Introduction

Postoperative whole body 1-131 scanning (WBIS) and I-131 ablation is recommended for most patients with differentiated thyroid carcinoma (DTC) following thyroidectomy. It is advantageous to have minimal functioning residual thyroid in post-operative patients with DTC. I-131 is less effective with a large residual thyroid tissue burden and decreased TSH levels. It is accepted that in low-risk DTC patients recombinant human TSH (rhTSH) injections can be substituted for intrinsic TSH stimulation for remnant tissue ablation. Pre-treatment WBIS can be omitted all together in those cases and post-treatment WBIS obtained instead. Therefore, it is sometimes necessary to reoperate on higher-risk DTC patients with a significant functioning thyroid remnant. It may be challenging to find and safely remove this remnant in the post-operative thyroid bed, especially in those with multiple prior surgeries.

We report the successful use of Tc-99m pertechnetate and intraoperative radio guidance to locate and remove thyroid remnants in the reoperative setting.

Cases

Three cases of differentiated thyroid cancer with excessive remnant thyroid tissue were identified at Penn State Hershey Medical Center since June 2009. These patients were deemed high risk based on their histopathology variant. Tc-99m pertechnetate was administered immediately prior to surgery and images were acquired. The skin was marked after identification of distinct areas of uptake. Intraoperatively, an OMNI (Care Wise, Morgan Hill, California, USA) probe was utilized to localize the tissue. Their preoperative presentations and postoperative course are reviewed.

Case 1: 23 year old female who had previously undergone hemithyroidectomy and completion thyroidectomy for follicular carcinoma was referred for removal of residual thyroid tissue after a nuclear medicine whole body imaging revealed a 72-hour uptake of 12.1%.

Case 2: 44 year old female with a diagnosis of papillary thyroid carcinoma had a 24-hour iodine uptake of 35.2% post-thyroidectomy and was referred for reoperative thyroid surgery for removal of remaining thyroid tissue.

Case 3: 67 year old female who had underwent a hemithyroidectomy for a Hurthle cell neoplasm underwent a right completion thyroidectomy for an incidental papillary carcinoma found at surgery. A thyroid uptake scan revealed a 24-hour uptake of 12.9% and reoperative thyroid surgery was recommended.

Discussion

Following thyroidectomy for DTC, a large thyroid remnant may interfere with postoperative radioablation therapy. Thyroid reoperations are tedious and demanding procedures because of fibrosis, inflammation, edema, friability of the tissues, and obliteration of anatomical landmarks. Reoperation carries a significantly higher complication rate than the initial surgery. Radioguided surgery is increasingly being used to facilitate the detection and removal of residual or recurrent thyroid tissue in patients with well-differentiated thyroid carcinoma. We support the notion that radioguidance can be an invaluable tool for localization of smaller foci of DTC. Depending on the type of differentiated thyroid cancer, up to 40% of recurrent cancer will lose their avidity for iodine. In our cases we utilized a probe and pertechnetate, which favorably compares to alternatives (I-123 and I-131) as it is easier to obtain, less expensive, and causes less radiation exposure. This technique allowed us to readily locate small foci of thyroid tissue in the postoperative field.

In each of our cases the intraoperative use of radioguidance with the gamma probe allowed for the specific location of the suspected thyroid tissue. In a neck that has undergone previous operation, intraoperative radioguidance provides for efficient targeting of persistent thyroid tissue.

Conclusion

Radioguided thyroid surgery is an effective method for localizing remnant tissue in previously operated fields. The intraoperative use of radioguidance with Tc-99m pertechnetate facilitated removal of the remnant thyroid tissue in all cases presented here, allowing for subsequent I-131 whole body scintigraphy and ablation.

References