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Original Research Article

Postoperative complications after total thyroidectomy for benign thyroid diseases

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ABSTRACT

Background: The thyroid gland is normally impalpable, once enlarged it is called goiter which may be simple, toxic, inflammatory or neoplastic. Autoimmune thyroid disease (ATD) includes goiters associated with antigen antibody reaction that initiates a series of inflammatory reactions. Due to these inflammatory reactions surgeries become more difficult with a tendency to develop postoperative complications.
Methods: This is a prospective study on 207 patients with thyroid disorders who were treated with total thyroidectomy in general surgery department, Menoufia university hospital between October 2015 and December 2018. Patients were divided into two groups based on postoperative histopathological findings group A included 73 patients with autoimmune thyroid disease while group B included 134 patients with non-autoimmune thyroid disease. All patients were followed up for 6 months postoperatively to evaluate vocal cord palsy and hypoparathyroidism.
Results: In our study, the rate of temporary and permanent vocal cord palsies were 4.1% and 1.4% in ATD group respectively while in non-ATD group were 1.5% and 0.7% respectively with no statistically significant difference between both groups, whereas the rate of temporary and permanent hypoparathyroidism were 9.5% and 4.1% in ATD group respectively while in non-ATD group were 2.9% and 0.7% respectively with significantly higher rate in ATD group.
Conclusions: Surgery for ATD is a challenging procedure but safe with a low incidence of general complications and vocal cord palsy when compared with surgery for non-ATD. However, postoperative hypoparathyroidism is significantly higher due to dense adhesions which obscure the surgical field so a special attention should be paid to the parathyroid glands during total thyroidectomy.

Keywords: ATD, Hashimoto's thyroiditis, Graves' disease, Thyroidectomy, Vocal cord palsy, Hypoparathyroidism

INTRODUCTION

Normally the thyroid gland is impalpable, enlargement of it is called goiter which is common disease and is commonly benign. Goiter may be simple, toxic, inflammatory or neoplastic.[1] Hashimoto thyroiditis and Graves' disease are inflammatory thyroid diseases that mediated through autoimmune mechanisms, as well as sub-acute thyroiditis which result from other inflammatory influences considered to be inflammatory thyroid disease.[2]

ATD is characterized by enlarged thyroid gland with severe inflammatory reaction between the thyroid capsule and surrounding tissues.[3,4]

As a result of this reaction, dense, adherent connective tissue is formed compressing and obscuring the critical

structures related to thyroid gland and making the thyroid surgery more difficult.[5]

In Graves' disease, TSH receptor-antibodies develop, which stimulate the thyroid gland, and commonly affect females with peak incidence between 20-40 years old.[6]

Graves' disease management includes multiple lines: e.g. anti-thyroid drugs. In these patients, when drug therapy fails or in recurrent disease thyroidectomy or radioiodine ablation is considered.[7]

In 1912, Hakura Hashimoto was the first one who described Hashimoto's thyroiditis (HT). In the United States HT affect 5% to 10% of the female population during childbearing age. It is an autoimmune disease which characterized by increased serum thyroid autoantibodies as anti–thyroid peroxidase antibodies. Patients with HT have various clinical manifestations and 20% develop hypothyroidism.[8]

Asymptomatic presentation is common in HT which does not need any treatment while patients with hypothyroidism are treated with levothyroxine. In case of suspicion of cancer or compressive symptoms surgical treatment is recommended.[8]

Thyroidectomy for ATD is technically challenging and because of the dense inflammatory process, the postoperative complication rates are high.[5]

Hypoparathyroidism is the most common complication which can occur transiently or permanently especially in patients with ATD during thyroidectomy as a result of trauma or disruption of the blood supply to the parathyroid glands. Hoarseness of voice because of the recurrent laryngeal nerve (RLN) injury is another recognized complication of thyroidectomy in ATD.[3]

The aim of this study was to asses if the autoimmune thyroid disease is a risk factor for postoperative complications after total thyroidectomy compared to non-autoimmune thyroid disease.

METHODS

This study was a prospective study included 207 patients with thyroid diseases who were operated in general surgery department, Menoufia University hospital between October 2015 and December 2018.

All patients were subjected to total thyroidectomy after obtaining informed consent from the patient.

Patients were divided into two groups based on postoperative histopathological findings.

Group A: included 73 patients with autoimmune thyroid disease.

Group B: included 134 patients with non-autoimmune thyroid disease.

Inclusion criteria

Patients with benign thyroid disease necessitate surgery.

Exclusion criteria

Exclusion criteria were recurrent goiter; malignant goiter; patients with vocal cord immobility diagnosed preoperatively; patients with calcium metabolic disorders e.g. hypo or hyperparathyroidism; patients with early complication and missing the follow-up; patients underwent hemithyroidectomy for pathology limited in one lobe.

All patients were subjected preoperatively to history taking, examinations (general and local) and investigations which include routine labs, thyroid profile (Free T3, Free T4, and TSH), neck ultrasonography, and routine chest X-ray.

Fine needle aspiration cytology (FNAC): Was done either under guide of ultrasound or not.

Indirect or direct laryngoscope demonstrates vocal cords mobility (medicolegal).

Thyrotoxic patients were prepared before surgery by using the following tools:

- Avoid stress.
- Carbimazol.
- Propranolol.
- Amylobarbitone at night before the operation according to anesthetist advice.

All thyroid surgery was performed under general anesthesia by one surgical team.

Follow up (end point)

All patients were under observation postoperatively for 24-48 hours for postoperative complications. The patient who was suspected to have recurrent laryngeal nerve injury underwent indirect or direct laryngoscope within the first 14 days after surgery then 3, 6 months later. Vocal cord palsy is considered permanent if symptoms persist more than 6 months.[7]

Postoperative calcium level was measured in which normal range (8.4–10.4 mg/dl) so postoperative hypocalcaemia occur when serum calcium level less than 8.4 mg/dl. Hypoparathyroidism is considered permanent if replacement of calcium was started after surgery and lasted for more than 6 months.[7]

Then every patient was followed up in outpatient clinic after one week then every 4 weeks for 6 months

Statistical analysis

The collected data were organized, tabulated and statistically analyzed using SPSS software (Statistical Package for the Social Sciences, version 21, SPSS Inc. USA). Data were described using mean and standard deviation (SD) and frequencies according to the type of the data (quantitative or categorical respectively). Chi-square and fisher exact test were used for comparison of qualitative variables. We used one way ANOVA test to compare between means of categorical and numerical data. Significance level (p value) was adopted, i.e. $p<0.05$ for interpretation of results of tests of significance**.** Post hoc analysis was done for subgroup analysis of quantitative data.

RESULTS

207 patients with benign thyroid diseases were included in our prospective study and operated by total thyroidectomy in general surgery department, Menoufia university hospital during October 2015 to December 2018.

The majority of our patients were female 72.6% and 73% in both groups respectively with mean age (40.15±10.2) in ATD group and mean age (42.6±9.6) in non-ATD group. There was no significant difference regarding age and sex between both groups (Table 1).

Table 1: Comparison between autoimmune disease and non-autoimmune thyroid disease regarding demographic distributions.

Characteristics	Group A (n=73)	Group B (n=134)	P value	X^2 value
Age	40.15±10.2	42.6±9.6	0.34	0.39
Sex				
Male	20 (27.3%)	36 (27%)	0.12	4.4
Female	53 (72.6%)	98 (73%)		
Post hoc analysis	0.04*	0.039*		

Table 2: Postoperative histopathological findings among the studied patients.

Histopathology	Number	Percentage (%)
Simple multinodular goiter (MNG)	83	40.1
Graves' disease (ATD)	52	25.1
Secondary toxic goiter	46	22.2
Hashimoto thyroiditis (ATD)	21	10.1
Colloid goiter	5	2.5

Table 3: Postoperative complications among the studied groups.

Characteristics	Group A (n=73)	Group B (n=134)	P value	X^2 value
	N (%)	N (%)		
Wound infection	1 (1.4)	2 (1.5)	0.58	0.19
Bleeding	2 (2.7)	2 (1.5)	0.442	0.388
Temporary vocal cord palsy	3 (4.1)	2 (1.5)	0.237	1.3
Permanent vocal cord palsy	1 (1.4)	1 (0.7)	0.582	0.192
Temporary hypoparathyroidism	7 (9.5)	4 (2.9)	0.047*	4.09
Permanent hypoparathyroidism	3 (4.1)	1 (0.7)	0.027*	2.82

The most common histopathological diagnosis postoperatively in our study was simple multinodular goiter (40.1%) followed by Graves' disease (25.1%) (Table 2).

The wound infection was 1.4% and 1.5% in both groups respectively with no significant difference among studied groups (p=0.58) (Table 3).

The postoperative bleeding was 2.7% and 1.5% in both groups with no significant difference (p=0.442) (Table 3).

Three patients in group A was suffering from temporary vocal cord palsy (4.1%), one of them became permanent (1.4%) while in group B there was two patients suffering from temporary vocal cord palsy(1.5%), one of them became permanent (0.7%) with no significant difference among the studied groups (p=0.582) (Table 3).

There was a statistically significant difference between both groups regarding temporary hypoparathyroidism which was 9.5% in ATD group while in non-ATD group was 2.9% (p=0.047) (Table 3).

Also permanent hypoparathyroidism was 4.1% in ATD group while in non-ATD group was 0.7% (p=0.027) with significantly higher rate in ATD group (Table 3).

DISCUSSION

3–5% of the populations in Europe have thyroid gland diseases. A high prevalence of these disorders includes ATD such as Graves' disease and Hashimoto thyroiditis.[7]

Surgery is indicated in certain cases of ATD: e.g. failure of medical treatment, recurrent disease, suspicion of cancer or compressive symptoms.

The mean age in our study were 40.15±10.2 and 42.6±9.6 in both groups respectively with slightly younger age in group A than group B with no significant difference and this is disagreed with McManus et al and Thomusch et al in which both studies demonstrate significant difference with also younger age in ATD group.[3,7]

Our study found that patients with thyroid disorders whether autimmune or non-autoimmune were significantly more female than male with no significant difference between both groups, which is consistent with other published literatures.[3,7,9-11]

Most of the patients in our study were diagnosed as simple multinodular goiter (40.1%) while Graves' disease was the second common diagnosis (25.1%) then secondary toxic goiter (22.2%) then Hashimoto thyroiditis (10.1%) this is agreed with Thomusch et al in that the MNG was the higher incidence among the studied patients but the Hashimoto thyroiditis was higher than graves' disease.[7]

Regarding general postoperative complications (wound infection and postoperative bleeding) there was no significant difference between both groups this is agreed with several studies.[3,9,12,13]

In our study the postoperative transient and permanent vocal cord palsy in the two groups was comparable with no significant difference and this is agreed with several studies.[7,4,15,16]

McManus et al demonstrate in his study that there was no significant difference between the two groups regarding transient vocal cord palsy while there was significant difference when looking at permanent vocal cord palsy between the studied groups.[3]

However, the postoperative transient and permanent hypoparathyroidism was significantly higher in group A compared with that for group B after thyroidectomy and this is agreed with Thomusch et al.[7]

The explanation for higher rate of hypoparathyroidism whether transient or permanent in ATD following surgery related to the severe fibro-vascular inflammatory reaction which obscures the surgical field and makes the preservation parathyroid blood supply more difficult.

In contrast to our study McManus et al demonstrated in his study that there was no significant difference between the two groups regarding permanent hypoparathyroidism while there was significant difference regarding transient hypoparathyroidism between the studied groups.[3]

Thus surgery in ATD is a challenging procedure because there is dense inflammatory process surrounding the thyroid gland and makes the gland firmly adherent to the surroundings. Surgery stills a line of treatment for ATD in selected cases as failure of medical treatment, suspicion of malignancy or presence of compressive symptoms.[5] Also recurrence of the disease after medical treatment is an indication for surgery in ATD.[17]

CONCLUSION

Surgery for ATD is a challenging procedure but safe with a low incidence of general complications and vocal cord palsy when compared with surgery for non-ATD. However, postoperative hypoparathyroidism is significantly higher due to dense adhesions which obscure the surgical field so a special attention should be paid to the parathyroid glands during total thyroidectomy.

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