204 (95.8%)	531 (94.8%)	
Multifocality				0.042 (4.121)
Yes	220 (28.5%)	72 (33.8%)	148 (26.4%)	
No	553 (71.5%)	141 (66.2%)	412 (73.6%)	
Anti-TPO positive				<0.001 (272.872)
Yes	149 (19.3%)	122 (57.3%)	27 (4.8%)	
No	624 (80.7%)	91 (42.7%)	533 (95.2%)	
Anti-Tg positive				<0.001 (344.366)
Yes	151 (19.5%)	133 (62.4%)	18 (3.2%)	
No	622 (80.5%)	80 (37.6%)	542 (96.8%)	
Dissected LN number	5 (3, 8)	7 (5, 11)	5 (3, 7)	<0.001 (–7.993)
LN metastasis	0 (0, 2)	0 (0, 2)	0 (0, 2)	0.155 (–1.421)
Yes	324 (41.9%)	73 (34.3%)	251 (44.8%)	0.008 (7.053)
No	449 (58.1%)	140 (65.7%)	309 (55.2%)	
Metastatic LN ratio	0 (0, 0.33)	0 (0, 0.17)	0 (0, 0.38)	0.011 (–2.544)
Lateral neck LN metastasis				0.407 (0.687)
Yes	41 (5.3%)	13 (6.1%)	26 (4.6%)	
No	732 (94.7%)	200 (93.9%)	534 (95.4%)	

Abbreviations: PTC, papillary thyroid carcinoma; CLT, chronic lymphocytic thyroiditis; Anti-Tg, anti-thyroglobulin; Anti-TPO, anti-thyroid peroxidase; LN, lymph node.

groups is presented in Table 2. After matching, the groups did not significantly differ in terms of age, gender, primary tumour size, multifocality, extrathyroidal extension, bilaterality, or intraglandular dissemination. The incidence of LN metas-

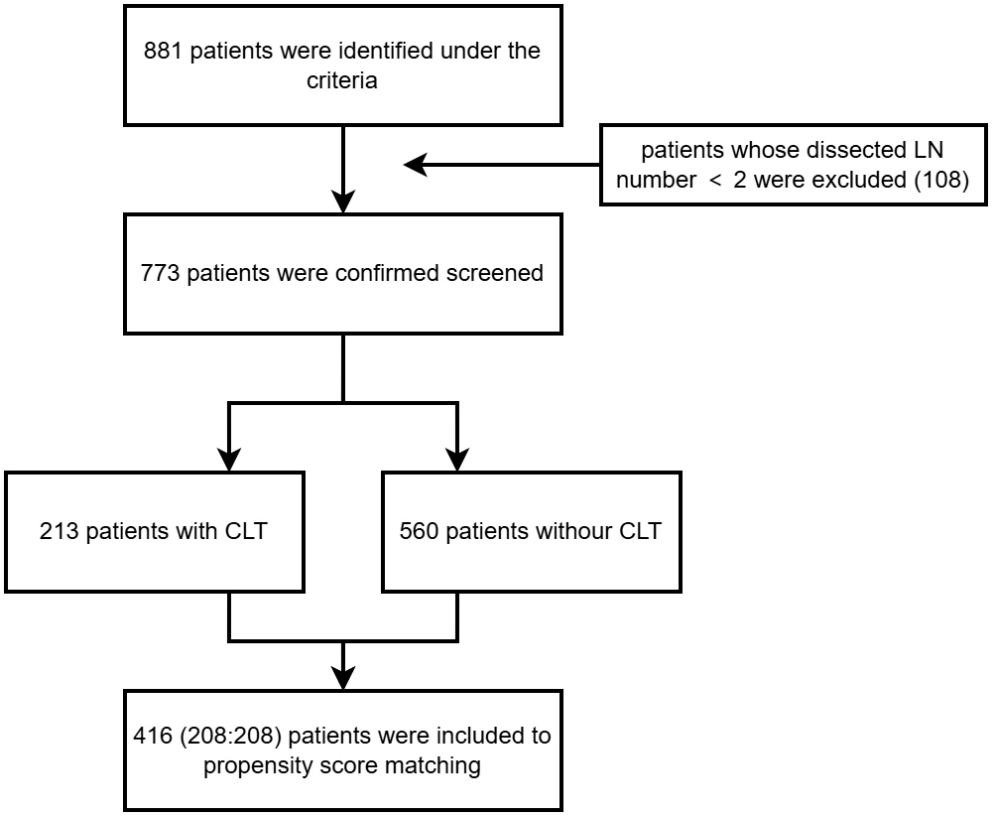

Fig. 1. The flow diagram of study cohort drawn from our institutional database.

tasis between the two groups remained significantly different after PSM, indicating that CLT was associated with a lower incidence. The metastatic LN ratio was significantly lower, and the dissected LN number was significantly higher, in patients with CLT, as was the case before PSM. The results of the cohort comparison using PSM are presented in Table 2. In addition, multivariate logistic regression analysis revealed that CLT was a protective factor for LN metastasis in both the unmatched patients (odds ratio (OR), 0.63; 95% confidence interval (CI): 0.44 to 0.91; p = 0.014) and in the matched subset (OR, 0.62; 95% CI: 0.40 to 0.96; p = 0.032) (Table 3). In the subgroup analysis, CLT was identified as a protective factor in patients aged $\geq$45 years and in those with bilaterality. In addition, CLT displayed a tendency toward protection in other subgroups (Fig. 2).

Assessment of the Covariate Balance in the Matched Groups

Assessment of the covariate balance in the matched groups was an important step in determining the quality of the resulting matched samples. The mean standardized difference analysis showed that values for all covariates were less than 10%, which indicated a well-balanced result (Fig. 3A). Moreover, kernel density estimation indicated that the cohort presented a low degree of overlap before matching, but an adequate overlap after matching, with a good control match for each individual (Fig. 3B). Therefore, the above results jointly confirmed that the confounders and the biases between the groups were well balanced and the comparison was reliable.

Table 2. Clinicopathological characteristics of patients after PSM.

	PTC with CLT (n = 208)	PTC without CLT (n = 208)	*p*-value (t/χ^2/Z)
Age, years	47.97 ± 10.98	48.33 ± 10.55	0.733 (0.342)
≥45	127 (61.1%)	136 (65.4%)	0.360 (0.837)
<45	81 (38.9%)	72 (34.6%)	
Gender			1.00 (0.000)
Male	24 (11.5%)	24 (11.5%)	
Female	184 (88.5%)	184 (88.5%)	
Bilaterality			0.805 (0.061)
Yes	40 (19.2%)	42 (20.2%)	
No	168 (80.8%)	166 (79.8%)	
Extrathyroidal extension			0.699 (0.150)
Yes	35 (16.8%)	38 (18.3%)	
No	173 (83.2%)	170 (81.7%)	
Primary tumour size, cm	0.7 (0.5, 1.1)	0.7 (0.5, 1.1)	0.777 (–0.284)
<1 cm	144 (69.2%)	142 (68.3%)	0.832 (0.045)
≥1 cm	64 (30.8%)	66 (31.7%)	
Intraglandular dissemination			0.381 (0.768)
Yes	9 (4.3%)	13 (6.3%)	
No	199 (95.7%)	195 (93.7%)	
Multifocality			0.408 (0.684)
Yes	67 (32.2%)	75 (36.1%)	
No	141 (67.8%)	133 (63.9%)	
Dissected LN number	7 (5, 11)	5 (3, 7)	<0.001 (–6.761)
LN metastasis	0 (0, 2)	0 (0, 2)	0.272 (–1.098)
Yes	72 (35.0%)	92 (44.7%)	0.045 (4.026)
No	136 (65.0%)	116 (55.3%)	
Metastatic LN ratio	0 (0, 0.17)	0 (0, 0.33)	0.038 (–2.087)
Lateral neck LN metastasis			0.263 (1.254)
Yes	13 (6.3%)	8 (3.8%)	
No	195 (93.7%)	200 (96.2%)	

Abbreviations: PTC, papillary thyroid carcinoma; CLT, chronic lymphocytic thyroiditis; LN, lymph node; PSM, propensity score matching.

Discussion

CLT is the most prevalent autoimmune illness, and its incidence has been increasing in recent years. Over the past ten years, the rising incidence of thyroid cancer has been paralleled by an equivalent rise in CLT, prompting an inquiry into a potential link between the two conditions. The impact of CLT on PTC prognosis has long been a topic of discussion. In comparison with patients without CLT, coexisting CLT has been shown in multiple previous studies to be significantly associated with better clinicopathologic characteristics and an improved prognosis among patients with PTC (Jeong et al, 2012; Liang et al, 2017; Moon et al, 2018; Ryu and Yoon, 2020). This was demonstrated by the decreased incidence of extrathyroidal extension, LN metastasis, distant metastasis, and an increased recurrence-free sur-

vival duration. Consistent with previous studies, our results also suggest that CLT is a protective factor for lymph node metastasis. However, by using PSM to control for bias inherent in retrospective analysis, our findings are more reliable.

It is well known that LN metastasis is an important risk factor for cancer prognosis (Lundgren et al, 2006), and the association between LN metastasis and CLT has been investigated. Several studies indicated that coexisting CLT in PTC patients is a protective independent prognostic factor for LN metastasis (Kim et al, 2011; Ryu and Yoon, 2020).

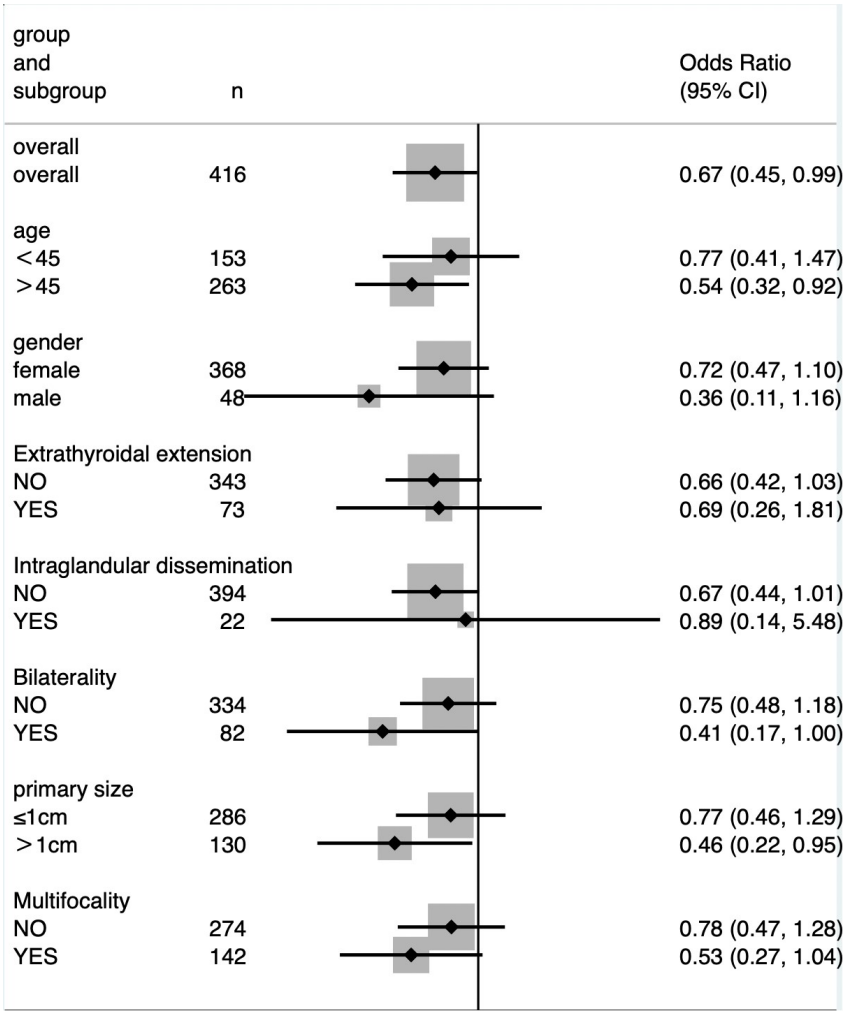

Fig. 2. Associations between chronic lymphocytic thyroiditi (CLT) and papillary thyroid cancer (PTC) in different subgroups.

Table 3. Multivariable logistic regression analysis of clinicopathological features for lymph node metastasis before and after propensity score matching.

	Pre-PSM			Post-PSM		
	OR (95% CI)	*p*-value	B/SE/wald χ^2	OR (95% CI)	*p*-value	B/SE/wald χ^2
Age, years						
≥45	0.56 (0.40–0.78)	0.000	–0.58/0.17/12.15	0.38 (0.24–0.61)	0.000	–0.96/0.24/16.77
<45	Ref					
Gender						
Male	Ref					
Female	0.58 (0.40–0.84)	0.004	–0.55/0.19/8.41	0.64 (0.32–1.29)	0.212	–0.44/0.36/1.56
Bilaterality						
Yes	1.30 (0.78–2.16)	0.316	0.26/0.26/2.82	1.58 (0.81–3.11)	0.183	0.46/0.35/1.77
No	Ref					
Extrathyroidal extension						
Yes	2.47 (1.67–3.64)	0.000	0.90/0.20/19.98	3.10 (1.73–5.55)	0.000	1.13/0.30/14.36
No	Ref					
Primary tumour size, cm						
<1 cm	Ref					
≥1 cm	2.87 (2.03–4.07)	0.000	1.06/0.18/35.40	3.07 (1.90–4.97)	0.000	1.12/0.25/21.05
Intraglandular dissemination						
Yes	2.78 (1.13–6.87)	0.026	1.02/0.46/3.02	1.35 (0.44–4.11)	0.603	0.29/0.57/0.27
No	Ref					
Multifocality						
Yes	1.41 (0.90–2.21)	0.140	0.34/0.23/6.15	1.62 (0.90–2.94)	0.111	0.48/0.30/2.54
No	Ref					
Coexistence with CLT						
Yes	0.63 (0.44–0.91)	0.014	–0.46/0.19/6.09	0.62 (0.39–0.96)	0.032	–0.48/0.23/4.60
No	Ref					

Abbreviations: PSM, propensity score matching; OR, odds ratio; CI, confidence interval; Ref, reference; CLT, chronic lymphocytic thyroiditis.

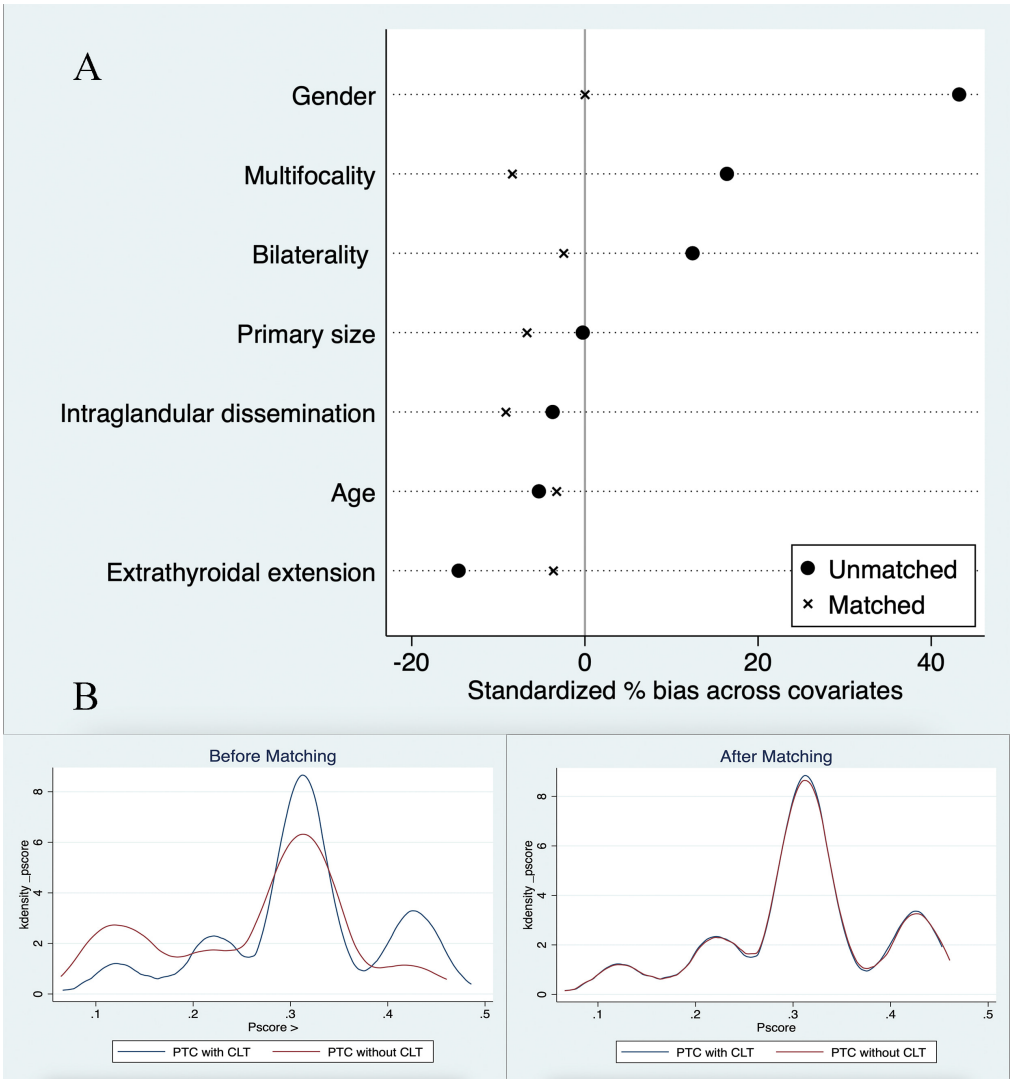

Fig. 3. Covariate balance before and after matching. (A) Balanced covariates (mean standardized difference <10%). (B) Improved overlap pre-matching, ensuring good control.

However, other investigations did not identify a protective impact of coincident CLT on LN metastases (Jeong et al, 2012; Song et al, 2018). A comprehensive retrospective analysis encompassing 9210 patients further demonstrated that CLT was not associated with LN metastasis based on a logistic regression analysis (Xu et al, 2021). Most of these studies are retrospective analyses, and most of them are mainly aimed at studying the risk of long-term recurrence; moreover, only univariate statistical methods such as single-factor analysis has been used to explore the relationship between CLT and LN metastasis. However, the patients included in retrospective analyses were not strictly screened, and baseline differences in clinicopathological features were relatively large. Without effective statistical analysis to control for potential bias, the results can be unreliable. In our research, we noted that the rate of LN metastasis was 34.3% in the group with concurrent CLT and 44.8% in the group with PTC only. This finding is in line with other research suggesting that CLT may protect against LN metastasis in PTC (Lee et al, 2020). However, the baseline clinicopathological characteristics were imbalanced, as in the previous studies. In

this investigation, there was no significant distinction in age, initial tumour size, intraglandular spread, or bilaterality between the two groups, however, female patients and those with multifocal tumours were disproportionately represented in the coexistent CLT group. There was also a trend toward less extrathyroidal extension in coexistent CLT group. These clinicopathological features have been shown to be associated with LN metastasis (Ma et al, 2016). It is difficult to avoid imbalance in these potentially confounding factors in retrospective studies; such differences can lead to unreliability of the results.

To match the samples across the groups and balance additional relevant parameters influencing LN metastasis, PSM was used. The mean standardized difference analysis and kernel density estimation were used to verify the covariate balance in the matched groups, and these indicated a well-balanced result. The PSM analysis revealed that the incidence of LN metastasis in patients who had CLT (35.0%) was significantly lower than that of patients without CLT (44.7%). This result is consistent with that obtained before PSM. In addition, multivariate logistic regression analysis showed CLT predicted decreased risk of LN metastasis in patients with PTC, before PSM (OR, 0.63; 95% CI: 0.44–0.91; $p = 0.014$) and after PSM (OR, 0.62; 95% CI: 0.39–0.96; $p = 0.032$). Thus, multivariate analysis, before and after PSM analysis, revealed that CLT had a protective effect on LNM in PTC. The consistency in the results lends support to our conclusions.

This relationship may be related to inflammation in the thyroid in patients with chronic lymphadenocytic thyroiditis. Tumour cells and normal thyroid cells are thought to be capable of destruction by autoimmune or thyroid-specific antigens. The autoimmune process of CLT is associated with the infiltration and accumulation of antibody-producing B lymphocytes, cytotoxic T cells, and macrophages in the thyroid tissue and extends from the thyroid to the lymphoid tissue (Zhang et al, 2016). Cytotoxic T cells directly participate in the destruction of cancer cells, whereas interleukin-1 and other cytokines indirectly inhibit the growth of cancer cells (Kim et al, 2009; Ryu et al, 2014). In addition, the Fas-mediated apoptosis pathway induced by inflammation also plays an important role in the destruction of thyroid tissue and tumour cells (Donangelo et al, 2016). As observed in this study, these responses may reflect mechanisms associated with the protective effect on lymphatic metastasis in thyroid cancer.

In addition, the coexisting CLT group had a much-reduced metastatic LN ratio and a considerably larger number of dissected LNs. These outcomes also align with the results of previous studies (Donangelo et al, 2016; Song et al, 2018). These results confirm the observation that LNs in CLT patients are more pronouncedly swollen or hyperplastic due to long-term inflammation. Grossly enlarged LNs in CLT patients may result in the total excision of metastatic LNs which can help us accurately assess tumour staging and develop accurate monitoring and treatment plans. Furthermore, in patients with pN1a PTC, the metastatic LN ratio was demonstrated to be an independent predictor of locoregional recurrence (Ryu et al, 2014). This may be one of the reasons why the long-term prognosis of thyroid cancer combined with CLT is better than that of thyroid cancer alone.

Despite our use of PSM, the disadvantage of retrospective analysis cannot be entirely avoided, and there were other potential biases that have not been eliminated, such as the V-Raf murine sarcoma viral oncogene homolog B1 (*BRAF*) gene, which was proven to be an indicator of more aggressive behavior in PTC and a risk factor for LN metastasis (Kim et al, 2009; Zhang et al, 2016). Another drawback of our study is the absence of long-term follow-up data. Recurrence, which is a better predictor of prognosis than LN metastasis, needs to be further investigated in future studies.

Conclusion

In conclusion, our findings suggest that CLT may protect against LN metastasis in PTC patients. PTC patients with coexisting CLT had fewer LN metastasis, more LN dissection, and a smaller metastatic LN ratio as demonstrated in both PSM analysis and multivariate logistic regression analysis.

Key Points

- Chronic lymphocytic thyroiditis's impact on papillary thyroid carcinoma lymph node metastasis is a contentious issue.
- This study investigated the relationship between chronic lymphocytic thyroiditis and lymph node metastases in papillary thyroid carcinoma using a retrospective clinical data analysis with propensity score matching.
- Our research indicates chronic lymphocytic thyroiditis could protect against lymph node metastasis in papillary thyroid carcinoma patients, with those having chronic lymphocytic thyroiditis showing fewer metastases, more lymph node dissections, and a reduced metastatic lymph node ratio.

Availability of Data and Materials

The datasets used and analyzed during the current study are available from the corresponding author on reasonable request.

Author Contributions

SRR and JY designed the study. ZJH collected data. JH and XYL analyzed and interpreted data. JY drafted the manuscript. All authors contributed to the important editorial changes of important content in the manuscript. All authors read and approved the final manuscript. All authors have participated sufficiently in the work and agreed to be accountable for all aspects of the work.

Ethics Approval and Consent to Participate

This study and included experimental procedures were approved by Wenzhou Central Hospital (Approval No. 2022-32). The study was performed in accordance with the ethical standards as laid down in the 1964 Declaration of Helsinki. All patients signed informed consent forms.

Acknowledgement

Not applicable.

Funding

This research received no external funding.

Conflict of Interest

The authors declare no conflict of interest.

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