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Original Research Article

Role of Thyroid Imaging Reporting and Data System (TI-RADS) to Evaluate Thyroid Nodules, Correlation with FNAC

Potla Srilakshmi[1], Indra Neil Mekala[2], Anusha Rani Sambangi[3], Lavu Srikanth[4]

[1]Consultant Radiologist, Susmitha Diagnostic Centre, Eluru.
[2]Associate Professor, Department of Radiodiagnosis, GITAM Institute of Medical Sciences and Research, Visakhapatnam.
[3]Assistant Professor, Department of Radiodiagnosis, GSL Medical College, Rajamahendravaram.
[4]Consultant Radiologist, Mithra Diagnostics, Nuzividu.

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Corresponding author: Dr. Lavu Srikanth
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Abstract

Introduction: The diagnostic techniques play vital role in the diagnosis of thyroid nodules. A study was conducted to assess the diagnostic reliability of TI-RADS classification in differentiating between benign and malignant thyroid nodules.

Methods: It was a cross sectional study carried in the department of Radiodiagnosis, GSL Medical College, Rajahmundry. The study was carried for 18 months. Both gender, >18 years, with thyroid swelling history and referred to radiology for ultrsonography (USG) were included in this study. The participant was kept in supine position, scanned with high frequency probe in sagittal, transverse, and oblique sections and the findings were recorded. It was followed by USG guided FNAC under strict aseptic precautions 23 gauge needle was introduced into the suspicious thyroid nodules under USG guidance, sample was aspirated and transferred to a microscopic slide. Then slides were transferred in coplin jar containing Isopropyl alcohol as fixative. P≤0.05 was considered as statistically significant.

Results: Total 93 members were included. Majority (33.5%; 31) were between 31 – 40 years; maximum (6.5%) malignant cases were also diagnosed in this group. Gender wise maximum (12%) malignant cases were detected in female, no statistical significance. Majority of malignant cases maximum were TI-RADS 5 category.

Conclusions: For evaluating thyroid nodules USG is commonly used with lot of variabilities and subjective reporting. USG features such as microcalcification, irregular margins, lobulated margins, width have an increased risk of malignancy. So TIRADS category is useful in stratifying the patient management.

Keywords: Category, Thyroid, Participant.

Introduction

The diagnostic techniques play vital role in the diagnosis of thyroid nodules; 4 – 7% is the prevalence range by palpitation whereas it is 20 – 76% with imagining modalities. [1] The average prevalence of thyroid nodular malignancy across the world is ranged between 4.0 to 6.5%. [2]

Due to the advantages such as widespread availability, low cost, and lack of ionizing radiation, ability to depict nodule features accurately Ultrasonography (USG) is commonly used for the evaluation of thyroid masses. [3] But it is not a confirmatory tool. Fine needle aspiration cytology (FNAC) is the standard method for evaluation of thyroid nodules which is used to differentiate between benign and malignant thyroid nodules. [4]

In 2017, the TI-RADS committee of the American College of Radiology published a new stratification system for classifying thyroid nodules based on their appearance at the ultrasound. In ACR TI-RADS, points in five features categories are summed to determine a risk level from TR1 to TR5. Recommendations for biopsy or the US follow-up are based on nodules ACR TI-RADS level and its maximum diameter. [5] With this a study was conducted to assess the diagnostic reliability of TI-RADS classification in differentiating between benign and malignant thyroid nodules

Methods

It was a cross sectional study carried in the department of Radiodiagnosis, GSL Medical College, Rajahmundry. The study was carried for 18 months, from October 2019 to May 2021. Informed consent was obtained from all study subjects. The study protocol was approved by the Institutional ethics committee. Both gender, >18 years, with thyroid swelling history and referred to radiology for USG were included in this study. Those with thyroid malignancy, non-cooperative individuals and minors were not considered in this research.

After getting the clinical history the participants were prepared for USG. The participant was kept in supine position and neck was hyperextended by placing a pillow below the shoulders. Neck area was scanned with high frequency probe in sagittal, transverse, and oblique sections to optimally visualize both lobes of thyroid gland, isthmus, carotid arteries as well as internal jugular veins and supraclavicular fossa; the findings were recorded. It was followed by USG guided FNAC. Under strict aseptic precautions 23 gauge needle was introduced into the suspicious thyroid nodules under USG guidance, sample was aspirated and transferred to a microscopic slide. Then slides were transferred in coplin jar containing Isopropyl alcohol as fixative.

Statistical analysis:

Data were analysed suing SPSS version 20, presented as Mean ± SD, percentage. Chi-square was used to find the association between CT and pathology findings. Sensitivity and specificity were calculated to the accuracy of diagnostic tests. $P \leq 0.05$ was considered as statistically significant.

Results

Total 93 members were included in this research. Age wise, majority (33.5%; 31) were between 31 – 40 years; maximum (6.5%) malignant cases were also diagnosed in this group (Table 1).

Table 1: Age wise distribution of study members; n (%)

Age	Benign	Malignant	Total
<20	3 (3.2)	1 (1.07)	4 (4.3)
21 – 30	22 (23.6)	2 (2.1)	24 (26)
31 – 40	25 (27)	6 (6.5)	31 (33.5)
41 – 50	21 (22.6)	3 (3.1)	24 (26)
>50	9 (8.6)	1 (1.07)	10 (9.6)
Total	80 (86)	13 (14)	93 (100)

Gender wise maximum (12%; 11) malignant cases were detected in female; there was no statistical significance (Table 2).

Table 2: Gender wise distribution of study members; n (%)

Gender	Benign	Malignant	Total
Female	68 (73)	11 (12)	79 (85)
Male	12 (13)	2 (2.1)	14 (15)
Total	80 (86)	13 (14)	93 (100)
Statistical analysis	Chi square = 0.0013; P = 0.9713.		
	Statistically not significant		

Multiple nodules were observed in majority (80%; 74). Out of the 13 malignant cases, 9 were hypoechoic and 4 were very hypoechoic; the difference was statistically significant. Majority were TI-RADS 2 and 3 categories, respectively; whereas in malignant cases maximum were TI-RADS 5 category (Table 3).

Table 3: Number of thyroid nodules as per the TI-RADS category among the study participants; n (%)

Category	Benign	Malignant	Total
TI-RADS 1	8 (8.6)	0	8 (8.6)
TI-RADS 2	32 (34.4)	0	32 (34.4)
TI-RADS 3	32 (34.4)	0	32 (34.4)
TI-RADS 4	8 (8.6)	3 (3.2)	11 (12)
TI-RADS 5	0	10 (10.7)	10 (10.7)
Total	80 (86)	13 (14)	93 (100)

Discussion

Thyroid cancer is a rare clinical condition, estimated prevalence is around 5%. [6] USG is used to evaluate the thyroid nodules, scores are assigned to each nodule to suggest whether the nodule require any follow-up or needed to undergo FNAC. American College of Radiology (ACR) TIRADS system is the most commonly used of all the different scores proposed. [6]

In this research female prevalence was reported. A study conducted by Rahawarin et al. [7] showed the incidence of a thyroid nodules is common among female; out of total of 114 patients 82 (71.9 %) were female and 32 (28.1%) were male. In another study by Srinivas MN et al. [8] out of 365 patients, 22 were male and 343 were female; female to male ratio is 16. In the present study, the distribution of thyroid nodules depending on gender was relatively similar to the study done by Rahawarin et al. [7] and included 79 (85%) female patients and 14 (15.1%) male patients.

The incidence of solitary thyroid nodule is 4 times common in women and the malignancy risk with this type is 5 – 10%. [9] In a study conducted by Hua Jiang et al. [10] the prevalence of solitary thyroid nodules is 35.5% and multiple nodules were 64.5% of cases. In the present study, the prevalence of thyroid nodules was relatively similar 19 and 74, respectively. So, the most of patients in the present study were presented with multiple nodules.

In this present study, there was no malignancy risk with TIRADS 2, 3 and 27.27% in patients with TIRADS score 4 and 100 % in TIRADS 5 (Table 3). Moifo B et al. [11] reported risk of malignancy was increased from TIRADS category 2 to 5. In Xu et al. [12] reported highest risk of malignancy in TIRDS 5. Similar view was opined in the other reports. [13, 14]

A study done by Middleton et al. [15] peripheral calcifications was associated with the risk of 20.2% of malignancy and punctate echogenic foci in solid nodules was 35%; it was reported that 11.1% of malignant nodules and 66.7% of malignant nodules have punctate echogenic foci. Microcalcification has a specificity of 84–97% and a positive predictive value of 33–78% and is highly suggestive of malignancy. In solid hypoechoic nodules, the presence of microcalcifications has increased risk but in partially cystic and hyperechoic nodules the risk is intermediate. [16] In Srinivas MN. [8] study, presence of microcalcification has 98.53% specificity, 40% sensitivity for detecting malignant thyroid nodules. In the present study, the presence of microcalcifications has 42.86% sensitive and 100 % specific. [17]

Conclusions

For evaluating thyroid nodules USG is commonly used with lot of variabilities and subjective reporting. USG features such as microcalcification, irregular margins, lobulated margins, width have an increased risk of malignancy. So TIRADS category is useful in stratifying the patient management.

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