Risk of contralateral lymph node metastasis in oral tongue squamous cell carcinoma

Anya Forma, BS[1]; Marcin Marciniak, BS[1]; Sean A. Setzen, MD[2]; Mihir K. Bhayani MD[2]
[1]Rush University Medical College, [2]Rush University Medical Center

Introduction

In lateralized oral tongue squamous cell carcinoma (OTSCC), ipsilateral neck assessment remains the standard of care. The American Society of Clinical Oncology recommends that an elective contralateral neck dissection may be considered for select patients with a clinically negative (cN0) contralateral neck[1]. However, definitive guidelines are lacking regarding specific clinical and tumor factors that predict contralateral neck metastasis. This study aims to determine the incidence of contralateral lymph node metastasis and to identify clinicopathologic factors associated with this risk.

Methods

Utilizing the Leaf database to screen appropriate ICD-10 codes of OTSCC, patient records from a single institution were collected from 2014 to 2024. Clinical and tumor characteristics were gathered, including tumor depth of invasion (DOI), midline involvement, differentiation, worst pattern of invasion (WPOI) status, lymphovascular invasion, perineural invasion, pathologic T stage, smoking history, and alcohol use history, to assess potential correlations with contralateral metastatic risk. Associations were analyzed using chi-square and Fisher's exact tests. Fisher's exact tests were applied for both 2x2 and larger contingency tables, with post-hoc pairwise analyses conducted for levels within cell differentiation and pathologic T stage. Relative Risk and Odds Ratios were calculated as well. All statistical analyses were performed using RStudio (Version 2024.04.2+764).

Table 1. Binary predictors of contralateral lymph node (CLN) metastasis.

Variable	CLN+ / N (Exposure= Yes)	Risk % (Yes)	CLN+ / N (Exposure= No)	Risk % (No)	OR (95% CI)	RR (95% CI)	p (Fisher)
Perineural invasion (PNI)	14 / 77	18.2	4 / 113	3.5	6.06 (1.91–19.2)	5.14 (1.76–15.0)	0.0016
Lymphovascular invasion (LVI)	9 / 46	19.6	9 / 143	6.3	3.62 (1.34–9.78)	3.11 (1.31–7.36)	0.0169
Smoking history	13 / 106	12.3	6 / 88	6.8	1.91 (0.69–5.26)	1.80 (0.71–4.54)	0.233
DOI ≥0.4 cm	16 / 142	11.3	1 / 29	3.4	3.56 (0.45–27.9)	3.27 (0.45–23.7)	0.312
Alcohol history	8 / 73	11.0	9 / 108	8.3	1.35 (0.50–3.69)	1.32 (0.53–3.25)	0.608
Prior HNC	3 / 43	7.0	14 / 149	9.4	0.72 (0.20–2.64)	0.74 (0.22–2.47)	0.768
Midline involvement	1 / 11	9.1	16 / 171	9.4	0.97 (0.12–8.06)	0.97 (0.14–6.67)	1.000
Primary bone invasion†	1 / 6	16.7	4 / 17	23.5	0.65 (0.06–7.32)	0.71 (0.10–5.15)	1.000

Table 1. Binary predictors of contralateral lymph node (CLN) metastasis.

Variable	CLN– (n)	CLN– mean (SD)	CLN+ (n)	CLN+ mean (SD)	p (t-test)
BMI (kg/m²)	169	27.9 (6.28)	17	22.6 (4.88)	0.00045
Age at diagnosis (years)	175	61.2 (14.6)	19	61.2 (15.0)	0.998

Results

Of 195 patients with OTSCC, 9.7% (19/195) had CLN metastasis. Among the CLN-positive cases, 94% (16/17 with available DOI) had tumor DOI ≥0.4 cm, 6% (1/17) had midline involvement, and 68% (13/19) had a smoking history. In univariate 2×2 analyses, perineural invasion (PNI) and lymphovascular invasion (LVI) were significantly associated with CLN metastasis. DOI ≥0.4 cm showed a similar direction but did not reach statistical significance (RR 3.27, 95% CI 0.45–23.7; OR 3.56, 0.45–27.9; p = 0.312), likely reflecting sparse events in the <0.4 cm group.

Smoking history, alcohol history, prior head and neck cancer, midline involvement, and primary bone invasion were not significantly associated with CLN metastasis in this dataset (all p ≥ 0.23). For continuous variables, CLN-positive patients had lower BMI (mean 22.6 vs. 27.9 kg/m²; p = 0.00045), whereas age at diagnosis was virtually identical between groups (61.2 vs. 61.2 years; p = 0.998).

Figure 1. Squamous cell carcinoma of left lateral oral tongue. Image provided by Research Gate.

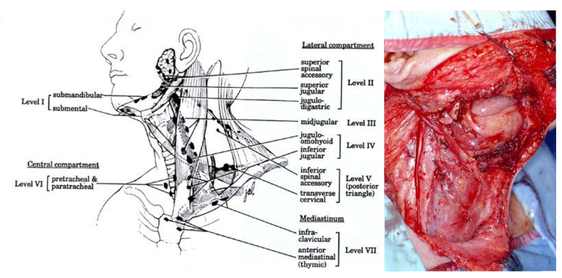

Figure 2. Neck dissection. Images provided by Auckland Head and Neck Surgery.

Conclusion

The incidence of contralateral lymph node metastasis in this population was found to be 9.7%. The clinicopathologic risk factors most highly associated with contralateral metastasis were presence of perineural invasion and lymphovascular invasion. Other studied factors, including depth of invasion and midline involvement did not yield statistically significant associations. These findings can provide support for surgeons in treating OTSCC. Further investigation is needed to assess whether any of these factors play a role in regional failure in the contralateral neck.

Contact

Anya Forma
Rush University Medical College
600 S Paulina St. Suite 524
Anya_j_forma@rush.edu
520.249.7334

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