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Oncologic and functional outcomes of pretreatment tracheotomy in advanced laryngeal squamous cell carcinoma: A multi-institutional analysis

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ABSTRACT

Objectives: Describe the influence of pretreatment tracheotomy and treatment modality (surgical versus non-surgical) on oncologic and functional outcomes.
Materials and methods: Retrospective study of previously untreated advanced-stage laryngeal squamous cell carcinoma patients at two academic tertiary care institutions from 1995 to 2014.
Results: Primary outcomes evaluated were disease-free survival, disease-specific survival, and overall survival of pretreatment tracheotomy versus no pretreatment tracheotomy cohorts. Functional status, measured by tracheotomy decannulation and gastrostomy tube placement/removal, was assessed. Of the 226 patients, 31.4% underwent pretreatment tracheotomy. Five-year disease-specific survival was 72.9%, and overall survival was 48.8% for entire cohort. There was a statistically significant decrease in overall survival ($p = .03$) and disease-free survival ($p = .02$) for the pretreatment tracheotomy group compared to no pretreatment tracheotomy, which was largely explained by primary tumor stage. Pretreatment tracheotomy was associated with gastrostomy tube placement and was an independent predictor of worse odds of gastrostomy tube removal. Disease stage, distant metastasis, and age independently conferred worse odds of gastrostomy tube removal.
Conclusion: Patients undergoing pretreatment tracheotomy for primary T4 laryngeal cancer had decreased overall survival compared to patients without pretreatment tracheotomy. There was no difference in local recurrence rates based on tracheotomy status. Organ preservation with chemotherapy and radiation did not result in better functional outcomes than surgery in the pretreatment tracheotomy group as nearly half of patients treated with organ preservation remained tracheotomy dependent. Based on this data, pretreatment tracheotomy may impact oncologic and functional outcomes in advanced disease, and it should be a consideration in an informed decision-making process.

Introduction

The management of advanced stage laryngeal squamous cell carcinoma (SCCA) continues to be debated. Both the Veteran's Affairs (VA) Laryngeal Trial and the Radiation Therapy Oncology Group (RTOG) Trial 91-11 have shown similar survival rates between surgical and non-surgical (organ preservation) cohorts [1,2]. However, there is compelling evidence that the increased treatment of locally advanced laryngeal

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Table 1
Patient demographics and clinical variables.

	Overall N = 226	No PreTx trach N = 155	PreTx trach N = 71	p-value	No G-tube N = 140	G-tubed N = 122	p-value
Institution, n (%)				0.93			**0.011**
SLU	66 (29.2)	45 (29.0)	21 (29.6)		39 (37.5)	27 (22.1)	
MEE	160 (70.8)	110 (71.0)	50 (70.4)		65 (62.5)	95 (77.9)	
Sex, n (%)				0.39			0.44
Male	160 (70.8)	107 (69.0)	53 (74.7)		71 (68.3)	89 (72.9)	
Female	66 (29.2)	48 (31.0)	18 (25.3)		33 (31.7)	33 (27.1)	
Age, n (%)				0.16			0.80
< 50	21 (9.3)	12 (7.7)	9 (12.9)		9 (8.7)	12 (9.9)	
50–64	105 (46.7)	75 (48.4)	30 (42.9)		51 (49.0)	54 (44.6)	
65 and older	99 (44.0)	68 (43.9)	31 (44.3)		44 (42.3)	55 (45.5)	
Primary site, n (%)				0.25			0.08
Supraglottis	153 (67.7)	109 (70.3)	44 (62.0)		69 (66.4)	84 (68.9)	
Glottis	65 (28.8)	42 (27.1)	23 (32.4)		34 (32.7)	31 (25.4)	
Subglottis	6 (2.7)	4 (2.6)	2 (2.8)		0	6 (2.6)	
Hypopharynx	1 (0.4)	0 (0.0)	1 (1.4)		0	1 (0.44)	
Unclear	1 (0.4)	0 (0.0)	1 (1.4)		1 (0.97)	1 (0.44)	
T Stage n (%)				**< 0.0001**			0.10
T1	5 (2.2)	5 (3.2)	0 (0.0)		5 (4.8)	0	
T2	33 (14.6)	29 (18.7)	4 (5.6)		14 (13.5)	19 (15.6)	
T3	95 (42.0)	74 (47.7)	21 (29.6)		42 (40.4)	53 (43.4)	
T4	93 (41.1)	47 (30.3)	46 (64.8)		43 (41.4)	50 (41.0)	
N Stage, n (%)				0.92			0.49
N0	84 (37.2)	58 (37.4)	26 (36.6)		39 (37.5)	45 (38.9)	
N1	40 (17.7)	25 (16.1)	15 (21.1)		23 (22.1)	17 (13.9)	
N2a	12 (5.3)	8 (5.2)	4 (5.6)		6 (5.8)	6 (4.9)	
N2b	35 (15.5)	26 (16.8)	9 (12.7)		15 (14.4)	20 (16.4)	
N2c	50 (22.1)	35 (22.6)	15 (21.1)		20 (19.2)	30 (24.6)	
N3	5 (2.2)	3 (1.9)	2 (2.8)		1 (0.96)	4 (3.3)	
Mets at diagnosis, n (%)				0.50			0.28
No	225 (99.6)	154 (99.3)	71 (100.0)		103 (99.0)	122 (1 0 0)	
Yes	1 (0.4)	1 (0.7)	0 (0.0)		1 (0.96)	0	
Overall Stage, n (%)				**0.01**			0.37
3	63 (27.9)	51 (32.9)	12 (16.9)		32 (30.8)	31 (25.4)	
4	164 (72.1)	104 (67.1)	59 (83.1)		72 (69.2)	91 (74.6)	
Primary Tx, n (%)				**< 0.0001**			**0.028**
Surgery	41 (18.1)	27 (17.4)	14 (19.7)		21 (20.2)	20 (16.4)	
Chemorads	100 (44.3)	79 (51.0)	21 (29.6)		35 (33.7)	65 (53.3)	
Surgery + Adj Tx	71 (31.4)	35 (22.6)	36 (50.7)		40 (38.5)	31 (25.4)	
Rads	14 (6.2)	14 (9.0)	0 (0.0)		8 (7.7)	6 (4.9)	
Local Recur, n (%)				0.33			**0.010**
No	190 (84.4)	131 (85.1)	59 (83.1)		95 (91.4)	95 (78.5)	
Yes	34 (15.1)	23 (14.9)	11 (15.5)		8 (7.7)	26 (21.5)	
Unclear	1 (0.4)	0. (0.0)	1 (1.4)		1 (0.96)	0	
Regional Recur, n (%)				0.85			0.97
No	199 (88.1)	137 (88.4)	62 (87.3)		92 (88.5)	107 (87.7)	
Yes	25 (11.1)	17 (11.0)	8 (11.3)		11 (10.6)	14 (11.5)	
Unclear	2 (0.9)	1 (0.7)	1 (1.4)		1 (0.96)	1 0.82)	
Distant metastasis, n (%)				0.39			0.67
No	178 (78.8)	124 (80.0)	54 (76.1)		83 (79.8)	95 (77.9)	
Yes	45 (19.9)	30 (19.4)	15 (21.1)		19 (18.3)	26 (21.3)	
Unclear	3 (1.3)	1 (0.6)	2 (2.8)		2 (1.9)	1 (0.82)	

*adj tx, adjuvant treatment; chemorads, chemoradiation; MEE, Massachusetts Eye and Ear Infirmary; mets, metastasis; n, number; Pretx trach, pretreatment tracheotomy; rads, radiation; recur, recurrence; SLU Saint Louis University; tx, treatment; Bold indicates statistically significant differences in assortment of clinical characteristics between groups.

cancer with chemoradiation is implicated in decreased overall survival when comparing the pre- and post-organ preservation eras [3]. Others have found that outcomes for stage III disease were comparable between non-surgical and surgical treatment types but improved with total laryngectomy for stage IV laryngeal cancer [4].

The need for tracheotomy at the time of patient presentation and prior to the initiation of laryngeal cancer management is both a marker of more advanced disease and laryngeal dysfunction. A normally functioning larynx has intact sensory and motor functions that allow for airway protection during deglutition. Tracheotomy may be performed because of disease encroachment of the airway or for pulmonary toilet in the setting of chronic aspiration related to laryngopharyngeal dysfunction. Several authors have demonstrated that a larynx with impaired function due to locally advanced cancer will not recover function following organ preservation therapy [5–7]. Given this clinical observation, the goal of organ preservation, which intends to preserve function in the setting of a dysfunctional larynx affected by advanced stage cancer, may not be successful. The presence of a persistent tracheotomy with the accompanying dysphagia and aspiration following non-surgical management of advanced stage laryngeal cancer may have far reaching impact on the quality of life that should be taken into consideration as patients are counseled regarding their treatment