

# The incidence of vocal cord injury after thyroid surgery – An Assessment study

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## ABSTRACT

**Objective:** The purpose of this study is to assess the incidence of vocal cord injury after thyroid surgery, with respect to post-operative diagnostics of groups of patients in Al-Hussein Hospital and Prince Rashid Hospital in Jordan.

**Methods:** Assessment was conducted on patients that had gone through thyroid surgery in Al-Hussein Hospital and Prince Rashid Hospital in Jordan between 2014 and 2017. Retrospective data of the patients were collected using clinical records abstract form which was designed to collect the preoperative data. Patients suspected to have vocal cord palsy were scheduled for follow-up in the Otorhinolaryngology. On the other hand, steroids were intravenously administered to all the patients during their hospital stay, or orally for at least 10 days. Then all the patients were sent to the speech therapy clinic for evaluation.

**Results:** Based on the evaluation, it was found that thyroidectomy was conducted on 500 patients. Among these, 35 patients were exposed to total thyroidectomy while hemithyroidectomy was performed on 71 patients (right hemithyroidectomy on 38 patients, and left hemithyroidectomy on 33 patients). So 106 patients were suffering from vocal cord paralysis (VCP) which represents about 21.2% of the total studied cases. Overall, the post-operative diagnostics of the studied patients indicated that 39% of the cases were malignant.

**Conclusion:** Results showed that the incidence of vocal cord palsy post thyroid surgery was reported in 4.6% of the studied cases which is considered on the high side of reports worldwide.

**Key Words** Nerve Injury, Vocal Cord Paralysis, Thyroidectomy.  
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## Introduction

Disorders of the thyroid gland are considered of the most common endocrine diseases after diabetes mellitus [1]. In areas with chronic iodine deficiency (ID), the pervasiveness of nodular goiter and thyroid independence is greater [2]. It has been documented that the thyroid gland adjusts to iodine deficiency through diffused hyperplasia in the early phases. However, chronic exposure to iodine deficiency could result into nodular hyperplasia, increased colloid content, and enhanced follicular cell height [3].

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Thyroidectomy is one of the most common surgical procedures carried out in areas with iodine deficiency [4, 5, 6]. Thyroidectomy was associated with higher morbidity and mortality in the early 20th century [7]. However, there have been great improvements in anesthesia and antisepsis, surgical instrumentation, and surgical techniques. These have made thyroidectomy an effective and secure therapy over the years with acceptable morbidity, and no recorded cases of mortality [8,9,10]. Notwithstanding, recurrent laryngeal nerve paralysis (RLNP) and hypoparathyroidism are currently the major postoperative complications of thyroidectomy.

Recurrent laryngeal nerve (RLN) injuries are among the most dreaded complications after thyroid and parathyroid surgery [11]. This is basically because they can trigger substantial morbidity after surgery [13]. Generally, the recurrent laryngeal nerve inhibits all of the larynx's inherent structures except the cricothyroid muscle. Hence, injury to this nerve could induce paresis or paralysis of the vocal cord [14]. In the event of this, the patient would normally have postoperative dysphonia that may or may not be linked with deglutition or dyspnea. These symptoms might stop after a while and it may persist for longer periods depending on the sort of injury (e.g., heat, compression, stripping, and section) [14].

Notably, postoperative RLN injuries may be temporary or permanent. In fact, vocal cord paresis may occur without clear intraoperative nerve injury (i.e., direct section), e.g. only through intense stretching during gland retraction. Generally, permanent RLN injuries are reported in 0.5 percent to 5 percent of patients, while temporary injuries are reported in different surveys at a value of between 1 percent and 30 percent, depending on the rigidity of postoperative otolaryngological controls [15, 16, 17].

In the last few decades, the incidence of thyroid carcinoma has risen drastically [18]. Due to this, total thyroidectomy with or without dissection of the core compartment is usually the thyroid carcinoma therapy of choice. One of the most dreaded complications of this surgical procedure is vocal cord paralysis (VCP) due to the possible recurrent laryngeal nerve (RLN) injury. The notable symptoms of this include speech heaviness, speech fatigue, and aspiration. On the other hand, there is the possibility for palsy of the vocal cord which may be temporary or permanent [18, 19].

The objective of this study was to assess the incidence of vocal cord injury in patients from Al-Hussein Hospital and Prince Rashid Hospital in Jordan.

## METHODS

The assessment was conducted on patients who had previously gone through thyroid surgery at Al-Hussein Hospital and Prince Rashid Hospital in Jordan between 2014 and 2017. All operations were done by Jordan Medical Council board-certified surgeon; neuro monitoring was not used in all operations. The set of data used for the assessment was retrospectively collected and some of the patients were excluded from the assessment.

Patients found to have vocal cord palsy were scheduled for follow-up in the Otorhinolaryngology clinic and their follow-up times were decided by the ENT surgeon according to the severity of their symptoms. Generally, the initial follow-up was at two weeks and subsequent follow-up was based on severity. However, this would continue for at least every two months till recovery. All patients were given steroids intravenously during their hospital stay or orally for at least 10 days. Then all patients were sent to a speech therapy clinic to be evaluated by a speech pathologist. This also involves the follow-up of the Otorhinolaryngology clinic; perhaps there might be a need for further management which could be either Medialization or Cordotomy.

As regards the criteria for exclusion, all patients with vocal cord paralysis on preoperative assessment, and patients with revision surgery on the same side were excluded.

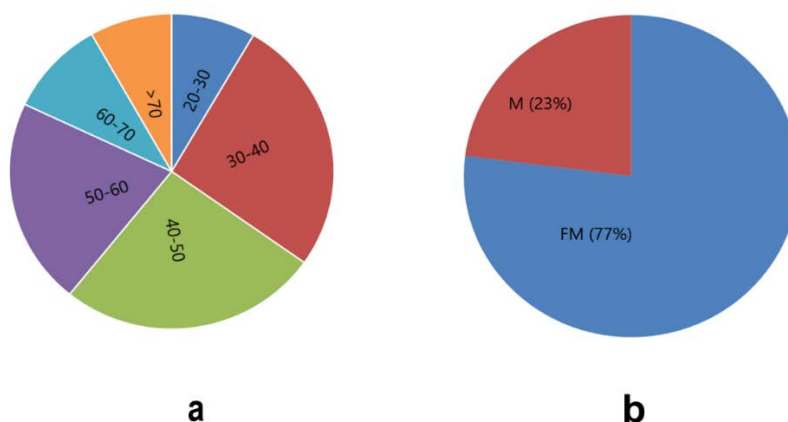
The clinical records Abstract form was designed to collect the preoperative data which includes age, gender, operation (total thyroidectomy, left hemi thyroidectomy, or right hemi thyroidectomy), as well as, the recurrent laryngeal nerve identification (yes/no). In addition, the collected data includes preoperative assessment of vocal cords movement (mobile, paralysis), and postoperative assessment of vocal cords movement (mobile, unilateral paralysis, bilateral paralysis, and histopathological diagnosis (Benign or malignant). Furthermore, the recovery time of the vocal cord recorded at the ENT follow-up was noted.

## RESULTS

During the study period, it was found that thyroidectomy was carried out on 500 patients (115 males and 385 females), with an average age of  $46.68 \pm 13.85$ . The age distribution of patients is shown in **Figure 1**. Based on the initial assessment after surgery results shown in **Table I**, it can be seen that 35(33%) of the patients underwent total thyroidectomy while 71 (0.67%) of the patients underwent hemi thyroidectomies (38 (35.85%) of right hemi thyroidectomies and 33 (31.13%) of left hemi thyroidectomies). In the case of the total thyroidectomy, 6 patients had bilateral recurrent nerve injury, 17 patients had right recurrent nerve injury and 12 patients had left recurrent injury. On the other hand, in the cases of hemi thyroidectomy, the surgery was done due to the recurrent nerve injury on the same side. As presented in **Figure 2** it can be seen that out of the 500 patients, 106 were suffering from vocal cord paralysis which represents about 21.2% of the total studied cases.

Results of the post-operative diagnostics of the studied patients are summarized in **Table II**. As can be seen in the Table, about 39% of the cases were malignant, 26% was due to Multi Nodular Goiter (MNG) disease, 3.8% was due to Graves' disease, and 8.6% of the cases were related to the Hashimoto thyroiditis. In addition, Follicular adenoma was responsible for about 10% of the studied cases, while only about 0.6% of the cases was due to the lymphocytic thyroiditis.

At one year follow up permanent VCP was reported in 4.6% of the patients as shown in **Table III**.

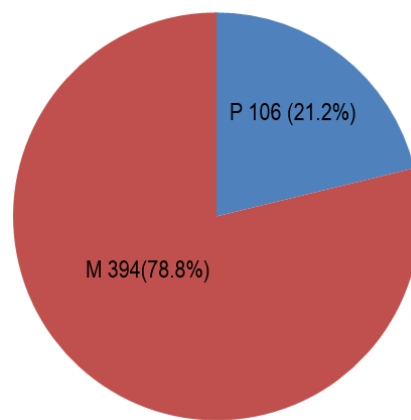


**Figure 1:** Demographic data of the studied patients (a): age distribution and (b): gender distribution.

**Table I:** Incidence of the VCP at initial assessment after surgery

	<b>Bilateral recurrent nerve injury</b>	<b>Right recurrent nerve injury</b>	<b>Left recurrent nerve injury</b>	<b>Total number of cases (%)</b>
Total Thyroidectomy	6 (17.1%)*	17(48.57%)*	12 (34.28%)*	35 (21.1%) <sup>•</sup>
Rt hemithyroidectomy	--	38	--	38 (21.2%) <sup>▲</sup>
Lt hemithyroidectomy	--	--	33	33 (21.3%) <sup>■</sup>
Total cases				<b>106</b>

\* % is calculated based on n = 35. <sup>•</sup> % calculated based on n = 166, <sup>▲</sup> % calculated based on n = 179, <sup>■</sup> % calculated based on n = 155

**Figure 2:** Number of patients with (P) vocal cord paralysis VCP, and (M) mobile vocal cord.**Table II:** Details of the post-operative diagnostics of the studied patients

<b>Post-operative diagnostics</b>	<b>Number of patients and (Percentages)</b>
Malignant	195 (39%)
Goiter (MNG)	130 (26%)
Graves' disease	19 (3.8%)
Hashimotos thyroiditis	43 (8.6%)
Lymphocytic thyroiditis	3 (0.6%)
Follicular adenoma	50 (10%)
others	60 (12%)

**Table III:** Incidence of the VCP at one year after surgery

	<b>Bilateral recurrent nerve injury</b>	<b>Right recurrent nerve injury</b>	<b>Left recurrent nerve injury</b>	<b>Total number of cases (%)</b>
Total Thyroidectomy	3	2	3	8 (22.8%) <sup>•</sup>
Rt hemi thyroidectomy	--	9	--	9 (23.6%) <sup>▲</sup>
Lt hemi thyroidectomy	--	--	6	6 (18.2%) <sup>■</sup>
Total cases				<b>23</b>

<sup>•</sup>% calculated based on n = 35, <sup>▲</sup>% calculated based on n = 38, <sup>■</sup>% calculated based on n = 33

## Discussion

Recurrent laryngeal nerve paralysis is the most severe complication in thyroid surgery [22]. It could lead to undesirable deficiencies in the quality of life, thereby adversely affecting job performance [23]. Recurrent laryngeal nerve palsy incidence has been associated with the extent of thyroidectomy, the presence of Graves' illness, thyroid carcinoma, and the need for reoperation [24, 25]. Postoperative infection was a significant complication of thyroidectomy at the start of the 20<sup>th</sup> century [26, 27]. However, nowadays, the general risk of postoperative wound infection is significantly low due to technological improvement in antisepsis and the steady progression of surgical methods.

In 1998, Wade et al stated that the RLN is very susceptible and should not be visualized or affected [28]. However, Bergamaschi et al demonstrated that temporary and permanent vocal palsy rates were not statistically different whether or not the RLN had been exposed [29]. Specifically, there was no statistically significant distinction in the levels of vocal paralysis for subtotal lobectomies within and without. Therefore, it can be inferred that higher degree of danger is associated with thyroid surgery compared to parathyroidectomy. This is because in thyroid surgery, bilateral neck exploration is more frequently conducted, which could pose the danger of 2 RLN.

As regard RLN injury, different treatments were defined based on the severity of the injury [31]. Whatever the case, talking or vocal exercises are generally the first steps. In the event of vocal cord surgery (e.g., transient or permanent vocal cord medialization), arytenoid cartilage resection may be provided in the event of definitive injury. However, when a 1-sided RLN injury occurred and was symptomatic, 3, 6, or 12 months of speech therapy was prescribed.

Generally, guidelines emphasize the significance of pre-and post-operative ENT examinations for several reasons in thyroid and parathyroid surgery [32]. Firstly, it enables accurate pre-operative evaluation of the motion of the vocal cord (landmark) and can serve as medicolegal evidence [33]. As such, intraoperative neuromonitoring was not used in this study, since the guidelines presently do not recommend routine use of neuromonitoring for thyroid surgery [34]. Although several articles have shown that the use of neuromonitoring did not decrease the risk of RLN injuries, the reports available in the literature reveal contradictory data [34].

## Conclusion

The results obtained from this study showed that the incidence of VCP post thyroid surgery in our practice is on the high side of reports in the world, and this can be improved by introducing Neuro monitoring especially for junior specialists, as well as, enhancing the training in the simulator labs.

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