



Research article

The impact of coexisting Hashimoto's thyroiditis on the feasibility of endoscopic thyroidectomy in papillary thyroid carcinoma

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ABSTRACT

Objective: The safety of endoscopic thyroidectomy in patients with Hashimoto's thyroiditis (HT) is a matter of concern. This study aimed to assess the effect of concomitant HT on the feasibility of endoscopic thyroidectomy in patients with papillary thyroid carcinoma (PTC).

Methods: This study is an observational, retrospective study. All patients were histopathologically diagnosed with HT. The study group consisted of 44 patients (40 %) with PTC who also had HT, whereas the remaining 66 patients (60%) without HT were assigned to the control group. The number of dissected lymph nodes, mean operation time, thyroid volume, blood loss, TSH level, and postoperative complications were recorded and statistically analysed.

Results: One patient underwent conversion to open thyroidectomy because of recurrent laryngeal nerve (RLN) transection. Another patient required reoperation owing to postoperative haemorrhage. Statistically significant differences were observed in mean operation time (105.4 ± 10.7 vs 98.2 ± 7.4 min, $P = 0.0001$), mean thyroid lobe volume (12.2 ± 5.8 vs 9.6 ± 3.5 mL [mL], $P = 0.0041$), TSH level (4.1 ± 1.5 mIU/L vs 3.4 ± 0.9 mIU/L, $P = 0.0028$), and the number of dissected lymph nodes between groups (4.1 ± 1.5 vs 3.4 ± 0.9 , $P = 0.0028$). The estimated mean blood loss (31.5 ± 6.8 vs 29.5 ± 3.9 mL, $P = 0.0529$) and rate of complications (15.9% vs 10.6%, $P = 0.4136$) did not show statistically significant differences between groups.

Conclusion: The coexistence of PTC and HT increases the operation time and difficulties in endoscopic thyroidectomy but does not affect postoperative outcomes. Endoscopic thyroidectomy can be safely performed with acceptable complication rates.

1. Introduction

Endoscopic thyroidectomy is particularly popular among the youth. This study explored the effects of HT on endoscopic thyroidectomy in PTC. The increased utilisation of high-frequency ultrasound examinations of the thyroid has resulted in an increase in the prevalence of thyroid nodules over the past two decades. The detection rate of thyroid nodules varies from 19% to 68% in the general population, with approximately 5% of the nodules being malignant [1,2]. Moreover, Hashimoto's thyroiditis, also known as Chronic lymphocytic thyroiditis (CLT), is a common autoimmune disease. Thyroid nodules in patients with HT are more likely to develop into PTC [3]. The coexistence of PTC and HT is common.

Surgical intervention is the standard treatment for PTC, and conventional open thyroidectomy is a safe and effective approach. Conventional open thyroidectomy requires a 5–8 cm transverse collar incision on the neck. Thyroidectomy was performed through this

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incision. This inevitably leads to scar formation on the neck [4]. Younger patients may not accept this surgical approach because of anterior cervical neck scarring. Compared to conventional open thyroidectomy, endoscopic thyroidectomy can relocate scars from the anterior neck to an unnoticeable part of the body and improve patient satisfaction and quality of life [5,6]. In PTC, the central compartment of the neck is a frequent site for lymph node metastasis. HT is a chronic autoimmune thyroiditis that can lead to lymphatic hyperplasia and lymphadenopathy. However, not all the enlarged lymph nodes indicated metastasis. The presence of enlarged benign lymph nodes in the central compartment is common in patients with HT [7,8]. Patients with HT had a significantly increased volume and rubbery texture in their thyroid gland. Additionally, patients with HT are more likely to develop hypothyroidism, which can lead to thyroid gland enlargement [9]. The aforementioned issues give rise to challenges in the execution of endoscopic thyroidectomy and escalate the likelihood of necessitating conversion to open surgery.

2. Patients and methods

A total of 135 patients with PTC treated at the Department of Thyroid and Breast Surgery of Shaoxing Central Hospital between January 2012 and January 2023 were included in this study. The inclusion criteria were endoscopic thyroidectomy and CLND without contralateral thyroid nodules, tumour diameter of <2 cm, and a histological diagnosis of HT. Exclusion criteria: Patients with latent or active infection, hyperthyroidism, diseases of the immune system, combination of other malignant tumours, and medullary thyroid cancer (MTC) or anaplastic thyroid carcinoma (ATC). However, 25 patients were excluded because of incomplete case records or because the pathological diagnosis before surgery did not match the post-surgical pathology. There were six men (5.45%) and 104 women (94.55%), with an average age of 34.76 ± 6.72 years. A detailed flowchart of the participants included in the study and the reasons for exclusion are presented in Fig. 1.

Patients with HT were diagnosed via pathological examinations. Age, tumour size, TSH levels, thyroid volume, number of dissected lymph nodes, mean operation time, blood loss, and postoperative complications were collected as clinical data. The data were collected throughout the study period. Based on the pathological findings, we included 44 patients with HT in the study group. The remaining 66 patients were without HT and served as the control group. All the surgeries were performed by the same team.

The Ethics Committee of Shaoxing Central Hospital approved this study and waived the requirement for informed patient consent owing to its retrospective nature. All methods were performed in accordance with the relevant guidelines and regulations.

3. Statistical analysis

SPSS 26.0 (version 26.0; IBM, Armonk, NY, USA) was used to analyse the data. Continuous variable was calculated using the mean

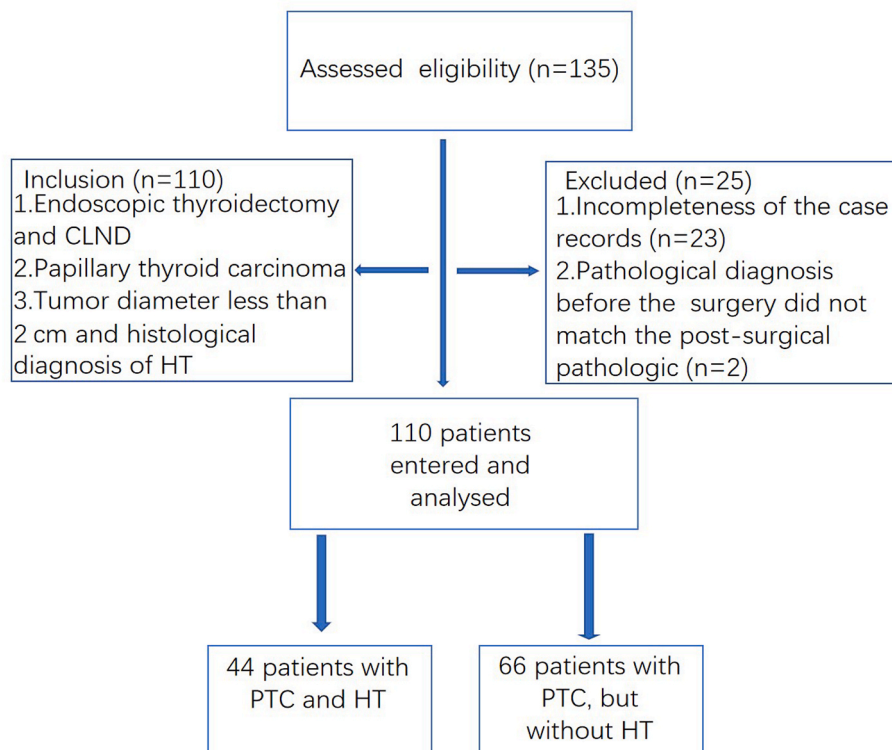


Fig. 1. Flow chart of participants included in the study and reasons for exclusion.

\pm stand deviation ($x \pm sd$) method. The χ^2 test was used to assess differences in two groups with varying the number of dissected lymph nodes, mean operation time, thyroid volume, blood loss, postoperative complications, age, tumour size, TSH levels. Statistical significance was defined as $P < 0.05$.

4. Results

In total, 110 patients with PTC were included in this study. The majority of patients were female ($n = 104$, 94.5%) (Table 1). The mean age of the patients was 34.7 ± 6.7 years, there were no statistically significant differences in age between the two groups, as shown in Table 2. As anticipated, TSH levels were higher in the study group compared to the control group (4.1 ± 1.5 mIU/L vs 3.4 ± 0.9 mIU/L, $P = 0.0028$). Brunn's formula was used to calculate thyroid volume ($(\text{length} \times \text{width} \times \text{depth of lobes}) \times 0.52$) [10]. The mean thyroid lobe volume in the study group was 11.8 ± 4.3 mL [mL], which was significantly increased compared to the control group (9.6 ± 2.8 mL [mL]).

One patient required conversion to open thyroidectomy because of transection of the recurrent laryngeal nerve (RLN), which resulted in permanent vocal cord palsy (VCP). Another patient required reoperation owing to postoperative haemorrhage. No instances of permanent hypocalcaemia were observed among the 110 patients. Three patients had transient hypoparathyroidism (Table 1). Blood loss and postoperative complications were not significant. Statistically significant differences were observed in mean operation time (105.4 ± 10.7 vs 98.2 ± 7.4 min, $P = 0.0001$) and the number of total lymph nodes harvested between groups (4.1 ± 1.5 vs 3.4 ± 0.9 , $P = 0.0028$).

5. Discussion

This study aimed to investigate the effects of coexisting HT on endoscopic thyroidectomy for PTC. Various studies have demonstrated that endoscopic thyroidectomy can achieve comparable outcomes in terms of the resection range for PTC compared to conventional open surgery [11]. Patients with HT generally exhibit diffuse enlargement of the gland, and we observed that thyroid volume was larger in patients with HT. It is difficult to expose the surgical field during an endoscopic thyroidectomy. Consequently, the potential for intraoperative and postoperative complications has increased in recent years. Therefore, endoscopic thyroidectomy is not recommended in patients with HT.

In recent decades, surgeons have increasingly preferred endoscopic thyroidectomies. Owing to the increasing incidence of PTC and a younger age of onset, there has been a growing demand for "no scar surgery" in patients with both PTC and HT. Previously, endoscopic thyroidectomy was abandoned in patients for several reasons. However, recent advancements in surgical techniques and equipment have made it possible to reconsider the safety and effectiveness of endoscopic thyroidectomies in patients with HT. However, this technique requires considerable time to achieve complete mastery. It is well-known that there is a significant learning curve for endoscopic thyroidectomy. Our previous study showed that a stable level could be achieved in 30 cases, whereas proficiency required more than 60 cases [12]. For this reason, the first 60 cases who had endoscopic thyroidectomy were excluded in this study. The main objective of this study was to provide evidence supporting the use of endoscopic thyroidectomy as a safe, effective, and less invasive surgical option for patients with both PTC and HT. By demonstrating its feasibility and positive outcomes, we aimed to address the concerns regarding scarring associated with traditional open surgery.

There is a potential connection between HT and thyroid cancer. However, whether HT increases the risk of thyroid cancer remains

Table 1
Baseline and clinicopathologic characteristics.

Variables	Patients
Sex,n (%)	
Male	6
Female	104
Age, mean \pm sd,years	34.7 ± 6.7
TSH, mean \pm sd,mIU/L	3.67 ± 1.21
Tumor size (mm)	
≤ 10	101
Operative time, mean \pm sd, min	101.1 ± 9.5
Blood loss, mean \pm sd, mL	30.3 ± 5.4
RLN palsy	
Transient	4
Permanent	1
Hypoparathyroidism	
Transient	3
Permanent	0
Infection	1
Seroma	2
Postoperative haemorrhage	1
Reoperation	1
Skin damage	0

Table 2

Comparison of the baseline, clinicopathological characteristics and complications between two groups.

Variables	Study group (n = 44)	Contral group (n = 66)	P Value
Age, mean \pm sd, years	33.5 \pm 4.5	35.6 \pm 7.8	0.109
Operative time, mean \pm sd, min	105.4 \pm 10.7	98.2 \pm 7.4	0.0001
Tumor size, mean \pm sd, mm	6.5 \pm 1.7	7.3 \pm 2.1	0.0374
TSH, mean \pm sd, mIU/L	4.1 \pm 1.5	3.4 \pm 0.9	0.0028
Thyroid lobe volume (millilitres (mL))	11.8 \pm 4.3	9.6 \pm 2.8	0.0015
Blood loss, mean \pm sd, mL	31.5 \pm 6.8	29.5 \pm 3.9	0.0529
Number of lymph nodes harvested	8.5 \pm 2.1	6.1 \pm 1.3	< 0.001
Complication (Total)	7/44	7/66	0.4136
RLN palsy			
Transient	2	2	
Permanent	1	0	
Hypoparathyroidism			
Transient	1	2	
Permanent	0	0	
Infection	0	0	
Postoperative haemorrhage	1	0	
Seroma	1	2	
Skin damage	0	0	
Open thyroidectomy	1	0	
Reoperation	0	1	

controversial. According to a meta-analysis conducted by Xu J, individuals with HT have an increased risk of thyroid cancer in thyroid nodules [13]. Then, HT may influence lymph node metastasis in PTC. In our study, we observed an increase in the number of enlarged cervical lymph nodes in patients with HT. Furthermore, we analysed the rate of lymph node metastasis in both the groups and found no significant differences. Several studies have shown that HT exerts a protective effect against the dissemination of cancer cells to the lymph nodes [14,15]. Thyroid infiltration by lymphocytes triggers an immune response, which in turn restricts tumour growth and metastasis [16]. Owing to the increased number of lymph nodes, statistically significant differences were observed in the mean operation time. The mean operation time in the study group was 100.1 \pm 4.7 min, and it significantly decreased in the control group (98.2 \pm 7.4 min). Once the learning curve was overcome, there was a natural decrease in operation time [17,18]. Additionally, the mean thyroid lobe volume increases in patients increased, which leads to difficulties during endoscopic thyroidectomy.

The complication rate of thyroidectomy ranges from 2.5% to 8.1% [19]. Major complications include RLN injury and hypoparathyroidism, which can cause temporary voice hoarseness and hypocalcaemia. Owing to the large number and enlargement of lymph nodes, the incidence of transient RLN injury in the study group was 4.5% (2/44), with no significant difference between the two groups. All the enrolled patients underwent unilateral lobectomy, isthmectomy, and CLND. Therefore, none of the patients were diagnosed with permanent hypoparathyroidism. Additionally, there was no significant difference in the incidence of transient hypoparathyroidism between the two groups. Certain complications may arise during endoscopic thyroidectomy, including skin damage, hypercapnia, and the possibility of conversion to open thyroidectomy (OT). Recently, devices such as ultrasonic scalpels, bipolar electrocoagulation forceps, and intraoperative neuromonitoring have been introduced into clinical practice, greatly improving the safety of endoscopic thyroidectomies [20,21]. In the control group observed one patient requiring reoperation for postoperative haemorrhage within a 24-h period. One patient in the study group experienced permanent vocal cord palsy (VCP) owing to transection of the recurrent laryngeal nerve. Skin damage occurred in one patient. Overall, the two groups did not show any statistically significant differences in terms of the estimated blood loss or complication rates. It is imperative that surgeons performing endoscopic thyroidectomies possess comprehensive knowledge and extensive experience to manage these potential complications effectively. Thorough preoperative evaluation, meticulous planning, precise surgical techniques, and vigilant postoperative monitoring are indispensable to minimise risks and ensure optimal outcomes in patients undergoing this procedure. Collectively, endoscopic thyroidectomy in patients with HT leads to increased procedure time and difficulty; however, it does not significantly affect the safety of surgery.

With the accumulation of extensive experience and refined surgical cooperation, we firmly believe that endoscopic thyroidectomy in patients with HT is a secure, minimally invasive, and highly efficacious surgical procedure that offers the distinct advantage of eliminating visible neck scarring. However, it is important to acknowledge certain limitations inherent to this study, including its relatively small sample size, single-centre design, short follow-up duration, and retrospective design. This may have been a potential source of publication bias. We could not avoid retrospective bias. Therefore, further prospective studies with a larger cohort of subjects are needed to support the present findings and elucidate the mechanism of HT in PTC progression [22]. Additionally, owing to the good prognosis of PTC, no recurrence occurred in either group. All eligible patients were contacted for this study; only one patient with a car accident died at the time of the last follow-up. A longer follow-up period is warranted to fully evaluate the survival differences.

6. Conclusion

The coexistence of PTC and HT increases the duration and complexity of endoscopic thyroidectomy while maintaining an acceptable level of postprocedural complications. The success of the surgical procedure depends on meticulous patient selection, and it

is noteworthy that this does not compromise postoperative outcomes.

Ethics statement

This study was reviewed and approved by the Ethics Committee of Shaoxing Central Hospital, Shaoxing, China (approval number:2023-035).

Funding statement

No.

Data availability statement

Data will be made available on request.

The data related to this study has been stored in Mendeley Data, Version 1 (<https://doi.org/10.17632/9m25b33zyk.1>, <https://data.mendeley.com/datasets/9m25b33zyk/1>).

CRediT authorship contribution statement

Miao feng Wang: Writing – review & editing, Writing – original draft. **Heng Xia:** Writing – review & editing. **Jiarui Cai:** Software, Data curation.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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