

Case study:

Radio Frequency Ablation for Substernal Multinodular Goiter

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History

A female patient in her 50s was referred to RUSH with a long history of thyroid nodules. Prior to her being seen at RUSH, a surveillance ultrasound showed bilateral thyroid nodules, which had progressive growth. A CT scan showed substernal extension and results from two fine needle aspiration biopsies were benign.

She was beginning to note some symptoms of dysphagia and a constant sensation in her throat. Given the large size of the nodules and the compressive symptoms, the patient was referred for surgery. She wanted to explore a non-surgical option to treat her condition that spared her thyroid function and came to RUSH.

Presentation and examination

The patient was discovered to have a multinodular goiter with retrosternal extension of the left thyroid lobe.

Two nodules occupied the left lobe, which overall measured 8.0 x 3.1 x 3.7 cm. The upper pole, which measured 4.6 x 2.6 x 3.0 cm was a largely heterogeneous isoechoic nodule with numerous internal cystic foci and a circumscribed macrolobulated margin. The mid and lower pole, which measured 4.8 x 2.8 x 4.1 cm, was a slightly heterogeneous hypoechoic solid nodule with a macrolabulated margin.



Pre-ablation dimensions: 5.5 cm x 2.6 cm x 3.7 cm



Post-ablation dimensions: 4.5cm x 2.4 cm x 2.6 cm

The right lobe, which overall measured 6.9 x 3.0 x 3.1 cm, had a 5.5 x 2.6 x 4.0 cm dominant, mildly heterogeneous hyperechoic oval circumscribed nodule with few cystic internal foci seen.

The isthmus anterior-to-posterior dimension was 18 mm and had a 3.5 x 3.3 x 2.6 cm slightly hyperechoic avascular nodule with a central spongiform component.

Treatment

The patient was an ideal candidate for radio frequency ablation (RFA) to treat her affected thyroid nodules, which is a safer alternative to thyroidectomy for patients with symptomatic or enlarging benign thyroid nodules.

Delivered through an electrode in the affected tissue, RFA sends targeted, high frequency radio waves into the thyroid nodule's cells, which causes thermal injury and subsequent cell death. As a result, the overall affected nodule shrinks and the body then absorbs the ablated tissue. RFA is performed in a clinical setting; as a result, patients may only require topical anesthesia and the procedure leaves no scarring. RFA was approved by the Food and Drug Administration as a treatment for benign thyroid nodules in 2018.

In April 2022, the patient arrived in the office and had an injectable anesthetic placed around the skin overlying the nodules. Using ultrasound guidance, an additional anesthetic was placed around both

nodules. The RFA probe was then inserted using a transisthmic technique into the nodules. At 50 watts of power, the nodule was ablated distally to proximally. Remnant areas were able to be ablated using a transverse approach. This approach was repeated for the isthmic nodule.

The patient tolerated the procedure well. Her voice was normal throughout and following the procedure.

Outcome

Four months following the procedure, the patient is doing well and her thyroid is reducing in size. She is very pleased with the results.

In August 2022, four months following the procedure, an ultrasound showed she had a 60% reduction in one nodule and 45% reduction in a second nodule, which is on par with the rate of reduction expected. Specifically, the right lobe of the thyroid measures 4.8 x 2.5 x 2.6 cm, and the left lobe measures 8.5 x 3.0 x 4.0 cm.

There is normal homogenous echogenicity of the thyroid gland bilaterally. The isthmus, whose nodule slightly decreased to 2.7 x 2.4 x 2.5 cm, appears unremarkable. There is no evidence of abnormal mass or fluid collections. Critically, she will be able to preserve native thyroid function.

We planned a staged approach for treatment and are planning on treating the left sided nodules in

six to 12 months. As the procedure requires multiple percutaneous entry points, we elected to stage the nodule treatments for patient tolerability.

For more information, visit rush.edu/RFA

Analysis

By the time they turn 60, one in every two Americans will have a thyroid nodule; only 5% of those nodules [will be cancerous](#). Thyroid RFA is a [safe, effective](#) and innovative therapy that can shrink thyroid nodules by up to 90% in a durable fashion. It has been used as a treatment for both primary and metastatic bone, kidney, liver and lung tumors since 2000, but more recently has been adapted for benign thyroid treatment.

Before RFA, thyroidectomy was the standard of care treatment for all thyroid nodules, benign and malignant. However, thyroidectomy can present the patient with [several possible complications](#) such as voice change, swallowing difficulty, hypocalcemia and an external scar. Should a patient get surgery, they must receive thyroid hormone supplement therapy for the rest of their lives and maintain close monitoring.

RFA has an advantage over surgery, in that, it is a technique that can reduce the size of the nodule without removing any functional thyroid tissue. The procedure is done in the office with minimal to no sedation and only injectable anesthetic. Patients return to their routine activities the same day.

The ideal patient for thyroid RFA would have either benign thyroid nodules that are enlarging, symptoms of neck compression from the enlarged thyroid or cosmetic issues related to an enlarged thyroid. Studies in low-risk cancers and indeterminate nodules are underway and will soon be added as indications.



Excellence is just the beginning.