Papillary Thyroid Carcinoma of a Diffuse Sclerosing Variant: Ultrasonographic Monitoring from a Normal Thyroid Gland to Mass Formation

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A diffuse sclerosing variant of papillary thyroid carcinoma is uncommon and has a tendency for rapid growth and a higher incidence of cervical lymph node metastases. We experienced a case of a diffuse sclerosing variant of papillary thyroid carcinoma in a 48-year-old man. This case showed benign features on initial ultrasonography and positron emission tomography (PET) scan. A new nodule was detected on follow-up ultrasonography that showed rapid enlargement. This case was confirmed by surgical excision. We herein describe the initial and follow-up ultrasonographic findings of a diffuse sclerosing variant of papillary thyroid carcinoma.

Index terms:
Papillary thyroid carcinoma
Diffuse sclerosing variant
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Most papillary thyroid carcinomas (PTC) are known as slow growing tumors with a favorable prognosis. A diffuse sclerosing variant of papillary thyroid carcinoma (DSVPTC) is uncommon and has a higher incidence of cervical lymph node metastases, compared with classic PTC (1, 2). Several articles recently reported the imaging findings and pathologic features of DSVPTC. Here, we describe a recently developed case of DSVPTC, which manifested as thyroiditis with a rapidly enlarging suspicious mass from a normal thyroid gland. The finding was noted at the time of two year follow-up ultrasonographic examination.

CASE REPORT

A 48-year-old man visited our hospital to be screened for cancer. His history and physical examination were unremarkable. His initial thyroid ultrasonography (Logic 700, GE Healthcare, Milwaukee, WI) and positron emission tomography (Advance, GE Healthcare, Milwaukee, WI) with F-18-deoxyglucose positron emission tomography (FDG-PET) were normal (Fig. 1A, B).

The man returned for a second-round cancer screening two years later. His physical examination and laboratory findings were also unremarkable; serum triiodothyronine (T3) 105 ng/dl (76–190), free T4 1.34 ng/dl (0.79–1.86), thyroid-stimulating hormone (TSH) 7.00 uIU/ml (0.3–6.00), total iron binding capacity (TIBC) 350 μg/dl (250–425). A second-round screening ultrasonography (iU 22 unit, Philips Healthcare, Bothell, WA) showed a mild heterogeneous parenchymal change with a suspicious mass located on an enlarged left lobe of the thyroid gland. The mass was regarded as likely being benign (Fig. 1C, D), therefore a follow-up ultrasonography was recommended. FDG-PET scan (Discovery STE16, GE Healthcare, Milwaukee, WI) showed diffusely increased FDG uptake in the left thyroid gland, which was also interpreted as benign thyroid disease.

A follow-up ultrasonography performed six months after the second-round screening ultrasonography demonstrated a partially ill-defined hypoechoic mass with multiple microcalcifications and cystic portions in the mid-region of left thyroid gland (Fig. 1E). His physical examination remained unremarkable. The size of this ultrasonographic mass was about 1.6 cm, and the left thyroid gland was diffusely enlarged with a snow-storm appearance, suggesting multiple scattered microcalcifications in the surrounding parenchyma (Fig. 1F). Vascularity of the left thyroid gland was generally increased on a color Doppler image. Multiple lymph nodes were found along left internal jugular chains (Fig. 1G). Some nodes showed multiple microcalcifications in the cortices, while the others showed loss of a hilum. Another 3-mm hypoechoic nodule with an ill-defined margin was newly noted in the mid-deep region of the right thyroid gland.

Fine-needle aspiration biopsies (FNAB) of the left thyroid mass and a lymph node were performed. The results of the FNAB indicated papillary thyroid carcinoma and lymph node metastasis. The laboratory findings, including an anti-microsomal antibody (AMA), anti-TSH-receptor antibody (TRAb) and, anti-thyroglobulin antibody (ATA) activity were checked at the same time. AMA was positive, whereas all other findings were negative; AMA 203 U/ml (0–100), TRAb –0.5% (–15–15), ATA 12 U/ml (0-100). A total thyroidectomy with modified radical neck dissection was performed. The specimen size of each thyroid gland lobe was 4.5 × 2.5 × 2.0 cm on the right side and 5.0 × 4.0 × 2.0 cm on the left side. Each lobe weighed 12 grams on the right side and 18 grams on the left side. The left thyroid gland was replaced by multiple masses with capsular invasion. The pathologic diagnosis was a DSVPTC in both lobes, with multiple lymph node metastases in the left lateral neck (Fig. 1H). The patient was treated with I-131 (150 mCi).

DISCUSSION

Diffuse sclerosing variant of PTC is an uncommon

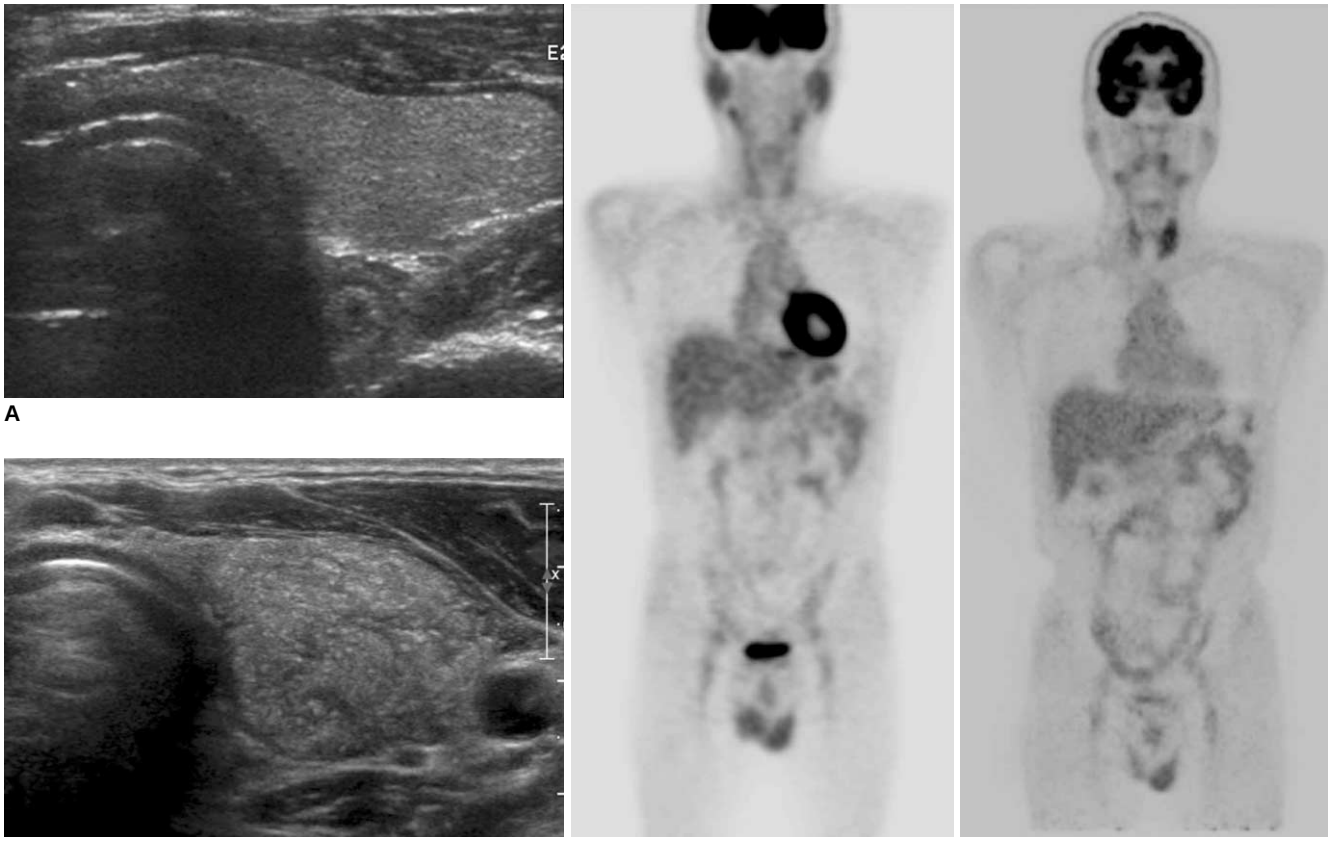

Fig. 1. Diffuse sclerosing variant of papillary thyroid carcinoma in 48-year-old man.
A, B. Initial thyroid ultrasonography (**A**) and PET scan (**B**) have normal appearance.
C, D. Second-round screening examination was performed two years later. Ultrasonography (**C**) shows diffuse enlargement of left thyroid gland with heterogeneous echogenicity and formation of suspicious mass. It is regarded as pseudo-mass by heterogeneous parenchyma of left thyroid. PET scan (**D**) shows increased FDG uptake in both thyroid glands, especially in left lobe. These findings are regarded as benign thyroid disease and call for recommended follow-up examination.

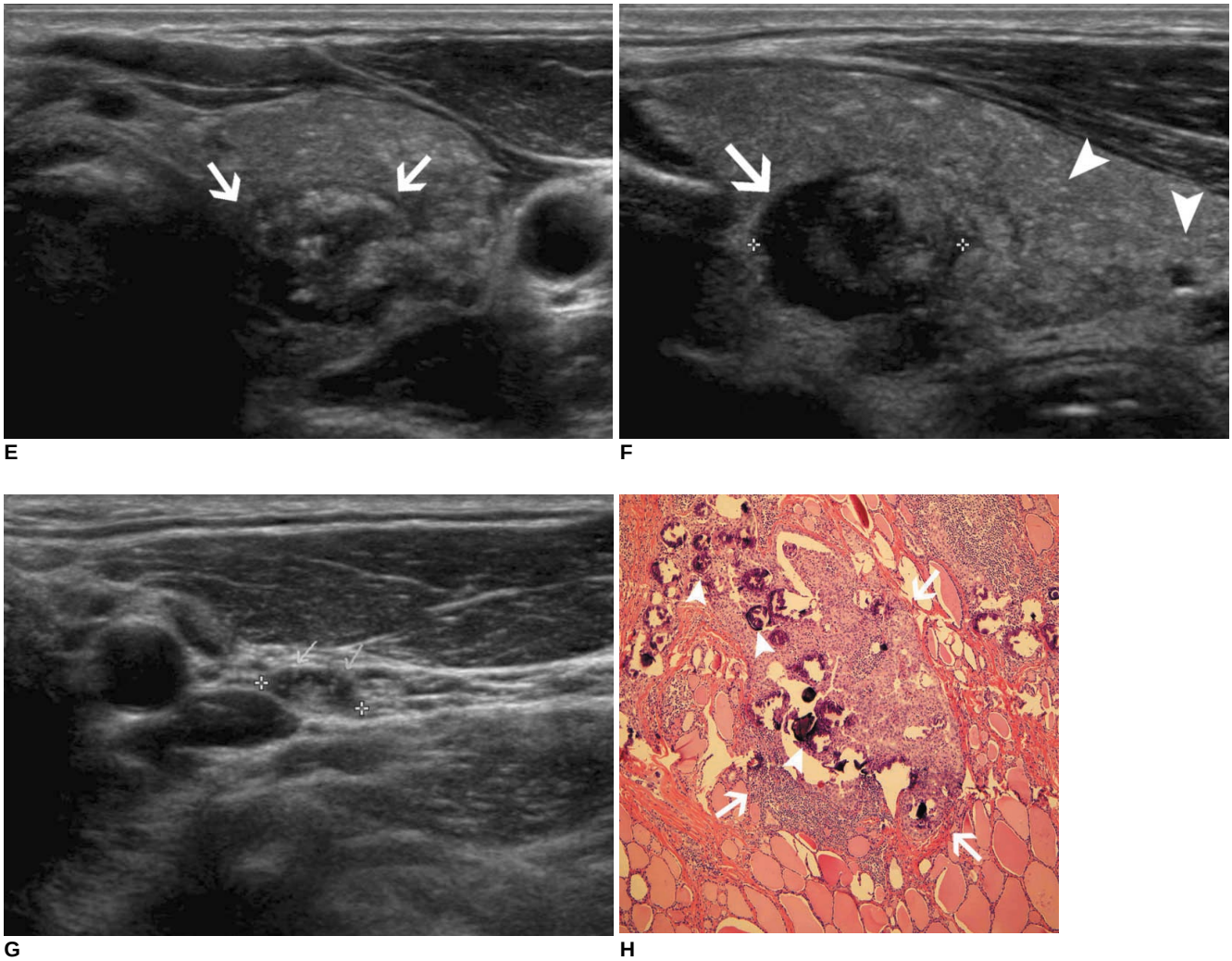

Fig. 1. Diffuse sclerosing variant of papillary thyroid carcinoma in 48-year-old man.
E, F. Follow-up examination was performed six months later. Ultrasonography shows well defined cystic and solid mass (arrows) measuring 16 mm at left thyroid gland (**E, F**). It also shows multiple internal microcalcifications within this mass and multiple high echoic dots suggesting microcalcifications (arrowheads in **F**).
G. Lymph node of left level III shows nodular cortical thickening and microcalcifications. Metastasis was confirmed by surgery.
H. Photomicrograph shows mass (arrows) with multiple internal psammoma bodies (arrowheads) (Hematoxylin and Eosin staining, × 20).

variant of papillary thyroid carcinoma and is considered to have an unfavorable prognosis. It occurs in young individuals, ranging from 19.5 to 34.7 years and has a higher incidence of cervical lymph node metastases, compared with classic PTC (1, 2). According to several reports (3, 4), the prevalence of DSVPTC of all papillary carcinomas has been reported to be 0.3% to 5.3%. DSVPTC is histologically characterized by diffuse involvement of one or both thyroid lobes with dense fibrosis, extensive squamous metaplasia, patchy lymphoid infiltration with germinal centers, psammoma bodies, and areas of conventional papillary carcinoma (1, 5). The usual ultrasonographic findings of DSVPTC are a round, solid, hypoechoic mass with internal vascularity and microcalcifications, or a diffusely enlarged thyroid gland with hypoechoic and heterogeneous internal echoes containing fine and multiple fine high-echo spots (6–8). The diffuse involvement of the thyroid in DSVPTC and the presence of anti-thyroglobulin antibodies usually mimic Hashimoto's thyroiditis (9). Underlying diffusely scattered microcalcifications are manifested to the prominent snow-storm appearance on ultrasonography.

This issue involving this variant is often delayed diagnosis due to the imaging features mimicking benign thyroid disease such as chronic thyroiditis (8). In our case, the diagnosis was also delayed for the same reason. Initial ultrasonography and PET scan was found to be normal. For the second-round screening examination, ultrasonogra-

phy showed diffuse parenchymal enlargement, suspicious mass formation, multiple microcalcifications and PET scan also showed diffusely increased uptake on the left thyroid gland, suggesting an abnormality. However, the physical examination and laboratory findings were unremarkable. The initial diagnosis was diffuse parenchymal change rather than a mass lesion on the left thyroid gland. A round, solid, and hypoechoic mass was finally detected on a follow-up at six months after the second-round cancer screening and two years and six months after the initial examination. When confirming DSVPTC by FNAB, ATA activity was also checked and was found to be negative. The higher frequency of ATA positivity was consistent shown in other reports (3, 10), accounting for 72–75% of DSVPTC. However, this case showed that AMA was only positive. A recent report (4) showed that only 25% (2 of 8) of DSVPTC were positive to AMA and they were all in the euthyroid state. As a result of this study, if we suspect this disease due to any change on image or laboratory findings, despite the initial normal finding, we found it to be important to keep observing the follow-up ultrasonography within the next six months. We also learned that a fine needle aspiration biopsy may be necessary when the ultrasonographic findings have changed.

Although DSVPTC is believed to be more aggressive than classic papillary carcinoma (6), some recent studies found that the prognosis of DSVPTC was similar to classic papillary carcinoma owing to aggressive treatment and close follow-up (2, 3).

In conclusion, we should be familiar with the findings of the DSVPTC, such as diffuse enlargement of the thyroid gland and multiple scattered microcalcifications with or without mass formation. The final diagnosis should only be given after a biopsy.

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