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Original research article

Intraoral stents in preventing adverse radiotherapeutic effects in lip cancer patients

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ABSTRACT

Aim: To fabricate and evaluate the efficacy of individualized intraoral stents to minimize the potential side effects of radiation on oral tissues in patients with early stages of lip cancer.
Background: Lower lip cancer is a common tumor found almost exclusively in middle-aged and elderly males. Surgery is the most common treatment of choice, although for less extensive lesions, exclusive radiotherapy may be preferred. Some studies have found that the use of intraoral stents in patients with intraoral cancer (e.g., of the tongue or floor of the mouth) obtained favorable results in preventing unnecessary radiation doses to adjacent normal tissue and reducing oral complications. However, studies investigating the efficacy of individualized intraoral stents in patients with lip cancer have not been reported in the literature.
Materials and methods: Six patients with early stage lip cancer were eligible for curative radiotherapy and personalized intraoral stents. The stents were fabricated and all participants were evaluated for the occurrence of oral complications.

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Results: The regions of the oral mucosa protected from radiation by intraoral stents showed no mucositis. One patient complained of mild oral dryness but without interference in habits. At follow-up, none of the patients had late xerostomia or signs of dental caries by radiation.

Conclusions: The use of individualized intraoral stents was shown to be promising in reducing the adverse effects of radiation therapy in lip cancer patients. These findings highlight the importance of a multidisciplinary team during oncological therapy.

1. Background

Lip cancer (LC) is a type of oral cancer that develops at the junction of the oral cavity and the skin; it is most common on the lower lip (80%), while the upper lip and commissures are involved less often (5–8% and 7–15% of cases, respectively).[1,2] Moreover, LC is the most frequent tumor of the oral and maxillofacial region, comprising 25–30% of all oral cancers.[2] It has a variable incidence around the world, with the highest rates being reported in southern Australia and some regions of Canada and Spain; incidence of LC is also considerable in tropical countries.[3] It is commonly developed on the vermilion border of the lip and is diagnosed as squamous cell carcinoma (SCC) in 95% of cases; basal cell carcinomas and adenocarcinomas occur more rarely.[1] The worldwide available data reveal that this type of cancer occurs mostly in white men (with a male-to-female ratio of 28.5:4.3), with peak incidence in the sixth and seventh decades, and among people working under conditions of prolonged sun exposure, such as agricultural workers and those with other outdoor occupations.[1,2,4] The etiology of lower lip SCC is highly related to chronic sunlight (especially UVB) exposure and other factors, such as low sociodemographic conditions, genetic susceptibility, and immunosuppression, which might produce a synergistic effect.[2,4,5] However, the definitive pathogenic pathway remains unclear.

It is very important to note that LC may evolve from precancerous lesions of the lip, such as actinic cheilitis, or from healthy lips.[5] Because the disease is asymptomatic, the diagnosis may be delayed, even when it occurs on an easily visible site on the lip.[3–5] In general, LC shows a survival rate higher than 5 years and a mortality rate of 10–15%, exhibiting a better prognosis compared with other head and neck tumors. The accessibility of the lesion site often allows for full-thickness resection of the neoplasm.[2,3] The prognosis depends mainly on the clinical staging of the tumor, especially with regard to its size and to lymph node status.[4]

Surgery is the treatment of choice, despite the fact that, for less extensive lesions in the early stages (T1/T2N0), the results obtained with radiotherapy (RT) may compare favorably.[6,7] Head and neck RT may offer better functional and cosmetic results, but can lead to complications, such as oral mucositis, xerostomia, and osteoradionecrosis, with significant impairment of patient's quality of life.[8,9] Several strategies have been used to prevent oral complications, because the treatment of these conditions is still considered difficult.[8–10] Individualized intraoral stent can decrease these effects by reducing unnecessary radiation doses to healthy oral tissue and thereby minimizing the adverse effects of radiation.[9–14] Some studies have evaluated the use of intraoral stents in patients with intraoral cancer (e.g., cancer of the tongue or floor of the mouth) and obtained favorable results in preventing unnecessary radiation doses to adjacent normal tissue and reducing oral complications. However, studies investigating the efficacy of individualized intraoral stents in patients with LC have not been reported in the literature.

2. Aim

The present study evaluated the efficacy of individualized intraoral stents to minimize the potential side effects of radiation on oral tissues in 6 patients with early stages (T1/T2N0) of LC.

3. Materials and methods

For this study, only patients diagnosed with LC in early stages (T1/T2N0), and following exclusively RT treatment programs with curative purpose were selected (Fig. 1 and Table 1). The staging of the patients was obtained through extra- and intraoral physical examination. Six patients meeting these study criteria were selected and referred to the Clinical Oncological Dentistry of Santa Casa Hospital of Montes Claros (Minas Gerais, Brazil) for the construction of individualized intraoral stents. All devices were built by an experienced clinician (BAR).

All patients underwent removal of the intraoral foci of infection prior to the fabrication of stents. Then, the dental and/or alveolar ridge arcades were molded, obtaining of the casts and assembly in articulator were held (Fig. 2A). Cerrobend alloy or lead with thickness of 5 mm was used as shielding (Fig. 2B). The stent was made of acrylic resin, adapted to the metal plate and wrapped in vinyl polychloride film and wax to avoid contact with the metal and reduce backscatter (Fig. 2C). According to the proposed treatment, the 6 patients received RT exclusively, with a total dose of 60–66 Gy fractionated at 2 Gy per day (for 5 consecutive days) for 6–7 weeks, using an electron beam with energy ranging from 4 to 8 mega electron volts (MeV) of linear accelerator (Siemens Mevatron Primus MXE-2® and Elekta Synergy Full®), with protection blocks and radioprotective stents placed in the retrolabial region (Fig. 2D). A bolus made of wax (5 mm thick) was superimposed on the immobilizing thermoplastic mask in the region corresponding to the tumor, with the patient in the supine position using anatomical head and neck support.