INTRODUCTION

The thyroid gland is one of the most vascular organs of the body. However, the clinical and surgical series have reported an incidence of secondary malignancies in this gland of only 3%. Nevertheless, thyroid metastasis is not an exceptional finding; at autopsy, it is encountered in a variable proportion (2% to 24%) of patients affected by a malignant neoplasm (1).

The most common primary sites are the kidney, lung, breast, and gastrointestinal tract (2). However, a variety of cancers may metastasize to the thyroid, including nasopharyngeal carcinoma, choriocarcinoma, osteosarcoma, leiomyosarcoma, liposarcoma, melanoma, and tumors of neuroendocrine origin. Review of the literature on hepatocellular carcinoma (HCC) metastasized to the thyroid identified four such cases (3, 4). However, to the best of our knowledge, this is the first radiologic report.

Thyroid nodules found in patients who have malignant disease could be benign, second primary malignancy or metastasis from other organs. High-resolution ultrasonography (US) is highly sensitive for the detection of thyroid nodules that are not even palpable on clinical examination, and it plays a major role in guiding fine-needle aspiration of such lesions (5). We report a rare case of a HCC metastatic to the thyroid and discuss the sonographic findings of thyroid metastasis and their use as an additional aid for differentiating between unknown primary tumor and thyroid metastasis.

Case Report

A 53-year-old man diagnosed with liver abscess 3 years ago was admitted for epigastric discomfort (Fig. 1A). The serum alpha-fetoprotein level was 2700 ng/mL. Subsequent liver com-
Computed tomography (CT) showed a mass with arterial enhancement and delayed washout pattern on dynamic enhancement, which was highly suggestive of HCC; it had been considered to be a liver abscess previously, and tumor thrombosis in the right hepatic vein and intrahepatic segment of the inferior vena cava due to direct invasion of the tumor were noted (Fig. 1B, C). Underlying conditions were chronic hepatitis B infection, atrial fibrillation, and heart failure. Physical examination was negative for spider angioma, shifting dullness, jaundice or scleral icterus, hand flapping tremor, or palpable neck mass. Laboratory data

Fig. 1. Hepatocellular carcinoma with thyroid metastasis in a 53-year-old male patient.
A. Initial CT taken 3 yrs ago. A low density hepatic mass 3.8 × 3.5 cm in size was noted in segment 7 of the liver. This mass was regarded as a liver abscess.
B, C. Follow-up CT scans. A 8.4 × 2 cm elongated mass was noted in the right hepatic lobe with invasion of right hepatic vein showing arterial enhancement and delayed washout pattern of enhancement. The findings were highly of hepatocellular carcinoma. Tumor thrombosis of right hepatic vein and intrahepatic segment of inferior vena cava were evident.
D. A 4 cm sized homogenous hypoechoic solid mass replaced the left thyroid lobe. The masses in the thyroid gland showed heterogenous hypoechoic features without necrosis or calcification.
E, F. Enlarged pathologic lymph nodes, left level 3 and 4 were evident. The nodes showed the same nature as the thyroid masses. No significant increase of intratumoral or intranodal vascularity was found on color Doppler study—denotes metastatic lymph nodes.
G. Typical trabecular pattern of tumor cells (hematoxylin & eosin stain, × 100).
H. Higher magnification of tumor cells showing pleomorphic cells with nuclear atypia (hematoxylin & eosin stain, × 200).
revealed serum aspartate aminotransferase level of 54 IU/L, alanine aminotransferase level of 10 IU/L, and creatinine level of 1.0 mg/dL. Transarterial embolization therapy was performed for the infiltrative tumor with a hepatic vein tumor thrombus and multiple tumors in the right lobe.

Nine months after the initial diagnosis of liver tumor, multiple masses were palpated in the anterior and left lateral neck along the internal jugular chain on physical examination. US performed to evaluate neck masses revealed multiple, variable-sized solid masses in the thyroid gland and enlarged lymph nodes along the left internal jugular chain (Fig. 1D-F). The masses in the thyroid gland showed echo features with heterogeneous, hypoechoic solid echogenicity without necrosis or calcification. The margins of the masses were well-circumscribed and they had a wider than tall shape. The lymph nodes appeared similar to the thyroid masses. No significant increase in the intratumoral or intranodal vascularity was found on the color Doppler study.

US-guided 16-gauge core needle biopsy was performed for the left thyroid mass and a pathologic lymph node at the left level 3. Histopathologic examination of the thyroid gland and lymph node showed similar histologic features, suggestive of metastatic HCC. The tumor cells had a typical trabecular pattern with a network of sinusoidal vessels, scanty cytoplasm, and nuclear pleomorphism (Fig. 1G, H). Additionally, immunohistochemical staining was positive for epithelial membrane antigen and cytokeratin, and negative for carcinoembryonic antigen.

The patient expired 20 days after the diagnosis of thyroid metastasis, due to hepatorenal syndrome.

**DISCUSSION**

Metastatic spread to the thyroid gland may be more common than primary malignant tumors of thyroid origin among patients with a history of a malignant neoplasm (6).

Primary tumors that most frequently metastasize to the thyroid gland are those that most often give rise to hematogenous metastasis, such as malignant melanoma, renal, breast, and lung carcinoma, and less frequently, secondary lesions from pancreatic and gastrointestinal malignancies (3). However, there are few case reports about thyroid metastases of HCC (7).

Metastatic lesions of the thyroid and neck usually do not present important clinical problems because they are mostly small and generally associated with evidence of widespread malignant disease. However, symptoms such as dysphagia, stridor, hoarseness, or palpable neck mass may be present (8, 9). Our patient presented with multiple palpable neck masses in the anterior neck and left lateral neck along the internal jugular chain.

US findings that indicate a high possibility of metastasis to the thyroid are nodules with ill-defined hypoechoic character and heterogeneous echotexture, and no evidence of microcalcification (10). In the present case, US showed heterogeneous, hypoechoic echogenicity without necrosis or calcification, but, the margins of masses were well-circumscribed and their shape was wider than tall, which could mimic a benign nodule. A patient with these sonographic findings who has an underlying malignancy should be considered for US-guided biopsy.

We confirmed thyroid metastasis from HCC with a 16-gauge core needle biopsy under ultrasound guidance because it may be difficult to distinguish primary from metastatic disease with fine needle biopsy when the cells are highly anaplastic, or the tissue shows histological architecture resembling that of a primary tumor (1).

Immunohistochemistry can also be helpful for correctly identifying undifferentiated cancers. Since only 20–30% of anaplastic thyroid carcinomas are positive for thyroid markers such as thyroglobulin, it is important to be aware of primary malignancies for appropriate marker staining (1). Although immunostaining for thyroglobulin was not performed in this case, hematoxylin and eosin staining showed typical histologic features of HCC. HCC tumor cells were positive for epithelial membrane antigen and cytokeratin, and negative for carcinoembryonic antigen.

We concur with the previous recommendation that all patients with a history of cancer should be evaluated for possible metastasis when a thyroid lesion is discovered (6).

The sonographic findings of thyroid metastasis from HCC in the present case were multiple, heterogeneous, hypoechoic, solid masses without significantly increased intratumoral vascularity, wider than tall in shape, no calcification or cystic changes, well-circumscribed margins, which are not typical benign or malignant findings. However, findings such as wider than tall in shape, well-circumscribed margins, no calcification, or significant intratumoral vascularity can be the findings that differentiate metastasis from primary thyroid malignancy. US-guided core needle biopsy with additional use of immunohistochemistry is helpful.
for differentiating metastasis from primary malignancies.

REFERENCES