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Case Report
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Papillary Thyroid Carcinoma Development after Radioactive Iodine Treatment for Toxic Adenoma

El Bez I, Ben Sellem D, Bannour S, Mhiric A and Slim I*

Nuclear Medicine Service, Institute Salah Azaïz, Tunisia

Abstract

There are limited reports about malignancy after 131I therapy for thyrotoxicosis. In this report, a case with papillary carcinoma is detected three years after radioactive iodine (RAI) therapy for toxic thyroid nodule. The fine needle aspiration biopsy (FNAB) had not been done before RAI therapy and. The patient underwent bilateral total thyroidectomy and central neck dissection. Physician should think that differentiated thyroid cancer can be found incidentally in toxic nodule or can be developed as a consequence of radioiodine therapy. FNAB must be performed for all the patients with hot or cold thyroid nodules before RAI therapy and all the patients taking RAI therapy should be closely followed in terms of nodule growing and cancer development.

Keywords: Thyroid cancer; 131I therapy; Toxic adenoma

Introduction

The usage of Radioactive Iodine (RAI) therapy for toxic goiter is increasing worldwide, so this issue is a public health problem [1]. RAI is an important radiopharmaceutical agent in nuclear medicine practice for the treatment of hyperthyroidism and differentiated thyroid cancer [2]. One of the long term side effects of ionizing radiation is the possibility of radiation induced malignancy [3,4]. In the literature, it is reported that thyroid cancer can be developed after 131I therapy for thyrotoxicos [5-9]. It is also reported that 131I therapy for diagnostic purpose does not increase the risk of thyroid malignancy although it is commonly used [10]. Besides, radiation exposure can cause thyroid malignancy, RAI therapy is recommended as the first choice for toxic adenoma by American Thyroid Association (ATA) without performing Fine Needle Aspiration Biopsy (FNAB). As there is no reported cancer case that developed from hot nodule, routine FNAB is not recommended by ATA [11,12]. In this report, a case with papillary thyroid cancer after RAI therapy for toxic thyroid nodule is presented.

Case Presentation

A fifty-two year old female patient was admitted to hospital for toxic adenoma. At the initial investigation, TSH, FT4, anti-thyroid peroxidase auto antibody and anti-thyroglobulin autoantibody (Anti Tg) levels were 0.2 µIU/mL (N: 0.35-5.5 µIU/mL), 1.32 ng/dL (N: 0.85-1.78 ng/dL), 80 IU/mL (N: 0-35 IU/mL) and 248 IU/mL (N: 0- 40 IU/mL), respectively. Thyroid Ultrasonography (USG) was not performed and the 99mTc thyroid scan showed a hyperactive hot nodule at right thyroid lobe (Figure 1). After the diagnosis, 666 MBq (18 mci) 131I treatment was administered orally in June, 2013. On October 2016, she was admitted at the hospital with compressive symptoms. The patient underwent total thyroidectomy with central lymph node dissection. The histopathological examination showed a follicular variant of papillary carcinoma in the right thyroid lobe, in keeping with the known right nodule. The limits for exereswere healthy.

On April 2017, the patient underwent 3700 MBq (100 mCi) radioiodine ablation therapy. The whole body scan revealed a solitary large and intense uptake in the right aspect of the neck in keeping with residual thyroid tissue.

Discussion

The prevalence of thyroid nodule increases with age and it is more common in women. Nearly less than 10% of all thyroid nodules are toxic [13]. Initial evaluation of all thyroid nodules requires FNAB, however, as the rate of malignancy in toxic nodule is low and benign hyper functioning nodules may be cytologically in distinguishable from non functioning benign follicular neoplasms and follicular cancer, ATA doesn't recommend it for toxic ones [11]. It is reported that toxic nodules

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Correspondence:

Intidhar EL BEZ, Nuclear Medicine Service, Institute Salah Azaïz, Tunis; Boulevard 9 Avril, BabSaâdoun, 1006, Tunis, Tunisia,

E-mail: elbez.intidhar@yahoo.fr

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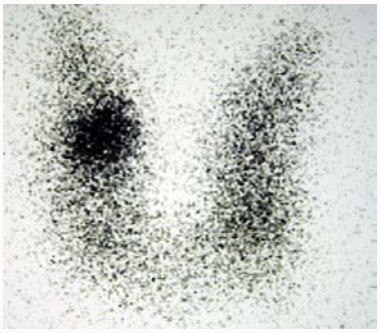

Figure 1: ^{99m}Tc scintigraphy showing a hot nodule at the right thyroid region.

are almost never malignant and cold nodules are 5% to 8% malignant [12].

The usage of RAI therapy for toxic goiter is increasing worldwide and the disadvantage of radioactive iodine therapy is the possibility of radiation induced malignancy. 131I has relatively high photon energy (364 keV), long half life (nearly 8 day) and the presence of beta particle emissions [2]. Latency period between radiation exposure and development of thyroid cancer ranges between a minimum of 3 to 7 years and a maximum of 40 to 50 years [3]. The risk of the development of thyroid malignancy decreases with age and after the age of 20 years the risk is less [3,4]. In our patient, if we accept that the thyroid cancer developed as a consequence of first RAI therapy, there had been nearly 3 years between first RAI therapy and the diagnosis of cancer. This was consistent with the literature for the development of the thyroid cancer after radioiodine.

In the literature, there are few reports about thyroid cancer after RAI therapy for toxic nodular or diffused goiter. Staffurth et al. reported a folliculary thyroid cancer following RAI therapy for Graves' disease [5]. In their case, FTC derived 17 years after the RAI therapy. Similarly, there are some reports of anaplastic thyroid cancer after RAI therapy for toxic goiter [6-9].

In the case, FNAB was not performed before the first RAI therapy. It is not known whether the cancer had been there before the therapy or it was developed after the therapy. Therefore, FNAB must be performed for all nodules before RAI therapy [4].

In conclusion, differentiated thyroid cancer can be found incidentally in toxic nodule or can be developed as a consequence of RAI therapy for toxic nodule. FNAB must be performed for all the patients with hot or cold thyroid nodules before RAI therapy and all the patients taking RAI therapy should be closely followed in terms of nodule growth and cancer development.

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