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Marine-Lenhart syndrome: The of Nuclear Medicine in Diagnosis and Management

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Abstract

The Marine-Lenhart syndrome is a rare disorder defined by the association or successive occurrence of Basedow's disease and autonomous thyroid nodules. This form is responsible for persistent hyperthyroidism requiring special treatment. Nuclear medicine contributes to the detection of this syndrome by means of thyroid scintigraphy, which allows its diagnosis by showing a hyperfixing parenchyma that is not inhibited by the presence of toxic nodules. Additionally, radioactive therapy is generally administered at higher doses, as this form is particularly resistant to standard treatment.

Keywords: Nuclear medicine • Radioactive therapy • Marine-Lenhart

Introduction

Marine-Lenhart syndrome is defined by the association or successive occurrence of Graves' disease and an autonomous thyroid nodule, either in the form of a toxic nodule or a toxic multinodular goiter [1]. Thyroid scintigraphy provides the relevant diagnosis by revealing the appearance of Graves' disease and one or more hyperfixating nodules, which explains the persistent thyrotoxicosis observed in this entity. This calls for special management based on radical treatment with high doses of radiotherapy [2].

The aim of our work is to illustrate the value of thyroid scintigraphy in the diagnosis of Marine-Lenhart syndrome and radiotherapy in its management.

Case Presentation

In this study, we present two types of Marine-Lenhart syndrome based on three observations collected at the Nuclear Medicine Department of Hassan II University Hospital in Fez over a six-year period, from 2016 to 2022. Patients were subjected to thyroid scintigraphy 20 minutes after the administration of 111 MBq sodium pertechnetate. The examination comprised a pinhole acquisition focused on the anterior cervical region and a wide-field acquisition centered on the anterior cervico-mediastinal region. Two of the patients underwent radical radioiodine treatment, with thyroid monitoring conducted at 6 weeks and 3 months following the procedure.

Patients and observations

Observation 1: The patient was 27 years old, followed for 4 years for Graves' disease with positive TSH receptor antibodies, without Graves' orbitopathy. They were prescribed synthetic antithyroid drugs and experienced short episodes of remission. During follow-up, the patient developed palpable nodules, which were confirmed by ultrasound. A 99mTc thyroid scan showed diffuse hyperfixation of the parenchyma with three warm nodules. The patient underwent total thyroidectomy and had a favorable outcome.

Observation 2: A 66-year-old patient with hyperthyroidism and positive TSH receptor antibodies (13.97 IU/L) showed no orbital signs. Ultrasound revealed heterogeneous, hypervascular thyroid parenchyma with a 2 cm nodule classified as TIRADS 3. Scintigraphy revealed a left inferior polar toxic nodule with hyperfixated parenchyma. The patient received a dose of 25 mCi and a biological check-up is planned at 6 weeks.

Observation 3: A 55-year-old patient, followed for 3 years for Graves' disease with highly positive anti-TSH receptor antibodies at 30.89 IU/L, was treated with antithyroid drugs without remission. A thyroid nodule appeared on ultrasound, and scintigraphy showed diffuse hyperfixation of the entire gland with a right mediolobar nodule. The patient was treated with 15 mCi and achieved hypothyroidism after 6 weeks.

Results and Discussion

Graves' disease is an autoimmune disorder characterized by the presence of stimulating antibodies that interact with TSH receptors and induce the overactivity of the thyroid gland. About 25-30% of cases of Graves' disease are accompanied by nodules, which are typically cold, benign, and multiple. However, approximately 1 to 2.5% of cases are associated with autonomous nodules [3,4]. These nodules are TSH-independent, less responsive to radioiodine therapy, and demonstrate increased radioactive iodine absorption following treatment [5]. In terms of diagnosis, TSH receptor antibodies and TPO antibodies tested positive, and, in the case of our patients, TRAKS were also positive. Nodular Graves' disease is easily detected by ultrasound examination, but the challenge lies in determining whether it is autonomous or not [6-8]. Thyroid scintigraphy allows for the diagnosis of this syndrome by revealing a hyperfixing parenchyma uninhibited by the presence of toxic nodules and its classification into three types: type 1, which is characterized by diffuse parenchymal hyperfixation with a single toxic nodule; type 2, which shows diffuse hyperfixation with several toxic nodules and type 3, which displays diffuse hyperfixation with both cold and hot nodules [9].

In terms of treatment, despite their prolonged use, synthetic antithyroid drugs do not allow for the remission of the disease, unlike in Graves' disease, where remission can be achieved after 18 to 24 months of treatment [10,11]. Consequently, the indication for radical treatment must be either radioiodine therapy or surgery. The latter is preferable in cases of malignancy, moderate or severe Basedowian orbitopathy, and compressive goiter [12]. It has been reported in the literature that Marine-Lenhart syndrome requires radioiodine therapy at higher doses compared with other etiologies of hyperthyroidism [10]. The activity administered increases with the increasing number of nodules,

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so thyroidectomy seems more reasonable for multinodular Marine-Lenhart syndrome, and for type 1, radioiodine therapy should be the first therapeutic option [13,14]. In our case, thyroid scintigraphy was used to make a positive diagnosis and to guide the choice of radical treatment. Radioiodine therapy was administered at doses of 15 and 25 mCi, with a good clinical and biological response.

Conclusion

Marine-Lenhart syndrome is a rare entity that should be suspected in the presence of nodular Graves' disease. Nuclear medicine plays a significant role in the diagnostic management through thyroid scintigraphy and in the therapeutic management through high-dose radioiodine therapy.

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Conflit of Interest

There is no conflict of interest by author.

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