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Continuous Dental Support for Oral Cancer Patients: From Early Detection to Complication Prevention and Rehabilitation

Ganiev A.A¹, Khamrakulov A.S²

1. Associate Professor, Department of Maxillofacial Surgery, Tashkent Medical Academy, Doctor of Medical Sciences
2. Master's student, "Maxillofacial Surgery" program, Tashkent Medical Academy

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Abstract: Oral cancer remains one of the most significant problems in modern onco-dentistry, as late diagnosis, aggressive combined treatment, and a high incidence of dental complications lead to impaired mastication, speech, swallowing, appearance, and quality of life in patients. This review article aims to briefly summarize key data from the current literature and substantiate the need for continuous dental support of oral cancer patients at all stages — from the identification of oral potentially malignant disorders to the prevention of complications and rehabilitation. Current sources on epidemiology, risk factors, diagnosis, artificial intelligence, dental preparation, oral mucositis, xerostomia, osteoradionecrosis, reconstruction, and prosthetics were analyzed. It is shown that dental care should not be limited to a one-time sanitation before radiation therapy: it should include risk assessment, elimination of chronic trauma and inflammation, preparation for surgery and irradiation, control of mucositis and infections, prevention of radiation caries and osteoradionecrosis, as well as restoration of function after treatment. An integrated model of continuous dental support is proposed, in which the dentist and maxillofacial surgeon are permanent participants in the oncological care pathway.

Keywords: oral cancer; squamous cell carcinoma; OPMD; xerostomia; dental preparation; oral mucositis; osteoradionecrosis; dental rehabilitation; quality of life

1. INTRODUCTION

Oral cancer is a clinically and socially significant form of malignant neoplasm of the head and neck. In most cases, it is represented by squamous cell carcinoma, and its course is associated with local invasion, regional metastasis, a high rate of late detection, and a substantial decline in quality of life [1]. A distinctive feature of the disease is that the oral mucosa is accessible to visual examination, yet a significant proportion of tumors are still diagnosed at stages requiring extensive surgical intervention, radiation or chemoradiation therapy, reconstruction, and prolonged rehabilitation [2].

The current problem lies not only in early diagnosis but also in the insufficient integration of dental care into the overall oncological care pathway. A patient with oral cancer does not need an episodic dental consultation, but rather continuous support: identification of precancerous changes, elimination of chronic trauma factors, oral sanitation, prevention of mucositis, xerostomia, radiation caries and osteoradionecrosis, restoration of mastication and speech, and long-term dispensary monitoring [3].

This article aims to highlight the key positions of the current literature and to propose a practice-oriented model of continuous dental support for oral cancer patients throughout the course of multimodal treatment.

2. MATERIALS AND METHODS

A brief analytical review of current publications and guidelines on oral cancer, diagnosis, risk factors, dental preparation, complications of antitumor therapy, and rehabilitation was performed. International guidelines, systematic reviews, clinical studies, and regional works from 2013–2026 were used, with priority given to sources from recent years. Primary attention was given to data of direct relevance to maxillofacial surgery, dentistry, and the organization of interdisciplinary care [4].

Early Detection and Precancerous Diseases

Oral potentially malignant disorders are a key link in oral cancer prevention. These include leukoplakia, erythroplakia, erythroleukoplakia, oral submucous fibrosis, certain forms of lichen planus, and other mucosal lesions associated with an increased risk of malignant transformation [5]. The most dangerous are long-standing red or mixed red-white lesions, ulcers, and infiltrates, particularly on the lateral surface of the tongue, the floor of the mouth, and the retromolar area. A suspicious lesion persisting for more than 10–14 days after removal of the traumatic factor should be regarded as an indication for biopsy or urgent referral to a specialist.

The primary-care dentist plays a decisive role in early detection. Their task is not only to treat teeth but also to systematically examine the oral mucosa, record risk factors, palpate regional lymph nodes, document lesions, and ensure proper referral. Survey studies of dentists show that gaps in oncological vigilance and referral remain one of the causes of late diagnosis [6]. For this reason, training dentists in the algorithm of action when OPMD or oral cancer is suspected constitutes an independent preventive direction.

Digital diagnostics is becoming an additional tool. Artificial intelligence models for analyzing intraoral images already demonstrate high accuracy in distinguishing normal mucosa, OPMD, and cancer, but they do not replace clinical examination and histological verification [7]. It is most reasonable to regard AI as a tool for preliminary image triage, teledentistry, and decision support in settings with a shortage of specialists.

3. RESULT AND DISCUSSION

Risk Factors and the Biological Rationale for Prevention

The classic risk factors for oral cancer remain tobacco, alcohol, chewing mixtures, chronic trauma to the oral mucosa, poor hygiene, periodontal disease, and a low frequency of preventive examinations [8]. Alcohol has an independent carcinogenic significance and enhances the damaging effect of tobacco carcinogens; global studies continue to show pronounced regional and sex-based heterogeneity in the alcohol-related burden of oral cancer [9].

Current data broaden the preventive model: important factors are not only smoking and alcohol cessation but also control of chronic inflammation, correction of the microbiome, treatment of periodontitis, elimination of traumatic teeth and dentures, and improved nutrition. Studies emphasize the link between oral cancer and dysbiosis, anaerobic flora, a chronic inflammatory microenvironment, and molecular epithelial disturbances [10]. Recent work also points to the role of genetic polymorphisms of carcinogen-metabolizing enzymes and epigenetic mechanisms, opening prospects for individualized risk stratification of OPMD [11].

Prevention should therefore be multilevel. The first level is behavioral: cessation of tobacco, alcohol, and chewing mixtures. The second is dental: sanitation, periodontal treatment, elimination of trauma. The third is diagnostic: monitoring of OPMD and timely biopsy. The fourth is digital and molecular: photodocumentation, AI analysis, biomarkers, and personalized risk assessment.

Dental Preparation Before Multimodal Treatment

Once a diagnosis of oral cancer has been established, dental preparation should begin immediately, in parallel with oncological planning. Its main objectives are to identify foci of chronic infection, assess tooth prognosis, perform sanitation, extract teeth with an unfavorable prognosis within the future radiation field, adjust dentures, train the patient in hygiene, and prepare an individualized program for complication prevention [12].

The main organizational difficulty lies in the limited time available: oncological

treatment cannot be unjustifiably delayed, yet extractions and sanitation require a healing period. A clear algorithm is therefore needed to quickly divide interventions into mandatory, desirable, and deferred categories. Mandatory interventions include elimination of acute infections, extraction of teeth at high risk of complications within the radiation field, correction of traumatic appliances, and hygiene training. Table 1. Desirable interventions include professional hygiene and stabilization of caries and periodontitis. Deferred measures are postponed to the stage after completion of antitumor therapy.

Table 1. Minimal algorithm for dental preparation

Stage	Main actions	Goal
Before treatment	Examination, radiographic control, sanitation, extraction of teeth with poor prognosis, denture adjustment	Reduce the risk of infection, osteoradionecrosis, and treatment interruptions
During therapy	Monitoring of hygiene, pain, mucositis, candidiasis, nutrition, and salivation	Maintain treatment tolerability and quality of life
After therapy	Prevention of radiation caries and trismus, management of xerostomia, prosthetic rehabilitation, dispensary follow-up	Restore function and prevent late complications

Main Complications of Antitumor Therapy

Oral mucositis is one of the most frequent and clinically significant complications of radiation and chemoradiation therapy. It causes pain, difficulty eating, impaired speech, risk of secondary infection, and may lead to interruptions in antitumor treatment. International MASCC/ISOO recommendations emphasize the need for a preventive and supportive approach, including hygiene training, pain management, infection control, nutritional support, and the use of methods with proven efficacy where indicated [13]. Russian studies show that a personalized approach to mucositis prevention and treatment can reduce the severity of complications and preserve the patient's ability to eat independently and maintain oral care.

Xerostomia and hyposalivation are late consequences of radiation therapy and substantially increase the risk of radiation caries, candidiasis, dysgeusia, and dysphagia. Prevention includes fluoride agents, moisturizing preparations, dietary control, regular professional hygiene, and long-term follow-up. Osteoradionecrosis remains one of the most severe complications, particularly after tooth extraction within the irradiated area; therefore, the decision to extract teeth with a questionable prognosis should be made before the start of radiation treatment [14].

Thus, the complications of multimodal treatment are not an inevitable background of therapy: many of them can be reduced through timely dental preparation, regular monitoring, and coordination among the oncologist, radiation oncologist, dentist, and maxillofacial surgeon.

Rehabilitation and the Author's Model of Continuous Support

Rehabilitation of oral cancer patients should be directed not only at closing the defect but also at restoring mastication, swallowing, speech, appearance, social activity, and psychological resilience. Microsurgical reconstruction with free flaps has expanded the possibilities for defect repair, but the functional outcome depends on subsequent orthopedic, speech-language, nutritional, and dental support.

Orthopedic and implant-based rehabilitation in patients after radiation therapy requires particular caution. Implantation can improve denture retention and quality of life, but the risk of complications is higher in irradiated patients, especially with high doses, xerostomia, poor hygiene, and impaired vascular status of the tissues [15]. The decision on prosthetic rehabilitation and implantation should therefore be made

individually, taking into account dosimetry, bone tissue condition, time since treatment, and the patient's motivation for hygiene.

Based on the literature analysis, it is reasonable to propose a model of continuous dental support. It comprises five stages: 1) primary prevention and identification of OPMD; 2) rapid oncological referral and biopsy; 3) pre-treatment dental preparation; 4) support during surgical, radiation, and systemic treatment; 5) long-term rehabilitation and monitoring for recurrence, secondary tumors, and late complications. This model shifts dental care from a reactive to a predictive-preventive mode.

4. CONCLUSION

Oral cancer requires an interdisciplinary approach in which dental care is not a supplementary but a mandatory component. The main reserves for improving outcomes lie in the early detection of OPMD, increasing oncological vigilance among dentists, timely sanitation, prevention of mucositis, xerostomia, radiation caries, and osteoradionecrosis, as well as functional rehabilitation after treatment. The concept of continuous dental support makes it possible to unite prevention, treatment, and rehabilitation into a single patient care pathway. Its implementation may reduce the incidence of complications, decrease interruptions in antitumor therapy, and improve the quality of life of oral cancer patients.

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