

## Radiofrequency ablation for management of thyroid nodules: a case report



Kristanto Yuli Yarsa<sup>1</sup>, Monica Bellynda<sup>2\*</sup>

### ABSTRACT

**Background:** Thyroid nodules constitute a frequently seen clinical problem and the incidence of thyroid nodules has increased with the recently increased use of thyroid ultrasonography. Radiofrequency ablation (RFA) is an effective and safe method for treating benign thyroid nodules and recurrent thyroid cancers.

**Case Presentation:** A 48 years old woman came to the surgical oncology clinic with the presence of a getting bigger, moves when the patient swallows, and painless mass on her neck since 20 years ago. The physical examination measured 5x5 cm mass, mobile on swallowing, no pain on palpation, and the laboratory examination shows a euthyroid state. The ultrasound result has revealed an enlargement of the right and left thyroid with increased echo intensity of parenchyma and increased vascularisation. This mass was concluded as struma nodus bilateral. The FNAB was follicular neoplasm, Bethesda system class 4. The patient underwent a single session RFA. RFA was performed employing transisthmic access using a 7 cm 18 gauge electrode-needle with a 1 cm active needle tip. The patient well tolerated the procedure and no adverse events were noted.

**Conclusion:** Radiofrequency ablation for thyroid lesions is a safe and effective method for treating benign thyroid nodules and even recurrent thyroid cancers. Therefore, various factors, including serum TSH, clinical risk factor assessment, size of the nodule, ultrasound characteristics, patient preferences, and results of the FNA biopsy, should be considered to manage thyroid nodule.

**Keywords:** Radiofrequency, Ablation, Thyroid Nodules, Case Report.

**Cite This Article:** Yarsa, K.Y., Bellynda, M. 2021. Radiofrequency ablation for management of thyroid nodules: a case report. *Bali Medical Journal* 10(1): 119-121. DOI: 10.15562/bmj.v10i1.2150

<sup>1</sup>Division of Surgical Oncology,  
Department of Surgery, Dr. Moewardi  
General Hospital, Surakarta, Indonesia

<sup>2</sup>Resident of Surgery, Faculty of Medicine,  
Universitas Sebelas Maret, Dr. Moewardi  
General Hospital, Surakarta, Indonesia

\*Corresponding author:  
Monica Bellynda;  
Resident of Surgery, Faculty of Medicine,  
Universitas Sebelas Maret, Dr. Moewardi  
General Hospital, Surakarta, Indonesia;  
monicabellynda@hotmail.com

Received: 2020-12-22  
Accepted: 2021-03-16  
Published: 2021-04-01

### INTRODUCTION

Thyroid nodules constitute a frequently seen clinical problem and the incidence of thyroid nodules has increased with the recently increased use of thyroid ultrasonography (US).<sup>1</sup> Although most thyroid nodules are benign and do not require treatment, some benign nodules may require treatment for associated symptoms and/or because of cosmetic problems.<sup>2,3</sup>

Since RF ablation of thyroid nodules was introduced in 2006, it has been reported to be both safe and effective for treating benign thyroid nodules and recurrent thyroid cancer.<sup>4-6</sup> Radiofrequency ablation (RFA) is an effective and safe method for treating benign thyroid nodules and recurrent thyroid cancers.<sup>6-11</sup> Since 2012, thyroid RFA has been adopted worldwide, with subsequent advances made in devices and techniques, such as shorter and thinner electrodes, bipolar electrodes, virtual needle tracking systems, and

unidirectional electrodes.<sup>12</sup>

Based on those mentioned above, this case study aims to evaluate the utilization of radiofrequency ablation to manage thyroid nodules at Dr. Moewardi General Hospital, Surakarta, Indonesia.

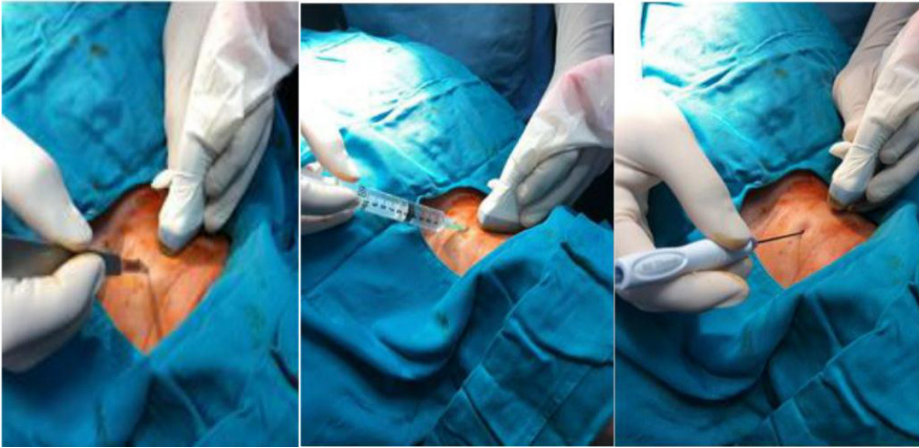
### CASE REPORT

A 48 years old woman came to the surgical oncology clinic with the presence of a getting bigger, moves when the patient swallows, and painless mass on her neck since 20 years ago. The physical examination confirmed the presence of a soft-elastic mass in the left and right side of the neck, measured 5x5 cm, mobile on swallowing, no pain on palpation (Figure 1). The laboratory examination shows a euthyroid state (TSH 2.4 mIU/L and FT4 1.2 ng/dL). The ultrasound result was the enlargement of the right thyroid (3.1 x 3.3 x 3.5 cm; Volume > 20 ml) with increased echo intensity of parenchyma, enlargement of left thyroid (2.6 x 3.4 x 3.4 cm; volume

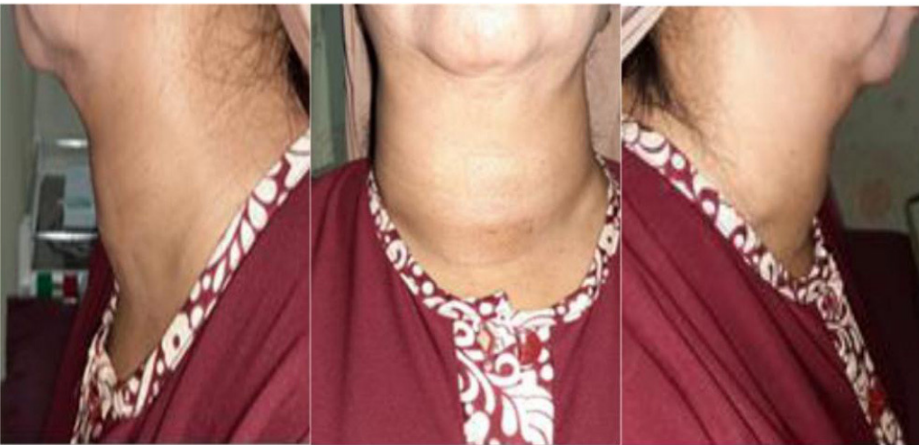


**Figure 1.** 48 years old with mass on her neck since 20 years ago.

>16.6 ml) with normal echo intensity of parenchyma, solid lesion around 1.2 cm spongiosa type at left thyroid and



**Figure 2.** RFA procedure in this case study



**Figure 3.** One week after the procedure



**Figure 4.** A) One month after the procedure, B) Three months after the procedure, C) Six months after the procedure

increased vascularisation. This mass was concluded as struma nodus bilateral. The FNAB was follicular neoplasm, Bethesda system class 4.

The patient underwent a single session

RFA. RFA was performed employing transisthmic access using a 7 cm 18 gauge electrode-needle with a 1 cm active needle tip. Minimally invasive percutaneous RFA was done by the moving-shot technique

(Figure 2). The patient well tolerated the procedure and no adverse events were noted.

Over the next 1 week, the patient went to the oncology clinic for follow up and the patient reported a progressive improvement of her neck symptoms (Figure 3). One month, three months, and six months after the procedure, both patients followed-up (Figure 4). The patient was followed up by ultrasound for six months. The result was a visible and progressive reduction of the nodule.

**DISCUSSION**

Benign thyroid nodules were found in 4–8% by palpation, in 10–41% by ultrasonography, and 50% by a pathologic examination.<sup>6,7</sup> It requires treatment for cosmetic reasons, subjective symptoms, or anxiety about a malignant change. The management for benign thyroid nodules consists of two parts: surgery and levothyroxine medication. However, both surgery and medication have disadvantages. Surgery is a curative procedure but has problems, including general anesthesia, scar formation, and iatrogenic hypothyroidism. Besides, the efficacy of levothyroxine medication therapy is still controversial.<sup>7</sup>

Radiofrequency ablation is an effective and safe method for treating benign thyroid nodules and recurrent thyroid cancer.<sup>12</sup> This procedure has been proposed as an alternative treatment modality for primary thyroid microcarcinomas. In 2012, this procedure was adopted worldwide, with further progress in tools and techniques.<sup>12</sup>

Radiofrequency ablation uses heat generated from high frequency oscillating electric currents around 200 to 1200 kHz.<sup>12,13</sup> RF waves passing through the electrodes move the tissue ions around the electrodes. They increase the temperature (by friction heat) in the tumor tissue, causing tumor damage located very close to the electrode. Heat conduction from the sanded area can cause tumor damage that is relatively slower or tissue far from the electrode's tip.<sup>13</sup>

Complications of radiofrequency ablation including hematoma, skin burn at the puncture site, fever, pain, voice change, thyrotoxicosis, hypothyroidism, and edema, but most patients recovered

rapidly without sequelae.<sup>13,14</sup> Hematoma, skin burn, and fever can occur because of mechanical injury to the anterior jugular vein or perithyroidal vessels. Mild compression stops bleeding to prevent hematoma and application of an ice bag prevents skin burn. Pain because radiofrequency ablation procedure radiates to head, ears, shoulders, chest, back, or teeth. The pain is rapidly relieved after the procedure stops or only 5.5 % of patients need oral painkillers.<sup>14</sup> Voice changes are caused by thermal injury to the recurrent laryngeal nerve or vagus nerve. Ablation carefully on the danger triangle and recurrent tumors to prevent voice changes.<sup>13,14</sup> Thyrotoxicosis and hypothyroidism can occur, but the mechanism is poorly understood because the patients show a continuous increase of serum peroxidase antibodies before and after radiofrequency ablation.<sup>3</sup>

## CONCLUSION

Radiofrequency ablation for thyroid lesions is a safe and effective method for treating benign thyroid nodules and even recurrent thyroid cancers. Therefore, various factors, including serum TSH, clinical risk factor assessment, size of the nodule, ultrasound characteristics, patient preferences, and results of the FNA biopsy, should be considered to manage thyroid nodule.

## CONFLICT OF INTEREST

There is no conflict of interest in the writing of this case report.

## FUNDING

All authors received no financial support for the research, authorship, and/or publication of this case report.

## AUTHOR CONTRIBUTION

All authors contributed to the writing of this case report, from the preparation of the conceptual framework, data collection, and data analysis to the interpretation of clinical outcomes in case reports in the form of scientific publications.

## REFERENCES

1. Moon WJ, Baek JH, Jung SL, Kim DW, Kim EK, Kim JY, et al. Ultrasonography and the ultrasound-based management of thyroid nodules: consensus statement and recommendations. *Korean J Radiol.* 2011;12(1):1-14.
2. Baek JH, Lee JH, Valcavi R, Pacella CM, Rhim H, Na DG. Thermal ablation for benign thyroid nodules: radiofrequency and laser. *Korean J Radiol.* 2011;12(5):525-540.
3. Ha EJ, Baek JH, Lee JH. The efficacy and complications of radiofrequency ablation of thyroid nodules. *Curr Opin Endocrinol Diabetes Obes.* 2011;18(5):310-314.
4. Spiezia S, Garberoglio R, Milone F, Ramundo V, Caiazzo C, Assanti AP, Deandrea M, Limone PP, Macchia PE, Lombardi G, Colao A, Faggiano A. Thyroid nodules and related symptoms are stably controlled two years after radiofrequency thermal ablation. *Thyroid.* 2009 Mar;19(3):219-25. doi: [10.1089/thy.2008.0202](https://doi.org/10.1089/thy.2008.0202). PMID: 19265492.
5. Spiezia S, Garberoglio R, Milone F, Ramundo V, Caiazzo C, Assanti AP, et al. Thyroid nodules and related symptoms are stably controlled two years after radiofrequency thermal ablation. *Thyroid.* 2009;19(3):219-25.
6. Faggiano A, Ramundo V, Assanti AP, Fonderico F, Macchia PE, Misso C, et al. Thyroid nodules treated with percutaneous radiofrequency thermal ablation: a comparative study. *J Clin Endocrinol Metab.* 2012;97(12):4439-45.
7. Jeong WK, Baek JH, Rhim H, Kim YS, Kwak MS, Jeong HJ, et al. Radiofrequency

ablation of benign thyroid nodules: safety and imaging follow-up in 236 patients. *Eur Radiol.* 2008;18(6):1244-50.

8. Ugurlu MU, Uprak K, Akpinar IN, Attaallah W, Yegen C, Gulluoglu BM. Radiofrequency ablation of benign symptomatic thyroid nodules: prospective safety and efficacy study. *World J Surg.* 2015;39(4):961-968.
9. Long B, Li L, Yao L, Chen S, Yi H, Ye X, et al. Combined use of radioiodine therapy and radiofrequency ablation in treating postsurgical thyroid remnant of differentiated thyroid carcinoma. *J Cancer Res Ther.* 2015;11 Suppl:C244-7.
10. Dupuy DE, Monchik JM, Decrea C, Pisharodi L. Radiofrequency ablation of regional recurrence from well-differentiated thyroid malignancy. *Surgery.* 2001;130(6):971-977.
11. Kim JH, Yoo WS, Park YJ, Park DJ, Yun TJ, Choi SH, et al. Efficacy and Safety of Radiofrequency Ablation for Treatment of Locally Recurrent Thyroid Cancers Smaller than 2 cm. *Radiology.* 2015;276(3):909-18.
12. Park HS, Baek JH, Park AW, Chung SR, Choi YJ, Lee JH. Thyroid Radiofrequency Ablation: Updates on Innovative Devices and Techniques. *Korean J Radiol.* 2017;18(4):615-623.
13. Shin JH, Baek JH, Ha EJ, Lee JH. Radiofrequency ablation of thyroid nodules: basic principles and clinical application. *Int J Endocrinol.* 2012;2012:919650.
14. Na DG, Lee JH, Jung SL, Kim JH, Sung JY, Shin JH, et al. Radiofrequency ablation of benign thyroid nodules and recurrent thyroid cancers: consensus statement and recommendations. *Korean J Radiol.* 2012;13(2):117-25.



This work is licensed under a Creative Commons Attribution