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Solitary liver metastasis from follicular variant papillary thyroid carcinoma: A case report and literature review

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ABSTRACT

INTRODUCTION: Papillary (PTC) and follicular (FTC) thyroid carcinomas, together known as differentiated thyroid carcinomas (DTC), are among the most curable of cancers. Sites of metastases from FTC are usually osseous and those from PTC are in regional nodal basins and the lungs. Visceral metastases are rare and when they do occur, they tend do so in multiple sites. We present the case of a patient with a follicular variant of PTC and a solitary metastasis to the liver then review the relevant literature.
PRESENTATION OF CASE: An otherwise healthy 68-year-old woman was diagnosed with follicular variant papillary thyroid cancer in 2003 and subsequently underwent thyroidectomy. The patient's endocrinologist conducted surveillance of her thyroid cancer. In 2012, due to rise in thyroglobulin, a whole body radioiodine scan was obtained which revealed an iodine-avid left liver lobe mass. Three cycles of radioiodine ablation therapy were unsuccessful and eventually the patient was referred for surgical resection. Metastatic evaluation including a PET scan was negative with the exception of an isolated enhancing 4 cm mass in segment 4B of the liver. Anatomic segmental resection of liver was performed without complications. Intraoperative ultrasonography was used to guide resection of the liver mass. Pathology reports confirmed metastatic follicular variant of PTC. Surgical margins were free of tumor. Patient was discharged home and is doing well one year after surgery. The latest thyroglobulin level was undetectable.
DISCUSSION: Post-operative surveillance by PCP, endocrinologist or surgeon for patients with thyroid carcinoma should be performed routinely. If identified, a solitary liver metastasis from primary thyroid carcinoma should be considered for surgical resection. Due to sparse data available in literature, collecting more data to establish algorithms for treatment of such rare metastatic cancers may be able to aid physicians to achieve better outcomes.
CONCLUSION: Rare distant sites of metastases from DTC include eyes, pharynx, skin, muscle, ovaries, adrenal glands, kidneys, esophagus, pancreas and liver. Isolated, resectable liver metastases from PTC are exceedingly rare. Literature review revealed only 10 reported cases of liver metastases from DTC. As in our patient, solitary liver metastasis from PTC should be considered for surgical resection which offers the best chance for prolonged survival.

1. Introduction

Papillary and follicular thyroid cancers, together, are referred to as differentiated thyroid cancer (DTC) [1]. Differentiated thyroid carcinomas are relatively rare despite common incidence of thyroid nodules [2]. Furthermore, thyroid carcinomas constitute less than 1% of all human cancers. The annual incidence world-wide ranges from 0.5 to 10 cases per 100,000 population [1]. The median age at diagnosis is 45–50 years with two to four times more frequent in women than men [1]. Fortunately, both papillary and follicular (differentiated) thyroid carcinomas are among the most curable cancers. However, some patients are at higher risk for recurrent disease or even death depending on the age at diagnosis, stage, capsular involvement, nodal involvement, size and histological type. Several factors influence pathogenesis of these cancers. Previous studies report a high frequency (70%) of activating somatic alterations of genes encoding effectors in the mitogen-activated protein kinase (MAPK) signaling pathway, including point mutations of BRAF and the RAS genes [14–18]. Rearrangements of the tyrosine kinase domains of the RET and TRK genes with the amino-terminal sequence of an unlinked gene are found in some papillary carcino-

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mas [1]. Additionally, activating point mutations of the RAS genes are found with a similarly high frequency in thyroid adenomas and follicular carcinomas, suggesting that RAS mutations represent an early event in thyroid tumorigenesis [1]. Also, activating mutations of the genes encoding the thyrotropin receptor and the α subunit of the stimulatory G (G_s) protein have been reported in some follicular carcinomas [1,3]. And inactivating point mutations of the p53 tumor-suppressor gene are rare in patients with differentiated thyroid carcinomas, but common in those with undifferentiated (anaplastic) thyroid carcinomas [3]. From an environmental stand point, external irradiation to the neck during childhood increases the risk of papillary thyroid carcinoma. A major risk factor is a young age at the time of irradiation; after the age of 15 or 20 years, the risk is not increased [1]. Lastly, in countries where iodine intake is adequate, differentiated cancers account for more than 80% of all thyroid carcinomas, with the papillary histologic type being the more frequent (accounting for 60–80% of cases) [1]. There is no increase in the incidence of thyroid carcinomas in countries where iodine intake is low, but there is a relative increase in follicular and anaplastic carcinomas [2,3]. From a genetic perspective, in non-sporadic cases, a higher incidence of papillary carcinomas has been reported in patients with adenomatous polyposis coli and Cowden's disease (the multiple hamartoma syndrome) [3]. About 3% of cases of papillary carcinoma are familial. In this case report, the primary focus will be papillary carcinoma which is an unencapsulated tumor with papillary and follicular structures that is characterized by overlapping nuclei that have a ground-glass appearance and longitudinal grooves, with invaginations of cytoplasm [1–3]. Encapsulated, follicular, tall-cell, columnar-cell, clear-cell, and diffuse sclerosing carcinomas are recognized histologic variants; they are classified as papillary carcinomas because of their characteristic nuclear features.

Isolated metastasis to the liver from thyroid cancer is a rare event with a reported frequency of less than 0.5% [3]. Metastatic liver involvement from differentiated thyroid cancer, both follicular and papillary, is nearly always multiple or diffuse and usually found along with other distant metastases including the lungs, bones and the brain) [4–12]. Locations with very rare incidence of metastases include eyes, pharynx, skin, muscle, ovaries, adrenal glands, kidneys, esophagus, pancreas and liver metastasis. A review of the literature revealed that only ten cases of all liver metastases from DTC have been documented, with a rate of 0.5% or less. Three patients were men and seven were women. Their average age was 63 years (range from 32 to 85 years). Histologically, the primary tumor was identified as papillary in four patients, follicular in five and Hürthle cell thyroid cancer in one patient [3]. In two cases, the metastatic histological type was inconsistent with the primary tumor. The primary tumors were FTC and PTC, while both their metastatic lesions were a FV-PTC [3]. What makes the case presented here in an interesting one is the fact that thyroid cancer metastases to liver are rare, and even more so is an isolated and resectable solitary liver metastases from thyroid cancer.

2. Methods

This is a retrospective case report and a review of the literature. Our patient's evaluation and surgical intervention were performed at Scottsdale Healthcare, in Scottsdale, Arizona, USA.

3. Results

The patient is an otherwise healthy 68-year-old woman with a history of follicular variant papillary thyroid cancer diagnosed in

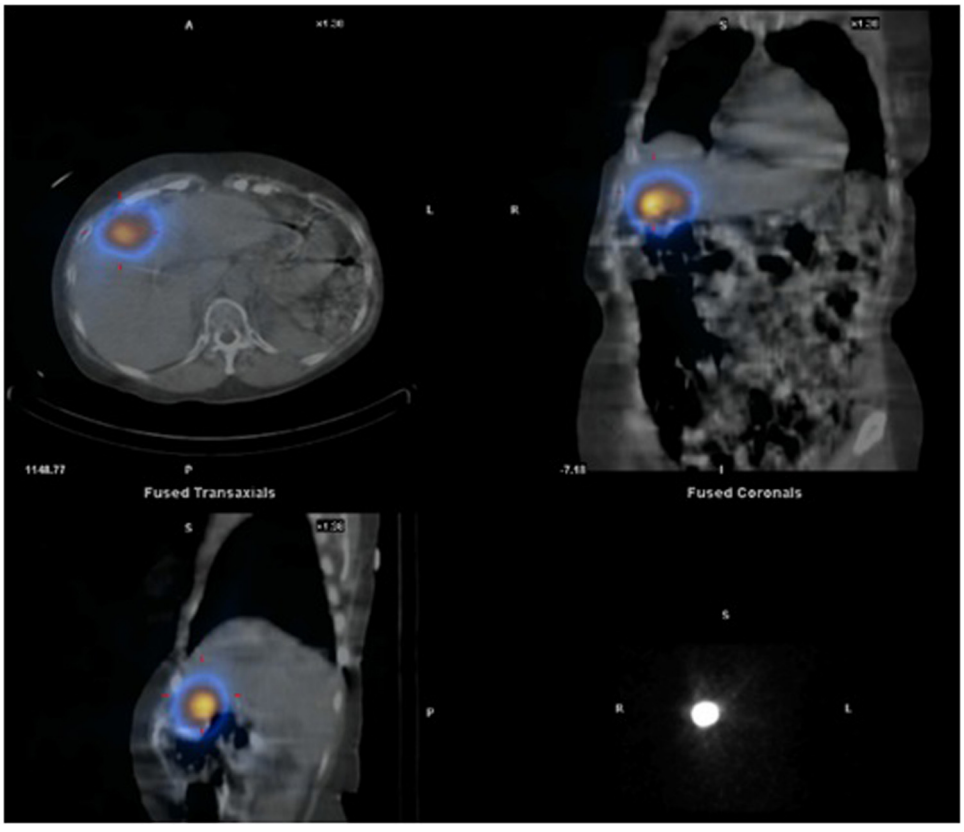

Fig. 1. Positron emission tomography (PET) scan demonstrates an isolated focus of FDG uptake in the liver indicating an isolated metastatic focus of tumor.