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THYROID CANCER

Radioactive iodine dosing based on the radioiodine uptake and thyroglobulin levels is helpful in treating differentiated thyroid cancer

BACKGROUND

Treatment for most patients with differentiated thyroid cancer includes surgery first to remove the thyroid. In more advanced cases, surgery is followed by radioactive iodine therapy to destroy any remaining thyroid cells, both normal and cancerous cells. This is done to decrease the risk of recurrence of the cancer. It also helps the initial cancer staging and early detection of recurrent cancer with serum thyroglobulin levels and whole-body scanning. Traditionally, a fixed-dose of radioactive iodine is administered. However, a fixed dose may be either insufficient to destroy the remaining cells or excessive, resulting in side effects. Normal and cancerous thyroid cells have the capacity to take up iodine and produce thyroglobulin proportional with the amount of remaining thyroid tissue after the thyroid surgery. Thus, an individualized radioactive iodine dose can be estimated based on the radioiodine uptake (RAIU) in the neck and the serum thyroglobulin level test measured after the thyroid surgery. The goal of this study is to analyze the effectiveness of an individualized radioactive iodine doses on the amount of the remaining normal and cancerous thyroid tissue after the thyroid surgery

THE FULL ARTICLE TITLE

Jin Y et al 2018 Radioiodine uptake and thyroglobulin guided radioiodine remnant ablation in patients with differentiated thyroid cancer: a prospective, randomized, open-label, controlled trial. Thyroid. Epub 2018 Dec 18. PMID: 30560716.

SUMMARY OF THE STUDY

The study included 265 patients with differentiated thyroid cancer who underwent thyroidectomy and were referred for radioactive iodine therapy between 2013 and 2017 at a university hospital from Shanghai, China. Patients with local or distant spread of the cancer were excluded. Most patients were women (77%) with an average age of 43 and had papillary thyroid cancer (89%). The neck RAIU and serum thyroglobulin levels were measured after the thyroid surgery. The patients were randomly assigned in a 4:1 ratio to receive radioactive iodine either based on their RAIU and serum thyroglobulin levels or as a fixed dose of 3.7 GBq (100 mCi). Those assigned to receive radioactive iodine therapy based on their RAIU and serum thyroglobulin levels were separated in four groups and took a radioactive iodine dose of 1.1, 1.85, 3.7, or 5.55 GBq based on the higher result of either the uptake (≤2%, 2–5%, 5–15%, and >15%) or thyroglobulin level (≤2 ng/mL, 2–5 ng/mL, 5–10 ng/mL, and >10 ng/mL). A total of 58 patients received a fixed radioactive iodine dose, while 52, 45, 57, and 53 patients received a calculated radioactive iodine therapy dose based on their RAIU/thyroglobulin levels. A complete response to the radioactive iodine therapy was defined as a serum thyroglobulin ≤1 ng/mL and the absence of visible RAIU after thyroid hormone withdrawal assessed six months or more (average of 12 months) after the radioactive iodine therapy.

A higher percentage of patients achieved a complete response to the radioactive iodine therapy in the calculated group than the fixed dose group (89% vs. 69%) with a similar response in the four RAIU/thyroglobulin-guided therapy subgroups. Additional radioactive iodine therapy was needed for less patients in the RAIU/thyroglobulin-guided therapy group than in the fixed-dose group (1% vs. 8%). Overall, a similar proportion of patients in the RAIU/ thyroglobulin-guided and fixed-dose treatment groups had side effects (21% vs. 33%). However, less patients who received calculated radioactive iodine therapy developed a dry mouth as compared to those who received a fixed radioactive iodine therapy (9% vs. 19%). The risk of experiencing a dry mouth or dry eyes was higher in patients who received a higher radioactive iodine dose.

WHAT ARE THE IMPLICATIONS OF THIS STUDY?

Patients with differentiated thyroid cancer who receive a calculated radioactive iodine therapy dose based on

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the individual RAIU and serum thyroglobulin level have a higher complete response and success rate and less side effects as compared to patients who receive a fixed radioactive iodine therapy dose. An individualized radioactive iodine therapy administration could contribute to the improvement of care for thyroid cancer patients.

— Alina Gavrila, MD, MMSC

ATA THYROID BROCHURE LINKS

Thyroid Cancer (Papillary and Follicular): https://www.thyroid.org/thyroid-cancer/
Radioactive Iodine: https://www.thyroid.org/radioactive-iodine/
Thyroid Surgery: https://www.thyroid.org/thyroid-surgery/

ABBREVIATIONS & DEFINITIONS

Differentiated thyroid cancer: includes papillary and follicular cancer and overall has a favorable prognosis.

Thyroidectomy: surgery to remove the thyroid gland.

Radioactive iodine (RAI): this plays a valuable role in diagnosing and treating thyroid problems since it is taken up only by the thyroid gland. I-131 is the destructive form used to destroy thyroid tissue in the treatment of thyroid cancer (RAI treatment). I-123 is the non-destructive form that does not damage the thyroid and is used in scans to take pictures of the thyroid (Thyroid Scan) or to take pictures of the whole body to look for thyroid cancer (Whole Body Scan).

Whole Body Scan: this radioactive iodine scan is performed under TSH stimulation, either after thyroid hormone withdrawal or after injections of recombinant human TSH (Thyrogen), and usually includes measuring serum thyroglobulin levels. The scan done after radioactive iodine treatment identifies what was treated and if there is any evidence of metastatic thyroid cancer.

Radioactive iodine uptake (RAIU): this is a measurement of the amount and activity of thyroid tissue and is reported as the percent of a dose of radioactive iodine that is retained in the neck 24 h after the dose is given.

Thyroglobulin: a protein made only by thyroid cells, both normal and cancerous. When all normal thyroid tissue is destroyed after radioactive iodine therapy in patients with thyroid cancer, thyroglobulin can be used as a thyroid cancer marker.

Cancer metastasis: spread of the cancer from the initial organ where it developed to other organs, such as the lungs and bone

Cancer recurrence: this occurs when the cancer comes back after an initial treatment that was successful in destroying all detectable cancer at some point.