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To the Editor,

We read the study ‘Residual vital ratio: predicting regrowth after radiofrequency ablation for benign thyroid nodules’ with great interest [1]. The issue of regrowth after radiofrequency ablation (RFA) is a hot topic in thyroid endocrinology/radiology [2,3]. The study by Yan introduces a new semiquantitative index, which is the residual vital ratio (RVR), as an independent predictor of regrowth after RFA of symptomatic benign thyroid nodules. The residual vital ratio was calculated as follows: $RVR = (\text{viable volume}/\text{total volume}) \times 100$, taking into account that $\text{viable volume} = \text{total volume} - \text{ablated volume}$. All the measurements were performed between 1 and 3 months after RFA, based on contrast-enhanced ultrasound. A total of 206 patients were evaluated for a mean follow-up time of 22 months [6–68 months], regrowth was observed on 26/206 patients (12.6%). RVR was 56% in the nodules that regrew and 31% in those that did not. The univariate and multivariate logistic regression analyses showed that RVR was an independent factor associated with regrowth.

Likewise, we have recently evaluated the ability of a similar index, which is the initial ablation ratio (IAR), to predict RFA 5-year outcomes [4]. The IAR is another semiquantitative index that was introduced by Sim et al. in 2018, which takes into account the amount of ablation rather than the viable volume left after an RFA. The IAR is calculated as follows: $IAR = (\text{ablated volume}/\text{total volume}) \times 100$, with a methodology that differs in terms of total volume assessment, as pointed out in a recent letter by Sim and Baek published in this Journal [5]. In our retrospective analysis of a cohort of 78 patients that were followed entirely for 5 consecutive years after the first RFA, we found that IAR was significantly associated with technique efficacy, 1- and 5-year volume reduction, and with the likelihood of a retreatment, but not with nodule regrowth [4]. In addition, ROC analyses showed that IAR cutoff was 49% for technique efficacy and 73% for retreatment [4]. These data are consistent with the findings of Sim et al. [6].

Given that in this study IAR was associated with major RFA outcomes, such as volume reduction, technique efficacy and retreatment, but not with regrowth, we aimed to verify if RVR, as assessed by Yan et al. [1], could eventually predict regrowth in the same cohort of 78 patients. Here we report our findings.

Briefly, after calculating RVR based on Yan et al. [1], we retrospectively analyzed RVR predictive value for efficacy, regrowth, and retreatment in the same cohort of 78 patients (82 benign thyroid nodules), who were treated between 2012 and 2015 with RFA, and then followed for 5

consecutive years thereafter [4]. Median age was 60 years (18–86); there were 59 females (76%). Median baseline thyroid nodule volume was 11.3 ml (0.44–54.6). Nodule structure was solid in 44% of cases, predominantly solid in 35% and predominantly cystic in 21% of cases. The majority of nodules were nonfunctioning (66%). Further details of the study cohort, the RFA procedure, and the methodology of the statistical analyses are reported in [4].

Nodule volume was reduced by 76%, 76%, 77%, 79%, and 79% at 1, 2, 3, 4, and 5 years after RFA. Median RVR was 34.4% (0–100%) after 1 month from RFA. We found a significant inverse correlation between RVR and volume reduction ratio after 1 and 5 years from the procedure (Figure 1(A,B)). Technique efficacy was achieved in 75 out of 82 nodules (91%), regrowth was observed in 19 out of 82 nodules (23%), and retreatment was performed in 9 nodules (11%). As shown in Figure 1(C–E), the RVR was significantly lower when technique efficacy was achieved (33% vs 78%) and in the nodules that did not require any retreatment (31.5% vs 72%), but it did not change between the nodules that regrew or not (29% vs 35%). On ROC curve analyses, AUC values indicated a moderate accuracy in predicting technique inefficacy and a good accuracy in predicting retreatment, but no discriminative value for regrowth (Figure 1(F–H)). The RVR cutoff best predicting technique inefficacy was 73% [AUC of 0.74 (95%CI: 0.51–0.97)]. The RVR cutoff best predicting retreatment over time was 60% [AUC of 0.81 (95%CI: 0.66–0.97)].

By contrast to the study by Yan et al. [1], our data indicate that RVR was not associated with regrowth and had no discriminative ability for this outcome. We believe that this discrepancy could be due – at least in part – to the fact that follow-up length was heterogeneous in the study of Yan (leading to an under or overestimate of regrowth). Nevertheless, we found that RVR was associated with volume reduction, technique efficacy and retreatment; even though IAR [4], as assessed with the method of Sim, had better accuracy in predicting technique efficacy (AUC 0.87[CI: 0.71–1.00]), than RVR as assessed with the method of Yan.

In conclusion, IAR and RVR are two indexes that might help clinicians to predict 5-year outcomes of RFA, due to their ability to indicate the patients who are more likely to be retreated over time. In our opinion, the association between RVR and regrowth needs to be confirmed by further studies with complete follow-up and a sample size adequate for multivariate analyses. Meanwhile, caution should be made in stating that RVR is an independent factor associated with regrowth.

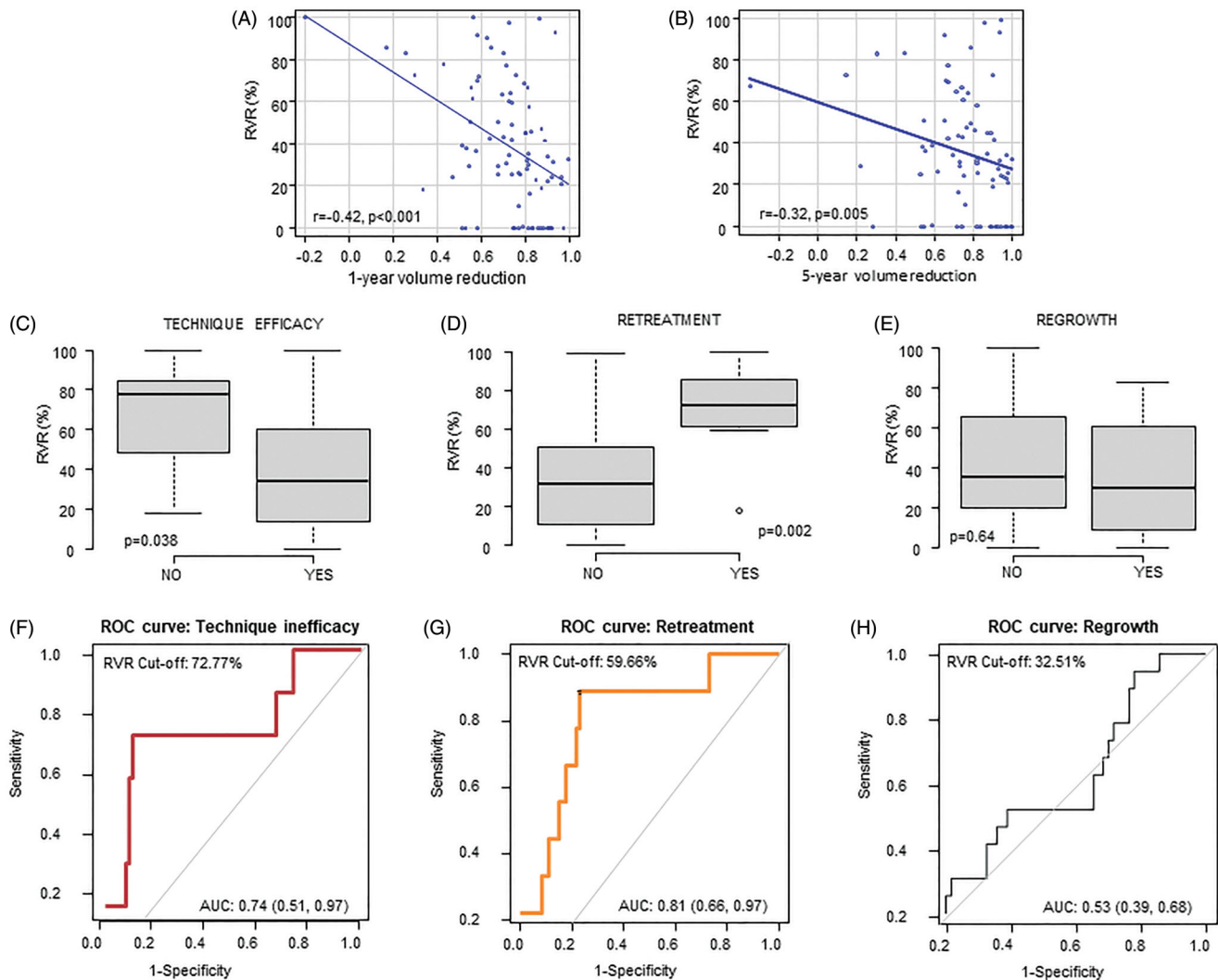


Figure 1. RVR and 5-year outcomes of RFA. (A,B) Linear correlations between residual vital ratio (RVR) and 1-year and 5-year volume reduction. (C,E) Box plots representing median RVR (min–max) in cases of (C) technical efficacy [33.3% (0–59.9)] vs inefficacy [77.8% (18–84.3)] (D) retreatment [71.8% (18–100)] or no retreatment [31.5% (0–99.4)]. (E) presence [29.2% (0–83.3)] vs absence of regrowth [34.7% (0–100)]. (F–H) ROC curves showing predictive accuracy of RVR for technique inefficacy, retreatment and regrowth.

Institutional review board approval

This retrospective study is part of a research project whose protocol was approved by the Institutional Review Board on 10/03/2020 (CEUR-2020-Os-039).

Disclosure statement

No potential conflict of interest was reported by the author(s).

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