



Epidemiology and Complications of Total Thyroidectomy in Patient Referred to Amir Almomenin Hospital in Rasht

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ABSTRACT

Total Thyroidectomy is common therapy in patients with thyroid malignancies, thyrotoxicosis, multinodular goiter and chronic thyroiditis. The most common complications of this procedure are hematoma, recurrent laryngeal nerve injury and hypocalcemia. modern thyroidectomy is focused on the mortality of surgery by preventing damage to adjacent structures, such as parathyroid glands and recurrent laryngeal nerve. Considering the prevalence of this procedure and the lack of similar studies in this area, we decided to evaluate epidemiology and complications of this procedure so we take a step to reduce complications. All patients referring to Amir al-momenin Hospital in Rasht during 2012-2016 for total thyroidectomy were participated. Demographic and clinical datas from their hospital records were collected in a questionnaire and the long-term complications of the disease and permanent injuries after 6 months were re-examined. Data analysis was done and p less than 0.05 was considered significant. Of the 103 patients, 79.6% were female. The average age was 44.61 years. The most common clinical manifestation was masses or nodules in the anterior of neck (84.5%). 58.3% of patients had the final pathology for Papillary thyroid carcinoma, 25.2% multidolateral goiter, 14.6% adenoma and 8.7% thyroiditis. transient hypocalcemia was seen in 26.2% of patients and 2.9% had permanent hypocalcaemia, 2 patients had recurrent nerve injury, which one of them was recovered in the Follow up. Other complications did not occurred. Papillary thyroid carcinoma is one of the most common indications of total thyroidectomy in this area. Low prevalence of complications in this center can be due to the surgeon's expertness and peri and postoperative care.

Key words: Pathology, Post Operative Complication, Thyroid Gland

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and affect nearly 11% of the general population [1]. Total thyroidectomy is one of the most commonly used therapies in patients with thyroid diseases [1,2]. The common complications of

INTRODUCTION

Neoplastic, inflammatory and endocrine anomalies of the thyroid gland are very common

thyroid surgery are recurrent laryngeal nerve injury, hypocalcemia, and hematoma [3]. Recent studies have reported the risk of transient

hypocalcemia and permanent hypocalcemia is up to 50% and less than 2%, respectively. In addition, the probability of recurrent laryngeal nerve injury is less than 1% when surgery is performed by expert surgeons [5, 6]. Postoperative hematoma occurs often in early period after surgery [5,6]. Other uncommon complications of this surgery include cellulitis, infection, and injury in adjacent structures, such as the carotid artery, jugular vein and esophagus [6,7]. What is important is preventing permanent and irreversible injury and mortality of patients, and modern surgical techniques emphasize on this point.

Bilateral injury of recurrent laryngeal nerve causes vocal cord paralysis, followed by severe respiratory and speech problems for the patient. incidental parathyroidectomy during the surgery can lead to permanent hypocalcemia in patients. Unlike unilateral thyroid lobectomy, total thyroidectomy is a potential risk for parathyroid glands and recurrent laryngeal nerves. The surgeon experience and his knowledge of the anatomical structures and the exact site of the nerve, and the identification and maintenance of parathyroid glands in its site, are among the necessary requirements to reduce the risk of death and serious injuries [8,9]. In the case of incidental parotidectomy, it can be implanted on the sternocleidomastoid muscle (SCM) or on the non-dominant forearm. In this center, the protection of the parathyroid gland through thin cuts around it and separating it from the thyroid tissue and implanting in SCM muscle are performed.

Objective

Given the prevalence of this procedure and the lack of similar studies in this area, we decided to evaluate the epidemiology of this surgical procedure and its subsequent complications in order to take steps to reduce complications and to control the adverse outcomes.

MATERIALS AND METHODS

This research was a retrospective review conducted on 103 patients admitted to Amiralmomenin Hospital in Rasht for total thyroidectomy during the years 2012-2016. Demographic information and data of all patients, regardless of early diagnosis and surgical technique, were collected and patients with a history of previous thyroid surgery were excluded. Demographic data of patients, their chief complaint, thyroid size, history of radiation / head

and neck radiotherapy, cervical lymph node involvement, cervical resection treatment, site of parathyroid gland and pathological outcome after operation were enrolled in pre-prepared forms, and the presence or absence of complications such as postoperative bleeding, surgery site hematoma, surgery site infection, recurrent laryngeal nerve injury, and postoperative hypocalcemia, were evaluated based on the patient medical records. All patients were admitted and monitored for at least 24-48 hours after surgery. indirect laryngoscopy was done for them, and their calcium was monitored regularly, and in case of calcium drop below 8 mg / dl, or incidence of symptoms of hypocalcaemia such as numbness and paresthesia around the mouth and fingers and the positive results of the Trousseau and Chvostek tests, calcium treatment started and all data were recorded in the medical files. Long-term complications and permanent injuries were examined at least 6 months after the operation physical examination and laboratory tests were done if necessary. Finally, chi-square, student, or its non-parametric tests and logistic regression analysis were used for evaluation the research objectives and questions. Data were analyzed using SPSS software and p value <0.05 was considered significant.

RESULTS

Table 1: Distribution of chief complaints of patients underwent total thyroidectomy

percentage	number	Chief complaintes
84.5%	87	Nodules in the anterior of neck
1.9%	2	Pain
3.9%	4	Dysphagia
3.9%	4	Hoarsness
5.8%	6	Others(weight loss, sweating,hair loss,...)
100	103	Total

The highest percentage of patients underwent total thyroidectomy (79.6%) was females. The mean age of the patients was 44.61 ± 10.2 years and 43.7% of the them were at the age range of 40-50 years old and 35.9% were 40 years old. The highest percentage of patients underwent total thyroidectomy were housewives (73.8%), and none of the them had radiation-related jobs or history of radiotherapy in the head and neck. The highest percentage of the underlying diseases was related to hypothyroidism (29.2%) and hyperthyroidism was seen only in 8.3% of patients. 29.1% of patients had family history of thyroid diseases. The most common chief

complaints of patients are summarized in (Table 1). The mean diameter of right lobe of the thyroid was 49.76 ± 15.79 mm and the diameter of left thyroid lobe was 47.88 ± 14.98 mm.

Cervical lymphadenopathy was found in 63.1% of patients either in the physical examination or in the ultrasound. Cervical resection and lymphatic dissection, either in the form of prophylaxis or after observing the malignancy evidence, was performed in 59.2% of patients. In 40.8% of patients, the surgeon was able to maintain the parathyroid gland in the original site, and in 50.2% of cases, it was implanted on the sternocleidomastoid muscle. The highest percentage of pathologic findings was related to papillary carcinoma (Table 2).

Table 2: Frequency distribution of types of pathological outcomes of thyroid glands in patients underwent total thyroidectomy

Percent Per patient	percentage	number	pathology
8.7	7.9%	9	Thyroiditis
25.2	22.8%	26	Multinodular Goiter
58.3	52.6%	60	Papillary Carcinoma
14.6	13.2%	15	Adenoma
3.9	3.5%	4	Others
	100	114	Total

The general incidence of complications in patients was 31.1%, which is listed separately in (Table 3).

Table 3: Frequency distribution of some of the complications of surgery in patients underwent Total Thyroidectomy

percent per patient	Percentage	number	Complications
0.97	3.1	1	Transient Vocal cord paralysis
0.97	3.1	1	Permanent Vocal cord paralysis
26.2	84.4	27	Transient Hypocalcemia
2.91	9.4	3	Permanent Hypocalcemia
	100	32	Total

DISCUSSION

Based on the similar studies, low age and female gender increase the risk of genetic mutations in RET / PTC3 and RET / PTC1, leading to papillary thyroid carcinoma (PTC) [10]. In the current research, by using the Chi-Square and Fisher's exact tests, it was found that there is a significant relationship between low age (40-50 years of old

and lower) and malignancy ($P = 0.001$), and a significant relationship was seen between female gender and post-operative complications ($P = 0.003$). Similar studies reported the same results [1, 11-14].

In this research, among the patients diagnosed with papillary carcinoma, 6.6% had concurrent thyroiditis and 6.6% had concurrent multinodular goiter, and one case had history of hyperthyroidism. However, unlike similar studies, no significant relationship was found between the underlying thyroid disease and the incidence of malignancy. Loh *et al.*, reported a relationship between lymphocytic thyroiditis and PTC and Girardi in 2015 found a relationship between Hashimoto's thyroiditis and PTC [15, 16]. In a study conducted by Medas in 2017, the concurrent incidence of graves disease and thyroid malignancies was up to 50%. Moreover, the more invasive tumor was observed in patients with hyperthyroidism [17]. Patient's thyroidectomy sample was sent to the laboratory and their final result suggested that more than half of the pathologic findings were related to papillary carcinoma (58.3%).

Bhattacharyya in 2002 in the United States, reported that the malignancy rate in the pathology report of patients underwent thyroidectomy was 52.6% [1], and as seen, papillary carcinoma is the most common cause of thyroidectomy and its prevalence is increasing, like the results of other studies [18-19]. In addition, in the research of Bhattacharyya, as our study, multi-nodular goiter was the most common cause of thyroidectomy after papillary carcinoma [1], followed by benign adenoma (14.6%) and thyroiditis (8.7%), respectively. However, different values have been reported for them in similar studies. Three common complications of total thyroidectomy include hypocalcemia, recurrent laryngeal nerve injury, and bleeding, which no case of bleeding after the operation was reported in our center fortunately. In a study conducted in 2016 in Albania, the prevalence of transient hypocalcemia was reported 16.7% and it was reported 21.9% in India [12, 20]. In our research, its prevalence was reported 26.2%.

Sreejayan in 2012 reported the rate of permanent hypocalcemia 3.2% [20], which this rate was 2.9% in our study. In this study, a significant relationship was found between the incidence of complications and malignancy ($P = 0.002$). A

significant relationship was also reported between the presence of lymphadenopathy and the treatment of cervical resection and complications and malignancy ($P = 0.01$ and $P = 0.0001$ for lymphadenopathy and $P = 0.002$ and $P = 0.0001$ for treatment of cervical resection, respectively). The extent of surgery field is effective in the incidence of complications in thyroid surgery.

In malignancy, the extent of surgery is generally high due to regional dissection of lymph nodes. Shen (2010) revealed that patients underwent lymphatic dissection showed higher rate of complications [21]. Cheah (2002) also stated that the incidence of hypocalcaemia was higher in patients underwent lymphatic dissection and thyroidectomy [22]. Aydin and Kwan in separate studies also referred to the role of lymphatic dissection in papillary thyroid carcinoma in incidence of transient hypocalcemia [23, 24]. The parathyroid gland autotransplantation is performed on the sternocleidomastoid muscle during total thyroidectomy in this center and 60 of our patients (59.2%) underwent it. In his study, Sokouti considered the re-implantation of parathyroid gland on muscle as one of the ways to reduce the risk of permanent hypocalcaemia [25]. In addition, Gabrielle in 2017 and Testini in 2007 also achieved the similar results [27, 28].

Recurrent laryngeal nerve injury occurs during surgery when the surgeon does not have required skill and accuracy. To avoid it, it is better to identify and mark it before thyroidectomy. Its prevalence in the study conducted by Jahani in Mashhad-Iran was reported 1.9 [5,6], and in other studies conducted in other countries, the permanent injury has been reported 0.4%, 7.3%, 1%, 0.7%, and 3.2% [1, 12, 28, 20, 30] and transient injury has been reported 4.6% [30] and 3.4 [28]. As stated above, different values were seen due to their close relationship with the experience of surgeon. In our research, 2 patients had unilateral vocal cord paralysis. As nerve injury can be recovered over time, one of them improved after 6 months of follow-up. In a study conducted in 1998 and in another study conducted by Hauch in 2014, the important role of surgeon experience was emphasized in surgical outcomes and the reduction of complications [32, 31]. Using t-test also revealed no significant difference between the mean diameter of thyroid lobes and incidence of postoperative complications ($P = 0.066$) and ($P = 0.061$).

CONCLUSION

The surgeon knowledge and skills and the accurate dissection of operation field and paying attention to hemodynamic and homeostasis before, during and after the surgery are among the key factors in reducing the incidence of transient or permanent complications and mortality. It should be noted that during total thyroidectomy, in comparison with the subtotal, the possibility of injury in the parathyroid glands and even unintentional parathyroidectomy, is so high. Thus, high accuracy and the use of appropriate and modern surgical techniques can prevent many of the complications. In addition, the surgeon should identify the recurrent laryngeal nerve of both sides during surgery, so that he does not cause injury, because unilateral injury might not cause severe symptoms and affects only the patient's speech, but the bilateral injury, despite its low probability, is much more important, because it can cause severe swelling and respiratory problems, and even death of patient.

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