

Does Postoperative Radiotherapy Still Have a Role in Resected Oral Cavity Squamous Cell Carcinoma with Adverse Pathologic Features? Navigating Intermediate Risks Through Clinical Evidence and Ai-Driven Perspectives

Fernando Munoz*

Department of Medical and Surgical Sciences, Radiation Oncology Unit, University of Torino, Ospedale S Giovanni Battista, Torino, Italy

*Corresponding author:

Fernando Munoz,
Department of Medical and Surgical Sciences,
Radiation Oncology Unit, University of Torino,
Ospedale S Giovanni Battista, Torino, Italy

Received: 19 Aug 2026

Accepted: 02 Sep 2026

Published: 06 Sep 2026

J Short Name: JCMi

Copyright:

©2026 Fernando Munoz. This is an open access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and build upon your work non-commercially

Citation:

Fernando Munoz, Does Postoperative Radiotherapy Still Have a Role in Resected Oral Cavity Squamous Cell Carcinoma with Adverse Pathologic Features? Navigating Intermediate Risks Through Clinical Evidence and Ai-Driven Perspectives. Jour of Clin and Medi Images® 2026; V9(1): 1-2

1. Commentary

Current NCCN guidelines for early-stage oral cavity squamous cell carcinoma (cT1–2N0) recommend observation after surgery in the absence of nodal disease and high-risk pathological features such as positive or close margins not amenable to re-resection. Among intermediate adverse features NCCN highlights PNI and lymph vascular invasion (LVI), as considerations for adjuvant radiotherapy. However, poor differentiation-present in approximately 15% of cases and depth of invasion, including depth of invasion (DOI), with a DOI >5 mm representing one of the criteria contributing to T2 classification, are not formally included among standard indications for postoperative radiotherapy (PORT).

This clinical gray zone often leads to heterogeneous management, although recent data help clarify the landscape. A prospective randomized trial from the Tata Memorial Hospital group compared PORT versus observation in patients with pT1–2N0 oral cavity carcinoma presenting with one or more intermediate-risk features [1,2]. All patients underwent surgery with adequate margins and at least ipsilateral neck dissection. Risk stratification included DOI (> or ≤5mm), tumour subsite, PNI, LVI, and histological grade. At 3-years follow-up, locoregional recurrence-free survival (LRFS) was significantly higher in the adjuvant radiotherapy arm compared with the observation arm (89% vs 81%; $p = 0.02$). While no statistically significant differences were observed in disease-free survival (DFS) or overall survival (OS), subgroup analyses suggested a more pronounced benefit of PORT in oral tongue cancers compared with buccal mucosa tumours. This observed lower magnitude of benefit in buccal mucosa tumours may reflect differences in patterns of spread. Patients with oral tongue tumours and DOI >4 mm frequently present a higher risk of contralateral nodal metastases

[3], a pattern rarely observed in buccal mucosa cancers. These findings are consistent with previous large retrospective series indicating a potential benefit of PORT in early-stage oral cavity cancer with intermediate-risk features such as LVI, PNI, and poor differentiation [4]. Further detailed reporting from the full Tata Memorial study may clarify the relative prognostic weight of the individual factors.

In this scenario of clinical uncertainty, artificial intelligence and deep learning could provide a superior tool for prognostic stratification compared to conventional biomarkers.

Separately, a Taiwanese group recently presented a deep learning model designed to predict immunotherapy response in head and neck cancer using pre-treatment H&E-stained histology slides. The model was trained on a highly heterogeneous cohort of 113 patients and externally was validated in 40 patients from independent institutions, demonstrating statistically significant superiority over PD-L1 expression as a predictive biomarker [5]. This study adds to a growing body of literature applying AI to histopathological, radiological, and molecular data for prognostic and predictive modelling in head and neck oncology, often reporting superior predictive performance compared with conventional clinical approaches.

However, important barriers to full clinical translation remain. As highlighted by a recent meta-analysis, challenges include small sample sizes, substantial cohort heterogeneity, lack of standardized data acquisition, and insufficient high-quality evidence supporting reproducibility [6]. Furthermore, intrinsic tumour heterogeneity necessitates the analysis of multiple histological sections from each tumour to improve representativeness.

Overcoming these limitations is particularly relevant for high-stakes clinical applications, such as identifying HPV-associated oropharyngeal cancer patients suitable for radiotherapy de-es-

calation strategies (7), or precisely identifying which pT1–2N0 oral cavity patients will truly benefit from PORT. Standardized AI models, together with harmonized data reporting and prospective validation, will be essential to bridge the gap between protocol-driven decision-making and truly personalized treatment.

References

1. NCCN guidelines. Version. 2026.
2. Nair SV. (2026) Adjuvant radiotherapy versus observation following curative surgery for early-stage oral squamous cell carcinoma. 2026.
3. Ganly L. Long-term regional control and survival in patients with “low-risk,” early stage oral tongue cancer managed by partial glossectomy and neck dissection without postoperative radiation: the importance of tumor thickness. *Cancer*. 2013; 119(6): 1168-76
4. Tian Q. Impact of Postoperative Radiotherapy on the Prognosis of Early-Stage (pT1-2N0M0) Oral Tongue Squamous Cell Carcinoma. *J Clin Oncol*. 2024; 42(15): 1754-1765
5. Chen S. Omitting postoperative radiotherapy after pathologic complete response to neoadjuvant immunochemotherapy for patients with locally advanced head and neck squamous cell carcinoma: Survival and patient-reported outcomes. *J Clin Oncol*. 2026.
6. Mäkitie AA. Artificial Intelligence in Head and Neck Cancer: A Systematic Review of Systematic Reviews. *Adv Ther*. 2023; 40(8): 3360-3380
7. Song B. Deep learning informed multimodal fusion of radiology and pathology to predict outcomes in HPV-associated oropharyngeal squamous cell carcinoma. *Ebio Medicine*. 2025.