TRATTAMENTO PERCUTANEO DELLA PATOLOGIA BENIGNA: I NODULI IPERFUNZIONANTI

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RFA OF THYROID NODULES

INDICATIONS

- Benign nodules
  - with symptoms (neck pain, dysphasia, foreign body sensation, discomfort, and cough)
  - with cosmetic problems
  - autonomously functioning
- Recurrent cancer (in pts at high surgical risk and in pts who refuse repeated surgery)

Korean Society of Thyroid Radiology and Korean Society of Radiology, 2012

RFA OF THYROID NODULES

- Transisthmic approach
- Moving shot technique
- 18 G electrodes (0.7 – 1.0 – 1.5 cm active tips)

Background

	Nº of AFTN	Electrode type	Mean initial volume	Nº of sessions	Follow-up duration	Volume reduction	Thyroid function normalization
Deandrea 2008	23	**14-G multitined expandable**	27.7 mL	**1**	6 mo	50.7%	**24%**
Baek 2009	9	**17 and 18-G internally cooled**	14.98 mL	**1-4**	6 mo	70.7%	**56%**
Spiezia 2009	28	**14-G multitined expandable**	24.5 mL	**1-3**	24 mo	79.4%	**79%**
Faggiano 2012	10	**14-G multitined expandable**	13.3 mL	**1**	12 mo	86%	**40%**
Bernardi 2014	12	**18-G internally cooled**	12.8 mL	**1**	12 mo	70%	**33%**
Sung 2015	44	**18-G internally cooled**	18.5 mL	**1-6**	6 mo	74.5%	**82%**

RFA OF AFTNs

RFA is effective in pts with AFTNs who are poor surgical candidates but the procedure is more difficult as the entire nodule needs to be ablated and more treatment sessions might be required

BACKGROUND

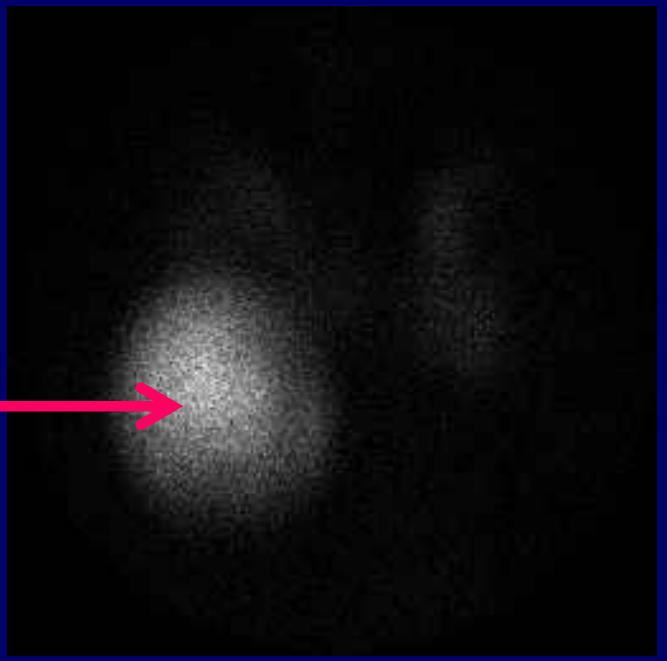
Multiple LAT sessions have generally been needed to normalize serum TSH levels in solitary AFTN or in multinodular goitre. LAT achieved normalization of serum TSH levels in a much lower number of patients in comparison to ^{131}I

Papini E et al, 2014

RFA and LASER ABLATION OF AFTNs

A major limitation is the partial ablation of the external border of the hyperfunctioning lesion, which may be followed by regrowth of the nodule and relapse of hyperthyroidism

RFA



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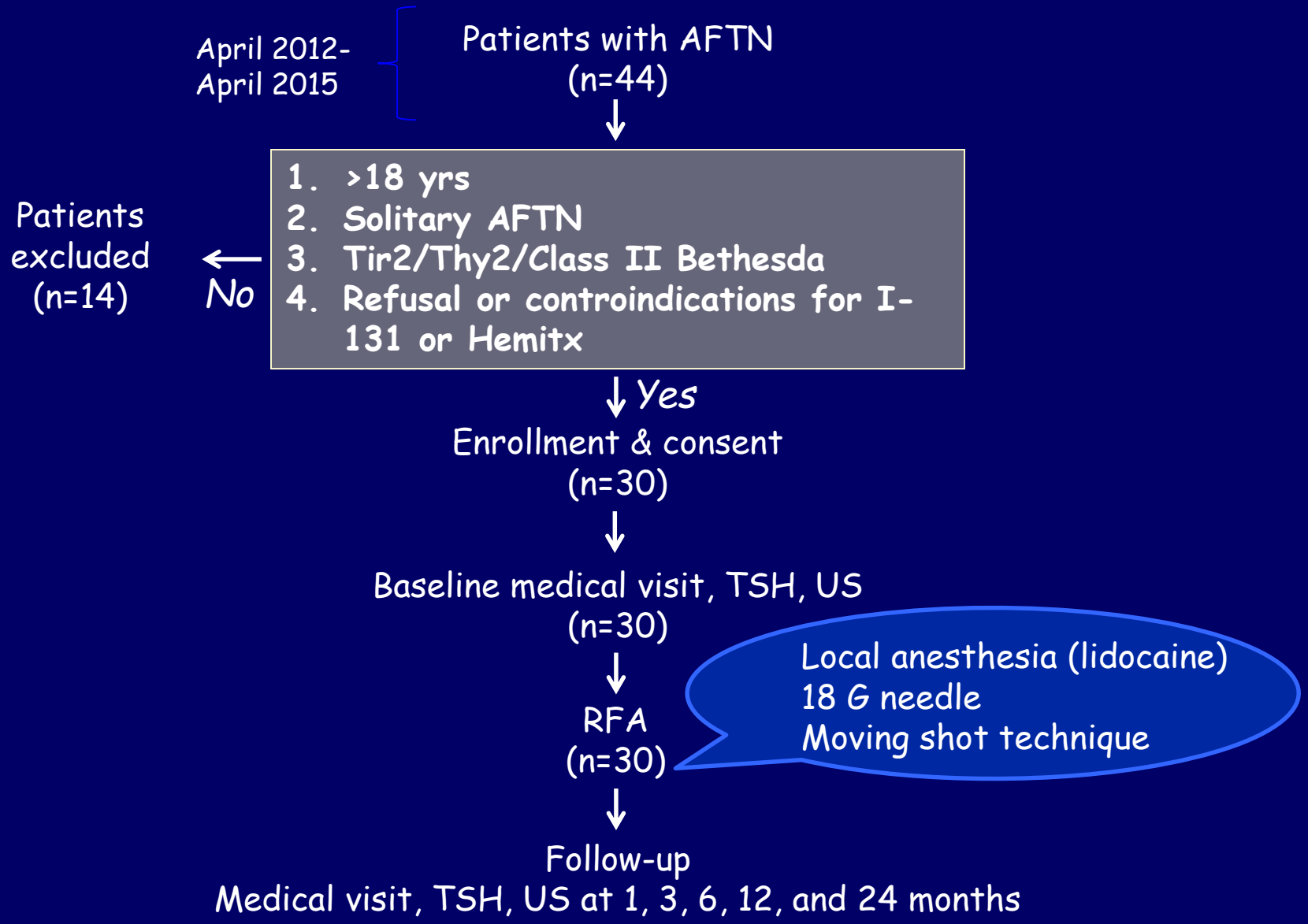
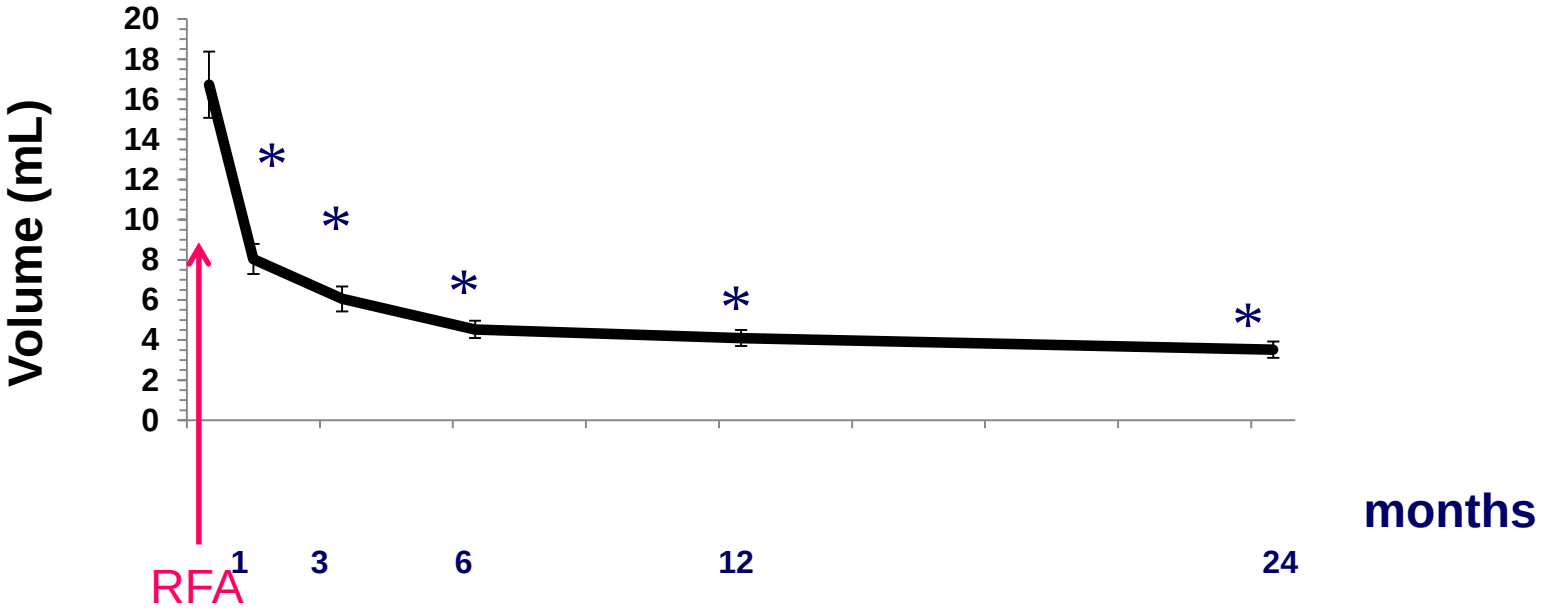
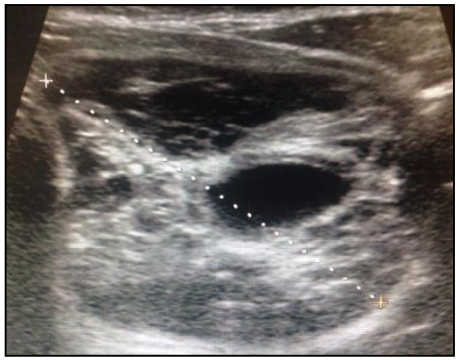
What is the effect of a single RFA (performed with the moving shot technique) on AFTN in the long term

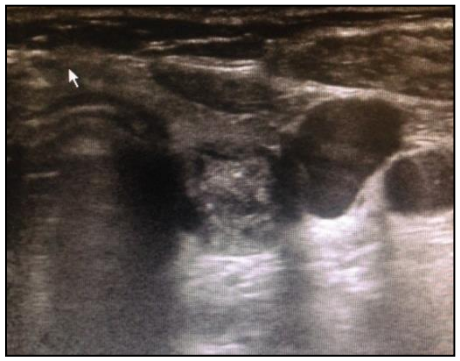
Materials and methods



Results (1)







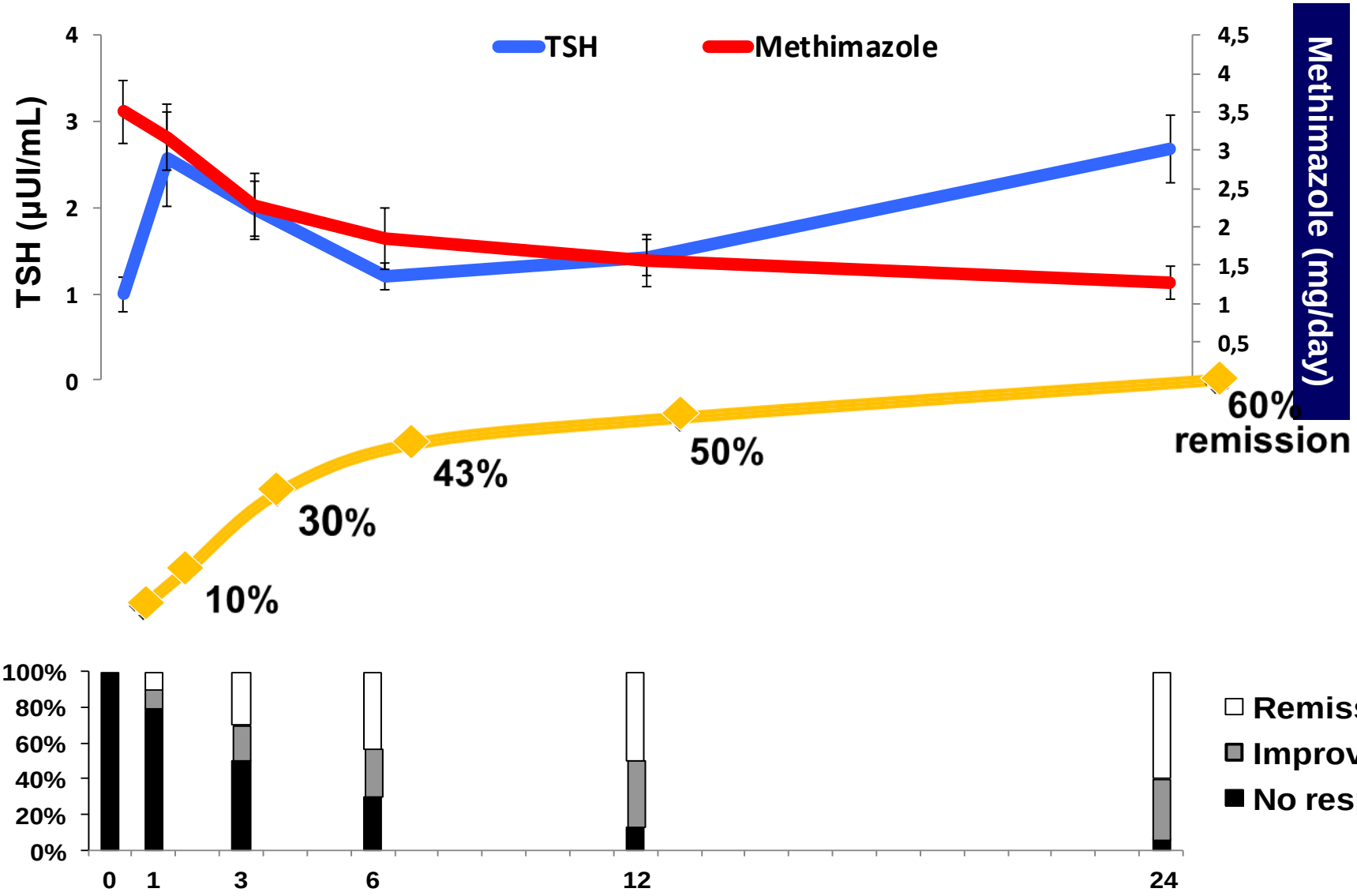
* $p < 0.05$ vs baseline Linear Mixed-Effects Model (LME)

Results (2)

	Baseline	1 month	3 months	6 months	12 months	24 months	*p* vs Baseline
No of nodules	30	30	30	30	30	30	
US characteristics of the nodules							
Volume (mL)	17.12 ± 2.39	7.92 ± 1.09 *	7.41 ± 1.38 *	4.65 ± 0.63 *	4.29 ± 0.61 *	3.52 ± 0.40 *	<0.001
Largest diameter (mm)	39.20 ± 1.51	30.70 ± 1.26 *	28.21 ± 1.37 *	25.67 ± 1.29 *	24.45 ± 1.28 *	21.66 ± 1.34 *	<0.001
Volume reduction (%)		51.06 ± 2.30	62.63 ± 2.13	69.35 ± 2.97	74.78 ± 3.01	76.91 ± 2.73	<0.001
Vascular grade (0-4)	2.50 ± 0.14	1.30 ± 0.08 *	1.30 ± 0.08 *	1.37 ± 0.09 *	1.33 ± 0.08 *	1.32 ± 0.08 *	<0.001
Symptom, cosmetic score, and thyroid function							
Symptom score (1-4)	2.03 ± 0.11	1.20 ± 0.09 *	1.20 ± 0.09 *	1.07 ± 0.05 *	1.07 ± 0.05 *	1.07 ± 0.05 *	<0.001
Cosmetic score (1-4)	3.08 ± 0.07	2.35 ± 0.10 *	2.35 ± 0.10 *	2.00 ± 0.12 *	1.74 ± 0.12 *	1.74 ± 0.12 *	<0.001
TSH (μIU/mL)	1.01 ± 0.20	2.50 ± 0.55 *	1.91 ± 0.32	1.15 ± 0.15	1.41 ± 0.20	1.49 ± 0.29	=0.003
Methimazole (mg)	3.5 ± 0.41	3.08 ± 0.44	2.19 ± 0.44 *	1.85 ± 0.40 *	1.72 ± 0.37 *	1.21 ± 0.32 *	<0.001

* $p < 0.05$ vs baseline with Linear Mixed-Effects Model (LME)

Results (3)

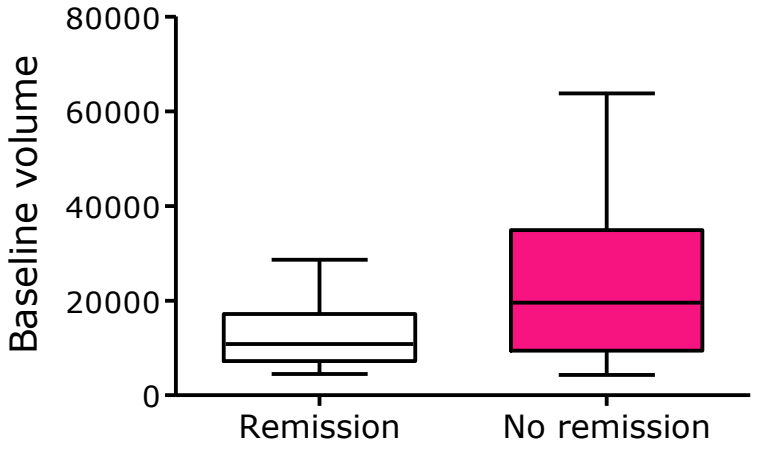


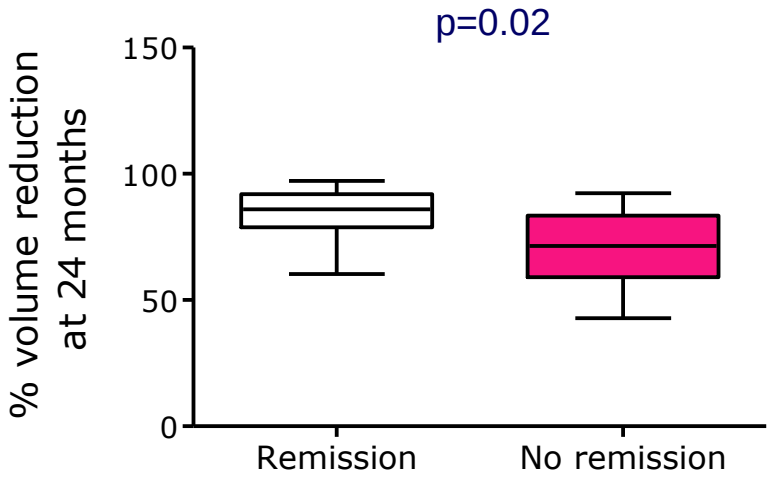
* p < 0.05 vs baseline Linear Mixed-Effects Model (LME) & Proportion Test

Results (4)

Remission vs No remission

Baseline volume?
% volume reduction at 1 month?
% volume reduction at 12 months
% volume reduction at 24 months?
Baseline vascularity?
Δ vascularity?
Subclinical vs Clinical Hyperthyroidism?





Additional RFA should be limited to patients with a large nodule (>20 mL) or unresolved clinical problems
[*Huh JY, Radiology 2012*]

* $p < 0.05$ vs baseline Mann-Whitney-Wilcoxon test

RFA OF THYROID NODULES

RFA VS SURGERY

	RFA (n=128)	Surgery (n=74)
	EFFICACY	
Resolution of nodule related symptoms	90%	100%
Excellent cosmetic results	79%	88%
ATD withdrawal	50%	100% *
	TOLERABILITY	
Hypothyroidism	0	22% *
Postoperative pain	3.1% (VAS 2-3)	100% * (VAS 2-3)
Complication rate	3.9%	13.51% *

(based on Bernardi S et al., International Journal of Endocrinology, 2014)

**** p < 0,05***

CONCLUSIONS

1. A single RFA allowed us to withdraw anti-thyroid medication in 60% of patients with AFTN, who remained euthyroid afterwards

2. Baseline volume and % volume reduction at 24 months were the parameters significantly correlated with the therapeutic response

3. Patients responded gradually to the treatment, consistent with the progressive shrinkage of the nodule

4. It is possible that longer follow-up studies will show greater response rates.

HOWEVER ...

Minimally invasive procedures are not indicated for hyperfunctioning nodules unless radioactive iodine is contraindicated or not accessible

Papini E et al, 2016

HOWEVER ...

Radioiodine may lead to hypothyroidism. Surgery has a low but still considerable risk of local complications. Moreover, some patients may have contraindications, or may be unwilling to be treated with radioiodine and/or surgery

THEREFORE …

RFA could be a second-line treatment for AFTN