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Research Article

Papillary Thyroid Carcinoma with Diffuse Sclerosing Type: A Case Report

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Abstract

The diffuse sclerosing variant of papillary thyroid carcinoma (DSVPTC) is a specific subtype of papillary thyroid carcinoma (PTC), accounting for approximately 0.3% to 5.3% of the PTC cases. While DSVPTC has a low incidence, it is highly aggressive, displaying concealed clinical manifestations and a poor prognosis. In ultrasound, both DSVPTC and Hashimoto's thyroiditis present as diffuse thyroid lesions, making them prone to misdiagnosis. The diagnosis of DSVPTC involves ultrasound imaging examination, considering the specific characteristics of the DSVPTC imaging. Confirmation of the disease was subsequently obtained through biochemical tests, clinical manifestations and postoperative pathology. This paper reports a case of DSVPTC, discussing its imaging features, biochemical testing, postoperative pathology, and prognosis, along with relevant literature. The aim is to enhance the understanding of ultrasound practitioners and reduce the likelihood of misdiagnosis..

Keywords: Papillary thyroid carcinoma; Diffuse sclerosing type; Scattered in microcalcification.

Case Report

A 31-years-old Chinese woman presented with a neck tumorous mass that had been noticeable for the past seven months and had progressively increased in size over one month. Initially, the neck mass exhibited a hard texture, clear boundaries, good mobility, and no significant tenderness. The patient had previously been diagnosed as Hashimoto's thyroiditis at an outside hospital and received irregular medication treatment. However, in the past month, the neck tumorous mass had notably enlarged. By physical examination, a diffuse thyroid II enlargement was observed, palpable on the neck, measuring approximately 1.0cm×1.0cm with a smooth, hard surface and no tenderness. The mass could move up and down with swallowing. Additionally, swollen lymph nodes were detected on both sides of the neck, with the largest measuring 1.6cm×1.0cm. These lymph nodes exhibited a tough texture, indistinct boundaries, reduced mobility, and an uneven surface.

On December 29, 2019, the patient underwent ultrasound examination at our hospital, revealing specific details about the thyroid. The left lobe thyroid measured 63mm× 21 mm× 16 mm, the right lobe thyroid measured 68 mm× 26 mm× 22 mm, and the isthmus measured 4.9 mm. Notably, the thyroid capsule displayed an irregular surface, and parenchymal echo was uneven. Diffuse small calcification foci were dispersed throughout the thyroid, showing a characteristic "blizzard" sign (Figure 1), despite normal blood supply. Besides, two space-occupying lesions were identified in the left thyroid lobe. One, located in the upper pole, measured 8.5 mm× 8.2 mm, and the other, in the middle pole, measured 6.5 mm× 3.6 mm. Both lesions exhibited equal echogenecity, clear boundaries, and a vertical-to-horizontal ratio less than 1. No Significant calcification or compromised blood supply was observed. In terms of lymph nodes, multiple nodes of varying sizes were detected in bilateral neck regions II, III, IV, V, VI. Notably, the right lymph node measured approximately 15.8 mm× 11.7 mm, and the left lymph node measured about 18.5 mm× 6.6 mm. These lymph nodes displayed unclear contour, non-uniform capsules with a round or oval shape, and visible local enlargement. Structurally, the lymph nodes exhibited poor organization, with some areas being hypoechoic and others showing scattered and spotty calcifications. The lymphovascular lesions appeared “tangled” (Figure 2). Based on the ultrasound findings, the patient was diagnosed with diffuse thyroid lesions, suggestive of Diffuse Sclerosing Variant of Papillary Thyroid Carcinoma (DSVPTC). Additionally, the lesion was located in the left thyroid lobe of the patient, prompting consideration of the possibility of nodular goiter. Besides, the swelling of multiple lymph nodes in the bilateral neck in the ultrasound images indicated a potential lymph node metastasis. On January 8, 2021, the patient was admitted to a reputable hospital for a thyroid tumor. The biochemical results revealed FT3 at 3.840 pmol/L, FT4 at 14.430 pmol/L, TSH at 4.82 0 mIU/L, TG at 7.46 ng/mL, A-TPO> 600.00 IU/mL, and A-TG> 4000.00 IU/m. During surgery, the incision was made along the anterior midline of the neck, exposing the thyroid glands completely. This exposure revealed the bilateral thyroid lobes and the isthmus, which appeared completely nodular, partially calcified, and possessed a hard texture, with minimal normal thyroid tissue. Carbon nanoparticles injected into the thyroid gland highlighted multiple black-stained lymph nodes in the VI region of the neck, with larger lymph nodes in the left neck measured approximately 1.5cm×1.0cm in the VI region. Intraoperative pathology (left lobe + gorge and left lobe) matched papillary thyroid cancer and the tumor breakthrough membrane. Nodes in the left neck III region, left neck IV region, left neck VI region, right neck III region, right neck IV region, and right neck VI region all showed signs of cancer spread. The intraoperative pathological results were consistent with the diagnosis of DSVPTC with

cervical lymph node metastasis. Now, the patient is recovering well.

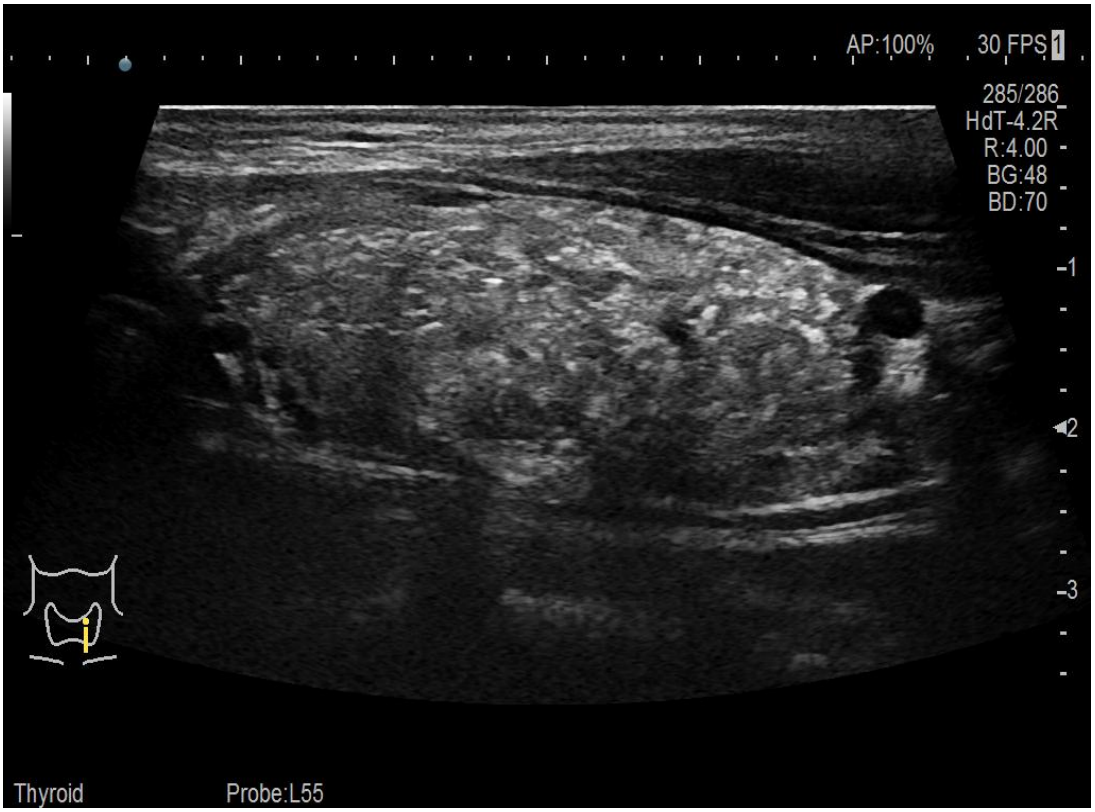

Figure1. The thyroid tissue echo is uneven, visible diffuse strong light point, showing a "blizzard" sign.

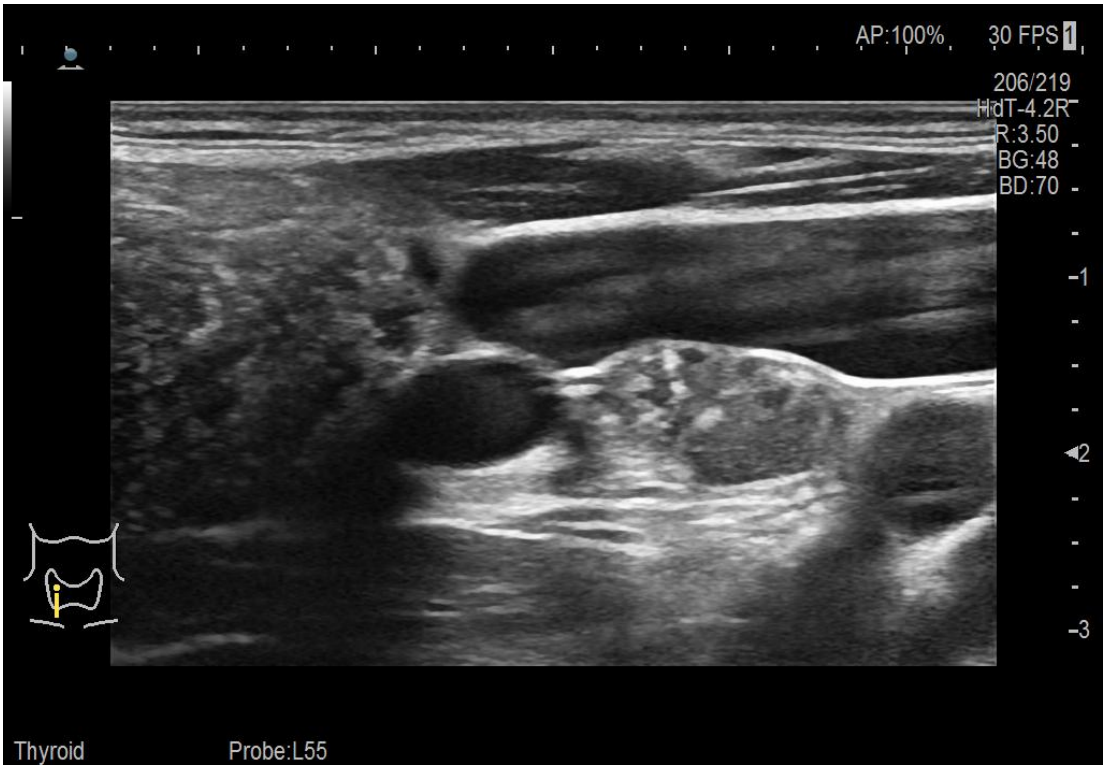

Figure 2. Lymphatic node cortex and medullary mass are poorly bounded, the lymphoid gate structure disappears and has irregular internal structure, showing multiple punctate strong echoes.

Discussion

Papillary Thyroid Carcinoma (PTC) accounts for approximately 60%-80% of thyroid cancers and stands as the most common pathological type. It follows a protracted course, often remaining concealed, displaying low malignancy and generally presenting a favorable prognosis. However, the clinical manifestations of PTC are complex and varied. Although most of them have a good prognosis, some develop rapidly and manifest early-stage local infiltration or metastasis. DSVPTC is a special subtype of PTC, characterized by diffuse thyroid invasion. It is a rare subtype of PTC, accounting for about 0.7% ~ 5.3% of cases (1). PTC is most commonly found in young women, with an average onset age lower than that of thyroid cancer in general (2). PTC patients often exhibit bilateral or unilateral diffuse enlargement of thyroid lobes with serological characteristics of autoimmune thyroiditis (3). It is characterized by diffuse thyroid enlargement and large scattered microcalcification on ultrasound (also known as "blizzard" sign) (4). PTC can be misdiagnosed as subacute thyroiditis or Hashimoto's thyroiditis on clinical and various imaging examinations. The morphological features of DSVPTC are significant sclerosis, numerous psammoma bodies, and chronic lymphocytic thyroiditis background, tumor cell nests are often solid, with extensive squamous biochemistry, they are easy to invade intrathyroid lymphatic vessels and extrathyroid tissue (5). The previous study suggested that this pathological feature can determine the acoustic image characteristics (6). Therefore, ultrasound is used for the clinical diagnosis of DSVPTC. However, diffuse sclerotic thyroid papillary carcinoma can lead to a variety of echoes due to different disease courses, aggressiveness, and degrees of fibrosis (6). Glandular echo may be attenuated by cell infiltration, cell phosphorylation, or interstitial fibrous hyperplasia, resulting in ambiguity in the interpretation of glandular echoes (7). Sand-like calcification observed in the enlarged thyroid gland are an important diagnostic indicator for DSVPTC. Microcalcification on ultrasound is one of the most reliable features in thyroid cancer diagnosis, with a specificity of 93%-95% (8). Microcalcification of bilaterally enlarged cervical lymph nodes with "blizzard" signs is also an important feature of this disease (9).

It has been reported that rate of cervical lymph node metastasis in DSVPTC can reach up to 90% (10). In this case, metastasis was observed in the lymph node of bilateral cervical regions II, III, IV, V, and VI. Ultrasound imaging revealed an ambiguous internal structure in the lymph nodes. Some appeared hypoechoic, while others exhibited scattered spotty calcification, lymphatic disorder and "disorderly". Metastatic cancer in the lymph node was confirmed by pathology.

Considering the patient's medical history and ultrasound findings revealing a diffuse enlargement of the thyroid gland, there was a risk of misdiagnosing it as Hashimoto's thyroiditis. However, in this case, distinct diffuse dotted echoes were observed in both thyroid lobes, along with metastatic lymph nodes in the neck and sand-like calcifications in the lymph nodes, indicating DSVPTC. DSVPTC is known for its higher aggressive and increased rate of lymph node metastasis compared to canonical PTC, making it a high-risk PTC subtype. The primary approach for treating DSVPTC involves active surgical treatment, postoperative radioactive treatment, and close follow-up, all contributing to improved disease-free survival (11,12). The patient underwent a series of surgical procedures, including bilateral total thyrotomy, bilateral recurrent laryngeal nerve exploration, and bilateral cervical lymph node dissection at the superior hospital. Now the patient is generally in good condition, and ongoing follow-up will be conducted.

Conclusion

Ultrasound is currently the preferred diagnostic imaging method for DSVPTC. Reliable

indicators for the nonoperative diagnosis of the disease include hyperthyrodism, diffuse microcalcification in parenchyma, cervical metastatic lymph nodes, and sand granular calcification in the lymph nodes.

Declarations

1) ***Consent to publication***

We declare that all authors agreed to publish the manuscript at this journal based on the signed Copyright Transfer Agreement and followed publication ethics.

2) Ethical approval and consent to participants

Written consent was taken from the patients.

3) ***Disclosure of conflict of interests***

We declare that no conflict of interest exists.

4) Funding

None

5) Authors' Contributions

Authors contributed to this paper with the design (SY, GAB, HYX, XHZ), literature search (SY,SLH), drafting (SY, SLH), revision (SY, SLH, XYW, SHZ, YHL, XBD, GAB, XHZ, HYX), editing (SY, SLH, XYW, SHZ, YHL, XBD, GAB, XHZ, HYX) and final approval (SY, XYW, GAB, XHZ, HYX).

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None.

7) Authors' biography

None.

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