Letter to the Editor

eISSN 2005-8330
https://doi.org/10.3348/kjr.2020.0690
Korean J Radiol 2021;22(2):293-295

Korean Journal of Radiology
KJR

How to Monitor and Manage Nodule Regrowth after Thermal Ablation of Benign Thyroid Nodules

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Dear Editor,

With great interest, we read the article published by Negro et al. (1) entitled "Twelve-Month Volume Reduction Ratio Predicts Regrowth and Time to Regrowth in Thyroid Nodules Submitted to Laser Ablation: A 5-Year Follow-Up Retrospective Study" in the *Korean Journal of Radiology*.

The authors evaluated the regrowth rate and predictive risk factors for the regrowth of solid thyroid nodules after laser ablation (LA) during a 5-year follow-up period in a relatively large population (104 patients) with a median nodule volume of 12.5 mL. They found that the regrowth rate was inversely related to the 12-month volume reduction ratio (VRR). In addition, non-spongiform type nodules had a higher regrowth rate. Among 37.5% (39/104) of patients who experienced nodule regrowth, 29.8% (31/104) had a 12-month VRR < 50%. Of these 39 patients, 17 (43.6%) underwent surgery and 14 (35.9%) underwent secondary LA. This is an important study investigating nodule regrowth after LA over a 5-year follow-up period (1).

Received: May 24, 2020 **Revised:** May 24, 2020
Accepted: May 26, 2020
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Although the present study made excellent observations during a long-term follow-up period, the authors mentioned several limitations, such as its retrospective design and technical limitations due to the use of the 'pull back' technique for complete LAs of the nodule margin (1). We agree that these limitations are pertinent.

Below, we raise several other points that readers should be aware of when reading this report. First, the present study suggested a '12-month VRR' to predict nodule regrowth, whereas a previous study suggested that the initial ablation ratio (IAR) should be used (2). IAR is a quantitative indicator one month after thermal ablation and is highly correlated with the long-term VRR (i.e., if IAR > 70%, a VRR > 50% is expected). Therefore, IAR can predict nodule regrowth earlier (one month), and thus the real clinical value of the 12-month VRR should be compared with that of IAR in a future study. Second, the present study described, as a technical limitation, that the 'moving-shot' and 'vascular ablation' techniques may achieve more complete ablation than the 'pull back' technique for LA. Since regrowth may appear at the margin of the ablated nodule, previous studies have recommended that the margin be completely ablated by using the 'moving-shot' and 'vascular ablation' techniques (3, 4). The current radiofrequency ablation guidelines also recommend these techniques (3, 5). Finally, we would like to address the study's definition of regrowth. The present study defined regrowth as a nodule volume increase > 50.0% over the minimum recorded volume. However, the definition of nodule regrowth varies between studies (6, 7). A majority of studies have defined regrowth as an increase in the nodule volume > 50.0% over the previously recorded volume (8-10). Others define regrowth as a follow-up nodule volume greater than the initial nodule volume (11) or a > 20.0% larger volume than that of one year after treatment (12). It is unclear which definition is most clinically meaningful; thus more work is needed to address this issue and arrive at a conclusive definition for future guidelines.

In conclusion, the present study reports important clinical aspects of nodule regrowth after thyroid LA. We appreciate the observations and suggest several points that readers should consider when appraising the regrowth of benign thyroid nodules after thermal ablation.

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REFERENCES

1. Negro R, Greco G, Deandrea M, Rucco M, Trimboli P. Twelve-month volume reduction ratio predicts regrowth and time to regrowth in thyroid nodules submitted to laser ablation: a 5-year follow-up retrospective study. *Korean J Radiol* 2020;21:764-772
2. Sim JS, Baek JH, Cho W. Initial ablation ratio: quantitative value predicting the therapeutic success of thyroid radiofrequency ablation. *Thyroid* 2018;28:1443-1449
3. Kim JH, Baek JH, Lim HK, Ahn HS, Baek SM, Choi YJ, et al. 2017 thyroid radiofrequency ablation guideline: Korean Society of Thyroid Radiology. *Korean J Radiol* 2018;19:632-655
4. Jung SL, Baek JH, Lee JH, Shong YK, Sung JY, Kim KS, et al. Efficacy and safety of radiofrequency ablation for benign thyroid nodules: a prospective multicenter study. *Korean J Radiology* 2018;19:167-174
5. Kim JH, Baek JH, Lim HK, Na DG. Summary of the 2017 thyroid radiofrequency ablation guideline and comparison with the 2012 guideline. *Ultrasonography* 2019;38:125-134
6. Sim JS, Baek JH. Response: long-term outcomes following thermal ablation of benign thyroid nodules as an alternative to surgery: the importance of controlling regrowth *(Endocrinol Metab)* 2019;34:117-23, Jung Suk Sim et al.). *Endocrinol Metab (Seoul)* 2019;34:325-326
7. Sim JS, Baek JH. Long-term outcomes following thermal ablation of benign thyroid nodules as an alternative to surgery: the importance of controlling regrowth. *Endocrinol Metab (Seoul)* 2019;34:117-123
8. Haugen BR, Alexander EK, Bible KC, Doherty G, Mandel SJ, Nikiforov YE, et al. 2015 American Thyroid Association management guidelines for adult patients with thyroid nodules and differentiated thyroid cancer: the American Thyroid Association guidelines task force on thyroid nodules and differentiated thyroid cancer. *Thyroid* 2016;26:1-133
9. Lim HK, Lee JH, Ha EJ, Sung JY, Kim JK, Baek JH. Radiofrequency ablation of benign non-functioning thyroid nodules: 4-year follow-up results for 111 patients. *Eur Radiol* 2013;23:1044-1049
10. Sim JS, Baek JH, Lee J, Cho W, Jung SI. Radiofrequency ablation of benign thyroid nodules: depicting early sign of regrowth by calculating vital volume. *Int J Hyperthermia* 2017;33:905-910
11. Gambelunghe G, Stefanetti E, Colella R, Monacelli M, Avenia N, De Feo P. A single session of laser ablation for toxic thyroid nodules: three-year follow-up results. *Int J Hyperthermia* 2018;34:631-635
12. Papini E, Rago T, Gambelunghe G, Valcavi R, Bizzarri G, Vitti P, et al. Long-term efficacy of ultrasound-guided laser ablation for benign solid thyroid nodules. Results of a three-year multicenter prospective randomized trial. *J Clin Endocrinol Metab* 2014;99:3653-3659

https://doi.org/10.3348/kjr.2020.0690

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Response

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To the Editor,

We greatly appreciated the thoughtful comments by Drs. Park and Baek.

In their letter, the authors outlined that the initial ablation ratio (IAR) is an earlier marker of nodule regrowth than the 12-month volume reduction ratio (VRR), which was evaluated in our study (1). We agree with Drs. Park and Baek; however, the simple measurement of the total volume 12 months after thermal ablation is less time-consuming and cheaper, especially if contrast-enhanced ultrasound is used to accurately assess the vital volume (2). Moreover, if the evaluation of the efficacy of thermal ablation is performed anytime within 12 months, it does not really influence the management of the nodule; in other words, there is no evidence that detecting the 1-month IAR or detecting the 12-month VRR makes any difference on deciding whether or not the nodule will need a second treatment. The crucial point is to establish reliable parameters that can timely help the physician in making a correct decision, whether it is IAR or the 12-month VRR. The second point raised in the letter, concerns the thermal ablation technique, particularly the "pull-back" technique for laser ablation and "moving-shot" technique for radiofrequency. As we outlined, the results we observed in the cohort of patients submitted to laser ablation cannot be automatically extended to other techniques; the devices, energies deployed, and technical procedures are different, but what is important in either laser or radiofrequency, is the ability to detect early signs of regrowth and possibly, to predict the efficacy by optimizing the nodule selection (3). Lastly, the other point of discussion concerns the definition of nodule regrowth. Mauri et al. (4) defined nodule regrowth as a nodule volume increase > 50% over the minimum recorded volume, while Haugen et al (5). defined it as an increase in nodule volume > 50% over the previously recorded volume. We chose the definition by Mauri et al. (4) because, in our opinion, it is more consistent with the "history" of the nodule. If you imagine that a nodule having an initial volume of 20 mL, will reduce by 50% 12 months after thermal ablation, then it will achieve a volume of 10 mL. Assuming that the nodule will increase annually by 40%, its volume will be 14 mL at 24 months, 19.6 mL at 36 months, and 27.4 mL at 48 months. Although 48 months later the nodule will be larger than at baseline, it would be defined as "non-regrowing" by Haugen et al. (5), but it would be more correctly defined as "growing" by Mauri et al (4).

We would like to thank Drs. Park and Baek. We believe that their comments have enriched our study, and we sincerely appreciate their attention.

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REFERENCES

1. Negro R, Greco G, Deandrea M, Rucco M, Trimboli P. Twelve-month volume reduction ratio predicts regrowth and time to regrowth in thyroid nodules submitted to laser ablation: a 5-year follow-up retrospective study. *Korean J radiol* 2020;21:764-772
2. Schiaffino S, Serpi F, Rossi D, Ferrara V, Buonomenna C, Alì M, et al. Reproducibility of ablated volume measurement is higher with contrast-enhanced ultrasound than with B-mode ultrasound after benign thyroid nodule radiofrequency ablation—A preliminary study. *J Clin Med* 2020;9:1504
3. Negro R, Rucco M, Creanza A, Mormile A, Limone PP, Garberoglio R, et al. Machine learning prediction of radiofrequency thermal ablation efficacy: a new option to optimize thyroid nodule selection. *Eur Thyroid J* 2020;9:205-212
4. Mauri G, Pacella CM, Papini E, Solbiati L, Goldberg SN, Ahmed M, et al. Image-guided thyroid ablation: proposal for standardization of terminology and reporting criteria. *Thyroid* 2019;29:611-618
5. Haugen BR, Alexander EK, Bible KC, Doherty GM, Mandel SJ, Nikiforov YE, et al. 2015 American Thyroid Association management guidelines for adult patients with thyroid nodules and differentiated thyroid cancer: the American Thyroid Association guidelines task force on thyroid nodules and differentiated thyroid cancer. *Thyroid* 2016;26:1-133

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