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DIAGNOSTIC UTILITY OF GRAY SCALE ULTRASOUND AND ELASTOGRAPHY IN SOLITARY THYROID NODULE

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Abstract

Background: A palpably firm and hard thyroid nodule is linked to a higher risk of cancer.Palpation is a personal experience. Gray-scale ultrasonography (US) may now more accurately diagnose patients by evaluating tissue hardness objectively thanks to the introduction of elastography

Goals: To assess the diagnostic value of elastography and gray-scale US in identifying thyroid nodules that are malignant vs benign.

Materials and procedures: In our Dhiraj General Hospital, a 6-month retrospective study of 70 solid thyroid nodules in 50 patients was conducted using Grey scale US and Elastography. The gold standard FNAC was used to assess the diagnostic performances of grayscale US, Elastography using Rago and Asteria criteria, and Odd's ratios (ORs) with 95% confidence intervals for predicting thyroid cancer.

Results: A total of 50 patients' solid thyroid nodules were examined. 49 were benign and 21 were malignant. The gray-scale US sensitivity, negative predictive value (NPV), and Odd's ratio (OR) for the 70 nodules were 91.6%, 94.5%, and 22.2, respectively. These values were higher than the corresponding values found for elastography with Rago and Asteria criteria, which were 15.6% and 65.3%, 71.6% and 79.2%, and 3.6 and 2.7 ORs, respectively.

Conclusion: Elastography by itself and in conjunction with gray-scale US characteristics performed worse than gray-scale US features when it came to differentiating between benign and malignant thyroid nodules.

Key words:- Gray scale US imaging, Elastography, FNAC, Thyroid nodule.

INTRODUCTION

A palpably firm and hard thyroid nodule is linked to a higher risk of cancer [1]. Subjective palpation is used [2, 3, 4]. Gray-scale ultrasonography (US) may now more accurately diagnose patients by evaluating tissue hardness objectively thanks to the introduction of elastography [5, 6]. The cellularity and content of thyroid nodules determine their rigidity [7]. The fundamental idea behind US elastography is that tissue displacement in a longitudinal direction, or strain, is produced inside thyroid tissue when compression is applied, and this strain is smaller in harder

tissues than in softer tissues [8]. Since malignant thyroid nodules are harder than the surrounding adjacent parenchyma, elastography can be used to distinguish between them [2, 3, 7, 9].

Elastography has been assessed

- No comparison to US characteristics in grayscale.
- Each gray-scale US feature individually or in combinations with a few dubious gray-scale US characteristics [2, 3, 9].

Goals and objectives

- To assess the diagnostic value of elastography in addition to gray-scale US in distinguishing between benign and malignant thyroid nodules.
- To assess the diagnostic value of elastography as a stand-alone diagnostic technique or as an adjunct to gray-scale US.

Materials and procedure

In our Dhiraj General Hospital, a 6-month retrospective analysis of 70 solid thyroid nodules in 50 patients was conducted utilising Grey scale US and Elastography.

Consent : Institutional review board consent with informed consent waived

Study type: retrospective

Date of study: January to June of 2023

Sample size: 50 patients with 70 solid thyroid nodules Gender: 19 men and 51 women

Range of ages: 18–79

US-guided fine-needle aspiration (FNA) and elastography were used to scan 73 thyroid nodules at gray-scale. Three nodules that had cystic components removed. The gold standard FNAC was compared to the diagnostic performances of grayscale US, Elastography with Rago and Asteria criteria (Photos – 1, 2), and odds ratios (ORs) with 95% confidence intervals for predicting thyroid cancer.

Photo – 1: RAGO criteria.

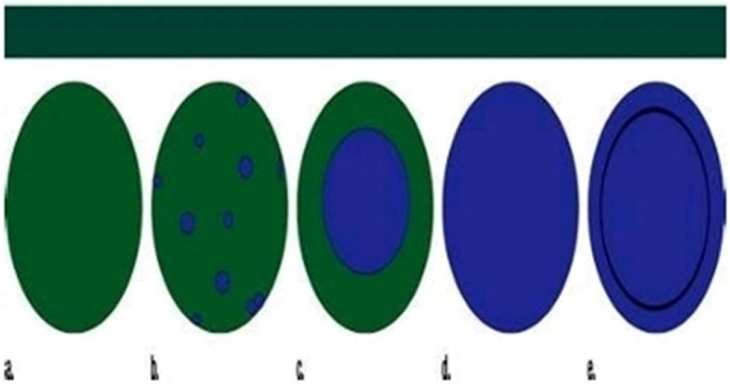
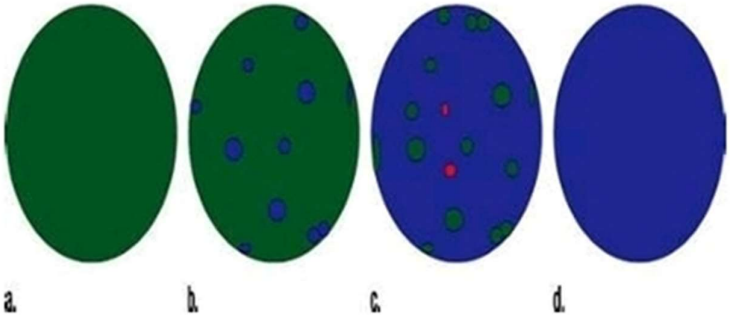


Photo – 2: ASTERIA criteria.



Real-time grayscale US with a linear array transducer operating at 6-14 MHz

Features in grayscale

1. Component.
2. Echogenicity.
3. Margins.
4. Calcification.

Results from elastography were categorised using

- Rago criteria.
- Asteria standards - Degree of strain: Blue: no strain, to Red: maximum strain (i.e., the softest component).

Findings and Discussion :- A 95% Confidence Interval was used with Odd's Ratio (Table 1). The analysis of generalised estimating equations was applied.

Table 1 lists the Asteria and RAGO requirements. Perceptiveness predicted value that is negative Scale of grey US 91.6% and 94.4% The Odd's Ratio 22.2 Rago standards 15.6% 71.6% 3.6 The Asteria standards 65.3% 79.2% 2.7

Pathologic and Demographic Features

Patients with benign nodules were older on average than those with malignant lesions. The patients' sex was unrelated to cancer. Every Elastography and Gray-Scale US Feature Associated with Malignancy 21 of the 70 nodules were cancerous and 49 were benign.

Table – 1: RAGO and Asteria criteria. Sensitivity Negative predictive value Gray scale US

Table – 1: RAGO and Asteria criteria.

	Sensitivity	**Negative predictive value**	**Odd's Ratio**
Gray scale US	91.6%	94.4%	22.2
Rago criteria	15.6%	71.6%	3.6
Asteria criteria	65.3%	79.2%	2.7

91.6% 94.4% Odd's Ratio 22.2 Rago criteria 15.6% 71.6% 3.6 Asteria criteria 65.3% 79.2% 2.7

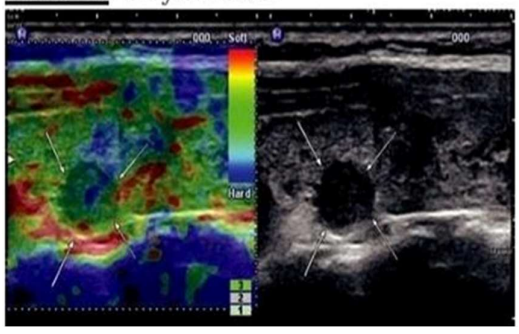
Malignant nodules were more frequently observed to exhibit gray-scale US characteristics of pronounced hypoechogenicity, a poorly defined edge, microcalcifications, a taller-than-wide form, and questionable evaluation. Malignant nodules were also more frequently found to have scores of 4 and 5 according to the Rago criteria and scores of 3 and 4 according to the Asteria criteria than benign nodules.

Cases

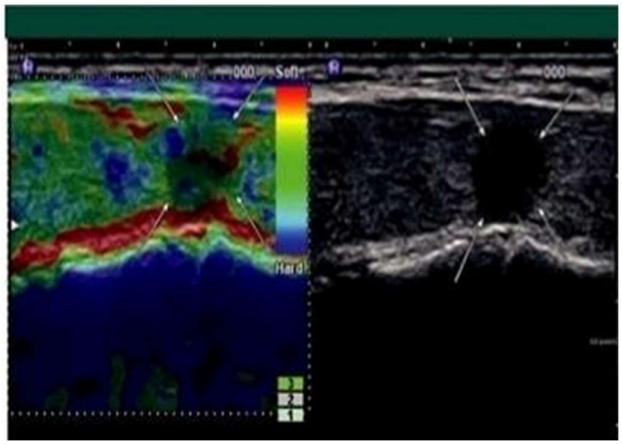
1) A 43-year-old lady who had a standard examination. Grayscale US revealed a 12 mm left thyroid nodule (arrows) that was deemed worrisome due to its strong hypoechogenicity, ill-defined borders, microcalcifications, and taller-than-wide form.

A 12 mm left thyroid nodule (arrows) with marked hypoechogenicity, poorly defined margins, microcalcifications, and a taller-thanwide shape was found at gray-scale US and assessed as suspicious (Photo – 3).

Photo – 3: Gray-scale US.



2) A 47-year-old male who had a standard examination. At gray-scale US, a 9 mm right thyroid nodule (arrows) was discovered. It was deemed worrisome because to its hypoechogenicity, weak margins, and taller-than-wide form. At elastography, a score of 3 was assigned based on both the Rago and Asteria criteria. After cytologic investigation and surgery, the thyroid lesion was found to be papillary thyroid cancer (Photo 4)



CONCLUSION

- When it came to differentiating between benign and malignant thyroid nodules, elastography by itself and in combination with grayscale US features performed worse than grayscale US features.
- Elastography is not a helpful method for suggesting FNAC.

LIMITATIONS

The reference standard that was employed was: histopathology: 22 nodules in 17, cytology: 48 nodules in 33; no surgical confirmation was performed for any of the lesions. There might have been false-negative cytologic results. Nodules with cysts were not included. The majority of the 21 cancers are variant forms of papillary thyroid carcinomas. Regarding nodules with unclear cytology, there is disagreement.

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