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Management of the cN0 Neck in Early Oral Cancer: An Overview

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Abstract: ***The management of the clinically negative (cN0) neck in early-stage oral squamous cell carcinoma (OSCC) remains a debated topic in head and neck oncology. This narrative review synthesizes current evidence on elective neck dissection (END) and sentinel lymph node biopsy (SLNB) in the context of the 8th edition of the TNM staging system, which incorporates depth of invasion (DOI). While END demonstrates improved survival outcomes, especially for tumors with DOI greater than 4 mm, SLNB offers a less invasive diagnostic alternative with comparable survival results and reduced morbidity, though its accuracy is subsite-dependent and institution-specific. The article emphasizes a risk-adapted approach grounded in tumor biology, patient-specific factors, and surgical expertise, while underscoring the need for future studies explicitly aligned with TNM 8 to refine current protocols.***

Keywords: oral squamous cell carcinoma, cN0 neck, elective neck dissection, sentinel lymph node biopsy, depth of invasion

1. Introduction

Management of the clinically negative (cN0) neck in early-stage oral squamous cell carcinoma (OSCC) remains one of the most debated issues in head and neck oncology. Despite significant advances in diagnostic imaging, occult cervical metastases continue to represent a major prognostic determinant, directly influencing disease-specific survival and regional control. Historically, treatment strategies for T1–T2 cN0 tumors have ranged from observation and sentinel lymph node biopsy (SLNB) to elective neck dissection (END), reflecting persistent uncertainty regarding the optimal balance between oncologic safety and treatment-related morbidity [1, 2, 3, 4].

Most of the evidence guiding current clinical practice has been generated using earlier editions of the TNM staging system (6th and 7th editions). With the introduction of the 8th edition of TNM, depth of invasion (DOI) was incorporated as an additional criterion for pathological staging, resulting in significant stage migration and reclassification of a subset of tumors previously categorized as T1 based on size alone [5]. This modification was based on robust evidence demonstrating the prognostic significance of DOI [6].

Importantly, the ongoing debate regarding management of the cN0 neck reflects not only differences in treatment philosophy, but also substantial heterogeneity in tumor biology, anatomical subsite, and patient-related factors. The risk of occult nodal metastases is not uniform across early-stage tumors and is influenced by depth of invasion, pattern of invasion, lymphovascular involvement, and tumor subsite. Consequently, a uniform approach to neck management may result either in overtreatment with unnecessary morbidity or undertreatment with compromised oncologic outcomes. This heterogeneity underscores the need for risk-adapted strategies grounded in contemporary staging systems and high-quality evidence.

This review aims to critically assess current approaches to managing the clinically negative neck in early-stage OSCC, focusing on the efficacy of elective neck dissection and sentinel lymph node biopsy within the framework of TNM 8. The evolving staging criteria and surgical standards highlight the significance of this review in guiding risk-based, individualized neck management for early OSCC, reducing both overtreatment and undertreatment.

2. Overview

Elective Neck Dissection in T1–T2 cN0 OSCC

The role of elective neck dissection in early oral cancer has been extensively investigated, primarily through randomized and prospective studies conducted under earlier TNM classifications. Several landmark randomized trials demonstrated a survival advantage for elective neck dissection compared with observation, while others failed to show statistically significant differences in overall or disease-specific survival [7, 8, 9, 10, 11, 12, 13, 14]. The apparent inconsistency among randomized trials should be interpreted with caution. Differences in inclusion criteria, surgical technique, extent of neck dissection, follow-up duration, and definitions of recurrence limit direct comparison between studies. Moreover, earlier trials frequently included heterogeneous tumor subsites and lacked standardized pathological assessment, particularly with regard to depth of invasion. These methodological limitations likely contributed to variable outcomes and may partially explain why some studies failed to demonstrate a survival benefit of elective neck dissection.

Among the most robust and frequently cited studies, four trials [15, 16, 17, 18] reported a statistically significant improvement in survival outcomes favoring elective neck dissection, whereas two [13, 14] did not demonstrate a clear survival benefit. Importantly, contemporary high-quality studies by Cruz et al. [15] and Hutchinson et al. [18] consistently reported improved oncologic outcomes associated with elective neck dissection in early-stage tumors. Cruz et al. [15] observed a higher 3-year overall survival rate in patients undergoing elective neck dissection (80%) compared with observation (67.5%). Furthermore,

Hutchinson et al. [18] explicitly demonstrated that the survival benefit associated with elective neck dissection persisted even after restaging tumors according to TNM 8, particularly within the T1 category.

Additional retrospective and prospective analyses have reinforced these findings, providing cumulative evidence that elective neck dissection improves regional control and survival, especially in tumors with increased depth of invasion. Multiple studies have identified DOI thresholds ranging from 2 to 4 mm as clinically relevant cut-off values above which the risk of occult metastases increases substantially [16, 17, 19, 20]. While some authors advocate elective dissection for DOI >2 mm, most contemporary guidelines converge around a DOI threshold of 4 mm as a practical and evidence-supported indication for neck treatment [3].

The incorporation of depth of invasion into TNM 8 has fundamentally altered the interpretation of early-stage disease. While this has improved prognostic stratification, it has also complicated the translation of historical evidence into modern clinical practice. Many tumors previously classified as T1 based solely on surface dimensions would now be upstaged, thereby redistributing risk across T categories. Importantly, this stage migration does not invalidate earlier evidence supporting elective neck dissection; rather, it suggests that DOI-driven biological aggressiveness, rather than tumor size alone, underpins the observed survival benefit.

It must be emphasized that data specifically generated under TNM 8 remain limited [21, 22, 23]. Only a small number of recent studies have directly addressed selective neck dissection in T1–T2 cN0 tumors staged according to the updated classification. Nevertheless, available evidence suggests that the oncologic rationale for elective neck dissection remains valid despite the stage migration introduced by DOI-based staging [18].

Extent of Neck Dissection

There is broad consensus that, in early-stage cN0 OSCC, elective neck dissection should include at least cervical levels I–III [4, 24]. From a clinical standpoint, limiting elective neck dissection to levels I–III represents a compromise between oncologic thoroughness and functional preservation. The majority of occult metastases are confined to these levels, while extension beyond level III increases operative time, morbidity, and the risk of shoulder dysfunction without consistently improving survival outcomes. Therefore, the decision to extend dissection should be individualized, taking into account tumor subsite, DOI, and radiologic suspicion rather than applied routinely. This approach balances oncologic adequacy with acceptable morbidity. While skip metastases to level III or IV have been reported—particularly in tongue carcinoma—their incidence remains relatively low – 15,8% [27].

Some studies have demonstrated improved regional control when the lower jugular chain is included; however, others have failed to show a survival benefit from routine inclusion of level IV in elective dissection. Specifically, Huang et al. reported a low incidence of level IV metastases (2.7%) and found no significant difference in 5-year overall or disease-free survival between patients undergoing supraomohyoid neck dissection (levels I–III) and those treated with more extensive dissections [12]. Similarly, involvement of level IIb appears uncommon, leading several authors to suggest that it may be safely preserved in selected patients [28, 29, 30].

Sentinel Lymph Node Biopsy

Sentinel lymph node biopsy has emerged as a less invasive diagnostic approach for staging the cN0 neck in early OSCC and is incorporated into several international guidelines, including NICE recommendations [24, 3, 25]. To date, only one randomized prospective trial has directly compared SLNB with elective neck dissection [31]. This study demonstrated comparable 2- and 5-year overall and disease-specific survival between the two strategies, with 5-year disease-specific survival rates of 87.1% for SLNB and 88.6% for elective dissection [31]. Cervical recurrence rates were approximately 10% in both groups [31]. Importantly, SLNB was associated with significantly lower morbidity during the first six months following treatment, highlighting its potential advantage in selected patients [31].

The large European SENT trial further validated the diagnostic performance of SLNB, reporting a sensitivity of 86%, a negative predictive value of 95%, and a false-negative rate of 14% [32]. However, false-negative rates varied by tumor subsite, reaching up to 21% in posterior tongue lesions, underscoring the technique's limitations [32].

From a clinical perspective, SLNB offers the potential to spare up to 70% of patients from unnecessary neck dissection and its associated morbidity [32, 25].

Despite its advantages, sentinel lymph node biopsy should be viewed primarily as a staging tool rather than a therapeutic intervention. False-negative results, particularly in anatomically complex subsites such as the posterior tongue, remain a significant concern. Furthermore, the oncologic safety of SLNB is highly dependent on institutional experience, availability of nuclear medicine infrastructure, and adherence to strict surveillance protocols. In less specialized settings, these requirements may limit the generalizability of SLNB as a universal alternative to elective neck dissection.

3. Conclusion

The management of the clinically negative neck in early-stage OSCC continues to evolve, particularly in light of the TNM 8 staging system and the incorporation of depth of invasion as a key prognostic parameter. Despite stage migration and reclassification, the cumulative body of evidence supports elective neck dissection as an oncologically sound strategy for T1–T2 cN0 tumors, especially in cases with DOI exceeding 4 mm [18].

Sentinel lymph node biopsy represents a valid alternative in carefully selected patients, offering comparable survival outcomes with reduced short-term morbidity. However, its diagnostic limitations and dependence on institutional expertise necessitate cautious patient selection and rigorous follow-up [4, 33, 24].

Ultimately, decision-making should be individualized, integrating tumor-related risk factors, patient reliability, and available surgical expertise. Future prospective studies explicitly designed around TNM 8 are needed to refine risk stratification and further optimize management algorithms for the early cN0 neck.

References

[1] Vassiliou LV, Acero J, Gulati A, Hölzle F, Hutchison IL, Prabhu S, Testelin S, Wolff KD, Kalavrezos N. Management of the clinically N0 neck in early-stage oral squamous cell carcinoma (OSCC). An EACMFS position paper. J Craniomaxillofac Surg. 2020 Aug;48(8):711-718.

[2] Wei WI, Ferlito A, Rinaldo A, Gourin CG, Lowry J, Ho WK, Leemans CR, Shaha AR, Suárez C, Clayman GL, Robbins KT, Bradley PJ, Silver CE. Management of the N0 neck--reference or preference. Oral Oncol. 2006 Feb;42(2):115-22.

[3] National Collaborating Centre for Cancer (UK). Cancer of the Upper Aerodigestive Tract: Assessment and Management in People Aged 16 and Over. London: National Institute for Health and Care Excellence (UK); 2016 Feb.

[4] Koyfman SA, Ismaila N, Crook D, D'Cruz A, Rodriguez CP, Sher DJ, Silbermins D, Sturgis EM, Tsue TT, Weiss J, Yom SS, Holsinger FC. Management of the Neck in Squamous Cell Carcinoma of the Oral Cavity and Oropharynx: ASCO Clinical Practice Guideline. J Clin Oncol. 2019 Jul 10;37(20):1753-1774.

[5] William M. Lydiatt, Snehal G. Patel, John A. Ridge, Brian O'Sullivan, and Jatin P. Shah. AJCC Cancer Staging Manual, Eight Edition, Chicago

[6] The International Consortium for Outcome Research (ICOR) in Head and Neck Cancer. Primary Tumor Staging for Oral Cancer and a Proposed Modification Incorporating Depth of Invasion An International Multicenter Retrospective Study. JAMA Otolaryngol Head Neck Surg. 2014;140(12):1138-1148.

[7] Lydiatt DD, Robbins KT, Byers RM, Wolf PF. Treatment of stage I and II oral tongue cancer. Head Neck. 1993 Jul-Aug;15(4):308-12.

[8] Yuen AP, Wei WI, Wong YM, Tang KC. Elective neck dissection versus observation in the treatment of early oral tongue carcinoma. Head Neck. 1997 Oct;19(7):583-8.

[9] Feng Z, Cheng A, Alzahrani S, Li B, Han Z, Ward BB. Elective Neck Dissection in T1N0M0 Oral Squamous Cell Carcinoma: When Is It Necessary? J Oral Maxillofac Surg. 2020 Dec;78(12):2306-2315.

[10] Yii NW, Patel SG, Rhys-Evans PH, Breach NM. Management of the N0 neck in early cancer of the oral tongue. Clin Otolaryngol Allied Sci. 1999 Feb;24(1):75-9.

[11] Cariati P, Cabello Serrano A, Fernandez Solis J, Martinez Lara I. Distribution of cervical metastasis in tongue cancer: Are occult metastases predictable? A retrospective study of 117 oral tongue carcinomas. J Craniomaxillofac Surg. 2018 Jan;46(1):155-161.

[12] Huang SF, Kang CJ, Lin CY, Fan KH, Yen TC, Wang HM, Chen IH, Liao CT, Cheng AJ, Chang JT. Neck treatment of patients with early stage oral tongue cancer: comparison between observation, supraomohyoid dissection, and extended dissection. Cancer. 2008 Mar 1;112(5):1066-75.

[13] Yuen AP, Ho CM, Chow TL, Tang LC, Cheung WY, Ng RW, Wei WI, Kong CK, Book KS, Yuen WC, Lam AK, Yuen NW, Trendell-Smith NJ, Chan YW, Wong BY, Li GK, Ho AC, Ho WK, Wong SY, Yao TJ. Prospective randomized study of selective neck dissection versus observation for N0 neck of early tongue carcinoma. Head Neck. 2009 Jun;31(6):765-72.

[14] Vandenbrouck C, Sancho-Garnier H, Chassagne D, Saravane D, Cachin Y, Micheau C. Elective versus therapeutic radical neck dissection in epidermoid carcinoma of the oral cavity: results of a randomized clinical trial. Cancer. 1980 Jul 15;46(2):386-90.

[15] D'Cruz AK, Vaish R, Kapre N, Dandekar M, Gupta S, Hawaldar R, Agarwal JP, Pantvaidya G, Chaukar D, Deshmukh A, Kane S, Arya S, Ghosh-Laskar S, Chaturvedi P, Pai P, Nair S, Nair D, Badwe R; Head and Neck Disease Management Group. Elective versus Therapeutic Neck Dissection in Node-Negative Oral Cancer. N Engl J Med. 2015 Aug 6;373(6):521-9.

[16] Fakih AR, Rao RS, Borges AM, Patel AR. Elective versus therapeutic neck dissection in early carcinoma of the oral tongue. Am J Surg. 1989 Oct;158(4):309-13.

[17] Kligerman J, Lima RA, Soares JR, Prado L, Dias FL, Freitas EQ, Olivatto LO. Supraomohyoid neck dissection in the treatment of T1/T2 squamous cell carcinoma of oral cavity. Am J Surg. 1994 Nov;168(5):391-4.

[18] Hutchison IL, Ridout F, Cheung SMY, Shah N, Hardee P, Surwald C, Thiruchelvam J, Cheng L, Mellor TK, Brennan PA, Baldwin AJ, Shaw RJ, Halfpenny W, Danford M, Whitley S, Smith G, Bailey MW, Woodwards B, Patel M, McManners J, Chan CH, Burns A, Praveen P, Camilleri AC, Avery C, Putnam G, Jones K, Webster K, Smith WP, Edge C, McVicar I, Grew N, Hislop S, Kalavrezos N, Martin IC, Hackshaw A. Nationwide randomised trial evaluating elective neck dissection for early stage oral cancer (SEND study) with meta-analysis and concurrent real-world cohort. Br J Cancer. 2019 Nov;121(10):827-836.

[19] van Lanschot CGF, Klazen YP, de Ridder MAJ, Mast H, Ten Hove I, Hardillo JA, Monserez DA, Sewnaik A, Meeuwis CA, Keereweer S, Aaboubout Y, Barroso EM, van der Toom QM, Bakker Schut TC, Wolvius EB, Baatenburg de Jong RJ, Puppels GJ, Koljenović S. Depth of invasion in early stage oral cavity squamous cell carcinoma: The optimal cut-off value for elective neck dissection. Oral Oncol. 2020 Dec;111:104940.

[20] Feng Z, Cheng A, Alzahrani S, Li B, Han Z, Ward BB. Elective Neck Dissection in T1N0M0 Oral Squamous Cell Carcinoma: When Is It Necessary? J Oral Maxillofac Surg. 2020 Dec;78(12):2306-2315.

[21] Tam S, Amit M, Zafereo M, Bell D, Weber RS. Depth of invasion as a predictor of nodal disease and survival in patients with oral tongue squamous cell carcinoma. Head Neck. 2019 Jan;41(1):177-184.

[22] Wu Y, Zhang X, Dai L, Fang Q, Du W. Neck Management in cT1N0 Tongue Squamous Cell Carcinoma as Determined by Sonographic Depth of Invasion. Front Oncol. 2022 Jan 24;11:786258.

[23] Nguyen E, McKenzie J, Clarke R, Lou S, Singh T. The Indications for Elective Neck Dissection in T1N0M0 Oral Cavity Squamous Cell Carcinoma. J Oral Maxillofac Surg. 2021 Aug;79(8):1779-1793.
[24] N.C.C.N., NCCN clinical practice Guidelines in oncology (NCCN guidelines): Head and neck cancers. NCCN guidelines, 2020 Version 1.2020
[25] Schilling C, Stoeckli SJ, Haerle SK, Broglie MA, Huber GF, Sorensen JA, Bakholdt V, Krogdahl A, von Buchwald C, Bilde A, Sebbesen LR, Odell E, Gurney B, O'Doherty M, de Bree R, Bloemena E, Flach GB, Villarreal PM, Fresno Forcelledo MF, Junquera Gutiérrez LM, Amézaga JA, Barbier L, Santamaría-Zuazua J, Moreira A, Jacome M, Vigili MG, Rahimi S, Tartaglione G, Lawson G, Nollevaux MC, Grandi C, Donner D, Bragantini E, Dequanter D, Lothaire P, Poli T, Silini EM, Sesenna E, Dolivet G, Mastronicola R, Leroux A, Sassoon I, Sloan P, McGurk M. Sentinel European Node Trial (SENT): 3-year results of sentinel node biopsy in oral cancer. Eur J Cancer. 2015 Dec;51(18):2777-84.
[26] Kyzas P. Management of the cN0 neck in early oral cancer: time to revise the guidance? Br J Oral Maxillofac Surg. 2021 May;59(4):387-388.
[27] Byers RM, Weber RS, Andrews T, McGill D, Kare R, Wolf P. Frequency and therapeutic implications of "skip metastases" in the neck from squamous carcinoma of the oral tongue. Head Neck. 1997 Jan;19(1):14-9.
[28] Liang L, Zhang T, Kong Q, Liang J, Liao G. A meta-analysis on selective versus comprehensive neck dissection in oral squamous cell carcinoma patients with clinically node-positive neck. Oral Oncol. 2015 Dec;51(12):1076-81.
[29] Elsheikh MN, Rinaldo A, Ferlito A, Fagan JJ, Suárez C, Lowry J, Paleri V, Khafif A, Olofsson J. Elective supraomohyoid neck dissection for oral cavity squamous cell carcinoma: is dissection of sublevel IIB necessary? Oral Oncol. 2008 Mar;44(3):216-9.
[30] Pantvaidya GH, Pal P, Vaidya AD, Pai PS, D'Cruz AK. Prospective study of 583 neck dissections in oral cancers: implications for clinical practice. Head Neck. 2014 Oct;36(10):1503-7.
[31] Garrel R, Poissonnet G, Moyà Plana A, Fakhry N, Dolivet G, Lallemant B, Sarini J, Vergez S, Guelfucci B, Choussy O, Bastit V, Richard F, Costes V, Landais P, Perriard F, Daures JP, de Verbizier D, Favier V, de Boutray M. Equivalence Randomized Trial to Compare Treatment on the Basis of Sentinel Node Biopsy Versus Neck Node Dissection in Operable T1-T2N0 Oral and Oropharyngeal Cancer. J Clin Oncol. 2020 Dec 1;38(34):4010-4018.
[32] Schilling C, Stoeckli SJ, Haerle SK, Broglie MA, Huber GF, Sorensen JA, Bakholdt V, Krogdahl A, von Buchwald C, Bilde A, Sebbesen LR, Odell E, Gurney B, O'Doherty M, de Bree R, Bloemena E, Flach GB, Villarreal PM, Fresno Forcelledo MF, Junquera Gutiérrez LM, Amézaga JA, Barbier L, Santamaría-Zuazua J, Moreira A, Jacome M, Vigili MG, Rahimi S, Tartaglione G, Lawson G, Nollevaux MC, Grandi C, Donner D, Bragantini E, Dequanter D, Lothaire P, Poli T, Silini EM, Sesenna E, Dolivet G, Mastronicola R, Leroux A, Sassoon I, Sloan P, McGurk M. Sentinel European Node Trial (SENT): 3-year results of sentinel node biopsy in oral cancer. Eur J Cancer. 2015 Dec;51(18):2777-84.
[33] Machiels JP, René Leemans C, Golusinski W, Grau C, Licitra L, Gregoire V. Squamous cell carcinoma of the oral cavity, larynx, oropharynx and hypopharynx: EHNS-ESMO-ESTRO Clinical Practice Guidelines for diagnosis, treatment and follow-up. Ann Oncol. 2020 Nov;31(11):1462-1475.