

ORIGINAL ARTICLE

Outcome of Novel Treatment of Thyroid Gland in Patients with Advance Carcinoma Larynx

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ABSTRACT

Background: Among the carcinomas Head and Neck surgeon encounter, carcinoma larynx is amongst the most commons. Thyroid gland is close to larynx so is its risk to be involved by laryngeal malignancies. Removing whole or part of thyroid gland may put the patient at risk of permanent or temporary hypothyroidism and hypoparathyroidism. In recent past a number of risk factors are nominated to predict invasion of thyroid gland by laryngeal malignancies. So, there is a need to re-consider the management of thyroid gland in total laryngectomy.

Aim: To justify the management of thyroid gland in advance carcinoma larynx.

Study design: The study is cross sectional Randomized Control Trial.

Place and duration of study: We conducted this study in ENT Unit I of Jinnah Hospital Lahore from June 2021 to May 2022.

Methodology: A total of 20 patients were included in this study and were randomly divided into two groups on the basis of management of thyroid gland. Group A underwent hemi thyroidectomy while thyroid sparing total laryngectomy was done in group B. Histological evaluation of thyroid Gland was done in group A in addition to analysis of local recurrence in both Groups. Mean duration of follow-up was 6 months. Data analysis was done by using SPSS software and is presented in tabulated forms as percentages.

Results: The study showed that thyroid gland was not involved in all cases of advance laryngeal malignancies thus obviating the need of total or hemithyroidectomy in all patients with advance Squamous Cell Carcinoma Larynx.

Practical implication: All the cases of advance laryngeal malignancies used to undergo total or at least hemithyroidectomy as bystander of total laryngectomy. This study helps the surgeon decide whether a patient with proven laryngeal malignancy needs thyroid gland manipulation or not, thus decreasing the morbidity of the patient and improving cost effectiveness.

Conclusion: This study made us reach to the conclusion that in patients with Grade I and II SCC, with no clinical or radiological involvement of thyroid and cricoid cartilage, thyroid gland, strap muscles or skin, there is no need for manipulation of thyroid gland in patients undergoing total Laryngectomy.

Keywords: Laryngeal Carcinoma, Thyroid Gland management, Total Laryngectomy with Hemi thyroidectomy,

INTRODUCTION

Incidence of laryngeal carcinoma is on rise¹ and so is the incidence of total laryngectomy. The procedure first coined by Bilroth in 1873 is the gold standard procedure in cases with advance laryngeal malignancies⁹. Among the Laryngeal Malignancies Squamous Cell Carcinoma is the predominant type. A number of associated risk factors are identified among which smoking ranks the top followed by alcohol abuse. Others include pan and tobacco chewing²¹ and Plummer Wilson Syndrome. Laryngeal Malignancies may also result from radiotherapy to neck as part of treating other head and neck malignancies and may be from direct extension from hypo pharyngeal or esophageal tumors.

There are three Primary sites from where laryngeal carcinomas arise. These are glottic, supra-glottic and subglottic. Among these glottis is the most common cause owing to minimum surface area and hence maximum exposure to smoke. This area also has least lymphatic³ and thus less chances of lymphatic spread. Second most common site is Supra glottic region followed by subglottic area. Both of these two sites are rich in lymphovascular structure and hence on maximum verge of distant metastasis. Since, the glottic carcinoma is most common and has least chances of distant metastasis; it makes it the most curable head and neck tumor with 5 year survival rate of almost 75%. There are a number of treatment modalities for treating biopsy proven laryngeal squamous cell carcinomas. For early stages T1 and T2 lesions, trans oral laser surgery, robotic surgery, radiotherapy and micro laryngeal surgery are the options with their own merits and demerits. But as the stage advances, organ preservation surgery is neither helpful in controlling disease nor treatment of choice.

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Advance tumors require more radical approach and thus have the options of vertical laryngectomy, supraglottic laryngectomy, near total and total laryngectomy depending upon the sites involved and available expertise. Most of the Head and Neck surgeons are expert in performing total laryngectomy making it the procedure of choice for T3 and T4 Laryngeal Squamous Cell Carcinomas.

Up till now almost all the patients who undergo total laryngectomy undergo total or at least hemi thyroidectomy as part and parcel of the procedure¹⁸. This is because there is a strong controversy as far as the management of thyroid gland in advance carcinoma larynx is concerned. Previously total thyroidectomy was the standard in total laryngectomy but recently trend has shifted toward ipsilateral hemi thyroidectomy with total laryngectomy or total thyroid sparing total laryngectomy. Total or hemi thyroidectomy is done in order to out risk the involvement of thyroid gland by direct or metastatic involvement by the tumor. Total thyroidectomy is associated with permanent hypothyroidism⁸ whereas hemi thyroidectomy poses risk of hypothyroidism² up to 52%⁵ in patients with total laryngectomy without neck irradiation and up to 70% in total laryngectomy with radiotherapy¹⁰ post-operatively. It requires lifelong management with thyroxin, recombinant Thyroid Stimulating Hormone, oral Calcium supplements, repeated visits to physician and more need of laboratory assessment of thyroid and calcium levels. It not only affects patients psychologically but also increases financial burden over patients. There are no such risks associated if thyroid sparing total laryngectomy is done¹⁵. Studies also suggest that thyroid gland management has least role in recurrences following treatment of Laryngeal Carcinomas²⁰. It is a common practice at

our setup to sacrifice ipsilateral half of the thyroid gland in all cases of advance carcinoma larynx irrespective of any evidence of direct extension of tumor into the thyroid gland. In the absence of thyroid gland involvement by tumor, both of the thyroid lobes can be preserved¹⁰. Now a few studies denote the factors upon which thyroid gland invasion in laryngeal Squamous cell carcinomas can be predicted^{4,6}. These factors include preoperative assessment based on 1. 70° Hopkins Telescopic finding i.e. significant involvement of anterior commissure^{7,12,16} 2. Radiological factors e.g. direct extension of tumor to the thyroid gland through thyroid or cricoid cartilage^{9,14}, subglottic extension >10mm tumor¹¹ 3. Histopathological feature of Biopsy Specimen that is a high grade (Grade III) Squamous Cell tumor¹³. In this study we will prospectively analyze the invasion of thyroid gland in total laryngectomy specimens based on telescopic, radiologic and histopathological findings who do not have any of the above mentioned clinical, radiological or histopathological factors, predictive of thyroid gland invasion and will analyze the results to guide whether the treatment modality of thyroid gland in all cases of carcinoma larynx needs to be changed or not.

METHODS

We conducted a prospective study over 20 patients who underwent total laryngectomy secondary to biopsy proven Squamous Cell Carcinoma of Larynx in ENT Unit I of Jinnah hospital Lahore from June 2021 to May 2022. Only those patients who were biopsy proven Grade I or Grade II primary Laryngeal Squamous Cell Carcinoma were included in disease. All those patients had reliable radiologist opinion on the basis of Contrast enhanced CT scan or Magnetic Resonance Imaging for evidence of thyroid or cricoid cartilage erosion or involvement, subglottic tumor extension >10 mm, gross clinical or radiological evidence of thyroid gland and strap muscles involvement or gross involvement of anterior commissure of larynx on 70° telescope. Histopathology report was done by expert histopathologist at our hospital. Any of the patients who had above mentioned radiological evidence, second primary, recurrent disease, primary pharyngeal or esophageal malignancies with laryngeal extension or Grade III Squamous Cell Carcinoma on Biopsy Specimens were excluded from study. All those patients who were not willing to take participate in the study were also eliminated from the research. We randomly divided the patients in two groups (Group A and Group B). Group A patients were those who were randomly selected for total laryngectomy with ipsilateral hemi thyroidectomy and Group B included the patients whom we done thyroid sparing total laryngectomy. For Group A we did histopathological analysis of resected specimen of thyroid gland along with laryngeal specimen for any evidence of direct or metastatic involvement of SCC in thyroid gland by expert histopathologist at our hospital. Group B was analyzed only for local recurrence. Both groups were followed up for up to 8 months in order to rule out local recurrence. Informed Consent was taken prior to procedure as per standard hospital protocols. Data analysis is done by using SPSS and is presented in tabulated forms as percentages. P value <0.05 is considered as statistically significant.

RESULTS

In this study, the results of gender showed overall male predominance owing to increase exposure to smoke and substance abuse in our setup. In Group A Total Laryngectomy with Hemi-thyroidectomy, 9(90%) were males and 1(10%) was female, while in Group B which underwent Thyroid Sparing Total Thyroidectomy, 8(80%) were males and 2(20%) were females (Table-1).

Table 2 shows the mean age of patients we selected in our study. In patients undergoing Total Laryngectomy with Hemi-thyroidectomy, the mean age was 56.90±11.445 years, while in patients with Thyroid Sparing Total Laryngectomy, the mean age

was 58.90±10.482 years. In Group A, 3(30%) patients had ages ≤50 years and 7(70%) patients had >50 years and the analysis was same for other group as well (Table-2).

None of the patients in either group had direct involvement of thyroid gland with direct tumor extension or indirect tumor metastasis. The p-value showed insignificant difference (p=1.000) (Table-3).

In Group A, recurrence was noted in 1(10%) patients, while in Group B in patients undergoing Thyroid Sparing Total thyroidectomy, recurrence was noted in none of patients. The p-value showed insignificant difference (p=0.305). It was concluded that thyroid gland manipulation is not associated with increased risk of tumor recurrence (Table-4).

Table-1: Comparison of gender distribution between groups

Gender	Groups		Total
	Total Laryngectomy with Hemi-thyroidectomy	Thyroid Sparing Total Laryngectomy	
Male	9 90.0%	8 80.0%	17 85.0%
Female	1 10.0%	2 20.0%	3 15.0%
Total	10 100.0%	10 100.0%	20 100.0%

Table-2: Comparison of age distribution between groups

Age groups	Groups		Total
	Total Laryngectomy with Hemi-thyroidectomy	Thyroid Sparing Total Laryngectomy	
≤50 years	3 30.0%	3 30.0%	6 30.0%
>50 years	7 70.0%	7 70.0%	14 70.0%
Total	10 100.0%	10 100.0%	20 100.0%

Table-3: Comparison of metastasis in thyroid gland distribution between groups

Metastasis in thyroid gland	Groups		Total
	Total Laryngectomy with Hemi-thyroidectomy	Thyroid Sparing Total Laryngectomy	
Yes	0 0.0%	0 0.0%	0 0.0%
No	10 100.0%	10 100.0%	20 100.0%
Total	10 100.0%	10 100.0%	20 100.0%

P value 1.000

Table-4: Comparison of recurrence in follow-up distribution between groups

Recurrence in follow-up	Groups		Total
	Total Laryngectomy with Hemithyroidectomy	Thyroid Sparing Total Laryngectomy	
Yes	1 10.0%	0 0.0%	1 5.0%
No	9 90.0%	10 100.0%	19 95.0%
Total	10 100.0%	10 100.0%	20 100.0%

P value 0.305

DISCUSSION

Laryngeal Malignancies are the second most common Head and Neck Malignancies. The most common acquired risk factors are smoking and alcohol abuse¹⁷. The most common site of laryngeal malignancy is the glottic region owing to increase exposure of smoke as it has the narrowest part of larynx. As per most of the tumors, laryngeal tumors also spread along the path of least resistance. For low and intermediate grade tumors it is unlikely to

invade or erode laryngeal cartilages in short periods and early stages. But as the thyroid gland closely lies over the cricothyroid membrane, which is a weak structure and hence can be easily invaded by the tumor, thus increasing chances of thyroid gland to be involved by the primary laryngeal Squamous Cell Carcinoma. Additionally, there is discrete prelaryngeal lymph nodes present which may harbor tumor cells and act as nidus for metastatic cells via extracapsular extension. Involvement of these lymph nodes also poses risk for involvement of thyroid gland by the laryngeal Malignancies. Tumors present at the anterior commissure have more chances of invading and eroding thyroid cartilage and cricoid cartilage. Subglottic extension further adds the risk of gaining access to lymphovascular structures and hence corresponding increased risk of thyroid gland. Involvement of these structures upgrades the tumor stage and thus increases chances of advance local or distant spread.

Standard procedure for advance stage tumor is total laryngectomy with or without post-operative radiotherapy. For years thyroidectomy has been the bystander of total laryngectomy. Management of thyroid gland in patients with laryngeal Carcinoma, who have to undergo Total laryngectomy, is a topic of debate. Initially total thyroidectomy was standard treatment in all cases of SCC larynx undergoing total laryngectomy owing to its close approximation to laryngeal skeleton and hence maximum chances of involvement by the tumor. However, recent retrospective studies of resected specimens favored that total thyroidectomy must not be the treatment of choice as there was not significant involvement of contralateral lobe of thyroid gland. So, the trend shifted towards the consideration of conserving contralateral thyroid lobe as part and parcel of the procedure. For decades Total laryngectomy with ipsilateral hemi thyroidectomy has been the treatment of choice by head and neck surgeons worldwide. Both total thyroidectomy and hemi thyroidectomy may render the patient at risk of permanent or temporary hypothyroidism and/or hypoparathyroidism¹⁹ leaving patients on the mercy of permanent replacement with Thyroxin and Calcium supplements respectively adding to their morbidity and increasing cost, no of hospital visits and financial burden both over the patient and the hospital. However no risk of hypothyroidism or hypoparathyroidism is associated with Thyroid sparing Total Laryngectomy¹⁵.

Studies conducted in the past decades denote the factors upon which thyroid gland invasion secondary to SCC Larynx can be predicted. In our research, we selected only those patients whose clinical, radiological and histopathological features suggested to least likely involving thyroid gland by primary laryngeal tumor. We classified patients randomly into two groups. Group A patients were those who were randomly selected for total laryngectomy with hemi thyroidectomy and Group B included the patients who were to undergo thyroid sparing total laryngectomy. For group A we did histopathological analysis of resected specimen of thyroid gland along with laryngeal specimen for any evidence of direct or metastatic involvement of SCC in thyroid gland and their follow up for any evidence of local recurrence. Group B was analyzed only for local recurrence. Most of the recurrences in primary laryngeal tumors occur in the first year, and among first year mostly in the first 6 to 8 months. We did follow up of all patients over the 8 months and concluded that in the absence of risk factors predictive of thyroid gland involvement by laryngeal Squamous Cell Carcinoma, there is need to shift the practice to thyroid sparing total laryngectomy as thyroid gland is unlikely to harbor any residual disease. There was no statistically significant difference between the two groups as far as the incidence of tumor recurrence was concerned and hence it is statistically proven that even hemi thyroidectomy is not justifiable in all cases of Advanced Laryngeal Carcinoma. Limitations of the study are related to sample size and inadequate time for follow-up. A larger sample size and follow up time period of at least 18 to 24 months can overcome the pitfall.

CONCLUSION

After thorough analysis of final histopathology report and 6 to 8 month follow-up, it was concluded that incidence of thyroid gland invasion by laryngeal carcinoma is negligible in the absence of predictive factors. Our study showed that none of the specimens in our group who underwent ipsilateral hemi thyroidectomy had any evidence of direct or microscopic involvement by the tumor. There was also statistically insignificant difference between the rate of local recurrence over the period of 8 months among two groups. So it was concluded that these predictive factors, if analyzed reliably and preoperatively, can help surgeon decide the management of thyroid gland before commencing total Laryngectomy. It not only decreases morbidity of the patient but poses minimal tissue handling and better surgical outcomes. So, we have come to the consensus that even Hemi thyroidectomy is not justifiable in all cases of advance laryngeal SCC. Thyroid gland must not be resected partially or totally in all cases of Laryngeal Malignancies.

Conflict of interest: Nil

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