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Evaluation and Management of Postoperative Neck Hematoma after Benign Thyroid Surgery

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ABSTRACT
Background: A neck hematoma that obstructs the airway following thyroidectomy might be life-threatening if it is formed early after the procedure.
Objective: To evaluate the incidence and timing of postoperative bleeding and to identify the potential etiological factors of cervical hematomas complicating thyroid surgery.
Patients and Methods: We examined 18 cases of benign thyroid diseases underwent the thyroid surgery. All patients had been subjected to full clinical assessment, routine laboratory studies, thyroid profile, neck ultrasound (US), and no patient was allowed to be operated upon unless became adequately prepared and euthyroid.
Results: The incidence of hematoma post total thyroidectomy was 16.67% as a mild to moderate collection that didn't need surgical intervention. In eighteen patients there was no postoperative recurrent laryngeal nerve injury found (0%) and just one case complained of transient hypocalcemia that regressed one month later
Conclusion: Using better technique with bipolar technology, Valsalva maneuver and rubber drain decrease the incidence of hematoma.
Keywords: Neck Hematoma, Thyroid Surgery, Thyroidectomy.

INTRODUCTION

Due to the thyroid's high level of vascularization, a post-thyroidectomy hematoma could be life-threatening because it can block venous and lymphatic drainage, resulting in laryngopharyngeal edema and airway obstruction [(1)].

Short-stay outpatient thyroidectomy in the United States is becoming increasingly common for benign or malignant thyroid tumor and Graves' disease patients. A neck hematoma that obstructs the airway following thyroidectomy is a potentially fatal early complication. Due to its unpredictable nature and the possibility for death, acute airway distress such as this warrants special attention and urgent evaluation and treatment using surgical methods. However, despite the safety of a short-stay thyroidectomy, there is concern about the period between the initial thyroidectomy and the beginning of hematoma [(2)].

According to the available research, the prevalence of bleeding after thyroid gland surgery ranges from 0% to 4.2% [(3)]. A neck hematoma following surgery on the thyroid can cause fast airway constriction or obstruction, which is potentially life-threatening [(4)]. Thyroid surgery's primary goal is to achieve effective intraoperative hemostasis [(5)]. An incorrectly applied ligature can slip owing to retching, vomiting, the Valsalva maneuver, or increased vein and artery pressure, are probable causes of bleeding. According to research, it's connected to anticoagulant drugs and hematologic disorders [(1)]. Subcutaneous tissue, infrahyoid muscles, the upper pole, residual thyroid tissue and the internal jugular vein may all be the source of bleeding. Wound re-examination may fail to reveal the source of bleeding in some cases [(2)].

A high degree of suspicion in the first postoperative hours is essential to detecting airway obstruction before it starts; early detection relies on a high degree of suspicion. Symptoms and signs of early hypoxia include sweating, rapid heartbeat, irritability, and bewilderment. Late symptoms and signs include ecchymosis, neck swelling, choking, dyspnea, difficulty phonating, and stridor. As a result of this condition, the surgical drain is often clogged with blood, making it a misleading instrument. Consequently, the patient's clinical picture is significantly more sensitive and specific in the identification of postoperative hematoma than the discharge of drains [(6)].

Intraoperative hemostasis has a wide range of options. Hemostatic clips, clamp-and-tie procedures, and conventional bipolar and monopolar cautery are all examples of traditional hemostatic techniques. For intraoperative hemostasis, these methods are often regarded as the gold standard [(7)]. Radiation-frequency or ultrasound-based hemostatic treatments have lately been shown to be highly effective, as has the usage of "alternative energy devices" [(5)].

It has been found that the use of radiofrequency and ultrasonic vascular sealing devices can reduce surgical time and problems such as thermal nerve injury during thyroidectomy [(8)]. When it comes to hematoma treatment, it all comes down to the symptoms. Only a patient with an unstable or worsening hematoma at the bedside necessitates rapid evacuation and re-examination. Reintubation in an operating room (OR) is often achievable. Because of the possibility of substantial epiglottis and arytenoid edema, the intubation should be performed by the most senior endoscopist. After an evacuation, postoperative treatment is typically unchanged [(9)].

It was the goal of this work to evaluate the incidence and timing of postoperative bleeding and to identify the potential etiological factors of cervical hematomas complicating thyroid surgery.

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PATIENTS AND METHODS

Eighteen patients with benign thyroid diseases who were candidates for surgical treatment as total thyroidectomy were included in the study. Our study was conducted in the Onco-surgery Unit, General Surgery Department, Faculty of Medicine, Zagazig University, during the study period (6 months).

Ethical consent:

An approval of the study was obtained from Zagazig University Academic and Ethical Committee (ZU-IRB#6989). Every patient signed an informed written consent for acceptance of participation in the study. This work has been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans.

Inclusion criteria: Patients for this study between 18 years of age to 75 years, type of thyroidectomy (total thyroidectomy), and patients who had benign thyroid disorders were candidates for thyroidectomy.

Exclusion criteria: Patients with bleeding disorders, patients previous neoadjuvant neck radiotherapy, patients unfit for general anesthesia and malignant thyroid disease.

All patients were subjected to:

History: The patient's age, sex, gender, comorbid medical conditions were all recorded in a thorough medical history.

Clinical examination: General and local examination of the neck were done to all patients.

Laboratory: CBC, blood sugar, INR, liver enzymes, serum creatinine, and thyroid function tests (T3, T4, and TSH).

Radiological: Neck US and fine-needle aspiration cytology (FNAC) for suspicious nodule

Operative Technique: Total thyroidectomy

The patient was under general anesthesia, positioned supinely on the operating table.

Skin incision: Two fingers above the sternal notch, between the medial borders of the sternocleidomastoid muscles, an incision was created in the skin.

Subplatysmal flaps: Diathermy was used to divide subcutaneous fat and platysma.

Getting to the thyroid's anterior surface by dissolving the strap muscles: fascia that connects these three muscles was cut in half midline and the muscle fascia was pulled back to its original position on each side of the midline.

Lateral dissection: Following the midline raphe dissection, the strap muscles were separated on a bloodless plane. Mobilizing the strap muscles away from the lobe further exposed the thyroid lobe. The strap muscles were then retracted laterally using a tiny Richardson retractor.

Identification and ligation of middle thyroid vessel: Using Babcock forceps, the thyroid lobe was gently withdrawn toward the midline to reveal the middle thyroid vein, which was then ligated and split using 2-0 or 3-0 silk or Vicryl sutures.

Identification and ligation of superior thyroid vessel: Thyroid gland was regrasped and pulled back to show all of the superior pole vessels, including those branches of superior thyroid artery that were previously hidden **(Figure 1)**.

Figure (1): Identification and ligation of superior thyroid vessel

Ligation of the inferior thyroid veins at the lower pole: Following this procedure, the Babcock clamp was moved to grip the thyroid lobe, allowing the inferior thyroid veins to be exposed and ligated as they enter the thyroid gland.

Identification of recurrent laryngeal nerve and parathyroid glands:

The parathyroid glands, inferior thyroid artery, and recurrent laryngeal nerve were exposed when the thyroid lobe was retracted medially. Dissecting carefully right below the inferior thyroid artery yielded the best results in locating the nerve. To ascertain where the nerve was located in reference to the thyroid, a trace was made upward.

The procedure was repeated on the opposite side to remove the entire gland.

Dissection of the gland from the trachea:

Thyroid gland-to-tracheal-ring ligament (Berry's ligament) was then carefully dissected by sharp dissection.

Drain insertion and wound closure:

A rubber drain, or a suction drain was introduced in some cases after the resection had been finished and hemostasis had been confirmed. Closure was achieved with the use of interrupted 3-0 Vicryl sutures to initially reapproximate the strap muscles in the midline **(Figure 2)**.

Figure (2): After removal of thyroid gland and achieving hemostasis

Statistical analysis

SPSS software (IBM, USA) version 23, was used for statistical analysis. Quantitative data were presented as range, mean, and standard deviation. Qualitative data were presented as number and percentage and were compared by Chi-square test (X^2). P value <0.05 was considered statistically significant.

RESULTS

This study was conducted on 18 female patients. The examined cases aged from 29 to 72 years with mean age of 50.28 ± 13.25 **(Table 1).**

Table (1): Qualitative demographic data

Sex		
	N	%
Male	0	0
Female	18	100
Total	18	100.00

Age Groups				
	N	**%**	**Hematoma**	**%**
25-35 Years	3	17%	0	0
36-45 Years	5	28%	0	0
46-55 Years	7	39%	0	0
56-65 Years	1	6%	1	16.67%
66-75 Years	2	11%	2	83.33%
Total	18	100.00	3	100.00

Hematoma was significantly related to hypertension **(Table 2)**

Table (2): Hypertension relation with hematoma

	Free		Hematoma			
Hypertension	N	%	N	%	X^2	p
No	10	66.7%	0	0.0	4.5	0.03
Yes	5	33.3%	3	100.0		

There was association between thyroid pathology with post thyroidectomy hematoma. 67% of hematoma's patients had Graves' disease **(Table 3).**

Table (3): Relation between pathology of the thyroid and post thyroidectomy hematoma

	Free		Hematoma			
Pathology of the thyroid	N	%	N	%	X^2	p
Multinodular goiter	10	66.7%	0	0.0	8.4	0.04
Solitary nodular goiter	2	13.3%	0	0.0		
2ry toxic goiter	2	13.3%	1	33.3		
Graves' disease	1	6.7%	2	66.7		

There was significant association between large thyroid size and post thyroidectomy hematoma **(Table 4).**

Table (4): Relation between thyroid size and post thyroidectomy hematoma

Thyroid Size						
	Free		Hematoma			
	N	**%**	**N**	**%**	X^2	P
Medium	13	86.7%	0	0	9.36	0.002
Large	2	13.3	3	100%		

The duration of operation for examined cases was from 55 to 190 minutes **(Table 5).**

Table (5): Relation Duration of operation and post thyroidectomy hematoma

Duration of operation				
	N	**%**	**hematoma**	**%**
Below 60 min	2	11%	0	0
60 – 120 min	15	83.33%	2	67%
121 min and above	1	6%	1	33%
Total	18	100.00	3	100.00

In our study there were three cases complicated with postoperative hematoma **(Table 6).**

Table (6): Incidence of post thyroidectomy hematoma

Hematoma incidence		
	Number of patients	**%**
Hematoma	3	16.67%
Non	15	83.33%
Total	18	100.00

DISCUSSION

There are several blood vessels in the thyroid. Compared to other highly perfused organs like the brain, its blood flow is many times greater. Thyroid surgery has a high rate of complications, including postoperative hemorrhage [10].

In today's general surgery, thyroidectomy is one of the most frequently done procedures. Hypoparathyroidism and recurrent laryngeal nerve

palsy are two possible postoperative consequences, despite improvements in safety over the last few decades. Because of the danger of significant airway impairment, postoperative hemorrhage is considered a medical emergency [(11)].

In the current study we aimed to avoid post thyroidectomy hematoma and manage it properly, the examined group was 18 patients diagnosed with benign thyroid disease that underwent thyroidectomy in the Onco-surgery Unit, General Surgery Department, Faculty of Medicine, Zagazig University.

In our study all cases operated upon for benign thyroid enlargement applying by the fixed modality of surgery i.e., total thyroidectomy using the bipolar electrosurgical cautery with uniform steps with postoperative Valsalva maneuver application and rubber drain inserted.

In our study, all patients were female that leads to a break of the relationship with the previous similar study for sex as a parameter of study.

Perera *et al.* [(12)] and Oltmann *et al.* [(13)] have reported that the risk of post-thyroidectomy neck hematoma increases with increasing age. Patients in our study ranged in age from 29 to 72 years, with the hematoma group having a significantly higher mean age than the non-hematoma group (68.66 ± 4.16 vs 46.6 ± 11.13). This implies that patients in this age bracket were more likely to develop a postoperative hematoma than younger ones.

In the study of **Lee *et al.* [(14)],** hemorrhage was shown to be more common in hypertensive patients (20 cases 83.33% with systolic pressure > 150 mmHg). It is also imperative that patients with hypertension, especially those who have had their antihypertensive medication terminated before to surgery owing to anesthesia, be monitored closely in the immediate postoperative period.

For lowering the risk of post-thyroidectomy hematoma, smooth extubation without substantial retching or coughing, as well as postoperative vomiting and pain control, are key factors [(9)].

In **Rosenbaum *et al.* [(15)]** study, Graves' disease was found to be an independent risk factor for post-thyroidectomy hematoma in two cases (67 percent). Thyroidectomy is made more difficult by increased intraoperative bleeding in Graves' disease. Graves' illness was found to be a significant risk factor for pulmonary hypertension in 207 patients studied in a retrospective, multi-center, and case-control investigation[(16)].

In our study, operative time ranged from 55 to 190 min, with mean time was (62.1 ± 9.5 min). In **Rageh *et al.* [(17)]** study, operative means time was (60± 15 min), which was significantly shorter. In the study of **Sewefy *et al.* [(18)]** operative time in the intracapsular total thyroidectomy group was (93.7 ± 9.6 min) compared to (86.9 ± 8.3 min) in the extracapsular thyroidectomy group, which is non-significant statistically in contrary to **Rageh *et al.* [(17)]** study.

In our study three cases (16.6 %) were diagnosed with post thyroidectomy hematoma as mild to the moderate collection and treated conservatively and no case needed reopening and evacuation of the hematoma. **Godballe *et al.* [(19)] and Inabnet *et al.* [(20)]** literature suggested an incidence of postoperative hematoma ranging from 0 to 6.5 percent; however, in larger series, these rates are much lower, at 0.3–1.2 percent. **Vasica *et al.* [(21)] and Serpell *et al.* [(22)]** found that hematoma rates in the Australian population ranged from 0.9% to 3.5%, according to data released in 2007. Postoperative bleeding definitions were inconsistent. Postoperative bleeding has been defined in various articles as an unanticipated return to the operation room for hematoma evacuation.

In our study, all cases (100%) of post thyroidectomy hematoma were presented with moderate to large thyroid size, which confirmed that the size of thyroid nodule was an independent risk factor. **Lang *et al.* [(11)]** found that individuals with a prominent nodule greater than 3 cm in diameter had an odds ratio (OR) of 4.54. (95 % CI, 1.22-16.92; p = 0.024) or approximately 4.5 times higher risk for hemorrhage after thyroidectomy than that of size ≤ 3 cm. A nodule's diameter (more than 3 cm) was found to be an independent risk factor for bleeding in our research. No recurrent laryngeal nerve (RLN) palsy was ever found in any of our 18 patients who had thyroidectomies. **Liu *et al.* [(23)]** found only 0.4 percent of the 250 complete thyroidectomies for benign nodular goiter (BNG) resulted in a unilateral RLN damage.

In our study results there was one patient from 18 patients (5.55%) got transient parathyroid injury (hypocalcaemia). Injury (3.4%) results were found in a study made by **Rageh *et al.* [(17)]** while 0% permanent or transient parathyroid injury (hypocalcaemia) from 50 patients was found in a study made by **Sewefy *et al.* [(18)]**.

CONCLUSION

Among thyroidectomy patients (with benign diseases) the development of the neck hematoma post total thyroidectomy was significantly associated with old age, hypertension, overweight or obese patients and Graves' disease. We discovered risk variables for postoperative hematoma following thyroid surgery. When it comes to identifying patients at risk for this potentially fatal consequence, surgeons should have access to this information. We've come to the conclusion that the Valsalva maneuver and rubber drain have a lower hematoma incidence when performed with improved technique using bipolar technology.

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