

Impact of Radiodermatitis on body aesthetics in head and neck cancer patients

Impacto da Radiodermatite na estética corporal de pacientes com câncer de cabeça e pescoço

Impacto de la Radiodermatitis en la estética corporal de pacientes con cáncer de cabeza y cuello

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Abstract: Objective: to describe the impact of radiodermatitis on body aesthetics in patients with head and neck cancer undergoing radiotherapy. **Method:** this is an exploratory descriptive case series study conducted at the radiotherapy outpatient clinic of a teaching hospital. Ten patients with head and neck cancer who underwent radiotherapy from 2015 to 2017 were included. Data collection was performed with an instrument designed for this purpose and through photographic record. Data was analyzed descriptively, presenting the calculation of frequency. **Results:** all patients presented characteristic signs of radiodermatitis, mainly the clinical signs of epilation (in men), hyperpigmentation and dry scaling, which affect body aesthetics. **Conclusion:** the body aesthetics of the followed patients was altered as a result of the clinical signs of radiodermatitis. It is important to evaluate these changes in patients with head and neck cancer undergoing radiotherapy.

Descriptors: Head and Neck Neoplasms; Body Image; Radiotherapy; Radiodermatitis; Aesthetics

Resumo: Objetivo: descrever o impacto da radiodermatite na estética corporal em pacientes com câncer de cabeça e pescoço submetidos à radioterapia. **Método:** estudo exploratório descritivo, do tipo série de casos, realizado no ambulatório de radioterapia de um hospital de ensino. Foram incluídos dez pacientes com câncer de cabeça e pescoço que foram submetidos à radioterapia no período de 2015 a 2017. A coleta dos dados foi realizada com instrumento construído para esse fim e por meio de registro fotográfico. Os dados foram analisados de forma descritiva, apresentando-se o cálculo da frequência. **Resultados:** todos os pacientes apresentaram sinais característicos de radiodermatite, principalmente os sinais clínicos de epilação (nos homens), hiperpigmentação e descamação seca, que afetam a estética corporal. **Conclusão:** a estética corporal dos pacientes acompanhados foi alterada em decorrência dos sinais clínicos da radiodermatite. Destaca-se a importância de avaliar essas alterações em pacientes com câncer de cabeça e pescoço submetidos à radioterapia.

Descritores: Neoplasias de Cabeça e pescoço; Imagem corporal; Radioterapia; Radiodermatite; Estética

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Resumen: **Objetivo:** describir impacto de la radiodermatitis en la estética corporal en pacientes con cáncer de cabeza y cuello sometidos a radioterapia. **Método:** estudio exploratorio descriptivo, del tipo serie de casos, realizado en ambulatorio de radioterapia de un hospital de enseñanza. Incluidos diez pacientes con cáncer de cabeza y cuello que fueron sometidos a radioterapia entre 2015 y 2017. Recolección de datos fue realizada con instrumento construido para ese fin y mediante registro fotográfico. Los datos fueron analizados de manera descriptiva, presentándose el cálculo de la frecuencia. **Resultados:** todos los pacientes presentaron síntomas característicos de radiodermatitis, principalmente síntomas clínicos de epilación (en los hombres), hiperpigmentación y descamación seca, que afectan la estética corporal. **Conclusión:** la estética corporal de los pacientes acompañados fue alterada en decurso de los síntomas clínicos de la radiodermatitis. Se destaca la importancia de evaluar esas alteraciones en pacientes con cáncer de cabeza y cuello sometidos a radioterapia.

Descriptores: Neoplasias de Cabeza y Cuello; Imagen Corporal; Radioterapia; Radiodermatitis; Estética

Introduction

Head and neck cancer (HNC) encompasses a heterogeneous group of neoplasms defined by anatomical basis of the upper aerodigestive tract, including the oral cavity, pharynx and larynx.¹ Worldwide, an estimated 246,000 new cases of tongue and oral cavity neoplasm in men and 108,000 in women were estimated in the year 2018.² In Brazil, oral cavity cancer is among the most frequent types of cancer among men (5%), with an expected 11,180 new cases in men and 4,010 in women each year in the triennium 2020-2022.³

The main risk factors for developing HNC include human papillomavirus (HPV) infection and tobacco and alcohol consumption.⁴ Among other factors, unprotected sun exposure stands out as being associated with a greater risk of developing lip cancer;³ hormonal conditions, family history of the disease and intake of iodized foods in association with thyroid neoplasia;⁴ excess body fat and factors related to occupational exposure.³

The main therapeutic modalities adopted for HNC are surgery, chemotherapy and radiotherapy, which can be used in isolation or concomitantly, depending on the tumor staging.¹ Radiotherapy is used to treat about 80% of patients with HNC. Despite the benefit of its use and its enormous technological advances, patients will commonly present toxicities associated with exposure to ionizing radiation, which negatively affect quality of life.⁵

Common toxicities in patients with HNC submitted to radiotherapy are: radiodermatitis, mucositis, xerostomia and taste alteration. Their occurrence and severity depend on several factors, such as: irradiated volume and site, total dose, fractionation, age, patient's clinical conditions and associated treatments.⁶ Because of these adverse effects, the patient can deal with alterations in body aesthetics. Voice changes, dysphagia, pain, intermittent coughing, fatigue, changes in smell, anxiety, and depression are examples of varying degrees of limitations, as well as loss of self-esteem and social isolation.⁷

Patients with HNC usually have significant problems with body image, due to visible disfigurement and organic dysfunction both from the disease itself and from the treatment.⁸ HNC, given its complexity and location, involves anatomical and physiological characteristics, and may promote alterations that compromise body aesthetics, function related to eating, breathing and communication, as well as social interaction.⁹

Several studies address the changes in body aesthetics in patients with HNC resulting from the disfigurement that occurs due to the surgical treatment required for these patients.^{8,10-11} However, little is discussed about the aesthetic changes in patients with HNC undergoing radiotherapy. Considering that the face and neck are the most visible parts of the body and that aesthetic changes resulting from exposure to ionizing radiation may affect quality of life, it is important to know such changes in this group of patients. Thus, the research question of this study was: what is the impact of radiodermatitis on the aesthetic changes presented by patients with HNC submitted to radiotherapy?

However, little is discussed about the aesthetic changes in patients with HNC undergoing radiotherapy. Thus, the aim of this study was to describe the impact of radiodermatitis on body aesthetics in patients with HNC undergoing radiotherapy.

Method

This is an exploratory, descriptive, case series study, conducted at the radiotherapy outpatient clinic of a High Complexity Oncology Care Unit (UNACON) of a university hospital in the Federal District. A case series comprises three to ten cases, which are described in detail, with presentation of the patient's socio-demographic and clinical characteristics, such as signs, symptoms and therapeutic procedures used, as well as the outcome of the case.¹²

The data in this study is derived from secondary analysis of outcomes presented by participants of a study developed by the research group named "Prophylactic and therapeutic interventions in the management of radiodermatitis in cancer patients". Patients were eligible to participate in the main study if they had a medical diagnosis of malignant head and neck cancer with indication to start radiotherapy, with or without concomitant chemotherapy. Thus, a convenience sample was formed in which ten patients (cases) with HNC who developed changes in body aesthetics during the time they were undergoing radiotherapy were included. The data was collected in the period from 2015 to 2017.

The participants were invited to participate in the study by the responsible researcher. The evaluation occurred weekly, from the first radiotherapy session until the completion of treatment, by nurses of the radiotherapy outpatient clinic, responsible for monitoring these patients. The evaluation included filling out the data collection instrument, containing socio-demographic (age, gender) and clinical characteristics (International Classification of Diseases [ICD], staging, purpose of radiotherapy, radiotherapy technique, total dose in Gy, daily dose in Gy and total number of fractions), by means of an interview or obtaining data from medical records. Additionally, the instrument contained the evaluation of the patient's skin and the photographic record made by the nurse evaluators.

The characteristics related to reactions due to ionizing radiation exposure were collected during treatment. To document the evolution of the results throughout the radiotherapy

sessions, the main regions of the head and neck subjected to evaluation were photographed weekly for eight weeks, namely: Week 1 (S1), Week 2 (S2), Week 3 (S3), Week 4 (S4), Week 5 (S5), Week 6 (S6), Week 7 (S7), and Week 8 (S8). The following regions were photographed: frontal region of the head and neck, right side profile, left side profile, and posterior region of the neck. The photographs were taken in a standardized manner, using the same distance from the patient, same type and intensity of light, and same camera (Nikon P510) for each patient, and were taken in the nursing office during the weekly appointment. All patients were instructed about the photographic record and were informed that the use of the images would be for research purposes only. Additionally, the identity of patients was preserved, protecting the region of the eyes in the photographed images.

Radiotherapy was performed using a 6 MV linac photon beam, with three-dimensional conformal planning (3D-CRT) and the use of a thermoplastic mask in all radiotherapy sessions to which the sample patients were submitted.

The data obtained was analyzed descriptively, presenting the calculation of the frequency of cases included. The study was conducted according to the required ethical standards (Resolutions 466/2012, 510/2016, 580/2018, of the Ministry of Health), having been approved by the Research Ethics Committee, process CAAE no. 24692813.6.0000.0030, ordinance number 610.425, on April 9, 2014.

Participants who gave their permission via the Free and Informed Consent Term (FICT) were part of the study. The FICT contained information about the study, potential risks and benefits, voluntary participation and withdrawal rights, and preservation of anonymity, as well as a request for permission to use photographic documentation of the irradiated area (Authorization for Use of Image).

Results

Ten patients with HNC who underwent radiation therapy from July 2015 to May 2017 were included. The mean age was 63 years. The predominant histological type was squamous cell carcinoma (n=9.90%), and only one had undifferentiated lymphoepithelial carcinoma type (n=1.10%). Among the patients followed, nine underwent chemoradiotherapy (n=9.90%), and only one underwent exclusive radiotherapy (n=1.10%). Regarding risk factors for HNC, most patients reported being former alcohol drinkers (n=8.80%), and two reported never having drunk alcohol (n=2.20%). One patient reported never having smoked (n=1.10%), two smoked (n=2.20%), and the others were former smokers (n=7.70%). Only one of the followed patients reported no previous sun exposure (n=1.10%). The sociodemographic and clinical characteristics of the cases included are shown in Table 1.

Table 1 – Sociodemographic and clinical characteristics of included cases from 2015 to 2017 — Brasília, DF, Brazil, 2020 (n = 10)

Case	Age	Sex	ICD - Diagnostic(staging)	RT Purpose	RT Technique	TD (Gy)	DD (Gy)	Fractions(days)
1	70	M	C32 - Larynx (III)	Radical	3D-CRT	70.0	2.0	35
2	76	M	C01 - Base of the Tongue (IVa)	Adjuvant	3D-CRT	70.2	1.8	39
3	71	M	C10 - Oropharynx (IVa)	Radical	2DRT	70.0	2.0	35
4	57	M	C12 - Pyriform sinus (IVa)	Adjuvant	3D-CRT	70.2	1.8	39
5	52	M	C04 - Floor of the Mouth (III)	Radical	3D-CRT	70.2	1.8	39
6	77	M	C10 - Oropharynx (IVa)	Adjuvant	2DRT	70.2	1.8	39
7	54	M	C10 - Oropharynx (IVa)	Radical	3D-CRT	70.0	2.0	35
8	22	M	C11 - Nasopharynx (IIIb)	Radical	3D-CRT	70.0	2.0	35
9	71	F	C05 - Palate (IVa)	Adjuvant	3D-CRT	70.0	2.0	35
10	79	M	C01 - Base of the Tongue (IVa)	Radical	3D-CRT	70.2	1.8	39

Note: DD - daily dose; TD - total dose; F - female; Gy - gray; M - male; RT - radiotherapy; 2DRT - conventional radiotherapy; 3D-CRT - conformal radiotherapy.

All patients presented esthetic alterations related to the signs of radiodermatitis, a cutaneous reaction resulting from exposure to ionizing radiation. Throughout the eight weeks of follow-up, it was possible to observe the development of dry scaling, epilation, and hyperpigmentation, characteristics that alter the appearance of the skin and, consequently, body aesthetics.

Figure 1 shows the images of Cases 1 to 5, at different moments during the treatment. It can be seen that over the weeks of treatment, the skin changes - and, in turn, the aesthetic changes in these patients - tended to worsen according to the accumulation of radiation dose received.

In Case 1, the hyperpigmentation and dryness of the patient's skin evolved over the weeks, as can be seen in images 1a (second week of treatment), 1b (fourth week of treatment) and 1c (seventh week of treatment). The evolution of the reaction is evident, being more intense as the accumulated dose increases, which in this case was approximately 60 Gy in the seventh week (Figure 1c). In Case 3, the patient received the same amount of dose per fraction, and it is possible to verify the changes in skin color during the weeks, having presented erythema, followed by hyperpigmentation and skin dryness.

In Cases 2 and 4, the patients presented hyperpigmentation, skin dryness, and epilation, as can be seen in images 2c and 4c, when the patients had received about 45 Gy. In Case 5, the patient presented the same changes with a lower cumulative dose of 36 Gy (5c).



Figure 1 – Weekly photographic follow-up of the esthetic alterations presented by Cases 1 to 5 - Brasília, DF, Brazil.

In Figure 2, Cases 6 to 10 are shown. Image 6a was performed on the first day of radiotherapy, and image 6b, on the fifth week of evaluation, when he had already received about 45 Gy of cumulative dose. Note that the patient shows alteration in skin coloration, with the presence of erythema and hyperpigmentation and, additionally, localized dry scaling.

In Case 7, it is possible to observe that in the course of the follow-up weeks, the patient presented intense cutaneous hyperpigmentation and dry scaling. Epilation can also be seen on the face in image 7b, taken at the sixth week of treatment, when he had already received about 60 Gy cumulative dose.

In Case 8, image 8a was taken on the first day of radiotherapy, and image 8b, on the fifth week of evaluation, when the patient had already received about 50 Gy of cumulative dose. One can see that the patient presents altered skin coloration, with the presence of hyperpigmentation, as well as dry scaling and epilation in the irradiated area.

In Case 9, it was observed that when the patient received about 65 Gy cumulative dose (image 9b), she showed extensive hyperpigmentation of the skin, as well as dryness of the irradiated area.

In Case 10, it was found that in the seventh week of evaluation (image 10b), when the patient had received about 63 Gy of accumulated dose, there was significant epilation of the irradiated area, with hyperpigmentation and dry scaling.



Figure 2 – Weekly photographic follow-up of the aesthetic changes presented by Cases 6 to 10 - Brasília, DF, Brazil, 2020.

Discussion

Radiotherapy is one of the main treatment options for patients with HCN, with doses ranging from 54 to 70 Gy, with fractionation around 2 Gy/fraction and 5 fractions/week.¹³ The adverse effects of exposure to ionizing radiation can start from the first dose of treatment. With each fraction of radiation, the dose accumulates in the tissues surrounding the tumor, and in the skin, so that this accumulation triggers a series of inflammatory reactions resulting from the increased recruitment of inflammatory cells to the affected tissues in order to reduce cellular damage.¹⁴

Radiodermatitis is a type of radiotoxicity triggered by radiation dose accumulation in the skin, an organ that is constantly affected by this type of treatment since it is external. The grade of radiodermatitis varies according to treatment-related (extrinsic) and patient-related (intrinsic) risk factors).

Extrinsic factors are: total radiation dose, dose fractionation scheme, type of external beam, concomitant chemotherapy, volume and surface area of the irradiated tissue.¹⁴ Furthermore, the use of devices in the irradiated area can be considered a risk factor, such as the tracheostomy tube, which causes humidity and local friction.¹⁵

Intrinsic factors are: age, sex, smoking, coexisting disease, local tumor, and genetic factors.¹⁴ In the case series presented, it was found that there was a slight variation regarding the total and fractional dose of radiotherapy as well as the number of fractions. Regarding the intrinsic factors, although there was more variation regarding age, tumor type and staging, the skin reactions were very similar. Despite the influence of extrinsic and intrinsic factors, it is observed that the occurrence of skin reactions are dose-dependent and follow a pattern in terms of grading, starting with changes in skin coloration, such as erythema and hyperpigmentation, until the occurrence of desquamation.

The erythema results from an inflammatory process, which generates increased sensitivity and can evolve with symptoms such as edema, dryness, burning, pruritus and hyperpigmentation.¹⁶ Hyperpigmentation is a post-inflammatory process resulting from disruption of the dermoepithelial junction¹⁴ which occurs approximately two to three weeks after the start of radiation therapy, with increased melanin production,¹⁶ causing a darkening of the skin. This excessive deposition of melanin in melanocytes is common to other skin conditions such as freckles, lentigo, chloasma (melasma), post-inflammatory and post-sun discolorations, scars, phototoxic and photoallergic reactions.¹⁷ Complaints of skin color changes are common reasons for dermatological consultations in search of aesthetic procedures that minimize this problem.¹⁸

Dry scaling results from increased mitosis rates in the basal keratinocyte cell layer, with insufficient production of new cells to replace those in the basal layer, unbalancing the skin cell repopulation process.¹⁴ The appearance of the skin in dry scaling is of opacity, roughness and dryness, different from hydrated skin, which presents a soft touch, smoothness and uniformity.¹⁹

Besides the aesthetic alterations reported, the loss of hair follicles stands out, called epilation, which occurs due to a decrease in the mitosis of the germ cells of the hair follicle.^{14,20} In men, the beard is part of the facial appearance, and the change generated by epilation has an impact on the body aesthetics of this group of patients.

Patients with HCN have a high potential for body image disturbances, given the highly visible location of the disease and the targeted treatments, such as radiotherapy, still little addressed in this context. Radiotherapy can affect physical appearance, resulting in tissue edema (lymphedema) and fibrosis, which cause changes in facial features, pigmentation, and facial asymmetry.²¹ In the series of cases presented, it is clear the alteration in facial aesthetics and in the patient's own self-image, caused by epilation, alteration in color and skin thickness.

Changes in body aesthetics compromise the psychological well-being of patients, and may cause symptoms of anxiety and depression, uncertainty, and low self-esteem.²²⁻²³ As the head and neck region is always exposed, it is suggested that the aesthetic alteration related to the occurrence of radiodermatitis negatively affects the quality of life, and may lead to social isolation. In patients with breast cancer submitted to radiotherapy, assessed in a qualitative study, it was observed that radiodermatitis affects several dimensions of quality of life and causes disturbances in body image.²⁴

Patients with HCN commonly already face significant physical changes in the performance of speech, breathing and jaw articulation functions. Such changes associated with altered aesthetics lead to psychosocial impairment. For this reason, it is essential to address body image changes when providing care to patients with HCN from the beginning of their treatment planning.²⁵⁻²⁶ The approach of functional and aesthetic changes should always be considered by health professionals when discussing the therapeutic interventions planned throughout the patient's care, in order to minimize functional and psychosocial damage through previous consultations with members of the multiprofessional team, such as nutritionists, psychologists, physiotherapists and speech therapists.

In this series of cases, it was observed how the clinical signs of radiodermatitis may interfere in the body aesthetics of patients with head and neck cancer. However, the clinical approach to radiodermatitis is usually prioritized, evaluating signs, symptoms and products aimed at preventing and treating this radiotoxicity,²⁷ without contemplating the aesthetic impairment that may occur due to skin reaction. In turn, studies that address changes in the body aesthetics of patients with HCN essentially observe the changes caused by surgical procedures,^{8,10-11} and not exactly by exposure to ionizing radiation. Although little studied, changes in the body aesthetics of patients with radiodermatitis are recognized as a factor that interferes with their quality of life.²⁴ Thus, this research highlights the importance of

developing further studies that deepen the knowledge on this subject, favoring the recognition of skin reactions as a factor that can interfere with the body aesthetics of patients with head and neck cancer undergoing radiotherapy.

A limitation of this study was not evaluating the patient's perception of their body image. In future studies, the assessment of self-image by patients with HCN undergoing radiotherapy may contribute to a better understanding of the theme. Furthermore, it is noteworthy that the case series method also implies the limitation of not being able to generalize the data.

Conclusion

In this series of cases, the patients presented clinical signs of radiodermatitis that significantly affected body aesthetics, namely: hyperpigmentation, epilation and dry scaling. Considering the impact that changes in body aesthetics may generate in patients with HCN undergoing radiotherapy because of the constant exposure of the region, it is essential that there is integrated multidisciplinary planning and assistance to offer support to the patient throughout his treatment.

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Conception or design of the study/research, analysis and/or interpretation of data, final review with critical and intellectual participation in the manuscript.

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