

# Zapping away hyperthyroidism

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Radiofrequency ablation (RFA) is a minimally invasive technique used to selectively induce tissue necrosis. Since the 1990s, RFA has been used for the treatment of benign and malignant disease, for example, by ablating an aberrant neurofibril bundle causing cardiac arrhythmia or ablation of hepatocellular carcinoma. Its first use for disease of the thyroid gland was described in 1998, when lymph node metastases from papillary thyroid cancer were successfully ablated. Nonetheless, it was not until 2006 that the first case series on its effect on primary thyroid nodules was described.<sup>1</sup> Since then, studies have shown a good efficacy of RFA for the treatment of benign (nodular) diseases of the thyroid gland. As such, the benefits of RFA outweigh potential harm, compared to conventional treatment modalities such as radioactive iodine therapy, antithyroid drugs, or (hemi)thyroidectomy. Combined with minimally invasive characteristics and preferred cosmetic outcome, these characteristics have paved the way for implementation of thyroid RFA in the Netherlands.<sup>2</sup>

In this issue of the journal, de Boer et al. report on their experience using RFA for the treatment of hyperactive thyroid nodules in 21 patients. Strengths of this study are the consecutive inclusion of patients over a three-year time period as well as the long follow-up ranging from 1.3 to 4.1 years. After 12 months, nodule volume decreased by about 60%, free thyroxine concentrations normalised in all patients, while thyroid-stimulating hormone concentrations normalised in 52%. Of those solely treated with RFA, biochemical control was achieved during the study period for all but one. Out of the total 21 patients, transient hyperthyroidism was seen in two patients, one of whom developed hypothyroidism requiring low-dose levothyroxine. Aside from transient mild local pain, no other adverse effects occurred. Pretty good statistics for a procedure that only took 3-16 minutes.

In parallel to the increased use of thyroid RFA, other minimally invasive techniques for thyroid ablation have also been introduced, such as ethanol/polidocanol ablation

(mainly indicated for cystic lesions), microwave ablation, laser ablation, and high-frequency ultrasound ablation.<sup>3</sup> Comparative studies typically show that overall, RFA is equally as effective as other techniques, if not slightly more efficacious for volume reduction together with microwave ablation.<sup>3-6</sup> Worldwide, RFA currently is the most popular minimally invasive thyroid ablation technique because of the abundant experience for non-thyroidal indications and the wider availability of thyroid-related data including studies with a longer follow-up. However, as with most procedural interventions in medicine, the quality of the procedure depends on the experience and skillset of those who perform the procedure. From that perspective, it is reassuring to see that in the literature summary provided in the article by de Boer et al., the technique was practically equally as effective in the hands of the authors as in other centres. Although there is a low threshold for repeating the procedure, the slow (re)growth of thyroid nodules requires an even longer follow-up than performed in the current study in order to optimally quantify its true efficacy.

Interestingly, studies assessing the efficacy and safety of RFA for malignant thyroid disease are now beginning to make their way into the literature.<sup>5</sup> These studies show heterogeneous results as they typically include patients ineligible for surgical intervention or who had a small (typically < 1 cm) but histologically proven papillary microcarcinoma (an oncogenic entity for which a wait-and-see policy has become very plausible).<sup>7</sup> Nonetheless, initial studies show excellent volume reduction and implicate equal (recurrence rates), if not favourable outcomes (such as costs or quality of life) for RFA when compared to surgery in patients with either a primary or locally recurrent thyroid papillary (micro) carcinomas.<sup>5,6,8,9</sup> Thyroid RFA is a very welcome tool in the endocrinologists arsenal when battling thyroid nodules. When adequately studied, these techniques could prove valuable in reducing the potential (surgical) harms related to overdiagnosis of thyroid cancer caused by the incidental radiological detection of thyroid nodules.

## REFERENCES

1. Kim YS, Rhim H, Tae K, Park DW, Kim ST. Radiofrequency ablation of benign cold thyroid nodules: initial clinical experience. *Thyroid*. 2006;16:361-7.
2. van Ginhoven TM, Massolt ET, Bijdevaate DC, Peeters RP, Burgers JW, Moelker A. [Radiofrequency ablation of a symptomatic benign thyroid nodule]. *Ned Tijdschr Geneesk*. 2016;160:D202.
3. Feldkamp J, Grunwald F, Luster M, Lorenz K, Vorlander C, Fuhrer D. Non-Surgical and Non-Radioiodine Techniques for Ablation of Benign Thyroid Nodules: Consensus Statement and Recommendation. *Exp Clin Endocrinol Diabetes*. 2020. doi: 10.1055/a-1075-2025. [Epub ahead of print].
4. Cesareo R, Pacella CM, Pasqualini V, et al. Laser Ablation versus Radiofrequency Ablation for benign non-functioning thyroid nodules: Six-month results of a randomised, parallel, open-label, trial (LARA trial). *Thyroid*. 2020. doi: 10.1089/thy.2019.0660. [Epub ahead of print].
5. Choi Y, Jung SL. Efficacy and Safety of Thermal Ablation Techniques for the Treatment of Primary Papillary Thyroid Microcarcinoma: A Systematic Review and Meta-Analysis. *Thyroid*. 2020. doi: 10.1089/thy.2019.0707. [Epub ahead of print].
6. Tong M, Li S, Li Y, Li Y, Feng Y, Che Y. Efficacy and safety of radiofrequency, microwave and laser ablation for treating papillary thyroid microcarcinoma: a systematic review and meta-analysis. *Int J Hyperthermia*. 2019;36:1278-86.
7. Ito Y, Miyauchi A, Oda H. Low-risk papillary microcarcinoma of the thyroid: A review of active surveillance trials. *Eur J Surg Oncol*. 2018;44:307-15.
8. Zhang M, Tufano RP, Russell JO, et al. Ultrasound-Guided Radiofrequency Ablation Versus Surgery for Low-Risk Papillary Thyroid Microcarcinoma: Results of Over 5 Years' Follow-Up. *Thyroid*. 2020. doi.org/10.1089/thy.2019.0147. [Epub ahead of print].
9. Choi Y, Jung SL, Bae JS, et al. Comparison of efficacy and complications between radiofrequency ablation and repeat surgery in the treatment of locally recurrent thyroid cancers: a single-center propensity score matching study. *Int J Hyperthermia*. 2019;36:359-67.