Applying Translaryngeal Ultrasonography in Unilateral Vocal Cord Paralysis before Thyroid Cancer Reoperation: A Single Center Study

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Abstract

Background: One of the most dangerous complications of thyroid surgery is recurrent laryngeal nerve (RLN) paralysis. The gold standard method to assess this damage is Videolaryngoscopy. However, we aimed to modify this approach by using Translaryngeal Ultrasonography (TLUS). We performed TLUS with a highly trained thyroid sonographer and an endocrine surgeon in 47 patients with recurrent thyroid cancer and unilateral RLN paralysis preoperatively, and compared the results with Videolaryngoscopy. The experienced sonographer identified 45 injuries in 47 patients, and the endocrine surgeon found 39 vocal cord injuries. It appears that TLUS, when performed by experienced practitioners, is a more accurate and safe modality for assessing vocal cord function in the preoperative setting of thyroid cancer reoperation.

Keywords: Thyroid Surgery, Thyroid Cancer, Recurrent Laryngeal Nerve, Translaryngeal Ultrasound, Vocal Cords, Videolaryngoscopy

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Introduction

In recent years, advancements in knowledge, experience, diagnostic tools, and modalities have led to an increase in the rate of thyroid surgery for both benign and malignant diseases [1-3]. One of the most serious and significant complications of thyroidectomy is damage to the Recurrent Laryngeal Nerve (RLN), resulting in transient paresis or permanent paralysis, causing considerable discomfort and comorbidity for patients [4].

Pre-operative evaluation of suspected or documented unilateral RLN injury before reoperation is routinely performed by Videolaryngoscopy (Flexible fiberoptic laryngoscopy or Stereoboscopy), which is considered the gold standard technique. According to the American Thyroid Association (ATA) guideline, the overall indications for Videolaryngoscopy include patients with voice alteration, extrathyroidal extension of a thyroid tumor, and a positive history or clinical exam of suspected or confirmed RLN injury from a previous operation [5-6].

During the COVID-19 pandemic, Videolaryngoscopy became a high-risk procedure for physicians [7].

Therefore, we aimed to use a safer technique. One of the safest, quickest, non-invasive, inexpensive, and feasible modalities is Translaryngeal Ultrasonography (TLUS) for assessing vocal cord injuries pre and postoperatively, which has been investigated in multiple studies before [1, 7, 8]. In this study, we aimed to assess the results of applying TLUS in the preoperative setting of thyroid cancer reoperation.

Materials and Methods

From September 2020 to December 2023, we registered 47 patients with recurrent thyroid cancer (Papillary thyroid cancer: 44, Follicular thyroid cancer: 3) and unilateral iatrogenic vocal cord

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paralysis (Right: 20, Left: 27) at our service as a tertiary center for endocrine surgery in Shariati Hospital, Tehran University of Medical Sciences, Tehran, Iran.

The patients were referred from multiple general and thoracic surgeons around Iran, and 3 cases came from Afghanistan. The inclusion criteria were: a history of previous total thyroidectomy for thyroid cancer, evidence of recurrence (clinical, laboratory, and imaging studies), and a report of Videolaryngoscopy from other centers that revealed unilateral vocal cord paralysis. The age range was between 23 and 59, with 34 female patients and 13 male patients. The Body Mass Index (BMI) ranged between 22 and 37.

Initially, all the patients were referred to a highly trained thyroid sonographer for TLUS and, after completion of the pre-operative setting, they were scheduled for re-operation due to the recurrence of thyroid cancer in the bed of the thyroid or involvement of central nodes.

Before surgery, all patients were assessed by an Endocrine surgeon with TLUS and, after the induction of anesthesia, direct laryngoscopy was performed by a highly experienced anesthesiologist before intubation. Subsequently, all the results were collected.

Result

The assessment began with a comparison of the results from the four examinations, using the Videolaryngoscopy documents as a baseline. The TLUS results from the sonographer revealed the same paralysis in 45 patients. However, in another 2 patients, the operator couldn't detect the vocal cords. Both of these patients were male with a BMI over 33 and had short necks. The Endocrine surgeons' TLUS results were less accurate, identifying only 39 injuries according to the Videolaryngoscopy results. The direct laryngoscopy performed following the induction of anesthesia identified just 27 injuries.

Discussion

Recurrent Laryngeal Nerve (RLN) injury remains one of the most significant complications of thyroid and parathyroid surgery. It affects patients' quality of life and also influences surgical planning in cases requiring reoperation for thyroid cancer surgery [4, 7].

In recent years, many investigators have published studies about the use of Translaryngeal Ultrasonography (TLUS) for the assessment of vocal cords in different situations. They revealed a sensitivity and specificity of over 90-94% for this technique [9-14]. In our study, the sonographer was able to identify 45 correct injuries in 47 cases.

Wolff et al. published their prospective cohort study of 219 patients and compared the sensitivity, specificity, and accuracy of TLUS and Videolaryngoscopy. The results were 98%, 100%, and 98% respectively [8].

Patel et al.'s meta-analysis data revealed that TLUS is a feasible, repeatable, accurate, safe, and inexpensive modality for the assessment of vocal cord paralysis. This conclusion was based on 16 studies involving 3332 patients [15].

In one large study, TLUS was used for about 1000 patients and showed an accuracy of approximately 96.8%. It was found that a previous operation did not affect the results [10]. Wong et al., in their study, concluded that the use of TLUS could decrease the need for Videolaryngoscopy by about 96% preoperatively and 86% postoperatively [14].

Factors that have a negative impact on vocal cord visibility during TLUS include male patients, especially those with high BMI, and older patients. The duration of both procedures is the same and, according to physicians' experience, can be less than 2 minutes [7].

Conclusion

According to the literature and our study, we find that TLUS in experienced hands is feasible and inexpensive diagnostic modality and can alter Videolaryngoscopy and also can reduce cost and stress for patients. It's accurate and safe and can apply in some high-risk situation such as COVID-19 Pandemic.

Conflict of interest

Authors haven't any confliction in this study.

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