

# Impact of nodal yield at a single institution in patients undergoing neck dissection and total laryngectomy



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## Abstract

**BACKGROUND:** There has been recent emphasis on lymph node yield during neck dissection in patients with head and neck squamous cell carcinoma (HNSCC).

**OBJECTIVE:** To determine the impact of nodal yield in patients undergoing neck dissection at the time of total laryngectomy (TL) at a single institution.

**DESIGN, SETTING, AND PARTICIPANTS:** Retrospective chart review of patients undergoing primary or salvage TL with unilateral or bilateral neck dissection between January 2008 and July 2016.

**MAIN OUTCOMES AND MEASURES:** Lymph node yield (LNY), lymph node ratio (LNR), total number of positive nodes, and extranodal extension (ENE) status were determined for all patients. Primary outcome measures were overall survival (OS) and disease-free survival (DFS).

**RESULTS:** A total of 232 patients underwent TL with neck dissection including 131 patients with no prior history of radiation (RT) and 101 patients that underwent salvage TL. Preoperative RT significantly decreased mean LNY from 29.6 to 21.9 nodes ( $p < .001$ ). Multivariate analysis demonstrated that OS was associated with a LNR greater than .026 (HR 2.48; 95% CI, 1.58 – 3.92,  $p < .001$ ), positive ENE (HR 1.71; 95% CI, 1.12 – 2.63,  $p = .013$ ), and salvage TL (HR 1.58; 95% CI 1.04 – 2.40,  $p = .031$ ). Similarly, DFS was associated with LNR greater than .026 (HR 2.70; 95% CI, 1.55 – 4.69,  $p < .001$ ), positive ENE (HR 2.42 (95% CI, 1.43 – 4.08,  $p < .001$ ), and salvage TL (HR 2.99; 95% CI, 1.79 – 4.99,  $p < .001$ ). LNY and total number of positive nodes had no impact on OS or DFS.

**CONCLUSIONS AND RELEVANCE:** Within a single institution, the importance of nodal yield during neck dissection is unclear. Previous RT significantly reduces the nodal yield during total laryngectomy and neck dissection. Lymph node ratio, ENE, and salvage laryngectomy are independent prognostic risk factors for overall survival and recurrence in patients undergoing TL with neck dissection.

## Introduction

Although the overall trend in neck dissection has been towards more selective neck dissection, there has been recent focus on the extent of regional lymph node dissection, specifically lymph node yield (LNY). Multiple studies have shown the significance of LNY in patients undergoing elective neck dissection for oral cavity cancer<sup>1-3</sup> and all HNSCC subsites,<sup>4-5</sup> with LNY less than 18 associated with poorer overall survival. These results have led to the consideration of LNY as a possible quality metric in head and neck cancer care.<sup>6</sup> The purpose of this study was to determine the impact of LNY in patients undergoing neck dissection at the time of total laryngectomy.

## Methods and Materials

- 232 patients identified who underwent primary or salvage TL with unilateral or bilateral neck dissection from a database of 278 consecutive who underwent TL from January 2008 to July 2016 at a single tertiary academic medical center.
- Patients with history of previous neck dissection were excluded.
- The average of the 2 sides was used to calculate the LNY in patients with bilateral neck dissection.
- Impact of prognostic variables on OS and DFS were determined with Cox proportional hazard regression analyses, for both univariable and multivariable analyses.

## Results

**Table 1.** Demographics/Pathologic Characteristics by Indication for TL.

	All TL (n = 232)	Primary TL (n = 131)	Salvage TL (n = 101)	p-value
<b>Age (years)</b>				
Mean	65.1	64.0	66.4	0.058
<b>Gender</b>				
Male	187 (81)	105 (80)	82 (81)	0.869
Female	45 (19)	26 (20)	19 (19)	
<b>Neck Dissection</b>				
Bilateral	217 (94)	126 (96)	91 (90)	0.161
Unilateral	15 (6)	5 (4)	10 (10)	
<b>T Stage</b>				
T1	7 (3)	0	7 (7)	<.001
T2	25 (11)	4 (3)	21 (20)	
T3	70 (30)	35 (27)	35 (35)	
T4a	130 (56)	92 (70)	38 (38)	
<b>N Stage</b>				
N0	116 (50)	49 (37)	67 (66)	<.001
N1	28 (12)	15 (11)	13 (13)	
N2a	2 (1)	2 (2)	0 (0)	
N2b	27 (12)	23 (18)	4 (4)	
N2c	52 (22)	36 (27)	16 (16)	
N3	7 (3)	6 (5)	1 (1)	
<b>Lymph Node Yield</b>				
Mean (Range)	26.2 (4 – 68)	29.6 (4 – 68)	21.9 (4 – 57)	<.001
<b>Lymph Node Yield</b>				
≥ 18	168 (72)	111 (85)	57 (56)	<.001
< 18	64 (28)	20 (15)	44 (44)	
<b>Lymph Node Ratio</b>	0.05	0.06	0.03	<.001
<b>Total Positive Nodes</b>				
Mean (Range)	1.97 (0 – 21)	2.68 (0 – 21)	1.05 (0-16)	<.001
<b>Extranodal Extension</b>				
No	138 (65)	68 (55)	70 (77)	.003
Yes	76 (35)	55 (45)	21 (23)	

**Table 2.** Overall Survival: Multivariate Analysis **Table 3.** DFS: Multivariate Analysis

	HR (95% CI)	p-value		HR (95% CI)	p-value
<b>Lymph Node Ratio</b>	2.49 (1.58 – 3.92)	<.001	<b>Lymph Node Ratio</b>	2.70 (1.56 – 4.69)	<.001
<b>Extranodal Extension</b>	1.72 (1.12 – 2.63)	.013	<b>Extranodal Extension</b>	2.42 (1.43 – 4.08)	<.001
<b>Salvage TL</b>	1.58 (1.04 – 2.39)	.031	<b>Salvage TL</b>	2.99 (1.79 – 4.99)	<.001

## Conclusions

- Previous radiation therapy significantly reduces the nodal yield during neck dissection.
- Lymph node ratio, rather than lymph node yield, during neck dissection for laryngeal cancer is associated with overall survival and disease-free survival.
- ENE and salvage laryngectomy are independent prognostic risk factors for overall survival and recurrence in patients undergoing TL with neck dissection.

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