

Correlation Between Preoperative Ultrasound-Guided Fine-Needle Aspiration Cytology and Postoperative Histopathology in Thyroid Nodule Diagnosis

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I. Introduction

A preoperative ultrasound-guided fine-needle aspiration cytology (USG-FNAC) from the suspicious portion has a strong correlation with postoperative biopsy (histopathology), but some discrepancies can occur. Postoperative histopathology is considered the gold standard for diagnosis and is often used to validate the accuracy of FNAC.

Strengths of FNAC

Studies demonstrate that FNAC is a highly effective diagnostic tool, though its accuracy can vary between institutions.

High diagnostic accuracy: Many studies show high overall accuracy rates, with some reporting figures over 90%.

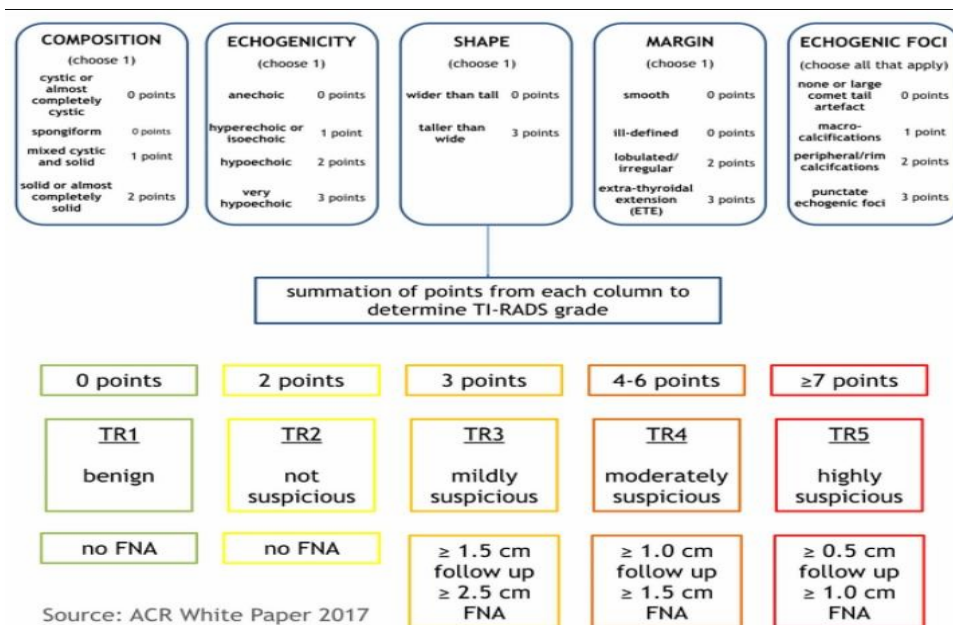
High specificity: The specificity of FNAC—its ability to correctly identify benign lesions—is often very high, with some studies reporting 95% to 98%.

Reduced unnecessary surgeries:

Due to its high accuracy, FNAC helps prevent unnecessary surgical removal of benign thyroid nodules, reserving surgery for the most suspicious cases.

Cost-effective and minimally invasive: FNAC is a simple, rapid, and less expensive procedure compared to surgical biopsy.

Ultrasound guidance: Using ultrasound provides real-time monitoring to ensure accurate sampling, especially for non-palpable, cystic, or very small lesions. This significantly improves the diagnostic sensitivity of the procedure.



Diagnostic category	Risk of malignancy (%)	Usual management
Nondiagnostic or unsatisfactory	1-4	Repeat FNA with ultrasound guidance
Benign	0-3	Clinical follow-up
Atypia of undetermined significance or follicular lesion of undetermined significance	5-15	Repeat FNA
Follicular neoplasm or suspicious for a follicular neoplasm	15-30	Surgical lobectomy
Suspicious for malignancy	60-75	Near-total thyroidectomy or surgical lobectomy
Malignant	97-99	Near-total

The Bethesda system for reporting thyroid cytopathology:
Implied risk of malignancy and recommended clinical management

II. Limitations And Sources Of Discordance

While the correlation is strong, several factors can lead to discrepancies between USG guided FNAC and final histopathology results:

Sampling error: Inadequate or improper sampling is a primary cause of false results. This can happen with very large nodules, where only one area is aspirated, or with cystic nodules, where the solid malignant component is missed.

Follicular lesions: It is often impossible to distinguish a benign follicular adenoma from a malignant follicular carcinoma on FNAC alone. A definitive diagnosis requires a histopathological examination to check for capsular or vascular invasion. This "gray zone" of indeterminate results is a common cause of diagnostic error.

Variations of papillary carcinoma: The follicular variant of papillary thyroid carcinoma (FVPTC) and cystic papillary carcinoma can be difficult to diagnose via FNAC, which can lead to false-negative results.

Cystic changes: False-negative results can occur when FNAC of a cystic nodule yields only fluid, even though a malignant lesion is present.

Inflammatory conditions: Hashimoto's thyroiditis can present with cellular changes that mimic malignancy, potentially leading to false-positive FNAC results.

Experience of the interpreter: The accuracy of FNAC heavily depends on the skill of the pathologist interpreting the slides.

Managing discrepancies

To manage potential discrepancies, international guidelines recommend specific steps based on the FNAC result. For certain Bethesda categories (the standard reporting system for thyroid FNAC), a benign cytology may still be considered for surgery if other clinical factors are suspicious, such as:

Rapid nodule growth

High-risk features on ultrasound (e.g., microcalcifications, irregular margins)

Significant cervical lymph nodes

Symptoms of compression

In such cases, even with a seemingly benign FNAC result, a follow-up with repeat FNAC or a definitive surgical biopsy may be warranted to confirm the diagnosis.

In this case report of 5 cases, all the 5 patients evaluated with Ultrasound neck, Thyroid profile with antibody assay, if necessary Laryngoscopy, CECT neck and PET CT whole body according to USG findings and cytology. After confirming Euthyroid status Ultrasound guided FNAC of the suspicious portions of the nodules is done in all 5 cases followed by Histopathological confirmation after surgery.

III. Case 1

A 47 year old female patient with Multinodular Goitre with compressing symptom of dysphagia, euthyroid and TIRADS 3 on ultrasound Neck with subcentimetric node. CECT done suggestive of MNG with bilateral subcentimetric nodes. USg guided FNAC of the nodule suggestive of colloid goitre and lymphnode suggestive of reactive lymphadenitis. Total Thyroidectomy along with removal of largest nodule done and histopathological report confirmed Colloid goitre.

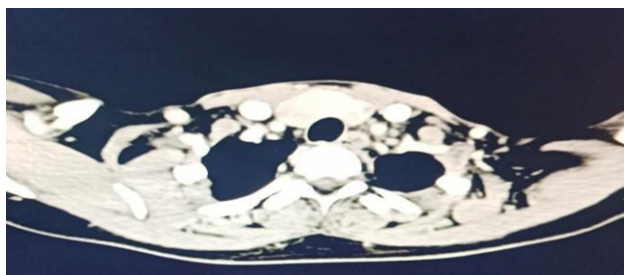


Fig 1.1 CECT of the Thyroid gland

IV. Case 2

A 42 year old female patient with Multinodular Goitre with compressive symptom of dyspnea, euthyroid and retrosternal extension. Ultrasonogram suggestive of Multinodular Goitre (TIRADS 3) and CT neck confirmed retrosternal extension. USg guided FNAC of the Thyroid gland suggestive of Colloid goitre. Total Thyroidectomy done and histopathological examination confirmed Colloid goitre.

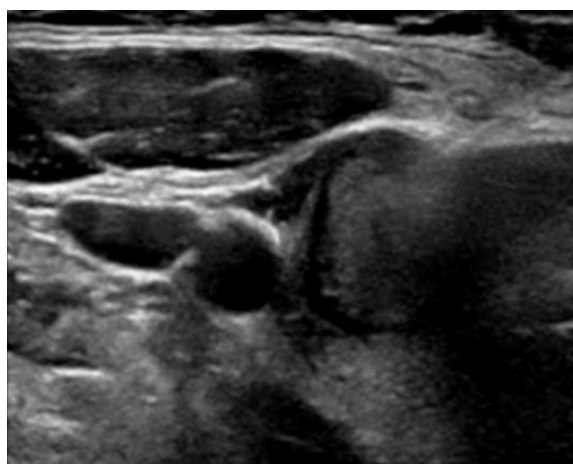


Fig 2.1 USG guided FNAC of the Thyroid lesion

V. Case 3

A 43 year old male patient with Multinodular goitre with Thyroid function tests showing hyperthyroidism. Ultrasound of the neck shows Multinodular goitre TIRADS 2. Patient brought to euthyroid state. Usg guided FNAC suggestive of colloid goitre. Histopathological examination after Total Thyroidectomy confirms colloid goitre.

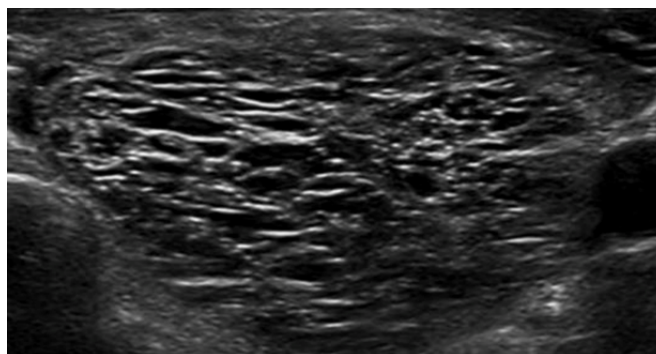


Fig 3.1 TIRADS 2 Thyroid nodule

VI. Case 4

A 57 year old female patient with solitary nodule on the left lobe of thyroid, euthyroid. Usg suggestive of nodule on the left lobe of thyroid TIRADS 2. Usg guided FNAC of the suspicious portion is suspicious of Papillary thyroid carcinoma. PET CT done showing mildly metabolic active nodule with likely reactive lymphadenitis. Total Thyroidectomy done. Final Histopathological examination shows Hashimotos Thyroiditis with one focus of Adenomatous Nodule.

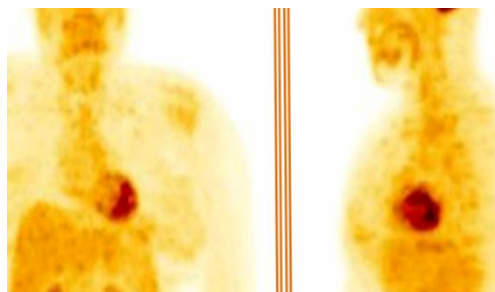


Fig 4.1 PETCT showing metabolically active Thyroid gland

VII. Case 5

A 37 year old female patient with Multinodular Goitre, euthyroid and compressive symptom of dysphagia. Ultrasound of the neck suggestive of Multinodular goitre TIRADS 1,3 and 4 lesions. Usg guided FNAC of the suspicious parts of the nodule suggestive of Nodular colloid Goitre. Total Thyroidectomy done. Histopathological examination shows Follicular nodular disease with degeneration.

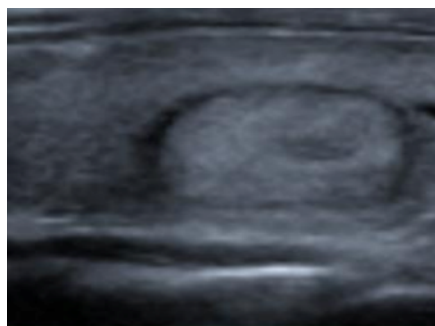


Fig 5.1 TIRADS 3 lesion



Fig 5.2 TIRADS 4 lesion

VIII. Conclusion

Case report analysis of the 5 cases exhibits the high accuracy of the Ultrasound guided fine needle aspiration and very high specificity in detecting benign lesions. This makes Ultrasound guided FNAC a very useful tool in preoperative evaluation of thyroid nodules with suspicious findings on Ultrasound and planning further management.

USG-FNAC is an accurate, cost-effective, and minimally invasive first-line diagnostic tool for thyroid nodules. A strong correlation exists with postoperative histopathology, but certain limitations necessitate careful clinical judgment. The integration of FNAC results with suspicious ultrasound features and other clinical findings is crucial for optimizing patient care and ensuring definitive diagnosis.

Reference Articles

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