

## **Laser and radiofrequency ablation in the treatment of benign thyroid nodules**

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## Purpose

Image-guided ablations have been increasingly using as an alternative treatment to surgery in the management of clinically relevant benign thyroid nodules. The two most widely used techniques for benign nodule image guided thermal ablation are radiofrequency ablation (RFA) and laser ablation (LA).

The purpose of this study was to compare our results in the treatment of benign thyroid nodules with RFA and with LA.

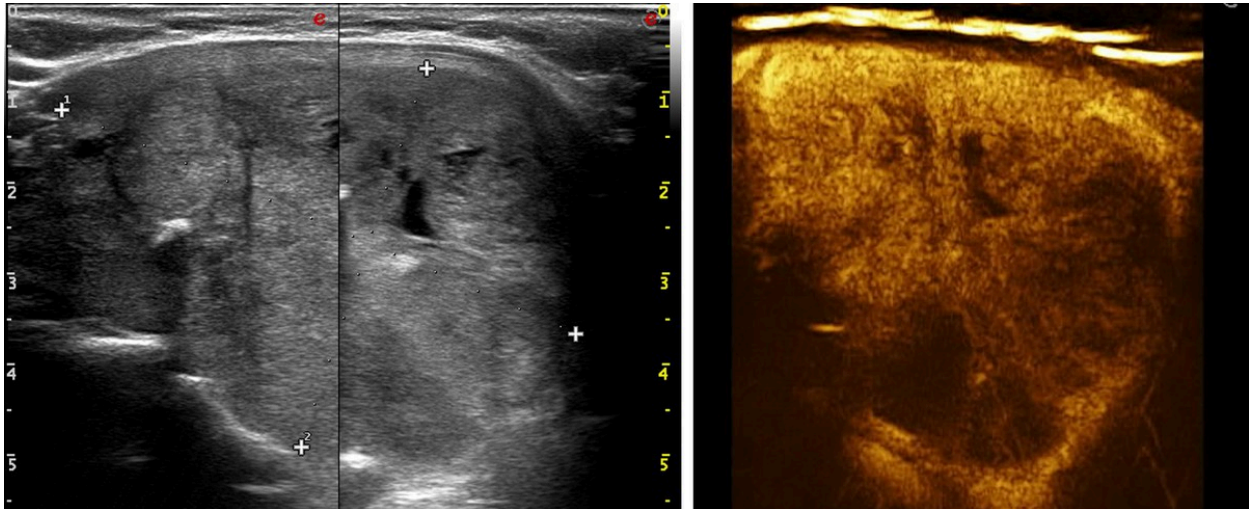
## Methods and materials

From 2011, 63 patients (12 males, 41 females) underwent percutaneous thermal ablation for a benign thyroid nodule. 32 (4 males, 28 females) underwent treatment with RFA (, and 31 (8 males, 23 females) underwent PLA under ultrasound guidance.

We used an internally cooled electrode with 17-18 gauge calibre and 0.5-1.5-cm active tip (AMICA, HS Hospital Service, Aprilia, Italy) and the moving-shot technique for RFA ablation. We used a continuous-wave Nd-YAG laser operating at 1.064  $\mu\text{m}$  (EchoLaser X4©, Esaote, Genoa, Italy) for LA.

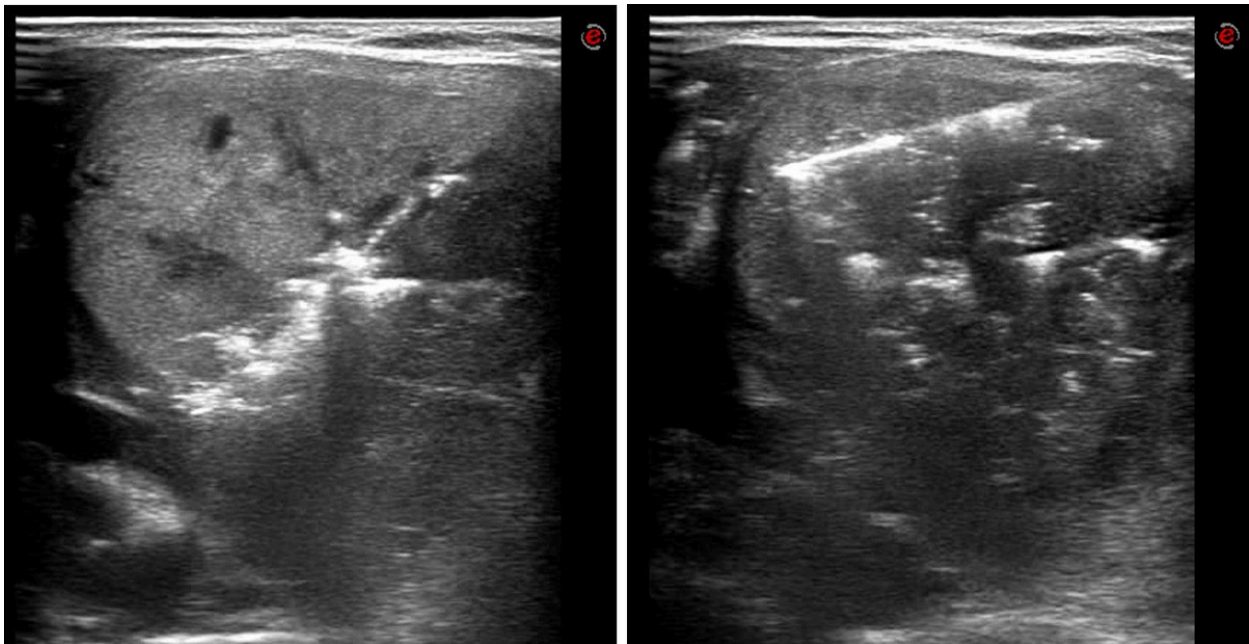
Mean nodule volume before ablation, Time and energy deployed for ablation, and volume percentage reduction at 1-2 months, at 6 months and at 1 year were compared.

**Images for this section:**



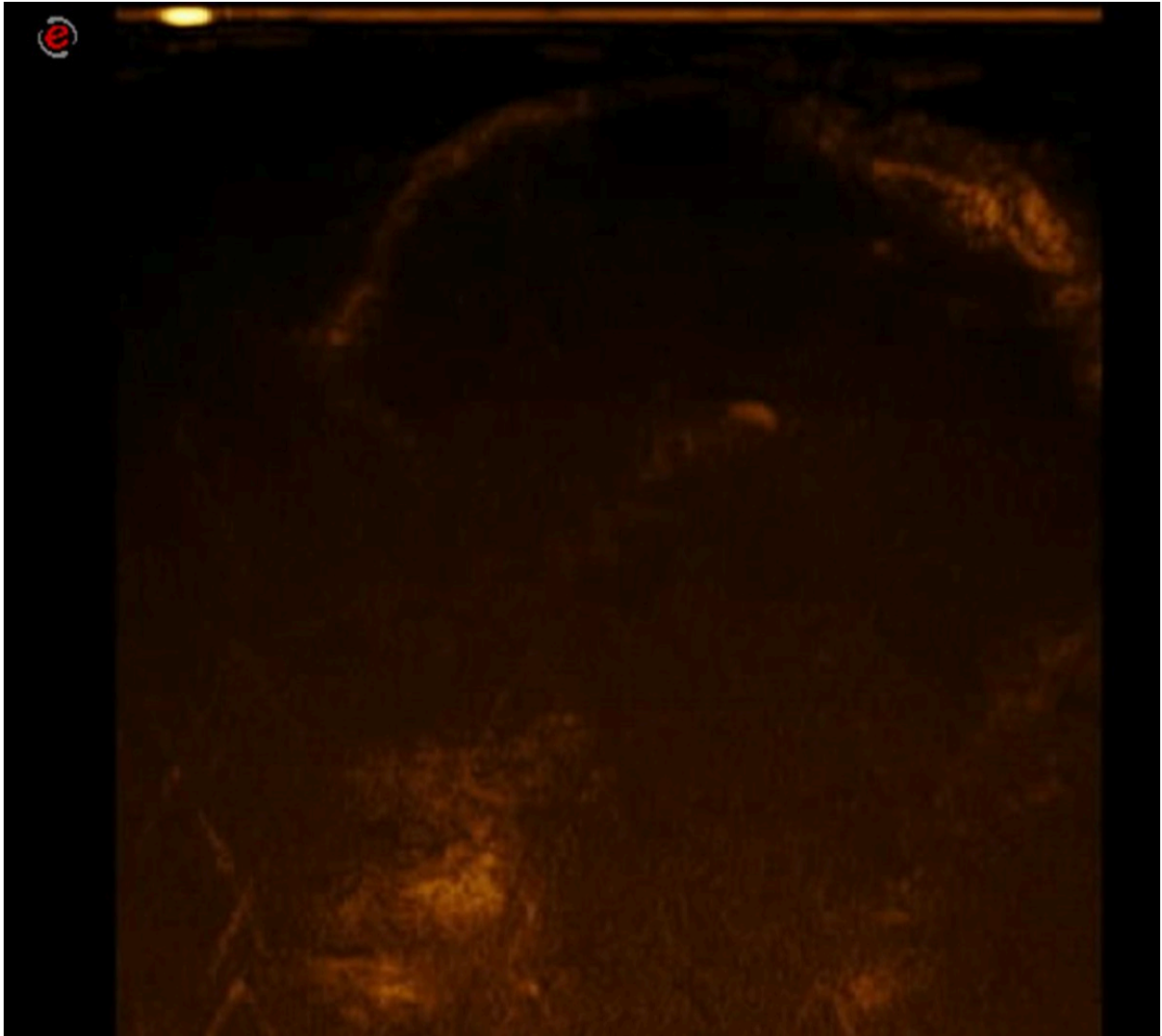
**Fig. 2:** Thyroid nodule treated with RFA: pretreatment imaging

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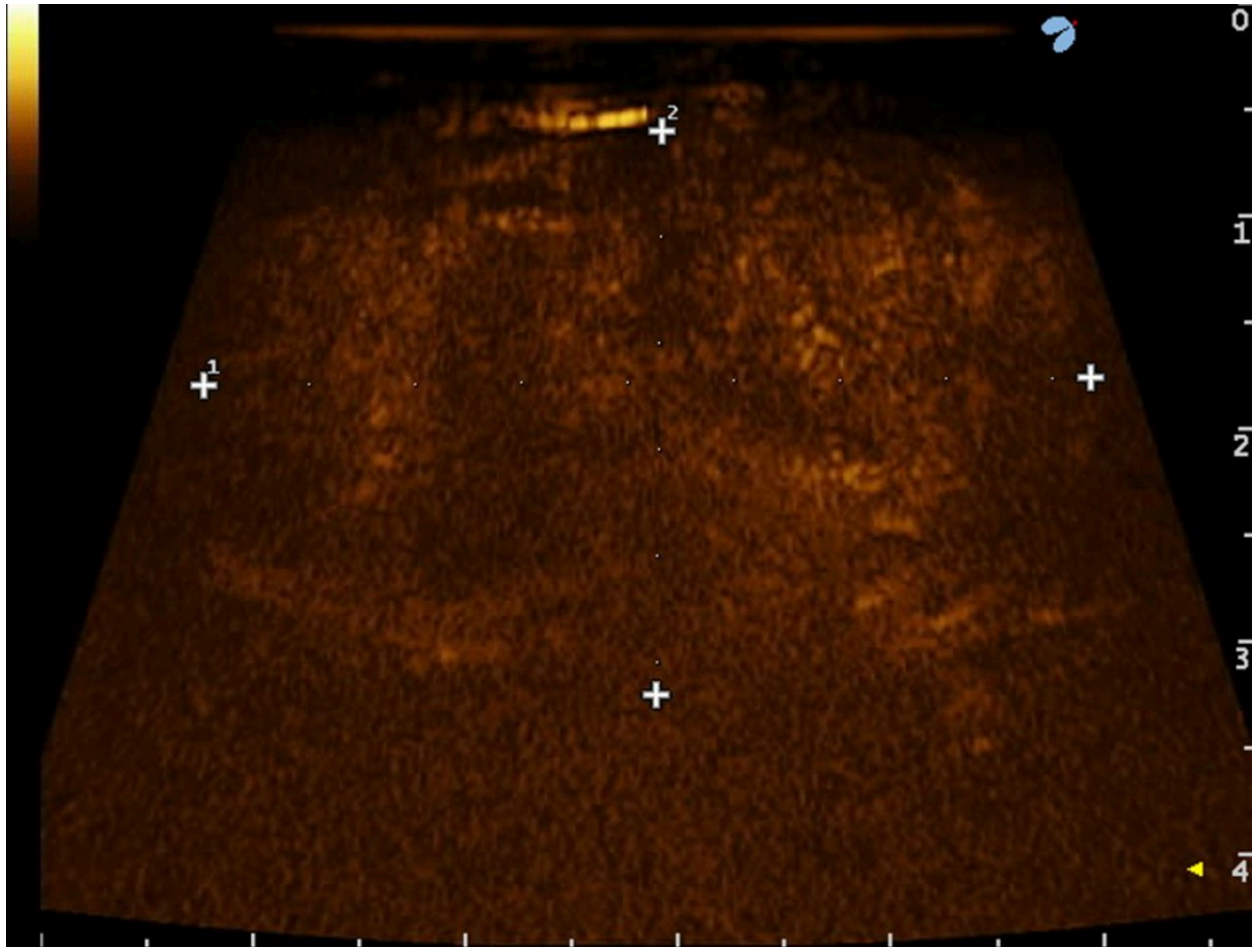
**Fig. 3:** Thyroid nodule treated with RFA: multiple electrode insertions using moving-shot technique

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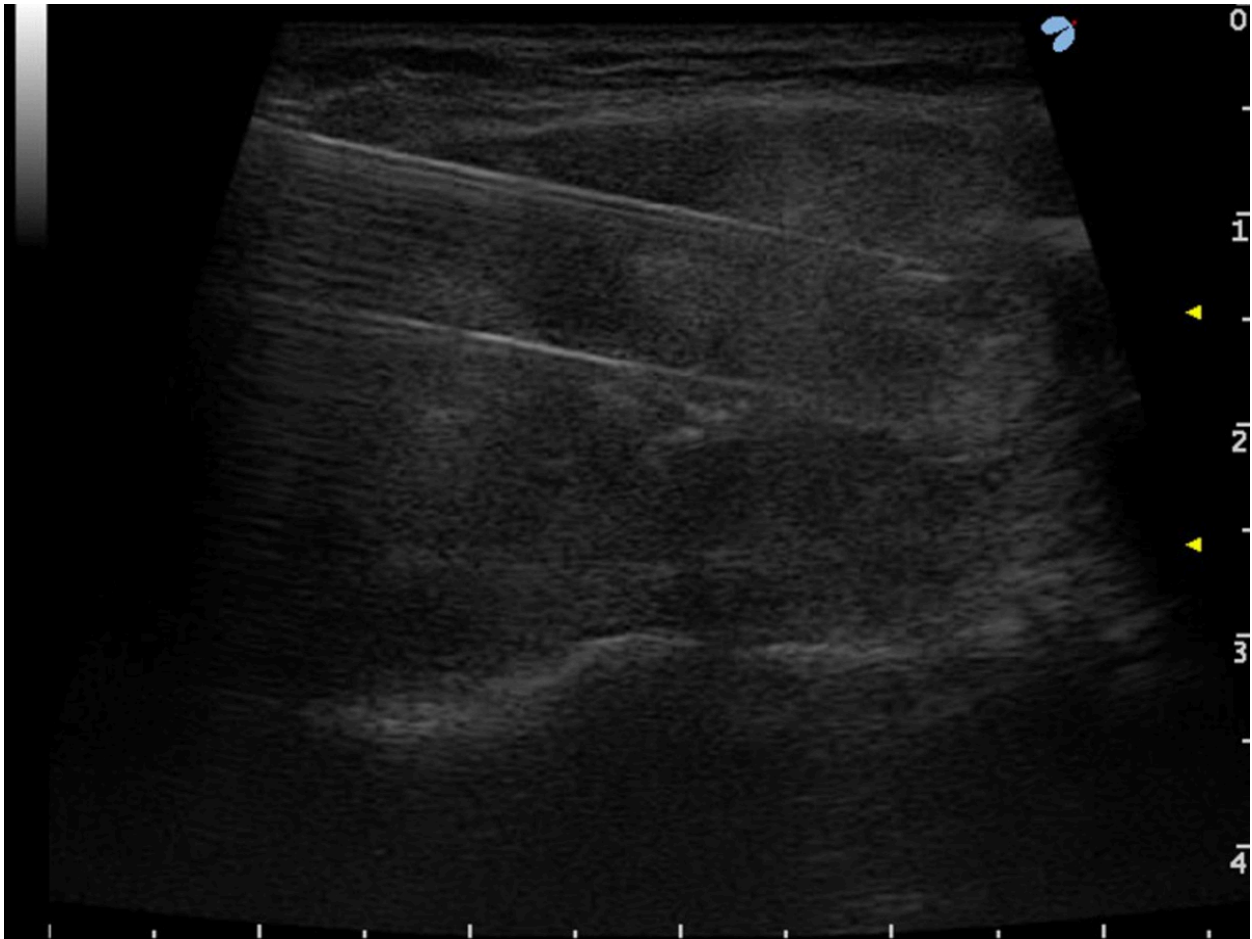
**Fig. 4:** Thyroid nodule treated with RFA: final result with absent enhancement at CEUS

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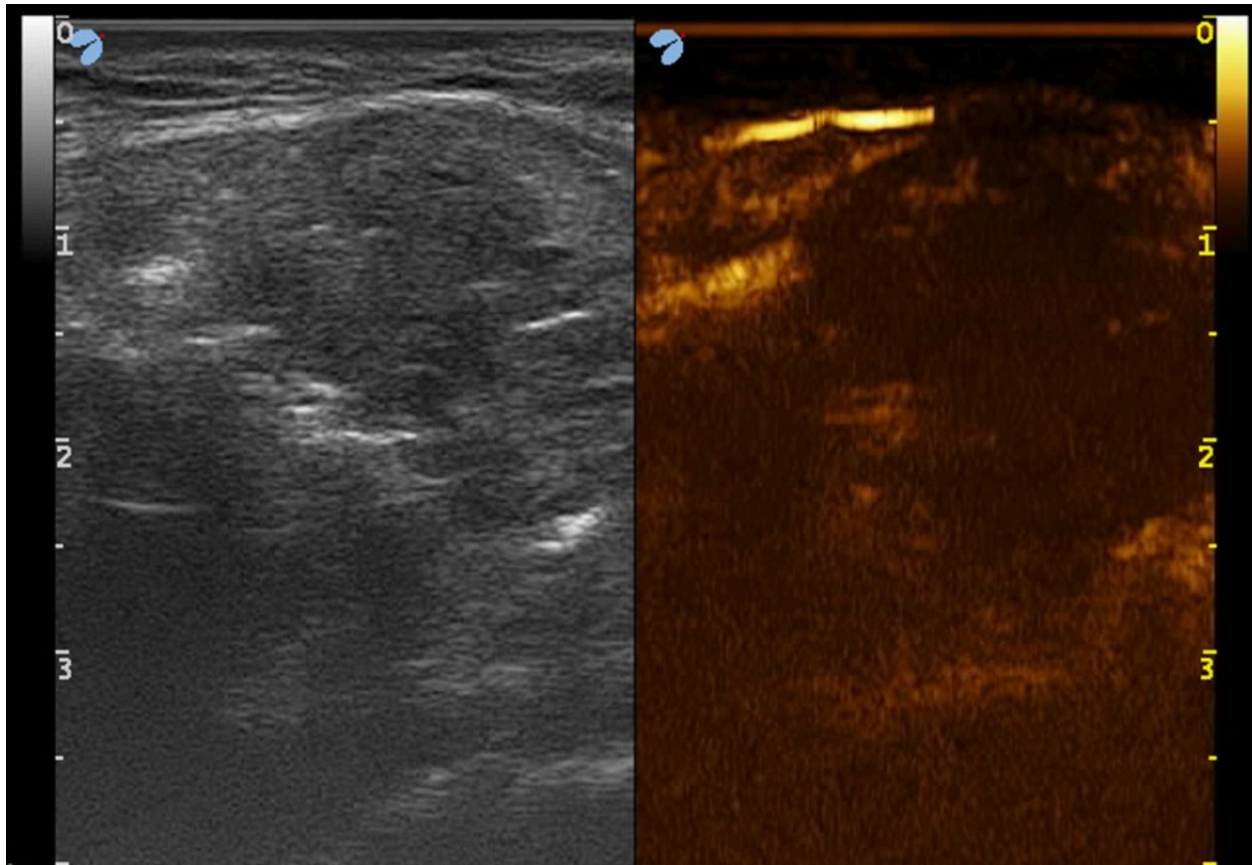
**Fig. 5:** Thyroid nodule treated with LA: pretreatment CEUS

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**Fig. 6:** Thyroid nodule treated with LA: treatment with two laser fibers

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**Fig. 7:** Thyroid nodule treated with LA: final result

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## Results

Mean nodule volume before ablation was  $19.2 \pm 17.1$  ml (mean  $\pm$  standard deviation) in PLA group vs  $35.1 \pm 22.2$  ml in RFA group ( $p = 0.002$ ). Mean time for ablation was significantly longer in PLA ( $21.1 \pm 7.2$  min vs  $14.9 \pm 7.2$ ;  $p < 0.001$ ), while mean energy deployment was significantly higher in RFA group ( $18726 \pm 9478$  J vs  $5493 \pm 2579$  J;  $p < 0.001$ ). Mean volume reduction at 1-2 months was  $46\% \pm 20\%$  in PLA group compared with  $49\% \pm 15\%$  in the RFA group ( $p = 0.275$ ). Mean volume reduction at 6 months was  $66\% \pm 18\%$  in PLA group and  $51 \pm 13\%$  in RFA group ( $p = 0.409$ ). Mean volume reduction at 1 year months was  $65\% \pm 15\%$  in PLA group and  $54 \pm 19\%$  in RFA group ( $p = 0.440$ ).

## Images for this section:

**Table 1.** Comparison of volume reduction, ablation time and deployed energy in 63 patients treated with image-guided thermal ablation with radiofrequency ablation and laser ablation for a benign thyroid nodule

	LA group (31 pts)	RFA group (32 pts)	P value
Volume reduction			
<i>1 month</i>	46% ± 20%	49% ± 15%	0.275
<i>6 months</i>	66% ± 18%	51 ± 13%	0.409
<i>12 months</i>	65% ± 15%	54 ± 19%	0.440
Ablation time	21.1 ± 7.2 min	14.9 ± 7.2	<0.001
Deployed energy	5493 ± 2579 J	18726 ± 9478 J	<0.001

Values are expressed as mean ± standard deviation

**Fig. 1:** Comparison of volume reduction, ablation time and deployed energy in 63 patients treated with image-guided thermal ablation with radiofrequency ablation and laser

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## Conclusion

PLA and RFA offers similar results in terms of volume reduction at 1-2 months and 6 months. PLA requires significantly longer times and lower energy deployment than RFA

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