INCIDENCE OF VOCAL CORD PALSY IN PATIENTS UNDERGOING THYROID SURGERY FOR BENIGN CAUSES AND THE IMPACT OF AGE, GENDER, TYPE OF THYROID SURGERY, AND INDICATION OF SURGERY ON IT

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ABSTRACT

Background

Thyroidectomy is common neck surgery, and recurrent laryngeal nerve (RLN) palsy is one of its devastating complications.

Objectives

To know the incidence of RLN palsy in patients who underwent thyroid surgeries for benign diseases in Sulaimani city and the effect of age, gender, and indication and types of surgery on its incidence.

Patients and Methods

The prospective observational study included 112 patients admitted to the Otolaryngology/Head and Neck Surgery Department of Sulaimani Teaching Hospital and private hospitals in Sulaimani from May to October 2020. All cases of thyroidectomy for benign conditions were included. Patients with voice problems before surgery, thyroid malignancies, follow up for less than one month, and a history of aerodigestive tract surgery was excluded. Age, gender, and preoperative symptoms were recorded. Indications, type and technique of surgery, pre-and postoperative vocal cord status, and complications were evaluated. Mallampati scores were recorded.

Results

The mean ± SD (standard deviation) of patients' ages was 43.5 ± 13.03 years, ranging from 21 to 75 years. The female to male ratio was 4.9:1, and 78 patients (69.6%) had abnormal thyroid function tests. All collected parameters from age, gender, indication and technique or type of surgery had no significant effect on postoperative vocal cord status.

Conclusion

The association of age, gender, type and technique of the surgery, indication for surgery, and the diagnosis of thyroid problem with the development of RLN palsy were statistically not significant.

Keywords: *Benign thyroid diseases; Recurrent laryngeal nerve; Thyroid surgery; Vocal cord palsy.*

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INTRODUCTION

One of the frequent surgeries performed in afflicted areas with iodine deficiency is thyroidectomy [1-2]. Total thyroid lobectomy is the total extracapsular removal of one thyroid lobe with isthmus and preserving the parathyroid gland and superior laryngeal nerve and recurrent laryngeal nerve (RLN) [3]. However, total thyroidectomy is the same procedure as total thyroid lobectomy on both sides during the same surgery [3].

The most frequent complications encountered, nearly half of all complications, are bleeding, hypoparathyroidism, and RLN palsy [1-2, 4]. Due to the increased frequency of performing thyroidectomies nowadays, RLN palsy has received more attention [5]. The incidence of RLN palsy is generally low; however, persistent hoarseness is a devastating lifelong handicap and has a tremendous negative impact and jeopardizes the patient's quality of life if it occurs [4, 6-7].

Unilateral RLN palsy can cause hoarseness of voice; however, bilateral RLN palsies lead to shortness of breath and life-threatening conditions due to glottal obstruction [2]. In addition, due to the wide variation of its anatomical locations, the right RLN has a higher risk of injury during surgery than the left RLN [2]. Besides, RLN palsy after thyroidectomies is a leading cause of litigation [8].

The RLN palsy incidence ranges from 0-14% in the literature [9-10]. Also, the incidence of persistent RLN palsy after thyroidectomy, which experienced surgeons perform, is 1-2% [10]. The incidence of RLN palsy is higher after re-exploration and carcinoma surgeries [11]. Thus, any method that decreases the incidence of RLN palsy has a tremendous interest [12]. One of the essential, effective, and safest ways to do that is anatomical and pathophysiological identifications and visualization of the RLN during all steps of the surgery combined with meticulous dissection and handling of the tissues [2, 5, 9, 13].

Visualization and assessment of vocal cords before and after thyroid surgery are essential [14]. However, assessments of the feasibility of the tools used for assessing the vocal cords are obtained by the Mallampati scoring system [15]. Further, the laryngeal views in the Mallampati scoring system have four grades; in which grades I and II are considered adequate exposure, and grades III and IV are considered inadequate exposure [16]: 1) Grade I: glottis can be fully exposed. 2) Grade II: glottis can be partially seen. 3) Grade III: glottis cannot be seen. 4) Grade IV: glottis and cornuate cartilage (or arytenoid cartilage) cannot be visualized.

Visualization of the vocal cords by laryngoscopy is considered the gold standard for diagnosing vocal cord paralysis, i.e., RLN palsy [14].

The aims were to know the incidence of vocal cord palsy in patients who underwent thyroid surgeries for benign diseases without using neuromonitoring in Sulaimani city and the effect of age, gender, indication for surgery, and surgical types on its incidence.

PATIENTS AND METHODS

We performed a prospective observational study on 112 patients admitted to the Otolaryngology/Head and Neck Surgery Department of Sulaimani Teaching Hospital and private hospitals in Sulaimani from May to October 2020. The patients were randomly selected using a simple random sampling method.

Research Ethical Committee of the Kurdistan Board of Medical Specialties (KBMS) approved the study proposal, and a formal acceptance letter was obtained from the Hospitals before starting the study. Also, informed consent has been taken from the patients for their inclusion in the study.

The inclusion criteria included patients of any age and gender who underwent thyroid surgery for medical or surgical benign causes. However, patients who had voice problems before surgery, malignancy of the thyroid, followed up for less than a month underwent surgery for the aerodigestive tract, or refused to participate in the study were excluded.

The data were taken from the patients' records and data collection forms. The demographic features, including age, and gender, were recorded. Symptoms due to hormonal imbalance, e.g., palpitation, sweating, heat intolerance, tremor, nervousness, agitation, anxiety, weight loss, fatigue, and irregular menstrual cycle, were recorded. Further, symptoms due to pressure effects, e.g., dyspnea, were also recorded. Besides, the indications, type and technique of thyroid surgery, preoperative vocal cord status, postoperative complications and vocal cord status, type and duration of voice changes, the need for postoperative tracheostomy, type and side of nerve palsy, thyroid function test (TFT), and indications mentioned, all were assessed.

The Mallampati scoring system was used to assess all the patients before assessing the vocal cords. Twenty-

eight patients were Mallampati class I, who easily were assessed by mirror examination, and 63 patients were class II, and they were easily evaluated using rigid indirect laryngoscopy. The remaining 21 patients were class III, and they were evaluated by a flexible indirect laryngoscope.

The "IBM SPSS Statistics version 25" was used to analyze the data, and both descriptive and inferential statistics were used. Further, a P-value of ≤0.05 was considered statistically significant. Also, Pearson Chi-Square was used to determine the significance of the association between categorical independent and dependent variable pairs.

RESULTS

The mean ± SD (standard deviation) of patients' ages was 43.5 ± 13.03 years, ranging from 21 to 75, and the majority were in their thirties and forties (Table 1). The distribution of gender of the patients was 19 (17%) male and 93 (83%) females, with a female to male ratio of 4.9:1 (Table 1).

There was no relation between demographic features and postoperative vocal cord palsies. However, the RLN palsy did not occur on the left side alone (Table 1).

Seventy eight (69.6%) patients had abnormal TFT (Figure 1).

Type of thyroid surgery, surgical technique, indications of the surgery, and diagnosis of the thyroid problem did not affect postoperative vocal cord status (Table 2).

However, 14 (12.5%) patients developed voice changes postoperatively (Table 3), and only one patient (0.9%) who developed permanent bilateral recurrent laryngeal nerve palsy needed a tracheostomy.

The mean ± SD of temporary voice change was 20.1 ± 26.8 days, ranging from 2 to 90 days, and the majority (80%) of the patients who suffered from temporary voice change and recovered were females (Table 4).

Table 1. Association of age groups and gender with postoperative vocal cord status.

Demographic features		Postoperative vocal cord status (%)					P-values
		Normal	Bilateral vocal cord palsy	Right vocal cord palsy	Normal but right side was in pain	Total (%)	
Age groups (year)	21 – 29	12 (10.7)	1 (0.9)	0 (0)	1 (0.9)	14 (12.5)	0.381
	30 – 39	37 (33)	1 (0.9)	0 (0)	0 (0)	38 (33.9)	
	40 – 49	23 (20.5)	2 (1.8)	0 (0)	0 (0)	25 (22.3)	
	50 – 59	18 (16.1)	0 (0)	1 (0.9)	0 (0)	19 (17)	
	60 – 69	11 (9.8)	0 (0)	1 (0.9)	0 (0)	12 (1.7)	
	70 – 75	4 (3.6)	0 (0)	0 (0)	0 (0)	4 (3.6)	
Gender	Male	18 (16.1)	1 (0.9)	0 (0)	0 (0)	19 (17)	0.898
	Female	88 (78.6)	3 (2.7)	1 (0.9)	1 (0.9)	93 (83)	
	Total	**106 (94.6)**	**4 (3.6)**	**1 (0.9)**	**1 (0.9)**	**112 (100)**	

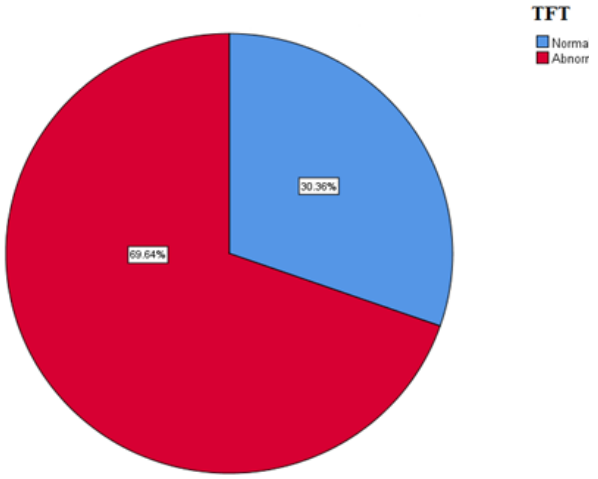

Figure 1. The frequency of abnormal thyroid function test (TST) among the patients.

Table 2. Associations of type of thyroid surgery, surgical technique, indications of surgery, and diagnosis with postoperative vocal cord status.

Thyroid surgery		Postoperative vocal cord status (%)					P-values
		Normal	Bilateral vocal cord palsy	Right vocal cord palsy	Normal but right side was in pain	Total (%)	
Type of thyroid surgery	Total thyroidectomy	77 (68.8)	4 (3.6)	1 (0.9)	1 (0.9)	83 (74.1)	
	Right lobectomy	17 (15.2)	0 (0)	1 (0.9)	0 (0)	18 (16.1)	0.732
	Left lobectomy	11 (9.8)	0 (0)	0 (0)	0 (0)	11 (9.8)	
Surgical technique	Both thyroid lobes and both RLN exploration	77 (68.8)	4 (3.6)	1 (0.9)	1 (0.9)	83 (74.1)	
	Right thyroid lobe and right RLN exploration	17 (15.2)	0 (0)	1 (0.9)	0 (0)	18 (16.1)	0.831
	Left thyroid lobe and left RLN exploration	11 (9.8)	0 (0)	0 (0)	0 (0)	11 (9.8)	
Signs and symptoms	Pressure symptoms	36 (32.1)	1 (0.9)	2 (1.8)	0 (0)	39 (34.8)	
	Clinical signs and symptoms of thyroid dysfunction	69 (61.6)	3 (2.8)	0 (0)	1 (0.9)	73 (65.2)	0.216
Diagnosis and indication of surgery	Multinodular goiter (MNG)	8 (7.1)	0 (0)	0 (0)	0 (0)	8 (7.1)	
	Hyperthyroidism multinodular goitre	23 (20.5)	1 (0.9)	0 (0)	0 (0)	24 (21.4)	
	Gravis	1 (0.9)	0 (0)	0 (0)	0 (0)	1 (0.9)	
	Hyperthyroidism	26 (23.2)	1 (0.9)	0 (0)	1 (0.9)	28 (25)	
	Gravis hyperthyroidism	17 (15.2)	2 (1.8)	0 (0)	0 (0)	19 (17)	0.112
	Thyroid nodule	23 (20.6)	0 (0)	1 (0.9)	0 (0)	24 (21.5)	
	Hyperthyroidism and thyroid nodule	5 (4.5)	0 (0)	0 (0)	0 (0)	5 (4.5)	
	Hypothyroidism and thyroid nodule	1 (0.9)	0 (0)	1 (0.9)	0 (0)	2 (1.8)	
	Colloid goiter	1 (0.9)	0 (0)	0 (0)	0 (0)	1 (0.9)	
	Total	**105 (93.8)**	**4 (3.6)**	**2 (1.8)**	**1 (0.9)**	**112 (100)**	

Table 3. Postoperative voice change type and duration after thyroid surgeries.

Type of voice change	Duration of voice change (%)			Total (%)
	Normal	Temporary	Permanent	
Normal	98 (87.5)	1 (0.9)	0 (0)	99 (88.4)
Hoarseness of voice	0 (0)	4 (3.6)	2 (1.8)	6 (5.4)
Low pitch voice	0 (0)	2 (1.8)	2 (1.8)	4 (3.6)
Weak breathy voice	0 (0)	2 (1.8)	0 (0)	2 (1.8)
Weakness of voice	0 (0)	1 (0.9)	0 (0)	1 (0.9)
Total	98 (87.5)	10 (8.9)	4 (3.6)	112 (100)

SD = standard deviation

Table 4. Distribution of duration of postoperative temporary voice changes according to age groups and gender of the patients.

Age groups (year)		Durations of temporary voice change (day)	Postoperative vocal cord status (%)			
			Bilateral vocal cord palsy	Right vocal cord palsy	Normal but right side was in pain	Total (%)
21-29	Female	90	0 (0)	0 (0)	1 (10)	1 (10)
30-39	Female	3	1 (10)	0 (0)	0 (0)	1 (10)
	Female	21	1 (10)	0 (0)	0 (0)	1 (10)
	Male	2	1 (10)	0 (0)	0 (0)	1 (10)
40-49	Female	4	1 (10)	0 (0)	0 (0)	1 (10)
	Female	14	1 (10)	0 (0)	0 (0)	1 (10)
	Female	4	1 (10)	0 (0)	0 (0)	1 (10)
50-59	Female	21	1 (10)	0 (0)	0 (0)	1 (10)
	Female	35	0 (0)	1 (10)	0 (0)	1 (10)
60-69	Male	7	1 (10)	0 (0)	0 (0)	1 (10)
Total			**8 (80)**	**1 (10)**	**1 (10)**	**10 (100)**

DISCUSSION

The incidence of RLN palsy varies; it is 0-14% in the literature [16-17], according to the surgeons' experience and the thyroid disease nature [9]. In the current study, the RLN palsy was present in six (5.4%) patients (Tables 1 and 2). Although we did not use intraoperative neuromonitoring due to the lack of facilities in our region, the incidence rate of RLN palsy was in the ranges reported in the literature [16-17]. Meticulous dissection of the thyroid and careful identification of RLN can reduce the rate of RLN palsy [27], which may explain the low incidence rate of RLN palsy in the current study.

Chen et al. [28] showed that ages more than 60 had a higher risk of RLN palsy (P-value = 0.01); however, in the current study, we did not find any relation between age with the complications. Besides, the study performed by Sarma et al. [9] showed that the most common indications for the thyroidectomy were colloid goitre followed by multinodular goitre (MNG), and the most commonest surgical procedure was hemithyroidectomy followed by total thyroidectomy. The current study also tried to find the associations between RLN palsy (i.e., vocal cord status) with age and gender of the patients, type of thyroid surgery, surgical technique, the indication of surgery, and final diagnosis of the thyroid diseases; however, these associations were statistically none significant (Tables 1 and 2).

Further, anatomical courses of the RLN on the sides of the neck may be the risk factor for right RLN palsy [9]. Also, the thyroid problems were all benign diseases in the current study; therefore, this may explain why their associations with RLN palsy were statistically none significant (Tables 1 and 2).

The recovery from RLN injury is indirectly proportional to the degree of injury [29]. Further, a watchful waiting policy is recommended in some thyroid diseases where the RLN is suspected or known to be intact [29]. Besides, corrective surgeries are not recommended until the end of the first six months postoperatively because reversible damages can improve during this period [29]. Therefore, we followed the patients up from one month to six months postoperatively in the current study, and 10 (8.9%) of patients with the voice changes recovered during the first three months (Tables 3 and 4).

In conclusion, RLN palsy is one of the complications of thyroidectomy. Besides, the age, gender, type and technique of the surgery, indication for surgery, and the final diagnosis of thyroid problem were not affecting the development of RLN palsy.

Limitations and Recommendations

The small sample size of the current study was the limitation; thus, we recommend performing the study on a larger sample. We also did not use neuromonitoring which may affect the results.

Conflict of interest

The authors declare no conflict of interest.

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