Hashimoto's thyroiditis as a risk factor of complications of total thyroidectomy

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Background
Hashimoto's thyroiditis (HT), a type of chronic lymphocytic thyroiditis, is the most common autoimmune thyroid condition. The diagnosis is primarily made on the basis of serum autoantibodies against thyroid peroxidase and/or thyroglobulin, which may precede clinical symptoms and biochemical hypothyroidism by several years. Medical treatment is usually the choice for most patients with HT. However, surgical intervention may be needed. Surgery for patients with HT tends to be more difficult and riskier as the thyroid gland tends to adhere more to its anatomical surroundings, which results in a higher rate of postoperative complications.

Patients and methods
A total of 46 patients who had undergone surgery for benign thyroid diseases from December 2021 to May 2022 were included. Group A consisted of 25 patients who had HT, and group B consisted of 21 patients operated for nonmalignant thyroid diseases.

Results
Patients with HT were younger and more likely to be female. The mean operative time was longer in group A than in group B, and also the mean intraoperative blood loss was higher in the HT group than the non-HT group. Patients who underwent thyroidectomy with HT had also a significantly higher rate of postoperative complications.

Conclusions
Patients with HT had a higher rate of complications after thyroidectomy when compared with patients without HT. Therefore, careful consideration must be taken before pursuing operative treatment in patients with HT, including providing adequate informed consent regarding the increased risks of surgery.

Keywords:
complications, Hashimoto's, thyroiditis, total thyroidectomy

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Introduction

Hashimoto's thyroiditis (HT) is an autoimmune disease characterized by production of anti-thyroid antibodies, such as anti-thyroid peroxidase, that destroy thyroid tissue, leading to abnormal thyroid function [1–4]. HT is common in females [4–7]. Histologically, HT is characterized by lymphocyte infiltration, fibrosis, and Hurthle cells [4,8–11]. Patients with HT are treated conservatively. However, surgical intervention may be needed [5,12–17]. For patients with HT, thyroidectomy is not recommended because the inflammatory process surrounding the gland makes surgical resection difficult resulting in a higher rate of complications [14,18]. Hypoparathyroidism is the most common complication, which can be transient or permanent [19–22]. Hoarseness owing to recurrent laryngeal nerve (RLN) injury is another surgical complication [3,12,14,23,24].

Patients and methods

After approval of the local ethics committee, all the patients included in this study were informed about the procedure and signed an informed written consent before carting the procedure. This prospective study included 46 patients who underwent total thyroidectomy from December 2021 to May 2022 and served as our sample population. We divided the total number of patients into two groups for analysis. Group A consisted of 25 patients who were diagnosed with HT, either as a primary or associated diagnosis. Group B consisted of 21 patients without a diagnosis of HT. The following data were collected

from patients in both groups: age, sex, indications of surgery, and intraoperative and postoperative complications.

Preoperative serum calcium level was recorded in both groups to be compared with 12-h postoperative serum calcium level, as shown in Table 1.

Ultrasonographic examination of the neck to assess the thyroid gland was performed for all patients [25], and the characteristics documented were similar in both groups. The dimensions of the right lobe, the left lobe, and the largest nodule, measured by neck ultrasonographic examination, showed no significant difference in both groups. Nodular disease was reported in most patients, with significant difference between the both groups. Results of sonographic examination are shown in Table 2 and Fig. 1.

Surgical procedure: all patients in the two groups underwent total thyroidectomy.

Intraoperative time was recorded, and intraoperative blood loss was estimated using the observational method for assessment of blood loss according to saturation of the different sizes of gauze material used during surgery (Fig. 2) (gauze visual analog) [26]. Patients were also evaluated for postoperative complications. When evaluating patients for hypoparathyroidism, 12-h postoperative serum calcium level was estimated. Postoperative transient hypocalcemia was defined as serum calcium less than 8 mg/dl either in the evening of or in the morning after operation. We also evaluated RLN function postoperatively. If patients subjectively experienced any voice hoarseness postoperatively that resolved on its own within 6 months, they were categorized as having transient hoarseness. Patients with voice changes, hoarseness or difficult swallowing, and possible postoperative RLN injury underwent indirect laryngoscopy. Data were fed to the computer and analyzed using IBM SPSS software package, version 20.0. (IBM Corp., Armonk, New York, USA).

The used tests were as follows:

(1) χ^2 test.
(2) Fisher's exact or Monte-Carlo correction.
(3) Student t test.
(4) Mann–Whitney test.
(5) Wilcoxon signed-rank test.

Table 1 Comparison between the two studied groups according to preoperative serum calcium level

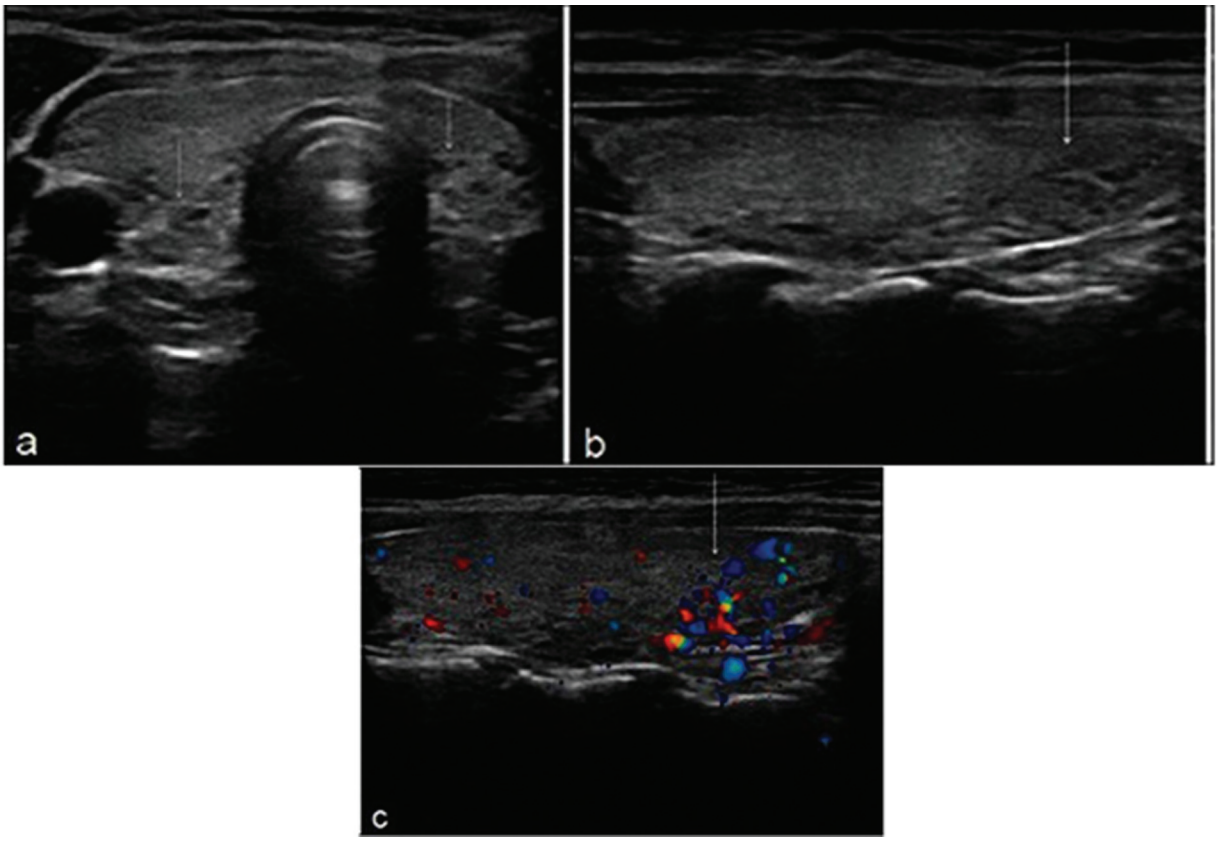
	Group A (*N*=25)	Group B (*N*=21)	*P*
Preoperative serum calcium level (mg/ml)			
Minimum–maximum	8.30–11.0	8.90–12.0	
Mean±SD	9.78±0.74	10.22±0.90	0.159
Median (IQR)	10.0 (9.0–10.0)	10.0 (9.9–11.0)	

Table 2 Comparison between the two studied groups according to preoperative ultrasound

	Group A (*N*=25)	Group B (*N*=21)	*P*
Right lobe			
Minimum–maximum	2.0–11.0	0.14–7.0	
Mean±SD	4.02±2.11	3.08±1.75	0.068
Median (IQR)	3.20 (2.9–4.6)	2.70 (2.0–4.0)	
Left lobe			
Minimum–maximum	1.80–11.50	0.14–9.0	
Mean±SD	3.73±2.08	2.94±1.94	0.095
Median (IQR)	3.0 (2.5–5.0)	2.40 (1.5–4.0)	
Texture [*n* (%)]			
Diffuse	8 (32.0)	3 (14.3)	
MNG	16 (64.0)	12 (57.1)	^{MC}P=0.049*
STN	1 (4.0)	6 (28.6)	
Size of largest nodule	(*N*=17)	(*N*=18)	
Minimum–maximum	0.60–2.0	1.20–6.50	
Mean±SD	1.07±0.33	3.94±1.62	<0.001*
Median (IQR)	1.0 (0.90–1.2)	4.0 (2.7–5.3)	

IQR, interquartile range; MNG, Multi Nodular Goiter; STN: Solitary Thyroid Nodule. *Statistically significant at $p \leq 0.05$.

Figure 1



Focal HT in a female patient who presented with hypothyroidism, with high anti-thyroid antibodies. Ultrasound of neck (a) shows ill-defined heterogeneous hypoechoic nodules located in the postero-inferior aspect of both thyroid lobes (arrows). Longitudinal scan (b) left lobe thyroid represents the abnormal region, which shows higher vascularity on color Doppler imaging (c) [25]. HT, Hashimoto's thyroiditis.

Figure 2

Soaked patties and peanuts for estimation of intraoperative blood loss.

Results

The present study was carried on 46 patients with benign thyroid disease, divided into two groups. Group A included 25 patients, and group B included 21 patients. Patients in group A were radiologically and laboratory proven as HT and those in group B were diagnosed as nonmalignant types of goiter.

Demographic data

According to the demographic data, both groups showed female predominance and almost similar age distribution. Group A included 20 (80%) females and five (20%) males. Their ages ranged between 18 and 71 years, whereas group B included 18 (85.7%) females and three (14.3%) males, and their age ranged between 20 and 72 years.

Clinical data

The mean duration of symptoms was similar in both groups with a nonsignificant difference. It was 18.72 ±11.53 months in group A compared with 16.86±10.15 months in group B (P=0.613).

Regarding local examination (palpable neck swelling), 10 patients in group A had palpable neck swelling as compared with 15 patients in group B, as presented in Table 3.

The commonest indication of surgery reported was the midline neck swelling, which was present in 10 (40%)

patients in group A and in 15 (71.4%) patients in group B. Other indications were dyspnea, dysphagia, and toxicity. Six (24%) patients in group A complained of thyrotoxic manifestations (palpitation, heat intolerance, and weight loss), similar to six (28%) patients in group B. The distribution of different indications in both groups is shown in Table 4.

According to the thyroid hormonal profile, all patients were subjected preoperatively to thyroid-stimulating hormone, free T4, and free T3, and the results obtained in both groups showed a nonsignificant difference, as shown in Table 5.

Intraoperative parameters

Intraoperative parameters were significantly different between the two studied groups. Intraoperative blood loss was estimated using the observational gauze visual analog [1,12]. It ranged from 100 to 1000 ml, with a mean of 416.0±198.5 ml in group A, which appeared to be more than what was estimated in group B, as it ranged from 75 to 200 ml, with a mean of 115.5 ±39.11 ml ($P<0.001$).

The mean operative time in group A was 153.6 ±23.43 min, which was longer than in group B, as it was 121.4±25.94 min ($P<0.001$).

Intraoperative injury to RLN and parathyroid glands was not significant statistically ($P=0.457$ and 0.614).

The intraoperative parameters are shown in Table 6 and Fig. 3.

Table 3 Comparison between the two studied groups according to local examination (palpable neck swelling) and duration of symptoms (months)

	Group A (*N*=25) [*n* (%)]	Group B (*N*=21) [*n* (%)]	*P*
Local examination			
No	15 (56.0)	6 (38.1)	0.033*
Yes	10 (44.0)	15 (61.9)	
Duration of symptoms (months)			
Minimum–maximum	6.0–48.0	6.0–36.0	0.613
Mean±SD	18.72±11.53	16.86±10.15	
Median (IQR)	18.0 (12.0–24.0)	12.0 (6.0–24.0)	

IQR, interquartile range. *Statistically significant at $p \leq 0.05$.

Table 4 Comparison between the two studied groups according to indication of surgery

	Group A (*N*=25) [*n* (%)]	Group B (*N*=21) [*n* (%)]	*P*
Indication of surgery			
Toxicity	6 (24.0)	6 (28.6)	0.725
Midline neck swelling	10 (40.0)	15 (71.4)	0.033*
Dyspnea	8 (32.0)	0 (0.0)	^{FE}P=0.005*
Dysphagia	6 (24.0)	0 (0.0)	^{FE}P=0.025*
Pain	3 (12.0)	0 (0.0)	^{FE}P=0.239

*Statistically significant at $p \leq 0.05$.

Table 5 Comparison between the two studied groups according to thyroid profile

	Group A (*N*=25)	Group B (*N*=21)	*P*
TSH			
Minimum–maximum	0.01–4.65	0.01–4.37	
Mean±SD	1.59±1.54	1.23±1.32	0.372
Median (IQR)	1.20 (0.40–2.43)	0.82 (0.12–1.42)	
FT3			
Minimum–maximum	1.90–5.14	0.97–5.34	
Mean±SD	3.01±0.78	3.01±1.09	0.995
Median (IQR)	2.91 (2.60–3.50)	3.24 (2.70–3.70)	
FT4			
Minimum–maximum	0.31–4.55	0.93–2.26	
Mean±SD	1.33±0.80	1.31±0.37	0.447
Median (IQR)	1.17 (0.90–1.50)	1.19 (1.09–1.50)	

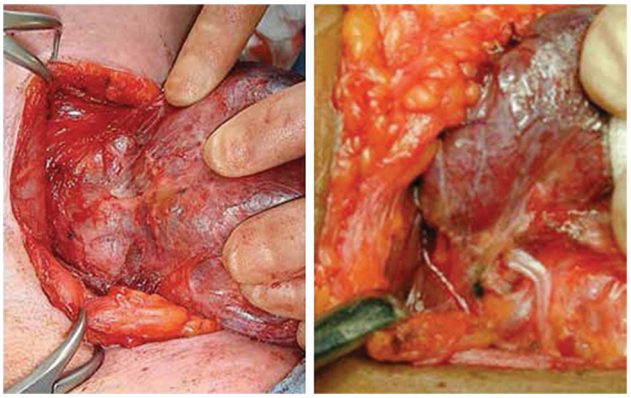
IQR, interquartile range; TSH, thyroid-stimulating hormone.

Table 6 Comparison between the two studied groups according to intraoperative data

	Group A (*N*=25)	Group B (*N*=21)	*P*
Blood loss (ml)			
Minimum–maximum	100.0–1000.0	75.0–200.0	
Mean±SD	426.0±198.5	115.5±39.11	<0.001*
Median (IQR)	350.0 (300.0–500.0)	100.0 (100.0–150.0)	
Injury to recurrent laryngeal nerve [*n* (%)]			
No	25 (100.0)	20 (95.2)	^{FE}P=0.457
Yes	0	1 (4.8)	
Injury parathyroid gland [*n* (%)]			
No	22 (88.0)	20 (95.2)	^{FE}P=0.614
Yes	3 (12.0)	1 (4.8)	
Duration of the operation (min)			
Minimum–maximum	120.0–180.0	90.0–180.0	
Mean±SD	153.6±23.43	121.4±25.94	<0.001*
Median (IQR)	150.0 (150.0–180.0)	120.0 (90.0–150.0)	

IQR, interquartile range. *Statistically significant at $p \leq 0.05$.

Figure 3



The image on the left shows a parathyroid gland lying on the thyroid capsule. The image on the right shows the recurrent laryngeal nerve under the ligament of Berry, and their very intimate relations with the true capsule of the thyroid gland [26].

Postoperative parameters

Postoperative parameters were significantly different between the two studied groups. Volume of blood loss postoperatively was measured in the standardized suction drain size 12, and it ranged from 75 to 300 ml, with a mean of 182.0±70.16 in group A, which appeared to be more than what was estimated in group B, as it ranged from 50 to 200 ml, with a mean of 98.81±40.68 ml (P<0.001).

Parathyroid gland function postoperatively was assessed using the estimation of serum calcium level at 12 h postoperatively (normal range, 8.5–10.2 mg/dl). It was significant between the two groups (P<0.008). It showed a mean of 8.58±0.91 for group A and a mean of 9.27±0.85 for group B. Low serum calcium level was documented in five (8%) patients of group A compared with only one (4.7%) patient of group B.

RLN affection was assessed by observation of voice changes, hoarseness, or difficulty in breathing or swallowing. It had no significant difference between both groups. Only one (4%) patient in group A developed transient hoarseness of voice compared with two (9.5%) patients in group B, comprising one who developed difficulty with swallowing and the other who had transient change in voice. All were confirmed by indirect laryngoscopy.

Presence of postoperative hematoma was observed, and it showed a nonsignificant difference between the both groups as only one patient in each group presented with a neck hematoma (P=1) (Table 7).

Discussion

The hypothesis that urged the conduction of the current study was that thyroiditis may increase the risk of surgical complications and make thyroid dissection more challenging.

In a trial to discuss this hypothesis, we decided to assess the intraoperative parameters in total thyroidectomy for patients with HT and to determine whether there was a higher rate of postoperative complications among them compared with non-HT patients after thyroidectomy.

We found that intraoperative blood loss was more in patients with HT than in the other nonmalignant goiters. The blood loss estimated in this study had a mean of 426.0±198.5 ml. In HT group, it was significantly more in volume compared with the non-HT group. This comes in accordance with different case series published in the literature. Chong *et al.* [22] reported that intraoperative blood

Table 7 Comparison between the two studied groups according to postoperative data

	Group A (*N*=25) [*n* (%)]	Group B (*N*=21) [*n* (%)]	*P*
Presence of neck hematoma			
No	24 (96.0)	20 (95.2)	^{FE}P=1.000
Yes	1 (4.0)	1 (4.0)	
Volume of blood loss (ml)			
Minimum–maximum	75.0–300.0	50.0–200.0	
Mean±SD	182.0±70.16	98.81±40.68	<0.001*
Median (IQR)	200.0 (150.0–200.0)	100.0 (75.0–100.0)	
Serum calcium level (mg/ml)			
Minimum–maximum	6.80–10.0	7.0–11.0	
Mean±SD	8.58±0.91	9.27±0.85	0.008*
Median (IQR)	8.80 (8.0–9.0)	9.0 (9.0–10.0)	
Signs and symptoms of hypocalcaemia			
No	20 (76.0)	20 (85.7)	^{FE}P=0.198
Yes	5 (24.0)	1 (14.3)	
Recurrent laryngeal nerve affection			
Negative	24 (96.0)	19 (90.5)	^{FE}P=0.585
Positive	1 (4.0)	2 (9.5)	

IQR, interquartile range. *Statistically significant at $p \leq 0.05$.

loss in autoimmune thyroiditis was higher in the goiter group (*P*=0.03). Moreover, in the study by Shimizu *et al*. [12], the measurement of intraoperative blood loss ranged from 15 to 150 ml, with a mean of 45 ml.

Regarding the operative time, we found that the average operating time was more in the HT group, with a mean of 153.6±23.43 min, in comparison with non-HT group, with a mean of 121.4±25.94 min (*P*<0.001), which is again in accordance with the literature, where the operative time in patients with HT estimated by Chong *et al*. [22] ranged from 61.75 to 85 min with a mean of 75 min, which was longer than in the goiter group, which ranged from 50 to 65 min (mean=43.5) (*P*=0.006). Shimizu *et al*. [12] reported similar results.

Discussing the postoperative complications, we found that patients with HT who had thyroidectomy did experience higher rates of postoperative complications. Of 25 patients with HT who underwent thyroidectomy, five (20%) patients experienced transient hypocalcemia, one (4%) had hoarseness or transient RLN palsy, and one (4%) developed a neck hematoma that required evacuation.

This again comes in accordance with the results of previous similar published case series. Shih *et al*. [14] performed a study to evaluate the rate of postoperative complications in patients with HT. Of 25 patients with HT who underwent thyroidectomy in their study, eight (32%) patients experienced transient hypocalcemia, one (4%) had hoarseness or transient RLN palsy, and no patients developed a neck hematoma that required evacuation. Similar results were published by McManus *et al*. [27] and Chong *et al*. [22], who reported two (6%) cases of RLN injury in the autoimmune thyroiditis group and the patients spontaneously recovered 1 month later.

Our findings lead us to the conclusion that HT is a risk factor linked to a higher rate of thyroidectomy complications. As a result, before pursuing operative management for patients with HT, great thought must be given, including giving proper informed consent regarding the higher risks of surgery.

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Conflicts of interest
There are no conflicts of interest.

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