CLINICAL VIGNETTE

Papillary Thyroid Carcinoma

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Clinical Case

A 37-year-old man presented to his primary care physician for his annual physical examination. He had several complaints including recent onset of snoring. On further questioning he noted excess daytime sleepiness and his wife had also noted possible apneic episodes. He denied a history of headaches or hypertension and he had never undergone a sleep study previously. He was otherwise feeling well. His medical history was notable for seasonal allergies, scoliosis and excision of a benign cyst on his upper back. His family history was notable for sleep apnea in his mother. He had no family history of malignancy. His only medication was loratadine-pseudoephedrine as needed for allergic rhinitis. His social history and habits were unremarkable. On review of systems he noted 1-2 episodes of dysphagia over the last year. He denied any changes in his voice quality.

On physical examination, vital signs were: BP 124/79 mmHg, HR 90/min, O2 sat 97% on RA and BMI 30.8 kg/m^2. He was comfortable with normal exam of the eyes, ears, nose and throat. His neck was supple with midline trachea. The left lobe of the thyroid was enlarged without discrete nodules. There was no anterior cervical, posterior cervical, or supraclavicular lymphadenopathy. Cardiovascular, lung, abdominal, skin, and musculoskeletal examinations were all normal.

Labs, including thyroid stimulating hormone (TSH), complete blood count, complete metabolic panel were normal except for a glucose of 111 mg/dL. Lipid panel was notable for high density lipid (HDL) of 40 mg/dL and triglycerides of 160 mg/dL. Neck ultrasound revealed "enlarged and heterogeneous left thyroid lobe with a large nodule replacing the entire lobe with prominent cystic foci, consistent with a multinodular goiter. There were also several right thyroid gland nodules, the largest measuring 9mm with indeterminate punctate echogenic foci but likely representing a colloid nodule." The 9mm lesion was characterized as, "ATA [American Thyroid Association] low to intermediate suspicion pattern." A repeat thyroid ultrasound was recommended in 6 to 12 months to assess stability.

The patient was referred to endocrinology. Upon further questioning the patient had no history of irradiation of the face or neck and no family history of thyroid cancers. A fine needle aspiration (FNA) of both the left lobe and right hypoechoic nodule was scheduled. During the procedure, bedside ultrasound showed possible tracheal deviation and CT scan of the neck was also ordered.

Pathology of the FNA sample from the thyroid nodule showed benign tissue. CT scan of the neck revealed a "rounded enlarged left thyroid mass in keeping with known history of thyroid goiter. There is regional mass effect with focal rightward displacement of the trachea and cervical esophagus and segment of mild narrowing of the airway at this level." The left thyroid mass measured approximately 6.9 x 6.9 x 8.8 cm and there was lateral displacement of the left common carotid and internal jugular veins. Given the large nodule and evidence of tracheal deviation on the CT scan, the patient was referred to endocrine surgery. Surgical options of left thyroid lobectomy versus total thyroidectomy were discussed. The surgeon recommended at least a left thyroid lobectomy considering the small size of the right lobe and the benign nodule on pathology. Post-surgical considerations were reviewed, including the need for life-long thyroid hormone supplementation if total thyroidectomy were pursued. In consultation with the surgeon, the patient decided on left thyroid lobectomy. Drawbacks including possible need for complete thyroidectomy if malignancy was revealed on the left lobe or if a goiter develops on the right side.

The surgery was successful without complication. Pathology of the left thyroid lobe showed an adenomatoid nodule measuring 9.0cm which was negative for malignancy. However, histologic evaluation of one of two pre-tracheal lymph nodes which were also submitted was positive for metastatic papillary thyroid carcinoma. The metastatic focus measured 1mm with no extranodal extension present. The pathology report noted that multiple sections of the left thyroid had been examined including the entire capsule of the dominant nodule and there was no evidence of any malignancy nor any capsular or vascular invasion.

The patient returned for a completion thyroidectomy. Pathology of the right thyroid showed papillary thyroid microcarcinoma measuring 0.4cm. There was no extrathyroidal or vascular extension. The patient recovered well from surgery. He was subsequently treated with levothyroxine supplementation. Thyroglobulin levels and thyroglobulin antibody levels were normal. At routine follow up TSH level was at goal and thyroglobulin and thyroglobulin antibody levels remain undetectable. Repeat thyroid ultrasound at one year showed no disease recurrence. The patient had lost 35 lbs and was feeling well.

Discussion

Papillary thyroid carcinoma is the most common type of well-differentiated primary thyroid cancers, accounting for approximately 85% of well-differentiated thyroid cancers.[1] According to the Surveillance, Epidemiology, and End Results (SEER) program data sheet approximately 15.8 cases per 100,000 were diagnosed between 2012-2016.[2] Prevalence was estimated at 822,242 cases in the United States in 2016.[2] Age, female gender, history of radiation to the head or neck, and a family history of thyroid carcinomas are associated with increased risk of papillary thyroid carcinoma.[3,4] Presentation occurs most commonly after patients self-palpates a nodule, by a clinician during routine physical examination or incidentally on imaging.[3] Diagnosis is typically made by FNA.[3] Less frequently it is diagnosed on pathology examination of thyroid tissue which had been resected for a presumed benign condition - as in the case of our patient. One analysis found that this accounted for up to 14% of all thyroid cancer lesions.[3]

Approximately 2-10% of papillary thyroid malignancies are found with distant metastatic lesions at the time of diagnosis [2-seer] most commonly to lung or bone.

Surgery remains the mainstay of treatment for differentiated thyroid cancers.[5] In addition subsequent radioactive iodine therapy can be used to ablate any residual thyroid tissue or disease after thyroidectomy in high risk and some intermediate risk patients.[1,5]

The extent of surgery is guided by the size of the tumor, which is usually assessed on preoperative ultrasound, and the presence of invasion into local surrounding tissue or lymph nodes.[6] Other considerations include known risk factors for thyroid malignancy, including a personal history of head or neck radiation or a family history of thyroid malignancy. Finally, if histologic examination of a lobectomy specimen shows multifocal papillary microcarcinoma, then a total thyroidectomy is often considered.[5]

Potential surgical complications include damage to the laryngeal nerve or hypoparathyroidism.

Our patient showed no evidence of malignancy in the resected thyroid lobe, despite the review of multiple sections. Because the local lymph node revealed papillary thyroid cancer, the patient returned for resection of the contralateral lobe.

Postoperative care includes treatment with suppressive doses of thyroid hormone. High risk or some intermediate risk patients may also benefit from radioiodine ablation therapy. For high risk patients, magnetic resonance imaging (MRI), CT or fluorodoxyglucose positron emission tomography (FDG PET) may be used to assess for residual disease.[7]

The American Thyroid Association (ATA) has developed a risk stratification system to navigate postoperative management of thyroid cancers. Thyroid cancers are categorized as low, intermediate or high risk. Localized cancers which have not spread beyond the thyroid are considered low risk. Intermediate risk is defined by local metastases, concerning histologic findings, or invasion of adjacent tissue or vasculature. Finally a patient is considered high risk if he/she has extensive local invasion, known distant metastases, or elevated serum thyroglobulin levels (suggests distant metastatic disease).[5] Mutations such as BRAF mutation can also be used to identify high risk cancers.[8]

For patients who undergo unilateral lobectomy, TSH is monitored at 4 to 6 weeks postoperatively and levothyroxine replacement may be initiated if TSH rises. Thyroxine is typically initiated at a dose of 1.6 to 2mcg/kg/per day.[5] For intermediate or high risk patients higher initial doses are used to prevent recurrence of disease. Thyroglobulin levels are also measured to monitor disease status.[5] An elevation in thyroglobulin levels warrants reevaluation with ultrasound and suggests possible presence of metastatic disease.

In the case of total thyroidectomy, levothyroxine therapy is initiated to prevent hypothyroidism and decrease risk for tumor growth stimulation. The dose of thyroid hormone replacement is dependent on the risk of recurrent disease and the potential need for radioiodine ablation.

Prognosis

Papillary thyroid carcinomas are rarely life threatening with approximately 98% overall survival rate at 5 years.[2] The most significant risk factors which influence prognosis include age at diagnosis, size of lesion at the time of diagnosis and extra-thyroidal spread or distant metastases.

Despite the excellent overall prognosis, the rate of recurrence has been up to 20% with most recurrent disease presenting within five years after treatment.[9] Therefore continued monitoring is recommended with ultrasound, in addition to measurement of serum TSH, thyroglobulin, and anti-thyroglobulin antibody levels.[5]

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