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Occupational papillary thyroid carcinoma and basal cell carcinoma coexistence: a case report

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ABSTRACT

Occupational cancers are cancers that result from exposure to carcinogens at work. Diagnosing occupational cancer expresses great importance in terms of public health. Because all occupational cancers are preventable as other occupational diseases. A detailed occupational history and careful questioning of exposure factors enable early diagnosis and prevention of occupational cancer. It is known that thyroid and skin cancers may occur due to occupational exposures. In this report, the coexistence of occupational thyroid cancer and occupational basal cell skin carcinoma is presented.

Keywords: Occupational cancer, papillary thyroid carcinoma, basal cell carcinoma, ionizing radiation

INTRODUCTION

Occupational cancers are described as cancers that result from exposure to carcinogens at work.[1] Occupational cancer diagnosis and treatment process are not different from cancers that occur without occupational exposure.[2] Diagnosing occupational cancer expresses great importance in terms of public health. Because all occupational cancers are preventable as other occupational diseases. Occupational history is often ignored when evaluating the patient. A detailed occupational history and careful questioning of exposure factors enable early diagnosis and prevention of occupational cancer.

In the study on occupational causes of cancer, 47 agents were identified as definite carcinogens in relation to 23 cancer types.[3] These occupational agents are chemicals and chemical mixtures; radiation and radionuclides; airborne particles and complex mixtures; metals and metal alloys. Documenting and minimizing exposure to occupational carcinogens is critical to prioritizing interventions and reducing the future cancer burden. Generating country-specific evidence for effective prevention is important in this regard.[4]

The biological effects of ionizing rays are very various. It is difficult to establish a causal relationship between occupational ionizing radiation exposure and cancer development since the stochastic effects of ionizing radiation, such as cancer, may occur many years after exposure, and the exposure doses could not always be recorded in the past. In this report, the coexistence of thyroid and skin cancer in a nurse with long-term exposure to low-dose ionizing radiation is presented.

CASE

The patient, who had no active complaints at the time of her application to the occupational diseases clinic, was operated on for a nevus in the right axillary region approximately 15 days ago. The pathology of the excised nevus was reported as basal cell carcinoma. The patient, who had previously been diagnosed with papillary thyroid carcinoma, applied with the suspicion of occupational cancer.

In the detailed anamnesis taken from the patient, it was learned that she had COVID two months ago. The patient had a 1-pack-year smoking history and had never smoked for the last five years. She has been diagnosed with hypertension for 17 years and diabetes mellitus for ten years. She had a cesarean section 17 years ago because of eclampsia. Total thyroidectomy was performed for papillarythyroid carcinoma in 2019, and in 2022, after nevus excision in the right axillary region, the pathology was reported as basal cell carcinoma.

In the patient's occupational history, it was learned that she started working as a nurse at 18, worked in the internal medicine service for three years, and then worked on the night shift for six years in the cardiovascular surgery intensive care unit. The patient, who started working in the coronary angiography unit at 28, mostly worked during the daytime hours. She had night shifts 3 or 4 times a month. An average of 50-60 angiography procedures were performed per day. She only wore a vest as personal protection and didn't always use head and neck protectors. She worked under these conditions for 21 years. She retired in 2019 after being diagnosed with papillary thyroid carcinoma. The patient declared that she used a dosimeter (but the measurement data could not be reached), and she was exposed to high levels of measurement sometimes.

In physical examination, there were incision scars in the right axillary region (2 cm) and the midline of the neck (approximately 4 cm). There were no pathological physical examination findings except scars. Thyroid function tests, complete blood count, and biochemistry parameters were within normal limits. The thyroid gland was not observed in the thyroid ultrasound, and no residue or recurrence was reported.

The pathology result of a total thyroidectomy performed in 2019 was reported as a follicular variant with classical-type papillary carcinoma in the right and left lobes. In 2022, the result of the right axillary nevus biopsy was reported as nodular-type basal cell carcinoma. Permission was obtained from the patient for the data used while writing this report.

DISCUSSION

The damage of ionized rays varies depending on the type of ray, the amount of energy, and the place exposed to the effect. Such rays adversely affect all other organs, especially the skin, thyroid, and hematopoietic system.[5] Some healthcare professionals, such as those working in the radiology department, may be repeatedly exposed to low levels of ionizing radiation throughout their working life. The probability of an adverse health effect due to ionizing radiation is proportional to the dose received.[6] Scientific studies have shown significant associations between cancer and radiation dose levels of approximately ten rem (0.1 Sv) or higher, and the risk of cancer increases as the radiation dose increases. For low-level radiation exposure [i.e., whole-body doses less than about ten rem (0.1 Sv)], statistical limitations in studies complicate cancer risk assessment.[7] However, the research report of the American National Research Council's health risks assessment committee in 2006 stated that the cancer risk continued linearly even at low doses. According to this, it is assumed that there is no safe threshold for cancer and that even low doses of ionizing radiation have the potential to cause an increased risk of cancer.[7,8]

Occupational skin cancers are less than 1% of all skin cancers. Although it is impossible to specify the prevalence of occupational skin cancers, it can be estimated that they are more common than diagnosed. The most common causes of occupational skin cancers are UV radiation, polycyclic aromatic hydrocarbons, arsenic, and ionizing radiation. Ionizing radiation is among the etiological factors of occupational skin cancer, especially in nuclear plant workers, X-ray technicians, and uranium miners.[9]

It has been well-known since the observations of thefirst scientists using X-ray and radiation sources to cause squamous cell skin cancer and other premalignant conditions.[5] Although ionizing radiation-related skin cancers have been reported less frequently using personal protective equipment in recent years, Freedman et al.'s[10] 2003 study reported that the risk of malignant melanoma increased in radiology technicians who did not use personal protective equipment before 1950. In addition, in a systematic review of 65719 radiology technicians by Lee et al.,[11] it was reported that the risk of basal cell skin cancer increased in healthcare workers who worked before 1960 and were exposed to ionizing radiation, especially under 30. The latent period can be two to three decades or longer.[12] Occupational-related skin tumors don't differ clinically from spontaneous skin tumors.

An increased risk of thyroid cancer has been observed due to certain occupational exposures. In a study by Dr. Ba et al.,[13] 462 patients diagnosed with thyroid cancer were included in the study, and it was observed that the risk of thyroid cancer is higher in occupational groups with high exposure to radiation, such as radiology technicians. There was a less consistent association with thyroid cancer risk in other occupational groups less likely to be exposed to radiation. It has been determined that the risk of thyroid cancer, especially papillary type, has increased significantly, especially among health professionals working under radiation exposure for more than ten years.

Our patient, who accompanied the angiography procedure for an average of 8 hours a day in the coronary angiography unit for 23 years as a nurse, didn't use personal protective equipment because of the absence of the equipment. At the same time, she was exposed to high dosimeter measurement levels sometimes. The latent period between the onset of the current disease and the beginning of exposure of the patient, who was diagnosed with thyroid cancer 23 years after starting the study, and basal cell skin cancer 26 years later, is consistent with the literature. In addition, the development of basal cell skin cancer in a skin area not exposed to sunlight (right armpit) where there is spontaneous UV radiation suggests that the malignant lesion may be associated with ionizing radiation exposure rather than UV radiation effect. The association of thyroid and skin cancer, the most common malignant lesions seen with the impact of ionizing radiation, also supports the possibility of malignancy developing with occupational exposure to ionizing radiation without protection. In addition, the absence of a known history of malignancy in first-degree and second-degree relatives also reduces the possibility of hereditary cancer.

CONCLUSION

By the current literature, clinical, radiological, and pathological findings of the patient whose diagnosis of thyroid and skin cancer is considered to be occupational have been presented to the literature to draw attention to the diagnosis of occupational cancer and thus to remind the need to produce common policies to improve preventive activities for those working with carcinogens.

ETHICAL DECLARATIONS

Informed Consent

The patient signed and free and informed consent form.

Referee Evaluation Process

Externally peer-reviewed.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

Financial Disclosure

The authors declared that this study has received no financial support.

Author Contributions

All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

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