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Thyroid Gland Invasion in Laryngeal Carcinoma

ABSTRACT

Objective: To determine the prevalence of, and describe transglottic cancer with thyroid cartilage invasion as a possible risk for, thyroid gland invasion in a series of patients with laryngeal carcinoma who underwent total laryngectomy with thyroidectomy.

Methods:

Design: Retrospective Case Series

Setting: Tertiary Government Training Hospital

Participants: 61 laryngeal carcinoma patients who underwent total laryngectomy with hemi- or total thyroidectomy from January 2010 to August 2017.

Results: Out of 61 patients with laryngeal carcinoma, 11 patients had supraglottic, 11 glottic, 2 subglottic and 37 had transglottic involvement. Eleven had thyroid cartilage invasion, all of whom had transglottic tumors. Of these 11 patients, only 1 had thyroid gland invasion. This was a case of a 78 year-old male patient with poorly differentiated SCC stage IVa transglottic tumor with thyroid cartilage invasion.

Conclusion: Thyroid gland invasion was uncommon in our sample of laryngeal carcinoma patients who underwent laryngectomy and thyroidectomy. Although transglottic involvement with thyroid cartilage invasion may increase the risk of thyroid gland invasion, it could not be confirmed by our series. Perhaps thyroidectomy should not be routinely performed on all patients with laryngeal carcinoma who undergo total laryngectomy but more rigorous studies are needed to establish this.

Keywords: *laryngeal carcinoma, transglottic, thyroid cartilage invasion, thyroid gland invasion, thyroidectomy*

Total laryngectomy is the standard of care for operable squamous cell carcinoma (SCC) of the larynx.¹⁻² SCC of the larynx can spread to adjacent structures like the trachea, esophagus and thyroid gland.³ Invasion of the thyroid gland can be contiguous or non-contiguous via lymphovascular spread.⁴ The incidence of thyroid gland involvement in laryngo-pharyngeal cancer ranges from 0-23%.⁵⁻⁶

The need for thyroidectomy during total laryngectomy is controversial as thyroid gland invasion is rare and thyroidectomy is associated with long term morbidities.⁷⁻⁸ A meta-analysis by Mendelson *et al.* advised hemithyroidectomy in transglottic tumors, subglottic tumors and tumors

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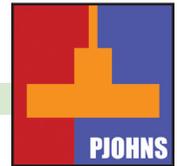
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with subglottic extension more than 10 mm.⁹ Other indications for thyroidectomy are palpable nodule,¹⁰ T3 and T4 lesion,^{5,9-13} transglottic growth,⁹⁻¹³ subglottic disease or extension more than 10 mm^{9-12,14-16} anterior commissure involvement^{5,12} and thyroid cartilage invasion.¹¹ A local study revealed that extralaryngeal spread, tracheostomal involvement and tracheal extension were associated with thyroid gland invasion.¹⁷ However, despite all these studies, thyroidectomy is still routinely done for laryngectomy cases in our institution. The NCCN 2017 Guideline for laryngeal cancer states that for glottic and supraglottic T3 tumors requiring (amenable) to total laryngectomy can undergo the procedure with ipsilateral thyroidectomy. For patients with glottic and supraglottic T4a tumors, the standard approach is total laryngectomy with thyroidectomy and neck dissection as indicated (depending on node involvement) followed by adjuvant treatment.¹⁸ Studies in the local setting may change prevailing guidelines about the need for thyroidectomy in laryngectomy.

Our study aims to determine the prevalence of, and describe transglottic cancer with thyroid cartilage invasion as a possible risk for, thyroid gland invasion in a series of patients with laryngeal carcinoma who underwent total laryngectomy with thyroidectomy.

METHODS

With institutional Ethical Review Board approval, we retrieved records of all patients who underwent laryngectomy with thyroidectomy of any type at our institution from January 2010 to August 2017. Excluded were incomplete records and those of laryngectomy without histopathologically-documented thyroidectomy.

Demographics such as age and sex of the patients were obtained. The laryngeal tumor extent, type of thyroidectomy and thyroid gland involvement were recorded based on reported histological analysis of pathological specimens by different pathologists. Data were tabulated using MS Word for Mac 2011 version 14.0.0 (100825) (Microsoft Corporation, Redmond, WA, USA). Data were analyzed using Epi Info 2017 Version 7 (Centers for Disease Control and Prevention, Atlanta, GA, USA). A descriptive analysis was performed using frequency and proportion for each subsite of laryngeal carcinoma that was treated with total laryngectomy with or without thyroid cartilage involvement and with or without thyroid gland invasion and results evaluated in the light of the reviewed literature.

RESULTS

Records of 64 patients were initially considered but only 61 met the inclusion criteria. Of the 3 records excluded from the study, 2 were incomplete while 1 reported a total laryngectomy without thyroidectomy. Of the 61 patients included in the study, 58 (95.1%)

were males and 3 (4.9%) were females. Their mean age was 62 years (range 48 to 78 years).

Twenty-seven patients underwent hemithyroidectomy (with isthmusectomy) while 34 had total thyroidectomy. Eleven had supraglottic involvement, 11 glottic, 2 subglottic and 37 transglottic. Out of the 37 transglottic cases, 11 had histopathologic thyroid cartilage invasion. Of these 11 transglottic cancers with thyroid cartilage involvement, only 1 (1.6%) had histopathologically-confirmed thyroid gland invasion.

DISCUSSION

Our study had a 1.6% prevalence of thyroid gland invasion among patients who underwent total laryngectomy with thyroidectomy for laryngeal SCC. Previous studies show prevalences ranging from 1-11%,^{1,11,14,15,17} supportive of our findings that suggest thyroid gland invasion is uncommon in patients undergoing total laryngectomy for laryngeal SCC. Given the varied sample sizes and clinical scenarios of these studies, there seems to be no significant geographical difference in the incidence rate of thyroid gland invasion.

We were also interested in transglottic involvement with thyroid cartilage invasion as a possible risk for thyroid gland invasion. In our study, the prevalence of thyroid gland invasion increases to 2.7% if we consider only transglottic tumors (or 1 out of 37 patients). The lesion has to invade through thyroid cartilage, cricoid cartilage or cricothyroid membrane to reach the extralaryngeal soft tissue.¹ A retrospective study by Iype *et al.* showed 30% increase in thyroid gland invasion among patients with pre-operative findings of thyroid cartilage erosion by CT scan.¹⁶ In our study, there were 11 cases with thyroid cartilage invasion confirmed through histopathology, all of which were transglottic tumors. Among these, only one had positive thyroid gland invasion, increasing the risk to 9.1% or 1 out of 11.

Laryngeal cancer is 4 times more common in males and 90% more common in patients more than 40 years old.⁹ Our patient with thyroid gland invasion was a 78 year-old male. It may be conjectured that he might have had ossified thyroid lamina that were more vulnerable to tumor invasion. Ossified portions of cartilage are potentially at higher risk for invasion because of vascular channel penetration, whereas intact perichondrium that surrounds avascular unossified cartilage resists tumor encroachment.¹⁹ Having said that, a meta-analysis by Mendelson *et al.* found that cartilaginous invasion by tumor was not a significant predictor of thyroid gland invasion.⁹

One drawback of the study is the limited number of cases with concomitant thyroid gland invasion. A multi-institutional study can be conducted to increase the number of cases. Another limitation is that it focused only on the subsite involved and presence of thyroid cartilage

invasion as possible risk factors for having thyroid gland invasion. Other parameters such as size of mass, presence of palpable lymph nodes and involvement of anterior commissure as possible risk factors for having thyroid gland invasion can be included in future studies. The quality and reliability of second-hand data retrieved from patient records add another limitation to our study. For instance, our study design cannot account for variability in qualifications and competence among the different pathology residents and pathologists who evaluated and cut the gross specimens, read the slides and issued final histopathology

reports. Future, controlled studies may address these issues.

Despite these considerations, thyroid gland invasion was uncommon in our sample of laryngeal carcinoma patients who underwent laryngectomy and thyroidectomy. Although transglottic involvement with thyroid cartilage invasion may increase the risk of thyroid gland invasion, it could not be confirmed by our series. Perhaps thyroidectomy should not be routinely performed on all patients with laryngeal carcinoma who undergo total laryngectomy but more rigorous studies are needed to establish this.

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