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ORIGINAL ARTICLE

INDIVIDUAL ORAL HYGIENE QUALITY INFLUENCE ON THE SEVERITY OF POST-RADIATION MUCOSITIS IN PATIENTS WITH SQUAMOUS CELL CARCINOMA OF THE OROPHARYNGEAL REGION

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ABSTRACT

Purpose of the study. Assessment of the quality of individual oral hygiene in patients with squamous cell oropharyngeal cancer before and after radiation therapy.

Materials and methods. Examined 76 patients with squamous cell carcinoma of the oropharyngeal region. For all patients, before and after radiation therapy, evaluated the hygienic state of the oral cavity using indices: index of individual hygiene (Green V.), Silness-Loe index (GI), index of prevalence of periodontal diseases (CPITN).

Results. The number of males was higher than that of females: 52 (68.4%) versus 24 (31.6%). Before radiotherapy, 52 (68.4%) patients had gingivitis, 66 (86.8%) had periodontitis, 43 (56.5%) had metal crowns, and 57 (76%) had destroyed teeth. All patients (100%) had oral mucositis after radiation therapy. We found a significant negative trend: the Green V. index changed by 29.2%, CPITN indicators-by 38%, GI — by 31.2% ($p<0.05$). There was also a direct dependence of the severity of oral mucositis on the total dose of radiation. Thus, patients with squamous cell carcinoma of the oropharyngeal region develop severe oral mucositis with a total radiation dose of 30 Gy and above. The probability of occurrence of oral mucositis of 4 severity is possible in 2/3 cases with a total radiation dose of 40 Gy or higher.

Conclusion. The severity of oral mucositis depends on both the total radiation dose and the initial dental status of the patient. Therefore, quality control of individual oral hygiene and periodontal support for patients with oral malignancies should be carried out throughout the patient's treatment.

Keywords:
head and neck cancer, squamous cell carcinoma of the oropharyngeal region, oral mucositis, index of individual oral hygiene, index of prevalence of periodontal diseases, radiation therapy

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ОРИГИНАЛЬНАЯ СТАТЬЯ

ВЛИЯНИЕ КАЧЕСТВА ИНДИВИДУАЛЬНОЙ ГИГИЕНЫ ПОЛОСТИ РТА НА ТЯЖЕСТЬ ПОСТЛУЧЕВОГО МУКОЗИТА У ПАЦИЕНТОВ С ПЛОСКОКЛЕТОЧНЫМ РАКОМ ОРОФАРИНГЕАЛЬНОЙ ОБЛАСТИ

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РЕЗЮМЕ

Цель исследования. Оценка качества индивидуальной гигиены полости рта пациентов с плоскоклеточным раком орофарингеальной области до и после лучевой терапии.

Материалы и методы. Были обследованы 76 пациентов с плоскоклеточным раком орофарингеальной области. У всех пациентов до начала лучевой терапии и после ее завершения оценивали гигиеническое состояние ротовой полости с помощью индексов: индекс индивидуальной гигиены (Green V.), десневой индекс Silness-Loe (GI), индекс распространенности болезней пародонта (CPITN).

Результаты. Количество мужчин было больше по сравнению с лицами женского пола: 52 (68,4%) против 24 (31,6%). До начала лучевой терапии у 52 (68,4%) пациентов был выявлен гингивит, у 66 (86,8%) человек — пародонтит, у 43 (56,5%) — наличие металлических коронок, у 57 (76%) — наличие разрушенных зубов. После окончания лучевой терапии у всех пациентов (100%) был зафиксирован оральный мукозит. Мы выявили достоверную отрицательную динамику: индекс Green V. изменился на 29,2%, показатели CPITN — на 38%, GI — на 31,2% ($p<0,05$). Также была зафиксирована прямая зависимость степени тяжести орального мукозита от суммарной дозы облучения. Так, при суммарной дозе облучения 30 Гр и выше у пациентов со злокачественными новообразованиями (ЗНО) полости рта развивается оральный мукозит тяжелой степени. При суммарной дозе облучения 40 Гр и выше вероятность появления орального мукозита 4 степени тяжести возможна в 2/3 случаев.

Заключение. Степень тяжести орального мукозита зависит и от суммарной дозы облучения, и от исходного стоматологического статуса пациента. Поэтому контроль качества индивидуальной гигиены полости рта и пародонтологическое сопровождение пациентов с ЗНО полости рта должны проводиться на протяжении всего лечения пациента.

Ключевые слова:
рак головы и шеи, плоскоклеточный рак орофарингеальной области, оральный мукозит, индекс индивидуальной гигиены ротовой полости, индекс распространенности болезней пародонта, лучевая терапия

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Oral cancer is the most common malignant disease of the head and neck [1, 2, 3]. This nosology ranks 5–6 among oncological diseases [4]. The prevalence of oral malignancies (OM) in 2018 reached 28.5 cases per 100,000 population, which is 17.5% more than in 2013. The proportion of patients with newly diagnosed malignant tumors of the oral cavity stage 1–2 is 36.9 per cent. The five-year overall survival rate in this group of patients is 40–50% [4]. In 2018 the percentage of patients with overall survival more than 5 years was 51.9% in Russia.

Radiation therapy is most common independent method in the treatment of oral malignancies (17.0%), and in 38% of cases in combination with other methods (Fig. 1). According to various authors, patients have after radiation therapy, in most cases post-radiation complications in the form of edema, hyperemia, wet desquamation of oral tissues, with the formation of ulcers [5, 6].

Most authors believe that smoking, alcohol, and papillomavirus infection are risk factors for developing not only squamous cell carcinoma of the oropharyngeal region, but also for the formation of oral mucositis [7–10]. The researchers also noticed that the severity of post-radiation oral mucositis depends on the initial hygienic state of the oral cavity, the total radiation dose, and the quality of oral care during radiotherapy [11, 12].

Purpose: to estimate the quality of individual oral hygiene in patients with oropharyngeal squamous cell carcinoma before and after radiation therapy.

MATERIALS AND METHODS

We have observed 76 patients with clinically and morphologically confirmed oropharyngeal squamous cell carcinoma. Radiation therapy was performed in all patients included in the study. We registered indicators, during the hygienic state of the oral cavity assessing: the index of individual hygiene (Green V.), the gingival index of Silness-Loe (GI), the index of the prevalence of periodontal diseases (CPITN). We assessed the severity of oral mucositis using the RTOG scale, also taking into account the area of the mucosal lesion, the nature of the discharge (mucosal/hemorrhagic/purulent), the presence of ulcers, etc.

The quality control of individual oral hygiene and periodontal support of patients with oral malignancies (*n*=76) was performed by the dentist both initially (before the start of radiation therapy) and after the end of radiotherapy.

Statistical processing of the material was carried out with the program “STATISTICA 6.0”. The reliability of differences between quantitative indicators was assessed using the Mann — Whit-

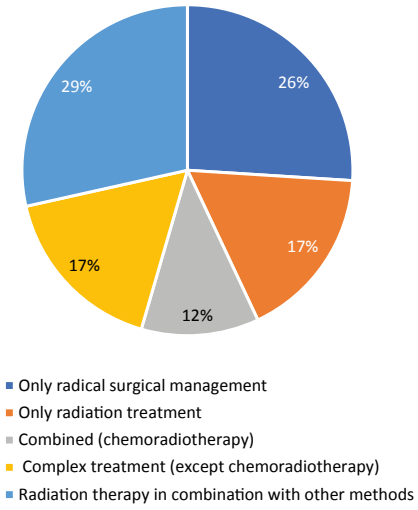

Fig. 1. Treatment types of oral cavity malignant tumors

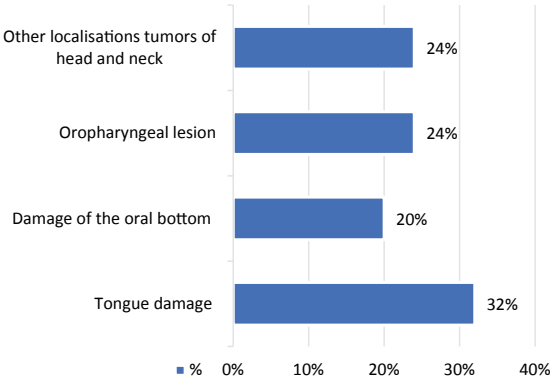

Fig. 2. Distribution of patients by tumor location

ney test. The differences were considered significant at $p<0.05$.

RESULTS

The average age of patients was 52+11 years. The number of males was higher than the number of females: 52 (68.4%) versus 24 (31.6%).

Figure 2 shows the distribution of patients by tumor location. Malignancies of the tongue (32%) prevailed among cancer lesions in other areas. Figure 3 shows a comparison of the number of patients according to the revealed degree of morphological differentiation of the oropharyngeal region of the malignancies. In our study, more than half of the patients were with moderately differentiated oropharyngeal cancer.

Before the radiation therapy, 52 (68.4%) patients had gingivitis, 66 (86.8%) people had periodontitis, 43 (56.5%) had metal crowns, and 57 (76%) had destroyed teeth. Indicators of the Green V index were 1.78+1.12 before the radiation therapy. In most cases, the oral hygiene index was considered satisfactory. The CPITN index before radiotherapy was 2.12+0.43, and the GI index was 2.41+0.39, which indicates the need for professional oral hygiene.

After the end of radiation therapy, oral mucositis was detected in all patients (100%) (table 1).

The Green V., GI, and CPITN indexes have significantly worsened: 2.48+0.29, 3.5+0.40, 3.40+0.38 accordingly. A significant negative dynamics was found for all indicators of the oral hygiene index: the Green V index changed by 29.2%, CPITN indicators — by 38%, GI-by 31.2% ($p<0.05$).

Table 1. Distribution of patients with oral malignancies according to the severity of oral mucositis after the end of radiation therapy

The severity of oral mucositis		Patients with oral malignancies	
		n	%
1	Hyperemia light pain (no need to use painkillers)	1	1.31
2	Focal mucositis, with possible production of serous-hemorrhagic discharge, edema, there may be moderate pain (painkillers re required)	9	11.84
3	Significant fibrinous mucositis, there may be severe pain (narcotic anesthesia is required)	39	51.3
4	Ulcer, necrosis, bleeding	27	35.55

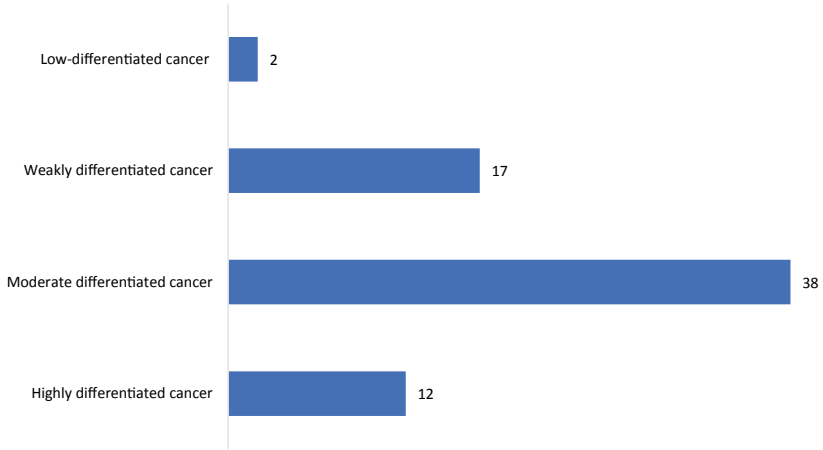

Fig. 3. The number of patients identified by the degree of morphological differentiation of the oropharyngeal malignancies

Green V. and CPITN levels before and after radiotherapy are shown in figures 4 and 5.

We have detected a direct correlation between the severity of oral mucositis and the total radiation dose. Thus, with a total radiation dose of 30 Gr or higher, patients with oral malignancies develop severe oral mucositis. But with a total radiation dose of 40 Gr or higher, the appearance of ulcerative lesions of the oral mucosa was detected in 75% of patients.

DISCUSSION

It is proved that post-radiation oral mucositis begins to manifest at a total radiation dose of 20 Gr or higher [11]. At a cumulative dose of 30 Gr or higher, the ulcerative-necrotic form of mucositis begins to develop [11]. Our study shows that with a total radiation dose of 40 Gr or higher, the probability of oral mucositis of 4 degrees of severity is possible in 2/3 of cases. In oral mucositis, the greatest discomfort is pain, the intensity of which can affect the treatment of the underlying disease and the quality of life of the patient.

Most researchers believe that the rate of development and severity of post-radiation oral mucositis is influenced by the initial dental status of the patient [12, 13, 14, 15]. Some patients already need professional oral hygiene before the start of radiation therapy, which should be continued after the end of radiotherapy [1]. Our study showed that patients had a CPITN index of more than 2 points, and they needed treatment and prevention of oral diseases.

Patients with oral mucositis require special oral care: brushing with a soft toothbrush, regular replacement of the toothbrush, the use of dental floss and rinses with antiseptics and moisturizers [12, 16, 17, 18].

The oral care regimen for patients with oral malignancies should include brushing their teeth with a soft toothbrush, regularly replacing the toothbrush, flossing, and using soft rinses and moisturizers [12, 19].

CONCLUSIONS

The "insidiousness" of post-radiation oral mucositis consists of several factors: the development of damage to the oral mucosa with the addition of necrobiotic processes, intense pain and a decrease in the quality of life. The severity of oral mucositis depends on both the total radiation dose and the initial dental status of the patient. Therefore, the quality control of individual oral hygiene and periodontal support for patients with oral malignancies should be carried out throughout the patient's treatment.

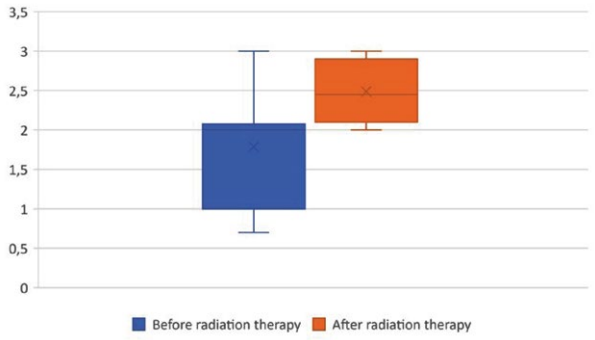

Fig. 4. Individual hygiene index (Green V.) before and after radiation therapy (p<0.05)

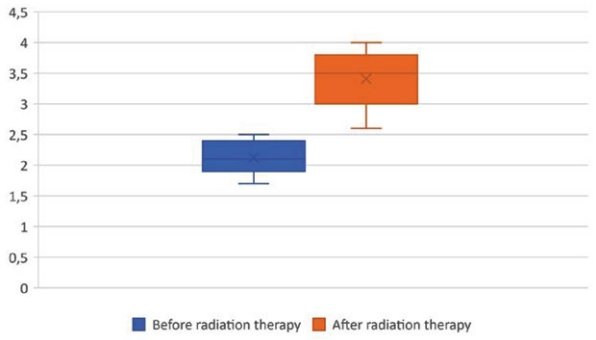

Fig. 5. The index of periodontal diseases spread (CPITN) before radiation therapy and after its termination (p<0.05)

Authors contribution:
Avanesov A.M. – concept and design of the study.
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Tarasova T.V. – scientific editing.
Haidar D.A. – data collection, analysis, technical editing.
Vinogradova A.A. – design of the references.
Zakharkin I.A. – preparation of illustrations.

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