

## Evaluation of Post-Thyroidectomy Complications in Autoimmune Thyroid Diseases versus Nodular Thyroid Diseases

AHMED S. ELGAMMAL, M.D.; MOHAMMED H. ELMELEGY, M.D. and MAHMOUD A. BADAWEY, M.Sc.  
The Department of General Surgery, Faculty of Medicine, Menofia University

### Abstract

**Background:** Thyroid surgery had been and was the most common endocrine surgical operations. An accurately performed operation on thyroid gland requires both experience and technical ability and is considered by many to be at the zenith of endocrine surgery. When thyroid operations are performed without sufficient interest, training, or experience the incidence of preventable complication is high. The mortality rate of thyroidectomy as reported in several large series approaches zero. The morbidity of thyroidectomy, however continues to be a matter of concern. Recent research suggests that surgeons may differ in their ability to perform this refined surgery with sufficient care.

**Aim of Study:** The aim was to evaluate of post-thyroidectomy complications in autoimmune thyroid diseases versus nodular thyroid diseases.

**Patients and Methods:** The study was a prospective randomized study which was done over 100 patients suffering from thyroid disease into two groups, group (I) 50 patients presented with autoimmune thyroid diseases, group (II) 50 patients presented with nodular thyroid diseases. The patients was subjected to total thyroidectomy under general anesthesia which was performed in General Surgery Department of Faculty of Medicine, Menofia University in the period from April 2019 to May 2020.

Operative time was reported from start of skin incision till closure of the wound. The two groups were followed-up for one month post-operative which is the end point of the study.

**Results:** In cases of group (I); during operations there was difficulty dissection in 30 cases (30/50, 60%), excessive bleeding in 35 cases (35/50, 70%), nerve damage in 5 cases (5/50, 10%), tracheal damage in one case (1/50, 2%). While in group (II) difficulty dissection in 5 cases (5/50, 10%), excessive bleeding in 2 cases (2/50, 4%), nerve damage only in one case (1/50, 2%). And statistical analysis revealed the predominance of operative difficulties and complications in group (I) than in group (II) ( $p=0.01$ ).

**Correspondence to:** Dr. Ahmed S. Elgammal,  
The Department of General Surgery, Faculty of Medicine,  
Menofia University

In group (I), two cases needed to be reopened for hemostasis and bleeding control due to excessive bleeding (2/50, 4%) and two cases need the insertion of tracheostomy tube for either nerve damage or tracheal damage (2/50, 4%). While in group (II) only one case needed insertion of tracheostomy tube due to tracheomalacia with huge swelling (1/50, 2%). And the statistical analysis revealed a significant increase in early post-operative complications than in group (A) than in group (A) ( $p=0.024$ ).

**Conclusion:** From our study we can concluded that surgery in autoimmune thyroid swelling is more dangerous than in multinodular goiter this is because excessive fibrosis that leads to excessive and vigorous dissection that leads to bleeding and more traumatic complications.

**Key Words:** Hashimoto's thyroiditis – Graves' disease – Post-thyroidectomy complications.

### Introduction

**THYROID** surgery has been and was the most common endocrine surgical operations. An accurately performed operation on thyroid gland requires both experience and technical ability and is considered by many to be at the zenith of endocrine surgery. When thyroid operations are performed without sufficient interest, training, or experience the incidence of preventable complication is high. The mortality rate of thyroidectomy as reported in several large series approaches zero. The morbidity of thyroidectomy, however continues to be a matter of concern. Recent research suggests that surgeons may differ in their ability to perform this refined surgery with sufficient care [1].

[2] said that thyroid nodules may be solid or fluid-filled lumps that form within the thyroid gland. The great majority of thyroid nodules aren't serious and don't cause symptoms.

Thyroid cancer accounts for only a small percentage of thyroid nodules [3].

In order to diagnose and treat thyroid cancer at the earliest stage, most thyroid nodules need some type of evaluation [6].

Complications of thyroid surgery can be divided into general and specific complications the latter being directly related to surgical technique and the former being more or less independent of surgical technical procedure itself [8].

Specific complications include vocal cord dysfunction resulting from injury to the recurrent or external laryngeal nerves, the nerves at risk during thyroid operations are the recurrent laryngeal nerve, the external branch of superior laryngeal nerve, and depending on the surgical approach chosen, the various branches of the hypoglossal ansa, hypoparathyroidism (origination from damage or ischemia to parathyroid glands), bleeding, serous or lymphatic leakage. Other complications such as lesions of the esophagus, thoracic duct, jugular vein, and carotid artery are extremely rare and are likely to occur only in patients with large, invasive tumors requiring more extensive surgery [5].

Hashimoto's Thyroiditis (HT) is an autoimmune disease occurs more frequently in women [4]. Characterized by the production of anti-thyroid antibodies such as anti-thyroperoxidase (TPO), that destroy thyroid tissue and can lead to a decrease in normal thyroid function [9].

Riedel's thyroiditis "also called Riedel's Struma" is a chronic form of thyroiditis. It is now believed that Riedel's thyroiditis is one manifestation of a systemic disease that can affect many organ systems called IgG4-related disease.

It is often a multi-organ disease affecting pancreas, liver, kidney, salivary and orbital tissues and retro peritoneum [7].

### **Patients and Methods**

The study was a prospective randomized study which conducted on 100 patients suffering from thyroid diseases admitted to the Surgical Department and had thyroid swelling and subjected to surgical treatment in the form of total thyroidectomy which was performed in General Surgery Department of Faculty of Medicine, Menofia University in the period from April 2019 to May 2020.

*The patients were divided into two groups:*

- *Group I:* Included 50 patients presented with autoimmune thyroid diseases.
- *Group II:* Included 50 patients presented with nodular thyroid diseases.

*Patient selection:*

The patients had been presented with the following thyroid diseases has been selected:

- 1- Simple multinodular goiter.
- 2- Diffuse toxic goiter relapsing after full medical treatment.
- 3- Secondary toxic goiter.
- 4- Thyroid carcinoma.

Informed consents will be obtained from parents of all patients included in the study which was approved by the Local Ethics Committee of General Surgery Department of Faculty of Medicine, Menofia University in the period from April 2019 to May 2020.

*Pre-operative workup:*

*All patients were subjected to the following:*

I- Detailed history taking:

- Personal history.
- *Complaint:*

Neck swelling, pressure symptoms, cosmetic purpose and associated symptoms as malignant symptoms.

- Analysis of the complaint.
- Past history.
- Family history.

II- *Full clinical examination "general and local":*

• *General examination:* To assess general body system, thyroid functions and presentation of metastasis.

- Local examination of the neck.

III- *Investigations:*

1- *Laboratory investigations:*

- Routine pre-operative laboratory investigation.
- Thyroid function tests "Free T3, Free T4, TSH".
- Autoimmune antibodies "Anti-microsomal antibodies, Antithyroglobulin, ....etc".

2- *Radiologic investigations:*

- X-ray neck.
- Neck ultrasonography.

3- *Instrumental investigations "indirect Laryngoscope".*

4- *Tissue diagnosis:*

- Pre-operative FNAC in patients with solitary or suspicious thyroid nodule.

*Operative work-up:*

*Consent taken from the patient for the operation:* All patients should be informed about all possible complications.

1- *Operative technique:* Total thyroidectomy under general anaesthesia.

2- *Operative and post-operative complications:* During operative and post-operative period the patients were assessed for symptoms and signs of specific complications (early and late complications).

- 1- Tracheal injury.
- 2- Recurrent laryngeal nerve complications.
- 3- External laryngeal nerve injury.
- 4- Hypoparathyroidism.
- 5- Bleeding (immediate and delayed).
- 6- Recurrence of previous diseases as MNG or Graves' disease.



Fig. (1): Ligation of the middle thyroid vein.



Fig. (2): Ligation of the inferior thyroid vessels.



Fig. (3): Ligation of the superior thyroid vessels.

*Post-operative work-up:*

Post-operative assessment of vocal cords movements immediately during recovery by an anesthetist.

The patient was observed in the recovery room for at least 2 hours.

Estimation of post-operative serum calcium on the first and third post-operative days were done.

Oral thyroxine was started one week after surgery for the patients underwent total thyroidectomy at a dose of 100mg per day and was stabilized by three months of surgery.

*The late post-operative follow-up:* Serum calcium and free T3 & T4 serum TSH was measured after one and two months after surgery to guide dose adjustment of thyroxine whether as a supplement or as a replacement therapy.

- *Post-operative complications:*

- Bleeding.
- Infection.
- Vocal cord affection "Hoarseness of voice".
- Degree of differentiation.
- Vascular and lymphatic invasion.

- *Detailed histopathological findings:*

- For differentiation between the pathological nature of both groups.

*Follow-up:*

Patients of the two groups were followed-up for one month post-operatively which is the end point of the study.

### Statistical analysis:

The collected data were tabulated and analyzed using SPSS version 16 software (SPSS Inc, Chicago, ILL Company). Categorical data were presented as number and percentages while quantitative data were expressed as mean  $\pm$  standard deviation (S.D), median, IQR and range. Chi square test ( $\chi^2$ ), or Fisher's Exact Test (FET) were used to analyze categorical variables. Coefficient of correlation was assessed by Cohen Kappa test was used to assess degree of agreement between 2 raters.

Quantitative data were tested for normality using Shapiro-Wilks test, assuming normality at  $p > 0.05$ . Student "t" test was used to analyze normally distributed variables among 2 independent groups.

Non-parametric variables were analyzed using Man-Whitney U-test. Difference among 3 independent means was analyzed using Kruskal Wallis test (KW) for non parametric variables. Significant KW tests was followed by post hoc multiple comparisons using Bonferroni test to detect the significant pairs. Spearman's correlation coefficient ( $\rho$ ) was used to assess correlations. ROC curve analysis was constructed to assess the performance of real time in prediction of fibrosis among patients group.

The accepted level of significance in this work was stated at 0.05 [ $p < 0.05$  was considered significant;  $p$ -value  $> 0.05$  is Non Significant (NS);  $p$ -value  $< 0.05$  is Significant (S);  $p$ -value  $< 0.001$  is Highly Significant (HS)].

## Results

The age of group I ranged between 17-85 years with a mean age of  $45.4 \pm 12.1$  years. While the age in group II ranged between 20-76 years with a mean age of  $41.9 \pm 12.1$  years. And the statistical analysis revealed no significant difference between the age of both groups ( $p = 0.385$ ) (Table 6) and Fig. (1).

Thirty-eight of cases of group I were males (38/50, 76%) while 12 were females (12/50, 24%) with a male to female ratio of 3.2:1. While in group II; 14 cases were males (14/50, 28%) while 36 were females (36/50, 72%) with a male to female ratio of 1: 2.3. The statistical analysis revealed that there was a male predominance in group I while there was a female predominance in group II ( $p = 0.01, 0.001$  respectively) (Table 2) and Fig. (3).

All cases (100%) of group I and group II were presented with a neck swelling having the criteria of thyroid swelling.

On clinical examination of cases in group I; the most common presenting symptoms were swelling associated with voice affection (35/50, 70%) while in group II the most common presenting symptoms were swelling associated with either eye manifestations and/or CVS symptoms (44/50, 88%). The statistical analysis revealed that there was a significant predominance of voice affection in group I while there was a significance predominance of eye manifestation and CVS in group II ( $p = 0.021$  and  $0.01$  respectively).

### Operative details:

In cases of group I; during operations there was difficulty dissection in 30 cases (30/50, 60%), excessive bleeding in 35 cases (35/50, 70%), nerve damage in 5 cases (5/50, 10%), tracheal damage in one case (1/50, 2%). While in group II; difficulty dissection in 5 cases (5/50, 10%), excessive bleeding in 2 cases (2/50, 4%), nerve damage only in one case (1/50, 2%). And statistical analysis revealed the predominance of operative difficulties and complications in group I than in group II ( $p = 0.01$ ) (Table 4), Fig. (4).

### Post-operative course:

In group I, two cases needed to be reopened for hemostasis and bleeding control due to excessive bleeding (2/50, 4%) and two cases need the insertion of tracheostomy tube for either nerve damage or tracheal damage (2/50, 4%). While in group II only one case needed insertion of tracheostomy tube due to tracheomalacia with huge swelling (1/50, 2%). And the statistical analysis revealed a significant increase in early post-operative complications than in group I than in group II ( $p = 0.024$ ) (Table 5) and Fig. (5).

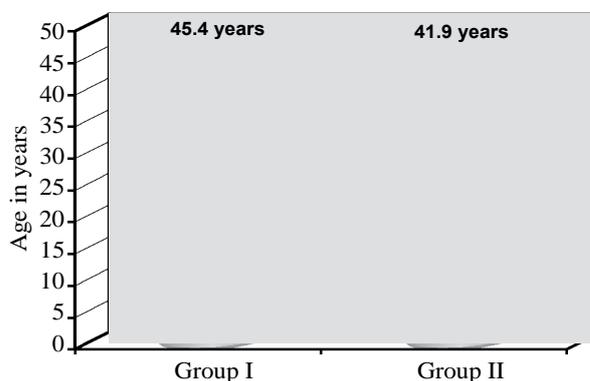


Fig. (4): Age distribution in groups of the study.

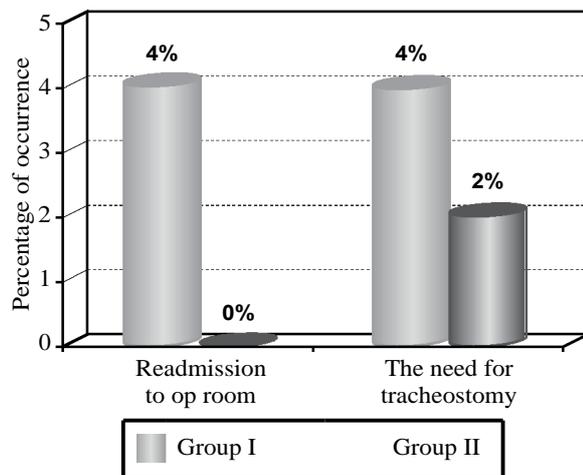


Fig. (5): Early post-operative course in cases of groups of the study.

### Discussion

Thyroid diseases are one of the most prevalent endocrinopathies globally, however, the importance of thyroid diseases is recently identified and now is considered as one of the non-communicable diseases that affect the community. Most of the thyroid diseases treated surgically especially when medical treatment fails, cosmetic purposes or when thyroid cancer extensively invading the surrounding structures. The operation duration is under multiple factors can be predicted pre-operatively [10,11].

The number of patients undergoing thyroid surgery has increased [12]. Compared with conservative methods, thyroid surgery is a relatively safe method for treating several kinds of thyroid diseases [13].

Thyroidectomy is one of the most common surgical procedures performed worldwide. Over 34,000 operations were performed during 2016 in Italy and the incidence of thyroid diseases that require total thyroidectomy is constantly increasing [14].

Surgical therapy for Hashimoto's Disease (HD) has been reserved for patients who have findings suspicious for thyroid cancer or in patients exhibiting neck pain or compressive symptoms [15].

Other uncommon complications of this surgery include cellulitis, infection, and injury in adjacent structures, such as the carotid artery, jugular vein and esophagus [17,18].

What is important is preventing permanent and irreversible injury and mortality of patients, and modern surgical techniques emphasize on this point [16].

This was a prospective study of cases of nodular thyroid swelling admitted to the Surgical Department in the at El-Menoufiya University Hospital. Fifty of them were autoimmune thyroid swelling (Group I) while the other 50 cases were nodular thyroid goiter (Group II) and all the cases were subjected to total thyroidectomy.

Our results revealed non significance difference between groups of the study regarding age.

[19] found in their study that there was a significant increase in age of Hashimoto's thyroiditis compared to MNG which conflicting with our results [19].

[20] found in their study that there was no significant difference between autoimmune thyroiditis and non-autoimmune thyroid swelling regarding age which was in agreement with our results [20].

In our study there was a significance predominance of females in nodular goiter while in autoimmune thyroid swelling males were predominant.

[19] found in their study that there was a significant female predominance in all studied groups regarding gender which conflicting with our results [19].

[16] found in their study that there was a female predominance in cases underwent total thyroidectomy for different causes of thyroid swelling which conflicting with our study [16].

[14] found in their study that females were more predominantly affected than males that disagree with our study [14].

[20] found in their study that there was no significant difference between autoimmune thyroiditis and non-autoimmune thyroid swelling regarding sex which was conflicting with our results [20].

In our study there was no difference between groups regarding the presenting symptom which was neck swelling. The swelling associated with voice changes in autoimmune thyroid swelling while in nodular swelling associated with eye and/or CVS symptoms.

[16] found in their study that all patients that underwent total thyroidectomy mainly complaint of neck swelling (nodule) which run in lines with our study [16].

During operation the operative difficulties were more pronounced in group I "autoimmune thyroid

swelling" in the form of difficult dissection, excessive bleeding, nerve damage and/or tracheal damage.

[15] found in their study that a rate of 5.5% of RLN injury in cases of Hashimoto's thyroiditis surgery which runs in lines with our results [15]. Also, reported a rate of 1.2% of RLN injury in their studied series of Hashimoto's patients which was in agreement with our results [7].

[19] found in their study that there was no significant difference in the incidence of complications "bleeding and/or vocal cord injury" in Hashimoto's patients compared with benign goiter and Gravis disease which conflicting with our results [19].

[21] found in their studies that the permanent injury has been reported 0.4%, 7.3%, 1%, 0.7%, and 3.2% and transient injury has been reported 4.6% and 3.4 which run in lines with our results [21].

[20] found in their study that there was no significant difference between autoimmune thyroiditis and non-autoimmune thyroid swelling regarding post-operative complications "bleeding and RLN injury" which was conflicting with our results [20].

During the early post-operative course, the need for readmission to the operative room and the need for tracheostomy were more common in group I than in Group II.

### Conclusion:

From our study we can concluded that surgery in autoimmune thyroid swelling is more dangerous than in multinodular goiter this is because excessive fibrosis that leads to excessive and vigorous dissection that leads to bleeding and more traumatic complications.

### References

- 1- EDWIN KAPLAN, PETER ANGELOS, MEGAN APLEWHITE, FREDERIC MERCIER, and RAYMON H. GROGAN: Xt book of endocrine surgery 2<sup>nd</sup> edition volume 1, Thyroidectomy chapter 21 188, Occurrence and prevention of complication in thyroid surgery chapter 23. Pp. 207, 2015.
- 2- KUMA K., MATSUZUKA F., KGOBAYASHI A., HIRAI K. MORITA S., MIYAUCHI A., et al.: Outcome of longstanding solitary thyroid nodules. *World J. Surg.*, 16: 586-8, 2015.
- 3- HAMMING J.F., GOSLINGS B.M., VAN STEENIS G.J., VAN RAVENSWAAY CLASSEN H., HERMANS J. and VAN De VELDE C.J.H.: The value of fine needle aspiration biopsy in patients with nodular thyroid disease divided into groups of suspicious or malignant neoplasms on clinical grounds. *Arch. Intern. Med.*, 150: 113-6, 2013.
- 4- REPPLINGER D., BARGREN A., ZHANG Y., ADLER J., HAYMART M. and CHEN H.: Is Hashimoto's thyroiditis a risk factor for papillary thyroid cancer? *J. Surg. Res.*, 150: 49-52, 2008.
- 5- MOHAMMAD TOLUEE, MOHAMMAD HASSAN HEDAYATI-EMAMI, MOHAMMAD REZA BARZEGAR-SAVASARI, YOUSEF SHAHROUSVAND and MOHAMMADREZAMOBAYEN: Total thyroidectomy is now the preferred option for the surgical management of Graves' disease. *Anz. J. Surg.*, 72 (5): Pp. 321, 2015.
- 6- P.V. PRADEEP and N. DORAIRAJAN: Total thyroidectomy is now the preferred option for the surgical management of Graves' disease. *Anz. J. Surg.*, 72 (5): Pp. 33, 2013.
- 7- McHENRY C.R., SLUSARCZYK S.J. and KHIYAMI A.: Recommendations for management of cystic thyroid disease. *Surgery*, 126: 1167-72, 2011.
- 8- SAURAV SARKAR, SWAGATAM BANERJEE, RATHIN SARKAR and BISWAJIT SIKDER: Total thyroidectomy for benign thyroid diseases. *Laryngoscope*, 113 (10): Pp. 1820-26, 2016.
- 9- STOLL S.J., PITT S.C., LIU J., SCHAEFER S., SIPPEL R.S. and CHEN H.: Thyroid hormone replacement after thyroid lobectomy. *Surgery*, 146 (4): 558-60, 2009.
- 10- PATOIR A., PAYET C., PEIX J., et al.: Determinants of operative time in thyroid surgery: A prospective multi-center study of 3454 thyroidectomies. *Plos One*, 2017.
- 11- HOLM S.E. and HOLST H.: Prolonged Duration of Surgery Predicts Post-operative Hypoparathyroidism among Patients Undergoing Total Thyroidectomy in a Tertiary Referral Centre. *Eur. Thyroid. J.*, 6 (5): 255-62, 2017.
- 12- SUN G.H., DeMONNER S. and DAVIS M.M.: Epidemiological and economic trends in inpatient and outpatient thyroidectomy in the United States, 1996-2006. *Thyroid*, 23: 727-33, 2013.
- 13- LIU J., SUN W., DONG W., WANG Z., ZHANG P., ZHANG T. and ZHANG H.: Risk factors for post-thyroidectomy haemorrhage: A meta-analysis. *Eur. J. Endocrinol.*, 176: 591-602, 2017.
- 14- D'ORAZI V., SACCONI A., TROMBETTA S., KARPATHIOTAKIS M., PICHELLI D., Di LORENZO E., ORTENSIO A., URCIUOLI P., BIFFONI M. and ORTENSIO A.: May predictors of difficulty in thyroid surgery increase the incidence of complications? Prospective study with the proposal of a preoperative score. *Br. Med. Cent. Surg.*, 18 (Suppl 1): 116-23, 2019.
- 15- GULDVOG I., REITSMA L.C., JOHNSEN L., et al.: Thyroidectomy Versus Medical Management for Euthyroid Patients with Hashimoto Disease and Persisting Symptoms: A Randomized Trial. *Ann. Intern. Med.*, 170: 453-64, 2019.
- 16- HABIBI A.F., JALALI M.M., BANAN R., MOTAMED B. and MOGHADDAM S.V.: Epidemiology and Outcomes of Total Thyroidectomy in Patient Referred to Amir Almomenin Hospital in Rasht. *J. Res. Med. Dent. Sci.*, 6 (3): 39-44, 2018.

- 17- BERRI T. and HOUARI R.: Complications of thyroidec-  
tomy for large goiter. Pan. Afr. Med. J., 16: 138, 2013.
- 18- SHIRYAZDI S.M., KARGAR S., AFKHAMI-  
ARDEKANI M. and NEAMATZADEH H.: Risk of post-  
operative hypocalcemia in patients underwent total thy-  
roidectomy, subtotal thyroidectomy and lobectomy sur-  
geries. Acta Med. Iran., 52 (3): 206-9, 2014.
- 19- THOMUSCH O., SEKULLA C., BILLMANN F., SEIF-  
ERT G., DRALLE H. and LORENZ K.: On behalf of the  
Prospective Evaluation Study of Thyroid Surgery (PETS  
2) Study Group: Risk profile analysis and complications  
after surgery for autoimmune thyroid disease. Br. J. Surg.,  
105: 677-85, 2018.
- 20- NASSAR M.N.S. and ALGAMMAL A.S.: Post-operative  
complications after total thyroidectomy for benign thyroid  
diseases. Int. Surg. J., 6: 3064-8, 2019.
- 21- SIDDIQUE M.A., HOSSEN M., KHAN J.A. and HANIF  
M.A.: Recurrent Laryngeal Nerve Injury in Thyroid  
Surgery: One Year Prospective Study in a Tertiary Care  
Hospital. Mymensingh. Med. J. (MMJ), 24 (3): 502-5,  
2015.

## تقييم مضاعفات ما بعد إستئصال الدرقية في أمراض الغدة الدرقية الذاتية المناعة مقابل أمراض الغدة الدرقية عقيدية

الهدف: تقييم مضاعفات ما بعد إستئصال الدرقية في أمراض الغدة الدرقية المناعية الذاتية مقارنة بأمراض الغدة الدرقية العقيدية.

الأساليب والنتائج: كانت الدراسة عبارة عن دراسة عشوائية مستقبلية تم إجراؤها على أكثر من ١٠٠ مريض يعانون من أمراض الغدة الدرقية وتم تقسيم المرضى إلى مجموعتين، المجموعة (أ) ٥٠ مريضاً يعانون من أمراض الغدة الدرقية المناعية الذاتية، المجموعة (ب) ٥٠ مريضاً يعانون من العقيدات أمراض الغدة الدرقية. خضع المرضى لإستئصال كامل للغدة الدرقية تحت التخدير العام في قسم الجراحة العامة بكلية الطب جامعة المنوفية وقسم الجراحة العامة بمعهد دمهور القومى الطبى.

الخلاصة: من دراستنا يمكننا أن نستنتج أن الجراحة في تورم الغدة الدرقية المناعى الذاتى أكثر خطورة مما هي عليه في تضخم الغدة الدرقية متعدد العقيدات وذلك لأن التليف المفرط الذى يؤدي إلى تشريح مفرط ونشط يؤدي إلى النزيف ومضاعفات خطيرة.