Bilateral Vocal Fold Paralysis Secondary to Intrathyroidal Calcifications Following Remote Administration of Radioactive Iodine Therapy for Graves Disease

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Common causes of vocal fold paralysis (VFP) include trauma or iatrogenic injury, malignancy, and neurogenic conditions.¹ Other uncommon etiologies include a large intrathyroidal calcification resulting from radioactive iodine ablation (RAI).² Unilateral VFP can result in hoarseness and dysphagia, while bilateral VFP can result in respiratory distress due to narrowing of the airway at the glottis.¹

We report a 60-year-old patient presenting with progressive stridor and flexible laryngoscopy revealed immobility of the true vocal folds bilaterally. Neck ultrasonography and computed tomography (CT) demonstrated bilateral, large, and irregular calcifications replacing most of the thyroid gland (Figure 1). The bilaterally immobile vocal folds resulted in a narrowed airway. The patient was taken to the operating room for direct laryngoscopy and possible thyroidectomy. The possibility of tracheotomy based on intraoperative findings was discussed. On direct laryngoscopy, the calcifications were found to have partially eroded the anterolateral trachea wall with associated edema and inflammation. Therefore, tracheotomy was performed for airway protection. Extensive calcifications just lateral to the trachea were noted during the procedure that were seen previously on CT (Figure 2). These represented the remnant of the thyroid lobes that had been largely replaced by calcifications.

The calcifications were removed through the tracheotomy incision, and biopsies were obtained from both the left and right thyroid remnant. Those biopsies showed dense hyalinized fibrosis and connective tissue with extensive coagulative necrosis and stippled dystrophic calcifications. The biopsy of the tracheal cartilage revealed dense hyalinized fibrosis with necrosis and ulceration and was negative for malignancy. One month postoperatively, the patient was found to have bilaterally mobile vocal folds and was ultimately decannulated.

Calcifications developing within the soft tissues due to radiotherapy have been reported numerous times in the literature.³⁻⁸ However, intrathyroidal calcifications as a result of RAI have been reported only once before.² In that case, RAI was used for ablation of a left thyroid lobe as an alternative to completion thyroidectomy following diagnosis of follicular carcinoma after a right hemithyroidectomy.² Preoperative ultrasound confirmed a normal left thyroid lobe. Several years later, the patient developed progressive hoarseness associated with left thyroid lobe calcification, which resolved after removal.

Our patient received RAI to treat Graves disease. She developed calcifications bilaterally causing dysfunction of both vocal folds and airway edema which has not been reported previously. The calcifications were likely causing compression of the recurrent laryngeal nerves resulting in bilateral VCP as well as inflammation and edema of the subglottis/trachea leading to narrowing of the airway and stridor. Although she did not have a baseline ultrasound, she had a CT chest in the interim showing small intrathyroidal calcifications bilaterally indicating progression of disease. The calcifications are likely a result of tissue necrosis due to the cellular damage caused by RAI. Calcium ions leak into cells with damaged membranes and localize in the mitochondria. The amount of calcium in the mitochondria increases until levels are high enough for crystals to form.⁹

In conclusion, our patient developed enlarging intrathyroidal calcifications and ultimately bilateral VFP and subglottic edema. Removal of the calcifications was associated with resolution of her airway edema and recovery of vocal fold function. It is possible that the intrathyroidal calcifications were caused by her prior RAI therapy for the treatment of Graves disease. To our knowledge, this is the second report of large, symptomatic intrathyroidal calcifications following

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radioactive iodine therapy. This condition should be included in the differential diagnosis of VFP.

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Figure 1. Computed tomography (CT) coronal (left), axial (right) reveals large calcifications (arrows) replacing the thyroid and eroding the tracheal wall.

Figure 2. Calcification lateral to the cricoid seen during the tracheotomy procedure (left), which was removed during the procedure (right).