

## Mold-Based Brachytherapy For Lip Cancer: Case Report

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### Abstract

This case report presents the use of a custom-made mold for high-dose-rate (HDR) brachytherapy in the treatment of early-stage squamous cell carcinoma (SCC) of the lower lip. The technique provided effective tumor control with excellent cosmetic and functional outcomes. Customized radiation stents, including tissue bolus and tongue-depressing types, were used to enhance dose precision and minimize radiation to surrounding healthy tissues. Close collaboration between the surgeon, radiation oncologist, and prosthodontist played a key role in treatment success and reducing post-therapy complications.

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### I. Introduction

Lip cancer, especially squamous cell carcinoma, commonly affects elderly males with risk factors like sun exposure and tobacco use. While surgery is often the first-line treatment, high-dose-rate (HDR) brachytherapy using a custom surface Mold offers a non-invasive, organ-preserving alternative with good cosmetic outcomes. Radiation therapy, though effective, can cause side effects like mucositis and xerostomia. To minimize these, a multidisciplinary approach using customized prosthetic stents—such as tissue bolus and tongue-depressing devices—can help protect healthy tissues, improve radiation accuracy, and support future oral rehabilitation.

### II. Case Report

#### Case: lower lip carcinoma

A 68-year-old male presented with a 1.5 cm ulcerated lesion on the lower lip, confirmed as moderately differentiated SCC via biopsy. Staging: T1N0M0 was consulted from radiotherapist. The patient was offered HDR brachytherapy using a customized Mold due to his preference to avoid surgery.

**Mold Fabrication:** A dental impression of the lower lip was taken using thermoplastic material. A custom acrylic Mold was created embedding 5 brachytherapy catheters spaced 1 cm apart to ensure dose coverage. Photograph was taken (figure 1) dental impression with alginate was taken (figure 2) and cast was retrieved and block out was given (figure 3) and Mold was made on cast (figure 4) marking of lesion done with copper wire on Mold (figure 5) and the stent was incorporated in Mold (figure 6) and After 6months healing was satisfactory (figure 7) the Mold material for dose enhancement of radiation to target spot. in present case was a tissue equivalent Mold material whose degree of radiation absorption is similar to that of soft tissues in the body. After 6 months follow up, HDR brachytherapy result was successful with stable lower lip healing on target spot area.



**Figure 1.** Pre-Radiotherapy State Of Lip Cancer In 69-Year-Old Male Patient



**Figure 2.** Impression Was Made Of The Lower Lip



**Figure 3.** Cast Were Poured And Block Out Was Given



**Figure 4.** Mold Was Made On Cast



**Figure 5.** Mold Was Placed On Lip And Marking With Wire Is Done On Lesion And Stent Space Were Prepared



Figure 6. Stents Were Incorporated In Mold For Brachytherapy



Figure 7. After 6months Healing Was Satisfactory

### III. Discussion

This case demonstrates the effective use of mold-based HDR brachytherapy in treating early-stage squamous cell carcinoma of the lower lip, where the primary challenge was delivering uniform radiation to an irregular surface. The use of a custom gel-based bolus stent allowed for better surface conformity and precise beam alignment, improving dose accuracy and reducing the risk of hotspots. Although initial discomfort was experienced due to increased inter-occlusal height, adjustments to the stent design enhanced patient comfort and compliance. This approach highlights the potential of HDR brachytherapy as a non-invasive, organ-sparing alternative to surgery in selected patients. Moreover, it emphasizes the importance of interdisciplinary collaboration between surgeons, radiation oncologists, and prosthodontists to achieve optimal treatment outcomes, especially in anatomically complex regions like the lower lip.

### IV. Conclusion

Custom mold brachytherapy is a feasible and effective modality for early lip SCC, offering excellent local control and cosmetic outcomes with minimal toxicity. Oral complications related to radiation can be controlled with customized intraoral stents provided by prosthodontist. The team approaches with multi-centre specialists should be preceded prior to initiation of surgery or radiotherapy. These works could make the progress of post-radiotherapy smoother and simplify the future treatment plan including dental cares.

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