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Case Series

TIRADS and BETHESDA correlation to histopathological results of thyroid nodules: a case series at Dr. Sardjito General Hospital, Yogyakarta

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ABSTRACT

Early diagnosis of thyroid nodules is necessary to identify malignancy before surgery. Fine needle aspiration (FNA) and ultrasonography (USG) are supporting examinations for diagnosing thyroid tumors. There have been several previous studies related to the sensitivity of each investigation compared to postoperative biopsy findings. Both have different diagnostic values, and it is hoped that if these two diagnostic methods are applied before surgery, they will have a higher sensitivity value in determining the type of thyroid nodule compared to a single examination. A single-center retrospective case series study. Socio-demographic and clinical data were obtained from hospital records. This study included six thyroid nodule cases, consisting of three (50%) women and three (50%) men. Patients had the appearance and clinical symptoms of swelling in the neck (100%), of which 50% had symptoms of difficulty swallowing and 16% had symptoms of shortness of breath. Three (50%) patients underwent isthmolobectomy, and 3 (50%) patients underwent total thyroidectomy. Three (50%) patients suspected of approaching malignancy based on TIRADS and BETHESDA underwent total thyroidectomy with postoperative histopathological results of non-malignancy. Three (50%) patients with suspected benign nodules based on TIRADS and BETHESDA underwent isthmolobectomy, with postoperative histopathological results indicating non-malignancy. The concordance of the results of the ultrasound examination (TIRADS) and histopathology of thyroid nodules before surgery (BETHESDA) compared with the results of the postoperative histopathological examination was 50%.

Keywords: Thyroid nodule, TIRADS, BETHESDA, Histopathological

INTRODUCTION

Thyroid nodules are common and generally benign. Several studies have shown a prevalence of 2-6% on palpation, 19-35% on ultrasound, and 8-65% on autopsy data.[1] USG is the radiological modality of choice for the detection and evaluation of the morphological features of thyroid nodules. The thyroid imaging reporting and data system (TIRADS) is a system for evaluating the risk of malignancy of thyroid nodules, which was first proposed by Horvath et al in 2009.[2] FNA has a very important role in the diagnosis of abnormalities in the thyroid. morphological criteria, and risk of malignancy. In 2007, the national cancer institute (NCI) in its conference proposed 6 levels of cytological assessment of thyroid nodules with the name The BETHESDA system for

reporting thyroid Sitopathology. The gold standard for the diagnosis of thyroid nodules is postoperative histopathology.[3]

The purpose of this case series was to assess the suitability of the results of ultrasound and histopathological examination of thyroid nodules before surgery compared to the results of postoperative histopathological examination at Dr. Sardjito general hospital, Yogyakarta.

CASE SERIES

This serial case used secondary data from patients with thyroid nodules who underwent ultrasound examination and fine needle aspiration histopathology before surgery, then underwent thyroid surgery and postoperative histopathological examination at Dr. Sardjito general hospital. This case series reported six patients who had thyroid nodules but with different initial presentations, diagnoses, and management (Table 1).

Case 1

A 10-year old complained lump in the right neck for the past 2 years. He also complained that it has been getting bigger for the last 5 months. The patient felt easily tired. He had no family history of thyroid disease. Physical examination revealed a well defined solid mass on anterior neck, round in shape with a diameter of approximately 3×4×3 cm, solitary, fixed, tender (-), signs of inflammation (-), and no lymphadenopathy. He had no autoimmune thyroid disease or a family history of thyroid disease. He had normal thyroid labs. USG guided FNA examination on the right thyroid showed: The BETHESDA system reports thyroid cytopathology as class IV, follicular neoplasm. Ultrasound examination showed a solid nodule intra-gastrular of thyroid dextra with a size of 2.31×2.76×3.43 cm, according to TIRADS 4. There were reactive lymph nodes at level IIB left. He underwent total thyroidectomy, and the final pathology was follicular adenoma with nodular hyperplasia on the right thyroid and nodular hyperplasia on the left thyroid.

Figure 1: Case 1.

Case 2

A 51-year old female complained lumps on the neck which was moving during swallowing since 15 years ago, gradually getting bigger in the past 2 years. Physical examination revealed a well-defined solid mass on anterior neck, round in shape with a diameter of approximately 4×4×3 cm, solitary, fixed, tender (-), signs of inflammation (-), and no lymphadenopathy. She had no autoimmune thyroid disease or family history of thyroid disease. She had a normal thyroid exam, but TSH was suppressed with normal free T4 and T3 levels. USG guided FNA examination on the bilateral thyroid showed: Follicular neoplasm (BETHESDA Class IV). Ultrasound examination showed goitre nodusa bilateral thyroid with multiple nodules in bilateral thyroid (TIRADS 5, highly suspicious). There was no lymphadenopathy in the neck. She underwent total thyroidectomy, and the final pathology was bilateral thyroid and isthmus: subacute granulomatous thyroiditis (de Quervain thyroiditis).

Figure 2: Case 2.

Case 3

A 70-year old female complained a lump on the neck for the past 2 years and getting bigger for the last 3 months. The complaint is accompanied by difficulty swallowing and feels lumpy since 6 months ago. Physical examination revealed a well defined solid mass on anterior neck, round in shape with a diameter of approximately 4x4x3 cm, solitary, pain on palpation, fixed, tender (-), and signs of inflammation (-). She had no autoimmune thyroid disease or family history of thyroid disease. She had low TSH and free T3 levels with normal free T4 levels. USG guided FNA examination on the right thyroid showed: follicular neoplasm (BETHESDA system for reporting thyroid cytopathology class IV). Ultrasound examination showed the bilateral nodul thyroid (TIRADS 5). She underwent a total thyroidectomy, and the final pathology was nodular hyperplasia. A day after the operation, there was hoarseness and distension, and on laryngeal endoscopy, there was right vocal fold paresis and dyspnea. She then underwent a tracheostomy.

Figure 3: Case 3.

Case 4

A 69-year old male complained a lump in the left neck for the past 2 years and getting bigger for the last 4 months with difficulty swallowing and feeling lumpy. Physical examination revealed a well defined solid mass on anterior neck, round in shape with a diameter of approximately 10x7x5 cm, solitary, fixed, tender (-), and showing signs of inflammation (-). He had no autoimmune thyroid disease or a family history of thyroid disease. He had a normal thyroid exam, but TSH was suppressed with normal free T4 and T3 levels. USG guided FNA examination on the left thyroid showed: No malignant cells were found. The BETHESDA system for reporting thyroid cytopathology class II: benign colloid nodule. Ultrasound examination showed a cystic nodules on the thyroid sinistra and solid nodules on the thyroid dextra (TIRADS 3). He underwent isthmolobectomy, and the final pathology was nodular hyperplasia (left thyroid and isthmus) with cholesterol granuloma and calcification.

Figure 4: Case 4.

Case 5

A 38-year old female complained a lump in the left neck for the past 1 year and getting bigger for the last 2 months. Physical examination revealed a well defined solid mass on anterior neck, round in shape with a diameter of approximately 6×4×3 cm, solitary, fixed, tender (-), and showing signs of inflammation (-). She had no autoimmune thyroid disease or family history of thyroid disease. She had normal TSH and a free T4 level with low free T3 levels. USG guided FNA examination on the right thyroid showed: No malignant cells were found. The BETHESDA system for reporting thyroid cytopathology class II: benign colloid nodule. Ultrasound examination showed struma nodusa on thyroid dextra (TIRADS 3: mildly suspicious), nodul spongioform, and simple cyst thyroid sinistra (TIRADS 1: benign). There were prominent lymphadenopathy levels IIA colli sinistra. She underwent isthmolobectomy, and the final histology was nodular hyperplasia.

Figure 5: Case 5.

Case 6

A 54-year old male complained a lump on the neck six months ago with pain episodes and felt uncomfortable while eating. Physical examination revealed a well-defined cystic mass, round in shape with a diameter of approximately 3×3×2 cm, solitary which was moving during swallowing, signs of inflammation (-). He had no autoimmune thyroid disease or a family history of thyroid disease. He had normal thyroid labs. USG guided FNA examination on the right thyroid showed: Malignant cells weren't found. The BETHESDA system for reporting thyroid cytopathology class II: benign colloid nodule Ultrasound examination showed a right heterogeneous thyroid (solid-cystic) mass according to TIRADS II. He underwent isthmolobectomy, and the final histology was nodular hyperplasia.

Figure 6: Case 6.

DISCUSSION

This study included six cases: three (50%) female patients and three (50%) male patients. Patients had the appearance and clinical symptoms of swelling in the neck (100%), of which 33% had symptoms of difficulty swallowing and 16% had symptoms of being easily tired. Three (50%) patients underwent isthmolobectomy, and three (50%) patients underwent total thyroidectomy.

From the USG, we found 2 cases (33%) with TIRADS 5, 2 cases (33%) with TIRADS 4, and TIRADS 2 and 4 each 1 case (16%). We find that with the increasing incidence of thyroid neoplasms, more parameters are required to identify possible suspicious nodules and address them appropriately.[4] Nodules in the thyroid are very common, and their prevalence rates are largely dependent on the identification method. By just palpation, the prevalence rate ranges from 4 to 7%, whereas by using imaging modalities such as the high-resolution ultrasonogram, it ranges from 20 to 76% in the adult population.[5]

Table 1: Patient characteristic and findings in FNAB, USG, histopathology.

Case	Gender, age (In years)	Clinical symptoms	FNAB (BETHESDA)	USG finding (TIRADS)	Operation	Histopathology
Case 1	Male, 10	Lump in the right neck (round in palpable 3×4×3 cm, solitary, well-defined, solid consistency, fixed); easily tired	The BETHESDA system reporting for thyroid cytopathology: Class IV, follicular neoplasm	-Solid nodule intra glandular of thyroid dextra with a size of 2.31×2.76×3.43 cm, according to TIRADS 4.	Total thyroidectomy	-Right thyroid: Follicular adenoma with nodular hyperplasia -Left thyroid: Nodular hyperplasia -Isthmus: Nodular hyperplasia -Lymph node: Sinus histiocytosis.
Case 2	Female, 51	Lump in neck (round in palpable 3×4×3 cm, solitary, well-defined, solid consistency, fixed)	BETHESDA system reporting for thyroid cytopathology: class IV, follicular neoplasm	-Struma nodusa thyroid bilateral with multiple nodul on bilateral thyroid (TI-RADS 5, highly suspicious)	Total thyroidectomy	Thyroid bilateral, isthmus: Subacute granulomatous thyroiditis (De Quervain thyroiditis)
Case 3	Female, 70	Lump in neck (round in palpable 4×4×3 cm, solitary, well-defined, solid consistency, fixed); difficulty swallowing	The BETHESDA system for reporting thyroid cytopathology: class IV, follicular neoplasm	-Nodul thyroid bilateral -Solid- cystic lesion, dominan solid, hiper-hipoechoic, amorf, irregular border, micro-calcification (+), taller than wider (+) (TIRADS 5)	Total thyroidectomy	Thyroid bilateral: nodular hyperplasia
Case 4	Male, 69	Lump in neck (round in palpable 10×7×5 cm, solitary, well-defined, solid consistency, fixed); difficulty swallowing	The BETHESDA system reporting for thyroid cytopathology: class II, benign colloid nodule	-Nodul cystic thyroid sinistra -Nodul solid thyroid dextra (TIRADS 3)	Isthmolobectomy	-Tiroid sinistra: nodular hyperplasia -Isthmus: nodular hyperplasia with cholesterol granuloma dan Kalsifikasi.
Case 5	Female, 38	Lump in the neck (round in palpable 6×4×3 cm, solitary, well-defined, solid consistency, fixed)	The BETHESDA system for reporting thyroid cytopathology: class II, benign colloid nodule.	-Struma nodusa thyroid dextra, TIRADS 3 (Mildly suspicious) -Nodul spongioform and simple cyst thyroid sinistra, TIRADS 1 (Benign)	Isthmolobectomy	Nodular hyperplasia thyroid
Case 6	Male, 54	Lump in neck (round in palpable 3×3×2 cm, solitary, well-defined, solid consistency, fixed), feeling lumpy	BETHESDA system reporting for thyroid cytopathology: class II, benign colloid nodule	-Dextra thyroid solid cystic mass corresponds to TIRADS 2	Isthmolobectomy	Nodular hyperplasia

From the FNAB-guided USG, we found 3 cases (50%) with BETHESDA class II and 3 cases (50%) with BETHESDA class IV. Traditionally, FNAB of thyroid nodules has proven to be superior to ultrasound in the evaluation of thyroid malignancies for solitary nodules or dominant nodules where FNAB would be feasible and acquire an adequate tissue sample for an appropriate diagnosis.[5]

Eventhough the accuracy of the TIRADS score remains low, the probability of cancer is higher in TIRADS 4 and 5 scores.[6] In contrast, TIRADS is a reliable classification system in routine practice that significantly reduces the number of unnecessary thyroid FNABs with higher specificity compared to local best practice guidelines.[6]

All of the histopathological findings in our cases were benign, with 4 cases (66%) finding nodular hyperplasia, 1 case (16%) finding follicular adenoma, and interestingly, 1 case (16%) finding de Quervain thyroiditis. TIRADS scores 4 and 5 were considered positive for malignancy, while scores 1-3 were considered negative for malignancy. The nodules classified as BETHESDA I and III were considered benign, and those nodules classified as BETHESDA IV-VI were considered malignant.[5,7] TIRADS and BETHESDA correlation to histopathological tiroid nodules in this case series found 3 cases (50%) in accordance with and 3 cases (50%) in disagreement with (Table 3).

This case series shows 3 cases (50%) with TIRADS leading to malignancy according to the BETHESDA classification, which also leads to malignancy, and vice versa. Three cases (50%) with TIRADS leading to negative malignancy and the BETHESDA classification also leading to negative malignancy. However, none of the six cases (100%) indicated malignancy on histopathological findings. Our case series attempts to address this exact dilemma in patients who present with high TIRADS and BETHESDA scores but whose final histopathology findings seem inappropriate or inadequate. The cross-tabulation of TIRADS and BETHESDA was prepared (Table 2).

Table 2: TIRADS, BETHESDA and histopathology findings.

Case	TIRADS	BETHESDA	Histopathology
1	4	4	Follicular adenoma
2	5	4	De Quervain thyroiditis
3	5	4	Nodular hiperplasia
4	3	2	Nodular hiperplasia
5	3	2	Nodular hiperplasia
6	2	2	Nodular hiperplasia

This case series shows the determination of operative action based on the results of TIRADS and BETHESDA, where if one or both findings indicate malignancy, the decision is total thyroidectomy, whereas if the findings show negative malignancy, the decision to take action is isthmolobectomy. FNA biopsy is the gold standard for the preoperative diagnosis of thyroid malignancies. Nevertheless, this method yields indeterminate results in up to 30% of cases. Therefore, these patients are often referred for unnecessary surgery to establish the diagnosis. To improve the accuracy of preoperative diagnosis, several other methods, such as ultrasonography, have been developed and can be used either in association with or as an alternative to FNA.[8] This review aims to evaluate all these diagnostic tools to determine the most appropriate way of managing thyroid nodules and subsequently improve the selection of cases referred to surgery.

Table 3: TIRADS classification, FNAB results crosstabulation.

TIRADS class	BETHESDA class		Total
	Positive	**Negative**	
Positive			
Count	3	0	3
% of total	50	0	50
Negative			
Count	0	3	3
% of total	0	50	50
Total			
Count	3	3	6
% of Total	50	50	100

Thyroid nodules in children tend to be malignant, but in this case series, 1 case of thyroid nodules in children showed benign histopathology (follicular adenoma), although the preoperative diagnosis suggests malignancy (TIRADS 4, BETHESDA 4).[7]

In this case series, there was 1 patient with a complication after surgery (vocal cord paresis) with the clinical findings of hoarseness and dyspneusis, and the next step is to perform a tracheostomy on this patient.

CONCLUSION

The correlation between TIRADS and Bethesda results showed concordance with postoperative histopathology in benign findings but in contrast to malignant findings. The concordance of the results of the ultrasound examination (TIRADS) and histopathology of thyroid nodules before surgery (BETHESDA) compared with the results of the postoperative histopathological examination was 50%.

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