

POSTOPERATIVE SEEDING OF LARYNGEAL SQUAMOUS CELL CARCINOMA: A CASE REPORT

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Received on 20.8.2025.

Reviewed on 25.9.2025.

Accepted on 11.11.2025.



ABSTRACT

Introduction: Surgical manipulation of malignant tumors can lead to the detachment of cancer cells and their dissemination into the surrounding interstitial fluid, vasculature, or along the tract of biopsy needles, potentially resulting in implantation and secondary tumor growth, also known as tumor seeding. Although squamous cell carcinoma (SCC) is among the most prevalent malignancies of the head and neck region, reported cases of tumor seeding in SCC of the larynx remain exceedingly rare. Nevertheless, this possibility should be continually considered to mitigate adverse outcomes and further enhance the safety and effectiveness of surgical interventions.

Case presentation: A 68-year-old male patient was diagnosed with squamous cell carcinoma (SCC) of the left vocal cord and subsequently underwent left-sided cordectomy. Due to positive surgical margins on histopathological examination, adjuvant radiotherapy was administered, achieving clinical remission as confirmed by direct laryngoscopy and multislice spiral computed tomography (MSCT) scans. However, three months post-radiotherapy, a small tumor mass was clinically identified at the laryngofissure incision site and was confirmed histologically as SCC. No intralaryngeal lesions or other locoregional pathology were detected on further evaluation. The lesion was interpreted as postoperative tumor seeding and was surgically excised, with no evidence of recurrence during one year of follow-up.

Conclusion: Laryngeal squamous cell carcinoma possesses the potential for postoperative seeding, underscoring the importance of adhering to fundamental oncologic surgical principles. Additionally, the role of prophylactic measures against tumor seeding, and the exploration of the tumor microenvironment that facilitates such dissemination, merit further investigation.

Keywords: squamous cell carcinoma of head and neck; neoplasm seeding; laryngectomy; recurrence; radiotherapy

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INTRODUCTION

Fine-needle aspiration, biopsy, and surgical excision remain indispensable tools for the diagnosis, treatment planning, and management of solid tumors, aimed at either curative intent or life-prolongation. Despite their therapeutic benefits, increasing clinical and experimental evidence suggests that surgical trauma associated with these procedures can provoke local and systemic responses that potentially enhance tumor progression and metastasis (1-5).

These interventions may facilitate tumor cell release and dissemination into the circulation or adjacent healthy tissues. Altered immune responses and reparative mechanisms can then promote malignant behavior, survival, and extravasation of circulating tumor cells (6, 7). Curran et al. even demonstrated the presence of SCC cells in surgical glove rinses and instrument washings, prompting recommendations to replace gloves and instruments after tumor excision as part of standard oncologic surgical protocols (8).

Although such adverse outcomes might contribute to tumor progression and dissemination, they are exceptionally rare and should not deter surgical intervention, which remains a cornerstone of curative treatment. Nevertheless, these risks warrant attention to further optimize patient safety.

Laryngeal squamous cell carcinoma (LSCC) is one of the most common cancers of the head and neck, with an incidence of 2.76 cases per 100,000 population annually, a prevalence of 14.33 cases per 100,000, and a mortality rate of 1.66 per 100,000 (9, 10). For 2024, approximately 12,650 new cases and 3,880 related deaths are projected (11).

The most significant prognostic factors in LSCC are metastasis and locoregional recurrence. Metastatic spread predominantly involves locoregional lymphatics, accounting for the majority of recurrences. Distant metastases via hematogenous routes, mainly to the lungs, bones, and liver, are less frequent and typically occur within two years of diagnosis. Locoregional recurrences are usually observed within the first year (12-14). Seeding of LSCC remains exceedingly rare, with only six cases reported in the PubMed database. Two of these involved gastrointestinal tract seeding, another two involved tracheal seeding, and merely two cases involved subcutaneous dissemination (12, 15). Therefore, we present an additional rare case of glottic LSCC with subcutaneous tumor seeding.

The aim of this article is to present a rare case of postoperative subcutaneous seeding of laryngeal squamous cell carcinoma following cordectomy and to highlight the clinical implications of this phenomenon.

CASE PRESENTATION

A 68-year-old man presented with a suspicious lesion and was diagnosed with squamous cell carcinoma of the left vocal cord (T1N0M0). He underwent left-sided cordectomy in July 2023 following preliminary tracheotomy. Histopathology revealed a positive surgical margin. Postoperative MSCT of the larynx showed no residual disease or cervical lymphadenopathy (Figure 1). Consequently, adjuvant radiotherapy was administered using a standard conformal technique (3D-CRT/IMRT) with conventional fractionation (2 Gy per fraction, five days per week), delivering a

total dose of 63 Gy to the laryngeal region

over September to November 2023.

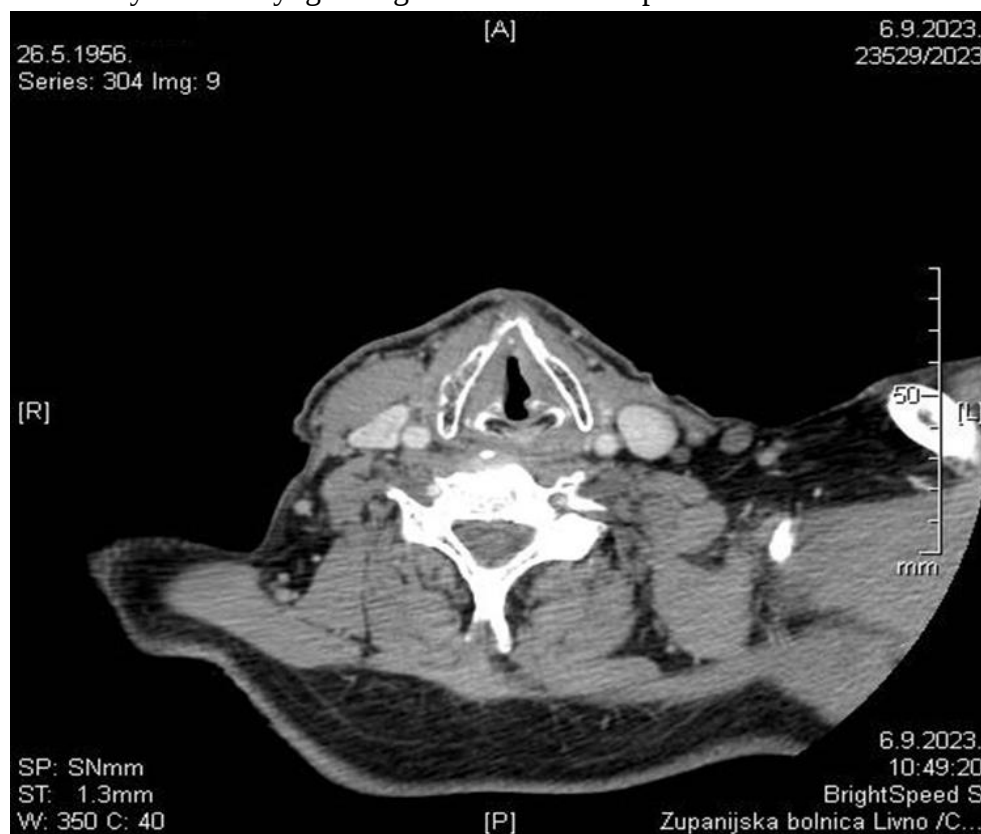


Figure 1. MSCT imaging of the larynx after left-sided cordectomy (showing postoperative scar tissue without visible signs of tumor)

In January 2024, during routine follow-up, a small nodular skin lesion was identified at the laryngofissure incision site, initially presumed to be a pyogenic granuloma. Ongoing monitoring revealed progressive changes, prompting biopsy, which confirmed SCC. Imaging with MSCT

revealed a lobulated mass measuring 30 × 20 mm, located ventrally and subcutaneously, extending to the dermis, without evidence of thyroid cartilage invasion or cervical lymphadenopathy. No residual or recurrent disease was observed at the vocal cords (Figures 2 and 3).



Figure 2. MSCT imaging of the larynx after left-sided cordectomy and postoperative radiotherapy. The recurrent tumor is visible (arrow), with surface ulceration, consistent with tumor seeding.



Figure 3. MSCT imaging of the recurrent tumor (arrow), showing intact thyroid cartilage and a normal intralaryngeal finding.

Surgical resection was indicated, and the patient underwent total laryngectomy with

complete tumor excision (Figure 4).



Figure 4. Intraoperative view of the recurrent tumor, showing the entire lesion with marked skin incision margins and tracheal transection in preparation for total laryngectomy (centrally ulcerated recurrent tumor)

Intraoperatively, no evidence of tumor was found at the original vocal cord site, where postoperative scarring and intact mucosal healing were observed (Figure 5). Histopathology confirmed complete

excision of SCC, with intact laryngeal cartilages and no neoplastic changes in the previously treated vocal cord area.



Figure 5. Intralaryngeal view of the larynx following total laryngectomy and removal of the recurrent tumor (arrow indicating the site of the previous corpectomy with intact epithelialization and postoperative scarring, without evidence of residual tumor)

Written informed consent was obtained from the patient for publication of this case report and accompanying images. The patient reviewed the report prior to submission.

DISCUSSION

For most solid tumors, complete surgical resection remains the cornerstone of treatment. However, even extensive resections may occasionally result in local dissemination of tumor cells, which under certain circumstances can evolve into clinically apparent tumors. Laryngeal squamous cell carcinoma most frequently spreads to regional lymph nodes, while

distant metastases are less common and subcutaneous seeding is exceptionally rare. To date, only a handful of cases of postoperative seeding in LSCC have been reported. Jiang et al. described a case of subcutaneous implantation occurring along the surgical tract, highlighting the potential for tumor cell displacement during surgery despite the absence of recurrence at the primary tumor site (12). Similarly, case reports of unusual dissemination patterns emphasize the need for strict adherence to oncologic surgical principles and consideration of prophylactic measures (1). Positive surgical margins are among the most important predictors of recurrence in

early glottic carcinoma. Ansarin et al. demonstrated that patients with positive margins after transoral laser microsurgery had significantly worse local control rates, underscoring the importance of complete resection (16). Moreover, studies have shown that anterior commissure involvement and deeper cordectomy types are associated with higher recurrence risks (17).

Adjuvant radiotherapy is often indicated when high-risk pathological features are present, such as positive or close margins. Conventional conformal RT or intensity-modulated RT, typically delivered with daily fractions of 2 Gy to a total dose of 60–66 Gy, has been shown to improve local control in selected cases (18). Nevertheless, its efficacy in preventing rare events such as postoperative seeding remains uncertain.

In our case, the development of a subcutaneous recurrence several months after surgery and shortly after adjuvant RT suggests that mechanical dissemination of tumor cells during cordectomy was the most plausible explanation. This emphasizes the need for meticulous surgical technique, careful intraoperative handling, and ongoing postoperative surveillance, even when adjuvant treatment is administered.

CONCLUSION

This case reinforces the need for strict adherence to oncologic surgical principles and raises questions about the efficacy of postoperative radiotherapy in preventing tumor seeding, particularly when administered several months after surgery. Future studies should explore effective prophylactic strategies and the role of the

tumor microenvironment in facilitating dissemination.

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POSTOPERATIVNO SIJANJE KARCINOMA PLOČASTIH STANICA GRKLJANA: PRIKAZ SLUČAJA

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SAŽETAK

Uvod: Kirurška manipulacija malignim tumorima može dovesti do odvajanja tumorskih stanica i njihove diseminacije u okolnu intersticijsku tekućinu, krvne i limfne žile ili duž kanala biopsijskih igala, što potencijalno može rezultirati implantacijom i sekundarnim rastom tumora, poznatim kao sijanje tumora. Iako je karcinom pločastih stanica (KPS) jedan od najčešćih malignoma u području glave i vrata, prijavljeni slučajevi sijanja KPS-a grkljana iznimno su rijetki. Ipak, ovu mogućnost potrebno je uzimati u obzir radi smanjenja nepovoljnih ishoda i dodatnog povećanja sigurnosti i učinkovitosti kirurških zahvata.

Prikaz slučaja: Muškarac u dobi od 68 godina dijagnosticiran je s karcinomom pločastih stanica lijeve glasnice te je podvrgnut kordektomiji. Zbog pozitivnih kirurških rubova na histopatološkoj analizi, provedena je adjuvantna radioterapija, kojom je postignuta klinička remisija potvrđena direktnom laringoskopijom i MSCT-om. Međutim, tri mjeseca nakon radioterapije na mjestu incizije laringofisure klinički je uočena manja tumorska masa, histološki potvrđena kao KPS. Daljnjom obradom nisu otkrivene intralaringealne lezije niti druga lokoregionalna patologija. Lezija je interpretirana kao postoperativno sijanje tumora te je kirurški odstranjena, pri čemu u jednogodišnjem praćenju nije bilo znakova recidiva.

Zaključak: Karcinom pločastih stanica grkljana može imati potencijal za postoperativno sijanje, što naglašava važnost pridržavanja osnovnih onkoloških kirurških principa. Također, uloga profilaktičkih mjera protiv sijanja tumora i istraživanje tumorskog mikrookoliša koji pogoduje takvoj diseminaciji zaslužuju daljnja istraživanja.

Ključne riječi: karcinom pločastih stanica glave i vrata; sijanje tumora; laringektomija; recidiv; radioterapija

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