Changes in the Thyroid After Sclerotherapy With Doxycycline

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Case Report

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Abstract

Background: The literature considers sclerotherapy to be a safe and effective treatment for benign thyroid cysts. No subsequent diagnostic problems have been reported as a complication. We report the occurrence of focal inflammation after said therapy, mimicking a thyroid malignancy.

Case presentation: We report a case of a young male with a solitary strongly suspicious lesion in the thyroid. The patient had undergone prior sclerotherapy of a thyroid cyst with Doxycycline. The lesion appeared to be a focal area of inflammation and thus iatrogenic in nature. Systemic use of doxycycline is known to sometimes cause a non-immune chemical thyroiditis, dubbed as black thyroid due to the intense black discoloration of the thyroid. It might be that the instillation of doxycycline was responsible for a similar, more localized, process of affliction.

Conclusions: For the work-out of a solitary suspicious thyroid lesion, the medical history of the patient should always be considered. In case of antecedents of ipsilateral sclerotherapy, a reactive inflammatory response may mimic thyroid malignancy. A fine needle aspiration should be performed to exclude thyroid cancer. Treatment is not necessary; the affliction appears self-limiting as evidenced in the follow-up of this case.

Background

In case of benign thyroid cysts, percutaneous tetracycline instillation, ethanol sclerotherapy, or thyroid hormone suppression therapy can be performed [1]. Thyroid hormone suppression therapy is no longer advocated, as the effect of medication in volume reduction of a thyroid nodule is uncertain and side-effects are to be expected [2]. Several sclerosants stimulate fibrous union of the tissue surfaces by inducing inflammation [3]. In our institution we opted to use doxycycline as a sclerosing agent, as it proved in our experience to be an effective and safe sclerosant for the treatment of seromas [3].

Doxycycline is an inexpensive drug and used to be readily available in its parenteral form. It is an antibiotic of the tetracycline family and its safety has been well established [4, 5]. Apart from its antibiotic properties, Doxycycline can be used as a sclerosant, for instance to treat pleurodesis of malignant effusions [6] or as treatment for lymphoceles [7] and lymphatic malformations [8, 9]. Parenteral forms of the drug are not available anymore in a number of countries (including the USA). In the meantime, it has been established that treatment with a saline solution of the oral form of the drug is equally effective [10].

Case Presentation

A 39-year-old male patient presented for a routine follow up of the thyroid. He had previously been treated for a recurrent bleeding cyst in the thyroid with sclerotherapy using doxycycline. A mildly painful swelling of the right thyroid lobe was noted by the endocrinologist upon physical examination. No other abnormalities were present. Thyroid tests and blood work in general were normal. The patient was then referred for an ultrasound examination.

Ultrasound revealed a large suspicious lesion in the right thyroid lobe. This lesion is illustrated in Figure 1. The lesion is solid and markedly hypoechoic with irregular borders. The lesion is also taller than wide and seemed to present with some microcalcifications. All these features point in the direction of a malignant thyroid lesion (TIRADS 5 lesion). The findings in question then necessitate a fine needle aspiration, a procedure that was subsequently performed.

When looking into the medical history, we withheld the antecedents of sclerotherapy with Doxycycline for the treatment of a benign thyroid cyst in the right thyroid lobe one year earlier (Figure 2). Moreover, this cyst (although more voluminous in nature) appeared to be localized in the same region as the suspicious lesion.

The fine needle aspiration sample was qualitative for diagnosis, it showed diffuse and extensive inflammation but no signs of malignancy. We then deemed the inflammation to be reactive following sclerotherapy and decided to follow up with ultrasound. In Figure 3 we illustrate the follow-up ultrasound 4 years later. Here the lesion is found to be clearly smaller in size and with a different morphology: the progressive formation of a macrocalcification and meanwhile smooth borders of the lesion now more resemble a benign colloid nodule.

Discussion And Conclusions

Ultrasound is the imaging modality of choice for the evaluation of the thyroid and the risk stratification/follow up of thyroid nodules. Many different proposals of a Thyroid Imaging Reporting and Data System (TIRADS) have been described in the literature. For the description of thyroid nodules in our hospital, we adhere to the system as proposed by Kwak et al. [11]

Regardless of the TIRADS system used, several described sonographic features are nearly universal. Lesions that are mainly solid are more suspicious than lesions that are mixed or predominantly cystic. The echogenicity of the solid part is also an important marker: lesions that are hypoechoic or even markedly hypoechoic (as compared to the strap muscles) are also associated with higher incidence of thyroid cancer. The lesions contours can be smooth (low suspicion) or irregular (high suspicion). Two other criteria are often used and are, though less common, more specifically associated with malignancy: taller-than-wide aspect and microcalcifications. Taller-than-wide refers to nodules that are more likely to extend to the depth of the thyroid on the axial images. Microcalcifications are, unlike macrocalcifications, difficult to detect on ultrasound. Any combination of these 5 signs leads to an increased probability of thyroid malignancy. In the described case, all different signs were present, suggesting a high statistical probability of thyroid cancer.

The literature considers sclerotherapy to be a safe and effective treatment for benign thyroid cysts. No subsequent diagnostic problems were reported as a complication. It could be we witnessed a common but underreported effect due to small patient groups and lack of follow-up. If this is the case, patients who have undergone sclerotherapy may then be at risk of false-positively being diagnosed with thyroid malignancy if the relevant medical history is not considered. As sclerotherapy is usually performed with

ethanol, it can also be suggested that doxycycline is specifically the agent to blame in this case. Systemic use of doxycycline is known to sometimes cause a non-immune chemical thyroiditis [12], dubbed as black thyroid due to the intense black discoloration of the thyroid [13]. It might be that the instillation of doxycycline was responsible for a similar, more localized, process of affliction.

In conclusion we would suggest that for the work-out of a solitary suspicious thyroid lesion, the medical history of the patient should always be considered. In case of antecedents of ipsilateral sclerotherapy, a reactive inflammatory response may mimic thyroid malignancy. In this specific case Doxycycline was responsible, an effect that may specifically be explained by the occurrence of non-immune chemical thyroiditis. It is not known if other sclerosants may elicit the same effect. A fine needle aspiration should be performed to exclude thyroid cancer. Treatment is not necessary; the affliction appears self-limiting as evidenced in the follow-up of this case.

Abbreviations

TIRADS: Thyroid Imaging Reporting and Data System

Declarations

Ethics approval and consent to participate

Not applicable

Consent for publication

Patient consent for publication of the ultrasound images was obtained.

Availability of data and materials

Not applicable

Competing interests

Not applicable

Funding

Not applicable

Authors' contributions

SR wrote the text and prepared the figures. BS revised the text. MT proofread the text and provided assistance in the production process. JD supervised the text.

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Figures

Figure 1

Ultrasound of the thyroid gland.

A (left): Axial plane. B (right) sagittal plane. Lesion in the lower part of the thyroid. The lesion is solid, hypoechoic with irregular borders. The lesion is also taller than wide and seems to contain some microcalcifications.

Figure 2

Ultrasound of the thyroid gland.

Ultrasound prior to sclerotherapy, one year earlier. Note the large bleeding cyst in the right thyroid lobe.

Figure 3

Ultrasound of the thyroid gland.

A (left): Axial plane. B (right) sagittal plane. Check-up ultrasound, 4 years later. The lesion is clearly smaller in size and with a different morphology: progressive formation of a macrocalcification and now smooth borders.