

Transvaginal Probe Application in the Visualization and Evaluation of a Retrosternal Thyroid Mass

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Abstract

Ultrasound evaluation of the thyroid gland is relatively easy in most cases with excellent visualization of the gland with linear transducer allowing clear characterization of lesions as well as guidance for biopsy. However when retrosternal thyroid tissue extension is present, evaluation may be difficult. We report the simple use of widely available transvaginal probe in helping to visualize and evaluate the retrosternal thyroid tissue.

Introduction

Ultrasonography is one of the most important and useful diagnostic tools as a basic investigative procedure in characterization of thyroid lesions. Linear high frequency probe (7.5-15 MHz) is routinely used giving good resolution images of the superficially localized thyroid gland [1]. Morphology, echotexture, size and characterization of lesions is relatively straightforward. In addition, ultrasound helps guide biopsy of suspicious lesions.

When the thyroid gland extends retrosternally, evaluation may be difficult, often necessitating computed tomography (CT) or magnetic resonance imaging (MRI) imaging. We however would like to present the use of a transvaginal probe to image difficult case, when conventional ultrasound has failed. In this technical note, we describe transvaginal probe use in a particularly challenging case of nodule in retrosternal thyroid tissue as an example of its utility.

Background

Retrosternal (substernal) thyroid gland refers to extension of thyroid tissue below cervico-thoracic isthmus [2]. Extension most frequently is anterior and prevascular [3], seen in 5th decade of life in majority of cases and more often in female. Retrosternal extension of thyroid tissue may cause dyspnea and difficulties with swallowing however in up to 50% of cases are asymptomatic [2,4]. The incidence of carcinoma development in retrosternal thyroid tissue is similar to cervical thyroid tissue end estimated at 1.3-3.7 new cases per 1000 patients [5]. Therefore standard thyroid nodules surveillance guidance applies to any nodule within retrosternal goiter [6]. CT appears to be the best imaging modality for identifying and characterizing substernal goiters [3]. CT however provides poor characterization of thyroid nodules. Also usage of iodinated contrast enables scintigraphy or administration of radioactive iodine (RAI) therapy for a period of 1 to 2 months limiting further characterization and potential treatment. Radioisotope imaging helps to determine if nodule is functioning or not however had very low prediction in relation to size and malignant nature of the lesions. MRI has minimal role in evaluation of thyroid nodules.

Ultrasound is the preferred imaging modality for thyroid and assessment of thyroid nodules as it is not only cost – effective but also provides accurate measurements of nodule diameter and allows characterization of nodules by sonographic features which suggest malignancy. Also ultrasound guided fine needle aspiration biopsy (FNAB) is the preferred method of tissue sampling [7]. In general linear high frequency probe is used in visualization of thyroid gland and nodules. However retrosternal components of thyroid gland are

not easily imaged by traditional ultrasound due to poor penetration and artifact generated by bony structures. That pose significant problem to visualize, correctly assess and sample thyroid nodules within retrosternal thyroid tissue causing exclusion of malignancy difficult [8]. A transvaginal probe is one of several endocavitary ultrasound transducers primarily employed in the fields of gynecology and obstetrics for the purpose of transvaginally examining intrapelvic organs. It is available on almost every modern commercial machine. The usage of transvaginal transducers in the normal transvaginal route for non-gynecological purposes has been well described, for example to assess for appendicitis [9]. In addition, the data in the medical literature suggests the application of endocavitary ultrasound probes outside the vaginal or other cavity to obtain vascular access [10]. However there is little in the literature to describe its use in evaluation or guiding a biopsy of retrosternal thyroid lesions. In the case we report, the use of an endocavitary transducer instead of traditional linear probe allowed for the successful evaluation of a retrosternal thyroid mass. This helped to reach rapid final diagnosis without the need for extra costs or distress to the patient. We advocate that this simple technique should be considered in cases where a retrosternal thyroid needs evaluation.

Description

45-year old female patient with background history of recurrent chest infections and family history of thyroid cancer had a CT thorax performed for further investigation of questionable density in the right lower zone noted on chest x-ray. Incidental 2.2 cm retrosternal soft tissue mass was noted on CT extending from the thyroid isthmus of uncertain aetiology (Figure 1). It was solid in morphology and it was not clear whether it represented a thyroid nodule or a mass indenting on the thyroid gland. Differential diagnosis included a thyroid tumour, ectopic thyroid tissue, inferior parathyroid gland enlargement or an enlarged lymph node. The area of concern was imaged by conventional ultrasound but due to its retrosternal localisation the specified lesion was not visualised. The case was discussed on endocrinology MDT

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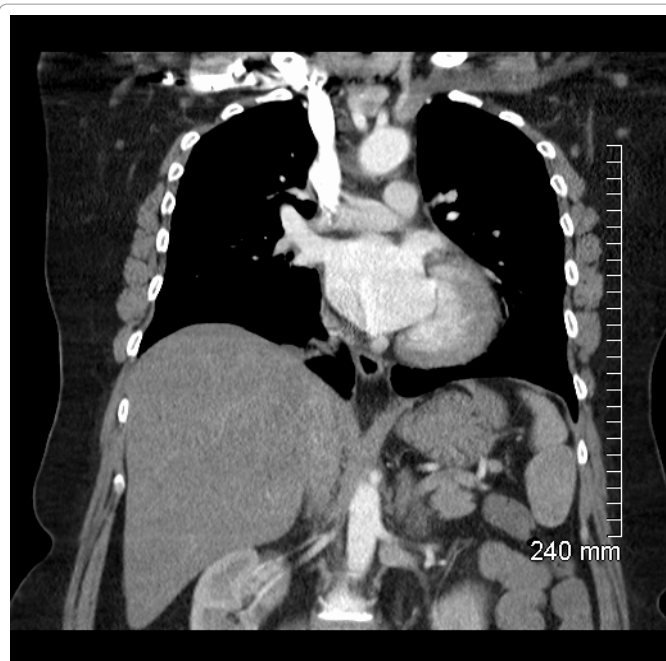


Figure 1: CT Thorax post intravenous contrast administration (coronal view). 2.2 cm Heterogeneous soft tissue mass in superior mediastinum of high density and uncertain etiology.

meeting and given focal nature of the lesion and patient's family history tissue sampling was recommended. US guided biopsy was scheduled with a view to proceed with CT guidance for tissue sampling if unsuccessful.

The lesion of interest was again not clearly seen with linear ultrasound transducer and transvaginal probe was used (Figure 2). A 2.1 cm by 1.3 cm thyroid tissue with mixed solid and cystic nodule was successfully visualised inferiorly to thyroidal isthmus (Figure 3) which based on ultrasonographic appearance was classified as a benign thyroid mass U2 as per British Thyroid Association classification [6] not necessitating biopsy or further follow up. Isotope thyroid scan was done subsequently for further evaluation of the mass, which demonstrated increased focal uptake typical for thyroid gland in the area corresponding to the findings from CT (Figure 4) confirming the diagnosis of ectopic thyroid tissue.

Discussion

While thyroid ultrasound with usage of linear probe is generally straightforward with excellent visualization of the gland and characterization of inherent lesions, challenges may present in cases of a retrosternal goiter. CT and MRI are sometimes employed in such cases. The use of an alternative ultrasound technique would be preferable if possible to other cross sectional imaging saving time and costs as well as radiation dose and distress for the patients. The value of transvaginal ultrasonography in gynecologic/obstetric diagnosis is well recognized. Also transvaginal assessment of gastrointestinal pathologies is well known. However its potential diagnostic value in other organ systems especially thyroid gland is not widely described. Transvaginal ultrasonographic probes apply ultrasound waves of the same megahertz values as linear probe however provides panoramic view. This allows visualization of deeply localized lesions such as retrosternal soft tissue masses, which are not clearly seen, with usage of standard linear probes.

In our case it helped to reach final diagnosis of retrosternal ectopic thyroid tissue containing benign nodule. The nodule did not need further tissue sampling or follow up in this case. However, in cases of a suspicious nodule, guided biopsy with the same probe is feasible and safe. In addition to retrosternal thyroid lesions, a transcavitary probe may also visualize other retrosternal lesions with a theoretical potential use in many other parts of the body without any extra cost in securing expensive small parts probes.

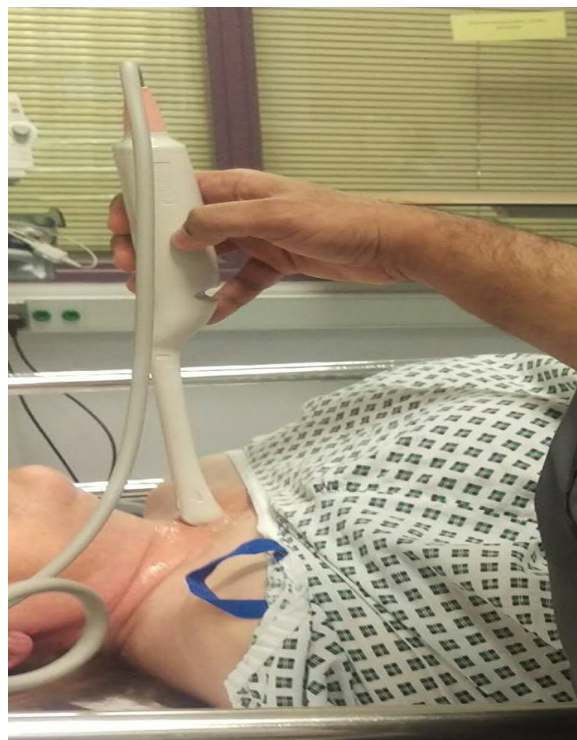


Figure 2: Transvaginal probe application for visualization of retrosternal soft tissue mass.

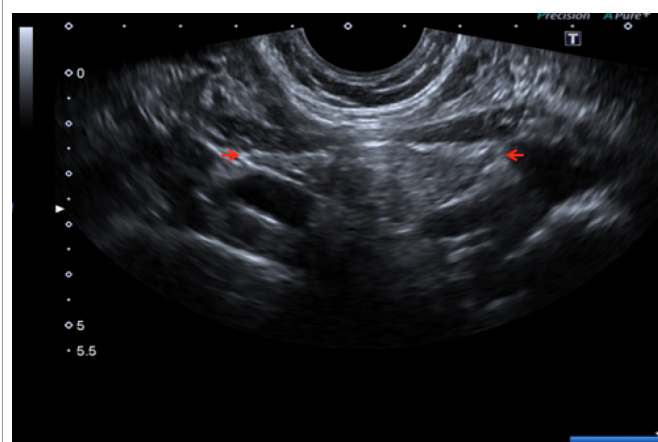


Figure 3: Spot image of Ultrasound of sternal notch area visualized with transvaginal transducer. Retrosternal thyroid tissue (red arrows) with mixed solid and cystic nodule measuring 2.1 × 1.3 cm (green arrows). No sonographic suspicious features were seen and nodule was classified as U2 (benign) as per British Thyroid Association.

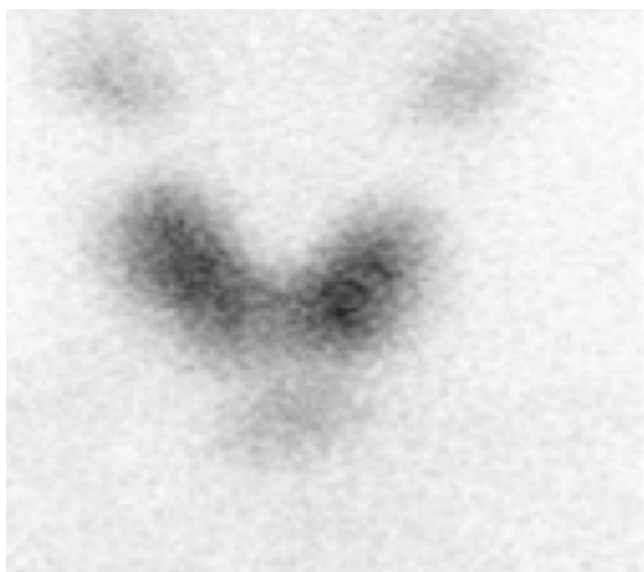


Figure 4: Thyroid scintigraphy spot image. Area of increased uptake typical for thyroid gland was seen inferiorly to the thyroid isthmus, in the suprasternal notch corresponding to findings from CT and US done with usage of transvaginal probe.

Conclusion

In cases of a retrosternal goiter or mass that is poorly seen by conventional ultrasound, an endocavitary probe may be useful in visualizing, characterizing and in process of tissue sampling of the lesions.

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