Papillary Thyroid Carcinoma Arising from a Mature Teratoma in a Cryptorchid Testis
Case Report and Molecular Implications

Introduction
Struma testis is a rare entity, and malignant transformation of a testicular teratoma to papillary thyroid carcinoma (PTC) has only once been previously described. Furthermore, solid tumor metastases to the testis are rare: a previous autopsy-based study of 278 patients showed a less than 1% rate of testicular metastases from solid tumors and there are no reports of primary thyroid carcinomas metastasizing to the testes.

We report a 57-year-old male who was found to have a cryptorchid testis which contained a mature teratoma with malignant transformation to PTC. The patient also had metastatic PTC in the lungs, and a papillary microcarcinoma in the thyroid. It is most probable that the testicular PTC arose from the teratoma and metastasized to the lungs, while the microcarcinoma in the thyroid is most likely an incidental finding.

Case Report
We report a 57-year-old male who was found to have a cryptorchid testis in October 2009 during an emergency appendectomy for appendicitis at an outside hospital. Past medical history was otherwise negative except for hypertension. The cryptorchid testis was found to contain a mature teratoma with a malignant somatic component in the form of a 1.6 cm PTC with follicular architecture. The tumor extended to within 1 mm of the peripheral margin, but the sperrmatic cord margin was free. Immunohistochemistry done at the outside facility included a strongly positive Thyroid Transcription Factor 1 (TTF1). Of note, the patient’s thyroid exams and accompanying ultrasonograms showed a normal thyroid gland from his first documented physical exam in the University of Missouri system in December, 2009.

Multiple lung nodules were subsequently detected on CT scan at the outside facility, and resections of the right lower lobe and a right peripheral nodule showed multifocal metastatic PTC, 2.1 cm in greatest diameter, with histology similar to that seen in the testis.

In order to facilitate treatment with radioactive iodine and due to the possibility of an unknown thyroid primary metastasizing to the lung, a total thyroidectomy was performed in March, 2010. Histologic examination revealed a 0.5 mm papillary microcarcinoma without extrathyroid extension.

The patient received radioactive iodine ablation in May, 2010. Chest X-ray reveals persistent lung disease. The patient is doing well otherwise, and continues to follow with the team at University of Missouri Health System.

Histology & Molecular Results

PTC in testis with adjacent seminiferous tubules. The neoplasm has a predominantly follicular architecture. (H&E, 2X)

Nuclear features of PTC in the testis: optically clear nuclei, nuclear grooves, delicate nuclear, and nuclear overlapping. (H&E, 4X)

A small focus of thyroid follicles without nuclear grooves and nuclear clearing, as well as focal area of respiratory type epithelium are also seen. (H&E, 1X, 10X and 40X)

PTC metastases to lung with a predominantly follicular pattern. Normal lung is visible adjacent to tumor. (H&E, 25 and 10X)

Papillary microcarcinoma from total thyroidectomy. The microcarcinoma measures 0.5 millimeters and has a follicular architecture. (H&E, 40X)

What is the origin of these tumors: thyroid or teratoma?
The question was raised as to whether the testicular and/or lung carcinomas could be metastases from the papillary thyroid microcarcinoma. This is unlikely for several reasons. First, it is generally accepted that papillary microcarcinomas exhibit benign behavior and have an overall excellent prognosis. In fact, there is up to a 35% incidental prevalence at autopsy. Furthermore, distant metastases from papillary microcarcinoma are reported to be 0.7%, based on a large meta-analysis, and a case of PTC metastasizing to the testis has never been reported. In addition, normal thyroid tissue was seen adjacent to the malignant papillary thyroid component in the teratoma, making it most likely that the teratomatous thyroid tissue underwent malignant transformation.

As far as molecular studies, the three specimens were sent for BRAF and RAS (HRAS, NRAS, and KRAS) mutational analysis at the University of Pittsburgh Medical Center. A mutational analysis would have characterized the tumors and may have given a more definitive answer as to the origin of the testicular and lung tumors. Unfortunately, mutational analysis of all three specimens for BRAF and RAS revealed no mutations.

Discussion and Conclusions
Struma ovarii with malignant transformation to papillary thyroid carcinoma is well described, with frequency of malignancy varying from 5% to 15%. Furthermore, malignant struma ovarii is known to metastasize to the lungs. On the other hand, tumors in male testis with malignant transformation is extremely rare, and transformation to papillary thyroid carcinoma has been previously described only once.

We present a case of a 57-year-old male who was found to have struma testis with malignant transformation to papillary thyroid carcinoma and subsequent lung metastases. A total thyroidectomy showed a 0.5 mm papillary microcarcinoma which is most likely an incidental finding. Molecular studies showed no BRAF or RAS mutations in any of the three specimens.

In conclusion, struma testis, a rare entity, can undergo malignant transformation to papillary thyroid carcinoma. Furthermore, this malignant PTC can metastasize to the lungs. It is important to examine the thyroid to make certain that a primary thyroid malignancy is not the cause of metastatic disease.