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Authors * Stefan Stojanoski, † Milorad Bjelović, ‡ Branislava Ilinčić, || Dejan Vučković, § Duško Kozić, ¶ Milica Medić Stojanoska, Vojnosanitetski pregled (2020); Online First June, 2020.

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EKTOPIČNO TKIVO ŠTITASTE ŽLEZDE U MEDIJASTINUMU KAO DIFERENCIJALNO DIJAGNOSTIČKI PROBLEM: PRIKAZ SLUČAJA

* Stefan Stojanoski, University of Novi Sad, Faculty of Medicine, Novi Sad* Center for Imaging diagnostics, Oncolgy Institute of Vojvodina, Sremska Kamenica, Serbia †

† Milorad Bjelović, University of Novi Sad, Faculty of Medicine, Novi Sad* Thoracic Surgery Clinic, Institute for Pulmonary Diseases, Sremska Kamenica, Serbia ‡

‡ Branislava Ilinčić, University of Novi Sad, Faculty of Medicine, Novi Sad* Center for Laboratory Medicine, Department for Nuclear Medicine, Clinical Center of Vojvodina, Novi Sad, Serbia ||

|| Dejan Vučković, University of Novi Sad, Faculty of Medicine, Novi Sad* Center for Pathology and Cytology, Institute for Pulmonary Diseases of Vojvodina, Sremska Kamenica, Serbia §

§ Duško Kozić, University of Novi Sad, Faculty of Medicine, Novi Sad* Center for Imaging diagnostics, Oncolgy Institute of Vojvodina, Sremska Kamenica, Serbia †

¶ Milica Medić Stojanoska, University of Novi Sad, Faculty of Medicine, Novi Sad* Clinic for Endocrinology, Diabetes and Metabolic Diseases, Clinical Center of Vojvodina, Novi Sad, Serbia¶

Correspondence to:

Stefan Stojanoski, Kraljevića Marka 28b, Novi Sad, Srbija; email: stefan.stojanoski@mf.uns.ac.rs

Mediastinal ectopic thyroid tissue
Abstract

Introduction. Mediastinal ectopic thyroid tissue (ETT) represents a rare entity. Clinically, it can manifest with thyroid gland dysfunction or with symptoms and signs caused by compressive effect on the surrounding structures, but in the majority of cases it is an asymptomatic condition and incidental finding. All pathologic processes, including malignancy, that can occur in the orthotopic thyroid gland can also develop in the ETT.

Case report. Here we discuss a case of 17-year-old female with incidentally found mediastinal ETT. Beside ETT, patient had an orthotopic thyroid gland and was euthyroid. During follow up, mild compressive symptoms developed. MRI examination showed non-significant increase of the mediastinal mass volume, but due to its morphological changes, a suspicion of another etiology was raised. A discrepancy between the positive technetium-99m pertechnetate and negative 131 iodine radionuclide imaging of the mediastinal mass was highly suspicious for malignancy. Surgery was performed and the pathologist confirmed that it was a colloid goiter in the mediastinal ETT. Conclusion. Mediastinal ectopic thyroid tissue should be taken into account in the differential diagnosis of mediastinal tumor mass. Increase in size of the mediastinal EET, development of compressive symptoms or suspected malignant alteration requests surgical treatment.

Key words:

ectopic thyroid tissue, mediastinal tumors.
Introduction

Ectopic thyroid (ETT) tissue is a rare congenital anomaly that develops during the migration of the thyroid angle from the floor of the primitive foregut to its final position on the anterior neck between 2nd and 4th tracheal cartilage rings. The prevalence of the ETT is 1 case per 100000-300000 people (1), while autopsy studies show the prevalence of 7-10% in the population. ETT can coexist with or without normal localized thyroid gland.

The anatomical locations of the ETT can be various: lignual, sublingual, submandibular, lateral cervical space, carotid space, axillary, endotracheal, mediastinal, pulmonary, cardiac, duodenum, stomach, pancreas, porta hepatitis, adrenal glands, ovaries even iris and pituitary gland. (1-4) The most common ectopic location is lingual in about 90% of cases. (1,2)

Clinical presentation of the ETT includes both hyper- and hypothyroidism, thyroiditis and symptoms caused by compression effect of the ectopic tissue, but it can also be asymptomatic and therefore an incidental finding.

Beside the tests of the thyroid function, imaging methods such as ultrasound, computed tomography (CT), magnetic resonance imaging (MRI), radionuclide thyroid imaging and biopsy, also have an important role in the diagnostic algorithm of the ETT.

Rare locations, functional and morphologic changes in the ectopic tissue can represent a challenge in differential diagnosis, such as in this case.

Case
We present a 17-years-old female with an incidental finding of two nodules in the left lobe of the thyroid gland on the neck ultrasound examination performed because of repeated sore throats. Further diagnostic procedures included thyroid gland scintigraphy performed with technetium-99m pertechnetate scintigraphy (Fig. 1), fine needle aspiration biopsy (FNAB) of the nodules and computed tomography (CT) of the neck and thorax. Thyroid gland scintigraphy with technetium-99m pertechnetate showed normal radionuclid uptake by the gland and uptake by the ectopic thyroid tissue in the upper mediastinum on the left side. Soft tissue mass just below the left lobe the thyroid gland, at level of the *apertura thoracis superior*, without compressive effect on the trachea was described on CT scan, suspected to be an ectopic thyroid tissue. Thyroid function was normal, while the additional findings included two hypodense nodules, one in both thyroid gland lobes, diameter less than 10mm. Performed FNAB was consisted with a benign follicular nodule.

One year later, patient was examined by an adult endocrinologist. Ultrasound of neck showed small cysts (less than 5mm) in both thyroid gland lobes while the nodules were same as on the previous examination. Thyroid function was normal. (Table 1) Due to appearance of intermittent pain and feel of pressure in the lower part of the neck, patient underwent an MRI scan. MRI scan showed well-circumscribed soft tissue paratracheal mass on the left side (approximately measured 18x14x30mm), with inhomogeneous postcontrast enhancement and mild compressive effect on the trachea. (Fig. 2) Differential diagnosis included ETT, but also teratoma and parathyroid adenoma. Repeated scintigraphy with 131I showed normal image of the thyroid gland but this time, there was no uptake by the soft tissue mass in the mediastinum. Patient underwent left sided cervicotom in general anesthesia, and the surgeon removed the whole mass that was not attached to the thyroid gland. Pathologist confirmed that it was colloid goiter in the ectopic thyroid gland tissue. (Fig. 4) After the surgery, thyroid function remained normal (Table 1.) and the patient was asymptomatic.

**Discussion**

EET is a rare developmental anomaly. There are studies that suggests genetic base of this anomaly, due to mutation of regulatory genes and transcriptional factors that determine the development of the thyroid gland. Several mutations in genes playing a role during thyroid morphogenesis such as NKX2-1, PAX8, FOXE1,NKX2-5 and TSHR, have been reported,
but the molecular mechanisms are not yet fully understood. (1,5,6) EET can appear at any time, but most commonly in childhood, adolescence or in menopause. Female to male ratio is about 4:1. (5) The presence of normal thyroid gland in patients with EET is not necessary. All pathological processes that can develop in the normal gland can also develop in the ectopic thyroid tissue. Clinical symptoms are typically related to the size and location as well as thyroid function. However, in most of the time it is asymptomatic and incidental finding. Increase in size of the EET typically correlates with physiological conditions with increased demands for thyroid hormones that is seen during puberty and pregnancy. (1,2)

Mediastinal EET is extremely rare entity, to our knowledge only a few cases were reported (5). It represents about 1% of mediastinal tumors, because of that it is necessary to be included in the differential diagnosis of mediastinal masses with lymphomas, thymic tumors and dermoid cysts. Hodgkin lymphoma, large B cell lymphoma and lymphoblastic lymphoma are the most common mediastinal lymphomas, while thymic and neuroendocrine carcinomas are rare but highly malignant. (7,8) Substernal thyroid goitre needs to be differentiated from the EET. CT and MRI both have very important role in the diagnosis of EET, especially when it is distant from the descending pathway of the thyroid. (5,7,9,10) Other imaging modalities such as single-photon emission computerized tomography (SPECT CT) with I-123 SPECT/CT and endoscopic bronchial ultrasound guided biopsy are useful especially in cases of mediastinal EET. (11-14) Mediastinal EET can coexist with orthotopic thyroid gland and patients are in most of the cases euthyroid, such as in our case. If there is no significant mass effect on the surrounding structures and thyroid function is normal, the patients should be followed. In other cases, treatment is surgery. Even in elderly patients, surgical treatment is suggested because of its low risk. (7-9) Both benign and malignant alteration can occur in EET of any location. Malignancy may occur within ectopic thyroid tissue with a variety of cell types (papillary, follicular, medullary thyroid cancer, and also Hurtle cell tumor). There are few cases of teratoma and B cell lymphoma in mediastinal EET. (1,5,6)

Rarely, a patient with normal TSH can have differences in radionuclide thyroid imaging using technetium pertechnetate vs. iodine scan. This false negative iodine scan could be explained by the presence of the nonorganifying thyroid tissue in EET (follicular cells which have access to the iodine pump, but without organification).
In our case, the first scintigraphy, at the time of diagnosis, was performed with technetium-99m pertechnetate and the uptake by the ETT was present, while the second one performed a year later with more sensitive iodine-131 did not show any uptake of the radionuclide. Because of the MRI finding, heterogeneous morphology of the tissue, and possible alteration, surgical removal was performed and pathologist confirmed that it was a benign lesion.

In summary, although mediastinal ETT is rare it is necessary to be kept in mind in cases of mediastinal tumor masses. Beside scintigraphy and ultrasound, CT and MRI both have important role in diagnostic algorithm of EET. Benign and malignant alterations can occur in EET of any location. Treatment of mediastinal EET is either follow up or surgery, depending on size, location, growth and morphologic changes.

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Table 1. Results of laboratory examinations

| VARIABLES                          | BEFORE SURGERY | AFTER SURGERY | REFERENCE INTERVAL |
|------------------------------------|----------------|---------------|--------------------|
| FREE THYROXIN (fT4) pmol/l         | 18,64          | 17,44         | 9,0 – 19,0         |
| TRIIODOTHYRONINE (fT3) pmol/l      | 5,01           | 5,29          | 2,6 – 5,7          |
| THYROID-STIMULATING HORMONE (TSH) IU/L | 1,020          | 1,13          | 0,35 – 4,94        |
| CALCITONIN pg/ml                   | 2,78           | /             | 1,4 - 78           |
| ANTI TPO AB * IU/ml                | < 10,0         | /             | < 5,6              |
| ANTI Tg AB** IU/ml                 | < 20,0         | /             | < 4,1              |

* Anti-Thyroid Peroxidase antibodies

** Anti-Thyroglobulin antibodies
Fig. 1
Fig. 2.
LEGEND TO THE FIGURES

Fig. 1. Thyroid gland scintigraphy performed with technetium-99m pertechnetate showing normal radionuclide uptake by the gland (white arrows) and uptake by the ectopic thyroid tissue in the upper mediastinum on the left side (black arrow).

Fig. 2. MRI examination. T1 weighted image in coronal plane (A) and T2 weighted image in axial plane (B) showing a well-circumscribed paratracheal mediastinal soft tissue mass on the left (white arrows) with mild compressive effect on the trachea. T1 weighted image in coronal plane (C) and T1 weighted image with fat saturation in axial plane (D) after gadolinium contrast administration showing an inhomogeneous enhancement of the soft tissue mass (white arrows). Black arrows in A and C indicating normal right and left thyroid gland lobes.
Fig. 3. Thyroid gland radioiodine scintigraphy with 131I performed with a gamma camera (Symbia E, Siemens) fitted with a high-energy, parallel-hole collimator, 24 hours after oral administration of 1,8 MBq of the radionuclide.

Fig. 4. Pathohistological finding: Colloid goitre (HE 6x40)

**ABBREVIATIONS**

EET – ectopic thyroid tissue

MRI – magnetic resonance imaging

FNAB - fine needle aspiration biopsy

CT – computed tomography

SPECT – single-photon emission computerized tomography

fT4 – free thyroxine

fT3 – free triiodothyronine

TSH – thyroid stimulating hormone

Anti TPO AB - Anti-Thyroid Peroxidase antibodies

Anti Tg AB - Anti-Thyroglobulin antibodies

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