

Introduction

- Thyroid nodules can be classified as benign, malignant, or indeterminate, the latter of which make up 10–30% of nodules.
- Radiofrequency ablation (RFA) has become an attractive and promising therapy for the treatment of benign thyroid nodules.
- Though an attractive treatment modality, the current ATA guidelines recommend RFA only for the management of benign thyroid nodule, necessitating surgical management for the treatment of both indeterminate nodules (10–30% of all nodules) and malignant nodules (5% of all nodules).
- International literature, however, suggests RFA to be promising beyond their typical treatment of benign nodules, including papillary thyroid carcinomas.

Research Question

Can RFA safely and effectively treat indeterminate thyroid nodules?

Methods

- Our protocol consisted of preoperative FNA as well as comprehensive neck ultrasounds, treatment by RFA, and subsequent follow-up appointments at the 1, 3, 6, and 12 month marks. All operations were performed by fellowship-trained endocrine surgeons.
- VRR was calculated as $[(V_0 - V_1) / V_0] \times 100$, where V_0 signifies the initial nodule volume and V_1 the post-ablation nodule volume. VRR was utilized to determine operative success, defined as a VRR of $>50\%$ at final follow-up. Nodular regrowth was described as a nodule that was assessed by ultrasound to be of greater volume postoperatively than pre-operatively.

Results

Table 2: Demographic characteristics of included patients

Characteristics	Levels	Total	Bethesda III & IV nodules	Bethesda II nodules	p-value
Number		178	53	125	
Demographic data					
Age	Median (IQR)	64 (53-69)	63 (56-68)	65 (52.5-70)	0.49
Gender	Female	128 (71.9)	30 (56.6)	98 (78.4)	0.003
	Male	50 (28.1)	23 (43.4)	27 (21.6)	
Race	African American	100 (56.2)	28 (52.8)	72 (57.6)	0.82
	White	71 (39.9)	23 (43.4)	48 (38.4)	
BMI	Median (IQR)	30 (26.7-34.3)	30.5 (27.5-34.5)	29.8 (26.4-34.3)	0.38
Baseline sonographic features					
Nodule maximum diameter	Median (IQR)	2.4 (1.5-4)	2.5 (1.5-4.3)	2.3 (1.4-3.7)	0.47
Baseline Volume	Median (IQR)	1.8 (1.1-2.9)	1.9 (1.1-3.2)	1.7 (1.1-2.7)	0.45
	Solid	5 (2.8)	3 (5.7)	2 (1.6)	
	Cystic	157 (88.2)	46 (86.8)	111 (88.8)	
Composition	Mixed	16 (9)	4 (7.5)	12 (9.6)	0.74
	Hypoechoic	33 (21.3)	11 (23.4)	22 (20.4)	
	Isoechoic	121 (78.1)	36 (76.6)	85 (78.7)	
Echogenicity	Hyperechoic	1 (0.6)	0 (0)	1 (0.9)	0.054
	Grade 0	11 (7.9)	1 (2.3)	10 (10.3)	
	Grade 1	46 (32.9)	11 (25.6)	35 (36.1)	
Vascularity	Grade 2	53 (37.9)	23 (53.5)	30 (30.9)	0.27
	Grade 3	30 (21.4)	8 (18.6)	22 (22.7)	
	Soft	7 (5.3)	4 (10)	3 (3.2)	
Elastography	Mixed	96 (72.2)	27 (67.5)	69 (74.2)	0.25
	Stiff	30 (22.6)	9 (22.5)	21 (22.6)	
	No Calcifications	91 (58.7)	29 (61.7)	62 (57.4)	
Calcifications	Microcalcifications	51 (32.9)	12 (25.5)	39 (36.1)	0.25
	Macrocalcifications	13 (8.4)	6 (12.8)	7 (6.5)	
	Laboratory data				
Baseline TSH uIU/mL	Median (IQR)	1.3 (0.7-1.9)	1.3 (0.8-1.9)	1.3 (0.7-2)	0.67
Post procedural TSH uIU/mL	Median (IQR)	1.2 (0.7-1.8)	1.1 (0.7-1.8)	1.2 (0.8-1.8)	0.58

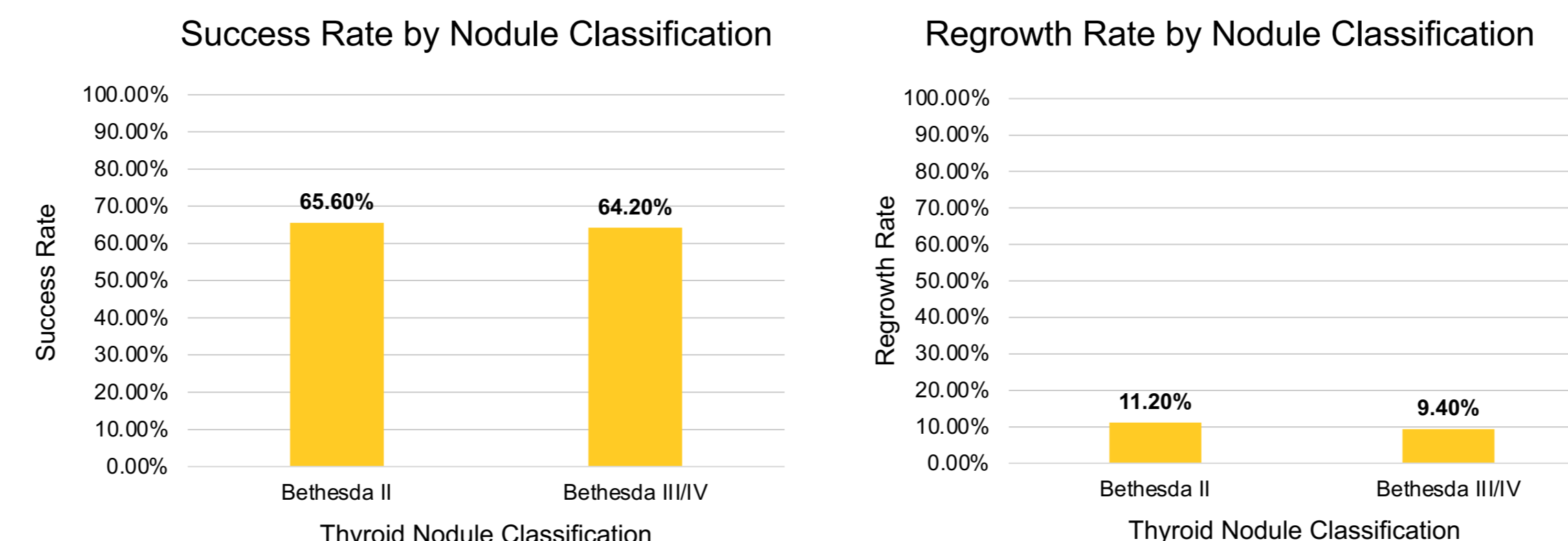


Figure 1: Benign and indeterminate thyroid nodules treated by RFA (A) success rates and (B) regrowth rates. Success was a volume reduction rate of $\geq 50\%$. Nodular regrowth was defined as a nodule which was assessed by ultrasound to be of greater volume postoperatively than pre-operatively.

Findings

- 178 patients with thyroid nodules diagnosed as benign (Bethesda II) or indeterminate (Bethesda III/IV) by preoperative cytopathological analysis were included.
- Though patients with benign nodules tended to be female, patients were similar with respect to age, race, BMI, baseline sonographic features, and pre-operative biochemical parameters.
- Patients in the benign and indeterminate cohorts had similar thyroid nodule volume reduction rates at 65.60% and 64.20%, respectively ($p=0.68$).
- The two groups had similar nodular regrowth rates, at 11.2% for benign nodules and 9.40% for indeterminate nodules ($p=0.72$).
- A total of 3 cases of transient dysphonia were reported.

Discussion

- RFA of indeterminate thyroid nodules was comparable to that of benign thyroid nodules in all parameters of interest, including volume reduction rate.
- To our best knowledge, our work is the first North American analysis comparing benign and indeterminate thyroid nodules and suggests RFA to be a promising modality for the management of indeterminate thyroid nodules.
- Future larger studies are warranted to further elucidate the difference, if any, in managing different nodule Bethesda classes.

References

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