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Assessment of Malignant Risk Potential of Thyroid Nodules using Ultrasound TIRADS Criteria with Correlation by FNAC/Excision Biopsy

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Abstract

Thyroid nodules are highly prevalent in the adult population, with a risk of malignancy in a subset of cases. Ultrasound-based Thyroid Imaging Reporting and Data System (TIRADS) classification enables risk stratification and guides decisions on whether to perform FNAC. This study evaluates ultrasound findings in thyroid nodules and correlates them with cytopathological results to assess malignancy risk. Nodules in TIRADS categories 4 and 5 showed malignancy, while category 3 had no malignant cases. Certain sonographic features (irregular/lobulated margins, marked hypoechogenicity, microcalcification, taller-than-wide shape) showed high specificity for malignancy. The study concludes that TIRADS is a valuable, non-invasive method for thyroid nodule assessment.

Keywords: Thyroid Nodule, TIRADS, Ultrasound, FNAC, Malignancy Risk, Thyroid Cancer

INTRODUCTION

Thyroid nodules are common, affecting up to 68% of adults. Although many nodules are benign, differentiating malignant from benign lesions remains a diagnostic challenge. FNAC is confirmatory but invasive. Hence, ultrasound is widely used as a first-line modality. The American College of Radiology (ACR) introduced TIRADS to categorize nodules based on suspicious features. This classification helps identify which nodules need FNAC and avoids unnecessary procedures.

OBJECTIVES

- To study characteristic ultrasound findings in thyroid nodules.
- To categorize nodules using TIRADS.
- To correlate ultrasound findings with cytological/histopathological results.
- To assess the malignancy risk associated with each TIRADS category.

MATERIALS AND METHODS

A short-term prospective study conducted in 50 patients with thyroid nodules referred to the Radiodiagnosis Department at ASRAM Medical College, Eluru, from January 2023 to June 2023. Each patient underwent thyroid ultrasound, followed by FNAC. Ultrasound features and pathology findings were analyzed.

Inclusion Criteria:

- Patients of all ages and genders with thyroid-related complaints.

Exclusion Criteria:

- Drug/radiation-induced thyroid dysfunction.
- Systemic or CNS-related thyroid disorders.
- Unwilling participants.
- Pregnant women.

RESULTS

Among the 50 nodules:

- TIRADS 3: 36 nodules – 0% malignancy
- TIRADS 4: 12 nodules – some malignant

• TIRADS 5: 2 nodules – 100% malignant

Odds ratios for malignancy features:
• Irregular Margin: 1.71
• Microlobulated Margin: 24
• Taller-than-wide Shape: 19.4
• Microcalcification: 20.35
• Marked Hypoechogenicity: 47

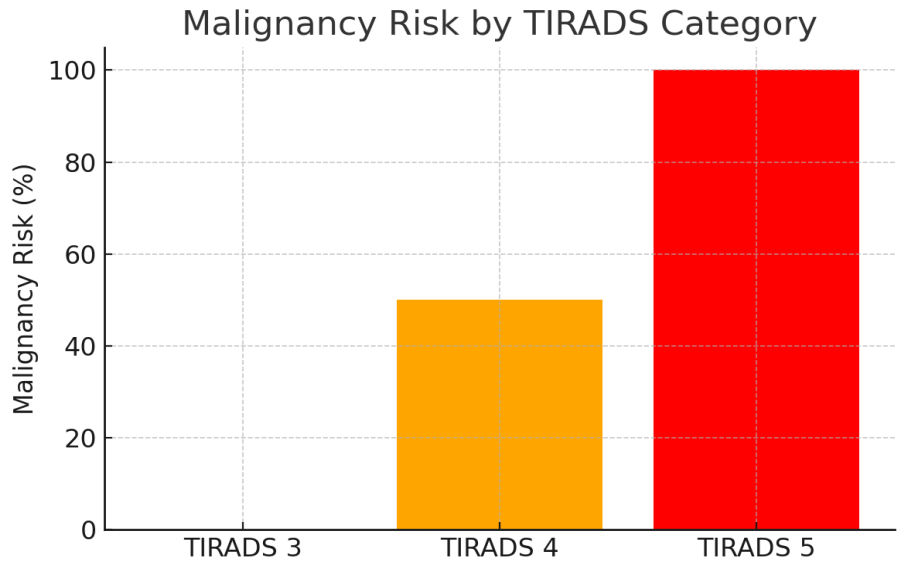
Table 1: Distribution of Thyroid Nodules by TIRADS Category

TIRADS Category	Number of Nodules	Malignancy Presence
TIRADS 3	36	0%
TIRADS 4	12	Some malignant
TIRADS 5	2	100%

Table 2: Odds Ratio for Suspicious Sonographic Features

Sonographic Feature	Odds Ratio
Irregular Margin	1.71
Microlobulated Margin	24
Taller-than-wide Shape	19.4
Microcalcification	20.35
Marked Hypoechogenicity	47

Figure 1: Malignancy Risk by TIRADS Category



DISCUSSION AND CONCLUSION

TIRADS classification is useful in identifying nodules at higher risk of malignancy. TIRADS 3 nodules showed no malignancy in this study, whereas TIRADS 5 nodules showed 100% malignancy. Ultrasound features like irregular/lobulated margins, microcalcification, taller-than-wide shape, and marked hypoechogenicity strongly correlate with malignancy. These findings can help reduce unnecessary FNACs and surgeries. The ACR TIRADS system is a practical and cost-effective method to guide thyroid nodule management.

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