Submandibular ectopic thyroid tissue and concurrent thyroid hemiagenesis

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ABSTRACT

Concurrent thyroid hemiagenesis and ectopic thyroid tissue are rare conditions and can challenge the clinical appearance. Only one other case story in the literature has described thyroid hemiagenesis and concurrent submandibular ectopic thyroid tissue. A 29-year-old female with an asymptomatic submandibular mass was referred to our clinic. Based on clinical investigation and ultrasound-guided fine-needle aspiration, we were not able to determine whether the neck mass was a cystic metastasis or ectopic thyroid tissue. Magnetic Resonance Imaging showed hemiagenesis of the right thyroid lobe. The neck mass was surgically removed, and the histopathology revealed thyroid tissue without malignancy. This case suggests that a thorough clinical evaluation with proper radiological imaging modalities is essential for the correct diagnosis. One should have in mind that ectopic thyroid tissue could be present outside the migration way of the thyroglossal duct and present as a submandibular neck mass.

Case report

A 29-year-old female with no prior medical history was referred to our outpatient clinic (Rigshospitalet, Department of Otorhinolaryngology, Head and Neck Surgery, and Audiology, a tertiary university hospital covering 2.7 million people) with a suspicion of cancer in her right submandibular gland.

Over the past two months, she had noticed swelling and tenderness on the right side of the neck. The swelling was not related to other symptoms such as dysphagia, dysphonia, dyspnea, no meal-related pain, or weight loss. The patient had a good dental status.

The clinical examination showed a firm, painless and mobile swelling on the right side of the neck in the submandibular area and no enlargement of the thyroid gland. An ultrasound of the neck was performed with a high-frequency linear transducer and showed a normal left lobe of the thyroid gland but no right lobe in its usual position (Figure 1(a)). A cystic structure was observed medially and separated from the right submandibular gland and had no relation with the hyoid bone. A Magnetic Resonance Imaging (MRI) confirmed these findings with a contrast-enhanced cystic structure with appearing hyperintense on T1-weighted images and hyperintense on T2W (Figure 1(b,c)), with the measures 12 × 13 mm transverse diameter and 14 mm craniocaudal.

Ultrasound-guided fine-needle aspiration cytology (US-FNAC) was performed, twice and the cytology was as follows: The first US-FNAC showed peripheral blood with numerous cyst macrophages in the cytoplasm. Blue colloid-like material and small groups of epithelial cells with a blurry delineated blue-like granular cytoplasm were present. There were no mucin or structures from salivary glands. The aspirate could represent a cystic process or ectopic thyroid tissue. The second US-FNAC showed sparse, thin colloid in the background and many cyst macrophages with haemosiderin pigment in the cytoplasm. Blue colloid-like material and small groups of epithelial cells with a blurry delineated blue-like granular cytoplasm were present. There were no mucin or structures from salivary glands. The aspirate could represent a cystic process or ectopic thyroid tissue. The second US-FNAC showed sparse, thin colloid in the background and many cyst macrophages with haemosiderin pigment in the cytoplasm. A well-coherent group of cells had the same characteristics as follicle epithelial cells from the thyroid. The cells had small nuclei and greenish pigment in the cytoplasm. Due to the mass’s unusual position in the submandibular area, we could not be sure whether the FNAC represented ectopic thyroid tissue or a cystic metastasis from a papillary thyroid carcinoma.

Preoperatively the patient had normal serum levels of thyroid-stimulating hormone (TSH), triiodothyronine (T3), and thyroxine (T4).

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The patient underwent surgery, and a solid cystic mass was resected in toto. The histopathology revealed thyroid nodule in the tissue with colloid-filled follicles without a sign of malignancy and no C-cells present.

Postoperative thyroid scintigraphy with technetium-99 m showed a normal function of the left lobe but no sign of thyroid tissue on her right side. After surgery, the patient became hypothyroid and was referred to the department of endocrinology for follow-up. The patient started on hypothyroid medication with levothyroxine 50 micrograms daily.

Introduction

The thyroid gland is the first endocrine organ to develop during embryogenesis and is visible from day 20 of fetal life [1]. The thyroid gland originates from two structures; the medial anlage derives from the primitive pharynx and the lateral anlage from the neural crest. The medial anlage has its origin at the second branchial arch level and contains the thyroxine-producing follicular cells. It is uncertain whether it arises as a paired organ or a single organ that divides into the two lobes. The lateral anlage arises from the fourth pharyngeal pouch’s ventral portion and fuses with the medial anlage at the tubercle of Zuckerkandl. The lateral anlage contains the parafollicular calcitonin-producing C-cells, explaining why these are not seen in the isthmus. The gland descends along the thyroglossal duct to its destination at the second to fourth tracheal rings, where the duct dissolves [2].

Thyroid hemiagenesis (THA) is a congenital disorder where the thyroid lobe does not develop, often with the left thyroid lobe absent [3]. The prevalence of THA has been reported to be from 0.05% to 0.5% [1,3]. THA is more dominated in females, and the absence of the left lobe is more frequently seen, with a left-to-right ratio of 3.6:1, and the isthmus being present in 44% [4].

Thyroid tissue in other locations than in the lower part of the neck is defined as thyroid ectopy. It is a developmental anomaly due to arrested migration throughout embryological development. The most frequent location of ectopic thyroid tissue is in the midline along the path of the thyroglossal duct – primarily seen in the base of the tongue [5–7]. Thyroid ectopy is often diagnosed when the thyroid tissue grows and causes symptoms.

The combination of THA and concurrent ectopic thyroid tissue is very rare. Only a few cases of this have been reported in the literature. To our knowledge, no previous cases describe ectopic thyroid tissue on the same side as hemiagenesis of the thyroid gland [8,9].

Discussion

Ectopic thyroid tissue can have a variety of clinical presentations [10]. In this case, it presented as a lateral neck mass in a young adult.
A median neck cyst was not suspected because of the location laterally on the neck. A median neck cyst is most often a thyroglossal duct cyst, which is a developmental anomaly and arises in the path of the thyroglossal migration (the thyroglossal duct) during embryogenesis. Because a thyroglossal duct cyst was not suspected, the median part of the hyoid bone was not resected, as would have been standard procedure if it had been suspected.

Because of the unusual location of the ectopic thyroid tissue outside the path of the thyroglossal duct, our pathologists would not rule out that the tissue could represent metastasis from a thyroid carcinoma. Therefore, it was decided to operate on the patient without waiting to perform a thyroid scintigraphy preoperatively.

If a scintigraphy had been performed preoperatively and had shown normal iodine uptake, it would have been indicative of ectopic thyroid tissue without suspicion of malignancy.

Alternatively, genetic analyses could have been performed on the FNAC. These tests are becoming more common in diagnosing thyroid neoplasias. Specific genetic mutations are known to be indicative of metastatic papillary thyroid cancer and could help distinguish from ectopic thyroid tissue [11]. Tumor markers such as v-Raf murine sarcoma viral oncogene homolog B (BRAF) and telomerase reverse transcriptase (TERT) could have the potential for this purpose [11,12]. However, these tests are not routinely used in diagnosing thyroid nodules in Denmark.

Unfortunately, the patient developed hypothyroidism after the surgery, and it could be discussed whether it would have been better to have performed the scintigraphy first and then maybe abstain from surgery. On the other hand, the mass in the neck was still symptomatic, and this was relieved by the surgery.

The most frequent location of ectopic thyroid tissue is in the midline along the path of the thyroglossal duct and is primarily seen in the base of the tongue [5,6]. In 70% of cases with ectopic thyroid tissue in the lingual area, the ectopic tissue represents the sole thyroid tissue with no orthotopic thyroid gland [10].

Literature describing thyroid ectopy and concurrent THA is sparse [8,9,13–16]. A review of the PubMed database showed that only one other case report described submandibular ectopic thyroid and concurrent THA (Table 1).

In our case of THA and ectopic thyroid tissue on the same side where the thyroid is missing, it could be speculated whether the ectopic thyroid tissue could represent a non-descended lobe.

However, since the surgically removed, ectopic thyroid tissue did not contain c-cells, it could only represent the medial anlage, and the lateral anlage would then not be accounted for.

In addition to ultrasound and US-FNAC, picture imaging such as CT/MRI and thyroid scintigraphy are important in the workup of thyroid disease, including ectopic thyroid tissue and THA.

Knowledge about the ultrasonographic appearance of thyroid tissue and metastases can also help in the preoperative assessment. There are specific features on ultrasound suggestive of metastatic lymph nodes from primary papillary carcinoma of the thyroid. A hypoechoic, solid cervical lymph node with ill-defined margins and microcalcification is most likely of malignant nature. In contrast, a benign nodule would be solid and isoechoic, regular, and well defined [17].

If the thyroid tissue is atrophic and non-functional, it can be difficult to visualize on CT [9], and therefore the recommendations are a combination of more radiological imagining modalities. In this case, MRI was the choice of picture modality for better imaging of soft tissue and lymph nodes.

| Author and year of publication | No. subjects | Sex | Age at diagnosis (years) | Localization of ectopic thyroid tissue | Localization of thyroid hemiagenesis |
|-------------------------------|-------------|-----|-------------------------|----------------------------------------|------------------------------------|
| Current case 2021             | 1           | Female | 29                     | Submandibular ectopic thyroid tissue | Right                              |
| Nakamura et al. 2018          | 1           | Female | 15                     | Base of the tongue and the infrathyroid region | Left                              |
| Hsu et al. 2014               | 1           | Female | Birth                  | Sublingual ectopic thyroid tissue       | Right                              |
| Aydogan et al. 2013           | 1           | Female | 38                     | Submandibular ectopic thyroid tissue    | Left                               |
| Velayutham et al. 2013        | 1           | Male   | 18                     | Suprahypopharyngeal and the infrathyroid region | Right                             |
| Yang et al. 2008              | 1           | Female | 26                     | Lingual ectopic thyroid tissue and Left-sided papillary thyroid cancer, and prelaryngeal ectopic thyroid tissue | Left                              |
| Huang et al. 2002             | 1           | Female | 47                     | Left                                  | Right                              |

Table 1. Summary of literature describing ectopic thyroid tissue and concurrent thyroid hemiagenesis.
In Denmark, thyroid scintigraphy is mainly used to identify nodules that do not have iodine uptake and therefore need further examination. In addition to assessing the iodine uptake in the orthotopic thyroid gland, thyroid scintigraphy can reveal thyroid tissue in other locations, and it is recommended before surgery not to miss a retained ectopic thyroid [18]. Scintigraphy can also help as a diagnostic tool to reveal THA. It is often possible to verify THA on ultrasound if the thyroid scintigraphy has given suspicion of this.

Conclusion

Although rare, a submandibular neck mass could be ectopic thyroid tissue. The physician should have this as a differential diagnosis and always supply the clinical evaluation with the proper radiological imaging modalities such as ultrasound, thyroid scintigraphy, and CT/MRI.

Ethical approval

All procedures performed in the study followed the ethical standards of the 1964 Helsinki declaration and its later amendments. Our institution does not require ethical approval for reporting individual cases or case series.

Informed consent

Written informed consent was obtained from the patient, including permission to publish pictures.

Author contributions

All the authors have accepted responsibility for the entire content of this submitted manuscript and approved submission. Mikkel Kaltoft helped diagnose, follow, and treat the patient, ultrasound check-ups, and manuscript editing. Marie-Louise U. Hansen helped to design, write and edit the manuscript and search for literature. Irene Wessel performed surgery on the patient and helped to edit the manuscript. Thomas Vedtofte helped to edit the manuscript;

Disclosure statement

The authors have no conflicts of interest to disclose.

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