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**Literature Review**

# External beam radiation therapy for oral squamous cell carcinoma: A narrative review

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## ABSTRACT

**Background:** Oral cancer is a malignancy that occurs in the oral cavity. Many factors cause oral cancer, namely alcohol consumption, tobacco smoking, smokeless tobacco, chronic irritation, and others. external beam radiation therapy (EBRT) is a technology commonly used in the standard treatment of head and neck cancer. **Purpose:** The aim of this review was to determine the effectiveness of EBRT for oral squamous cell carcinoma. **Review:** Lip carcinoma has a higher chance of healing compared to other cancers that usually appear in the neck and head. Lip carcinoma can be cured through radiation therapy, namely external beam radiation therapy (EBRT). EBRT can be combined withbrachytherapy, which can improve cancer healing. **Conclusion:** EBRT can be used for oral squamous cell carcinoma cancer treatment. However, there are some disadvantages of EBRT that need to be reviewed based on the conditions in the patient's case.

**Keywords:** external-beam radiotherapy; oral squamous cell carcinoma; oral cancer; cancer; non-communicable disease; medicine

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## INTRODUCTION

Oral cancer is a malignancy that occurs in the oral cavity. Lesions in the oral cavity that have the potential to be malignant must be recognized, identified, and treated through early diagnosis. Early diagnosis of oral mucosal lesions can detect up to 99% of oral cancers. Early diagnosis will improve disease prognosis and the survival rate by up to 80%. About 50% of oral cancer diagnoses are at an advanced stage (stages III and IV), because many patients are asymptomatic in the early stages and do not seek medical attention until they have obvious and bothersome symptoms (such as pain, bleeding, or a mass in the mouth or neck if there is already lymphatic spread). The hallmark of a lesion that requires an immediate biopsy is a suspicious lesion that does not resolve within two weeks of being detected and the cause of local irritation removed. The gold standard for diagnosing oral cancer is a surgical biopsy. Diagnosis can be made through additional tools such as toluidine blue vital staining and autofluorescence imaging.[1–3]

Head and neck cancer is the sixth most common cancer in humans, while oral cancer accounts for 48% of head and neck cancer cases.[4,5] Generally, oral cancer that occurs is called oral squamous cell carcinoma (OSCC). Other malignancies that can occur are lymph node tumors, hard tissue, and soft tissue. Oral cavity cancer often occurs in people over 40 years of age. However, do not rule out that oral cavity cancer also occurs in young patients and children. The most common sites for oral cancer involve the lateral margins and the base of the tongue. Rare locations include the lips, gingiva, dorsal tongue, palate, and salivary glands. Cancer can develop from epithelial remnants and from epithelial odontogenic lesions, including cysts and benign tumors (burquettes). The cancer journey in the oral cavity starts with the change of normal cells into abnormal cells. These normal cell changes can be observed through histological analysis. Normal cell changes that can be seen are the ratio of changes in the size of the cell nucleus and cytoplasm, changes in the shape of the cell nucleus, abnormally increased mitotic numbers, increased


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cell density, and abnormal keratinization. Many factors contribute to causing oral cancer, namely long-term use of alcohol, tobacco smoking, smokeless tobacco, some microorganisms (Candida albicans, which produce the carcinogens N-nitrosobenzylmethylamine, Epstein-Barr virus (EBV), and human papillomavirus (HPV), poor nutrition (e.g., iron deficiency), chronic irritants, patients with compromised immune systems, and others.[6,7]

Therapeutic modalities that can be used in the treatment of oral cancer are surgery, chemotherapy, and radiation, which can be done alone or in combination. Current therapies focus their effects on cancer cells and no longer affect normal cells. Radiotherapy is radiation therapy that can kill cancer cells in the target area. This radiotherapy can cause deoxyribonucleic acid (DNA) damage, so damaged cells will be repaired. Conventional radiotherapy can kill as well as kill normal cells (such as hair, salivary glands, and mucosa). Radiotherapy is usually recommended for small cancers or patients with contraindications for rehabilitation. The radiation therapy that is often used is external beam radiation therapy (EBRT). External Beam Radiation Therapy (EBRT) is a technology commonly used in the standard treatment of head and neck cancer.[8–12] Furthermore, the aim of this review was to determine the effectiveness of EBRT for oral squamous cell carcinoma.

## REVIEW

Lip cancer is a malignant disease that usually appears in the neck and head areas. Lip cancer can be detected at an early stage. Lip cancer, or Squamous Cell Carcinoma (SCC), or lip carcinoma, has a higher chance of healing compared to other cancers that usually appear in the neck and head. Carcinoma of the lip can be cured with a variety of treatments, including surgery, EBRT (brachytherapy), or a combination of various treatment methods. Combination treatment can be done according to histopathological findings or based on the stage of the carcinoma. This treatment modality is based on factors such as tumor resectability, probability of disease control, preference and general condition of the patient, functional results, and availability of resources (experts).[7] Many studies have been carried out related to OSCC, and its comprehensive studies include diagnostic methods, risk factors, and methods of treatment. However, to this day, the death rate from OSCC is still quite high. Treatment that uses X-rays or high-energy particle rays is radiation therapy, the purpose of which is to stop the growth and kill cancer cells. In some major cases, external radiation directs energy beams to the cancer. Sending a beam of high-energy particles (photons or protons) through the skin to a tumor is radiation therapy. Cancer cells are destroyed when light reaches tumors by damaging their DNA. The effectiveness of radiation therapy against neck tumors and oral cancer has made radiation therapy very well known. Oral squamous cell carcinoma (OSCC) treatment consists of single-modality surgery, EBRT, and/or brachytherapy as radiotherapy. In addition, other combinations for this modality can be done using either systemic therapy in the form of chemotherapy or without systemic therapy. The treatment that is generally chosen to treat OSCC is either surgery or use. External beam radiotherapy is usually performed in three conditions, namely: (a) in cases with unfavorable pathological features; (b) EBRT as an adjuvant that improves loco-regional control (LRC) in primary surgery. (b). EBRT as primary surgery in cases that are intolerable or unsuitable for surgical treatment. (c). EBRT as a curative treatment to manage recurrent or persistent disease.[13–17]

## DISCUSSION

There are several advantages and disadvantages to EBRT when combined with brachytherapy. Treatment with brachytherapy allows the dose of heavy local radiation to the tumor to decrease rapidly, eliminating the need for additional planning calculations. This ability cannot be obtained with other EBRT methods. Apart from the dosage, another advantage of brachytherapy is that it has a better level of toxicity compared to Intensity-modulated radiation therapy (IMRT). IMRT is one of the newest treatments. In addition, the control rate with radical brachytherapy implants is better than the combined EBRT+BRT implant.[12] In several other journals, evidence has been found regarding the benefits of combining EBRT and BT.[13] The weakness of brachytherapy, which is quite significant, is the need to optimize local control in SCC patients with the assistance of a radiation oncologist.[18]

Brachytherapy, whether combined with EBRT or not, can achieve the preservation of the patient's organs with good functional results. This method can be an alternative treatment for surgery for early-stage oral cancer. Combining with EBRT can be considered because this method can achieve organ preservation and provide good functional results.[18] In the process of administering radiotherapy with brachytherapy, the position of the radioactive source is close to the tumor, so the distribution of the dose is according to the target, including small areas according to the speed of falloff in the surrounding tissue.[19] In addition to this combination, the combination of EBRT with stereotactic boost is a safe treatment to be applied to patients who are not eligible for surgery and need a non-operative approach. invasive.[15] External beam radiotherapy (EBRT) hyperactivity in terms of OS is not very good compared to EBRT, which has an absolute benefit of 80% in 5–10 years.[16] From this study can be concluded that EBRT can be used for oral squamous cell carcinoma cancer treatment. However, there are some disadvantages of EBRT that need to be reviewed based on the conditions in the patient's case.

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