

REVIEW: THE ROLE OF COLOR DOPPLER ULTRASOUND IN THE EVALUATION OF THYROID NODULES

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Background: Thyroid nodules are commonly detected in clinical practice, with a significant portion being benign, but a small percentage harbor malignancy. Accurate evaluation of these nodules is crucial for guiding management decisions, such as the need for biopsy or surgery. Color Doppler ultrasound, an advanced imaging technique, is increasingly used to assess thyroid nodules by evaluating blood flow within the nodule. The **aim** of this review is to examine the role of color Doppler ultrasound in the diagnostic workup of thyroid nodules and its effectiveness in differentiating benign from malignant nodules.

Material and Methods: A review of studies published in medical databases, including PubMed and Cochrane Library, was conducted to evaluate the utility of color Doppler ultrasound in assessing thyroid nodules. Key studies focused on the use of Doppler imaging to analyze vascularity patterns in thyroid nodules and its correlation with malignancy. The review included articles that assessed the sensitivity, specificity, and overall diagnostic performance of color Doppler in the context of thyroid nodule evaluation.

Results: Color Doppler ultrasound assesses blood flow within a thyroid nodule, with malignant nodules often exhibiting abnormal vascular patterns, such as increased peripheral or internal blood flow. Studies have shown that color Doppler ultrasound can provide additional information beyond conventional ultrasound, particularly in nodules with ambiguous characteristics. Malignant thyroid nodules are frequently associated with increased vascularity, irregular blood vessels, or a higher resistance index in blood flow. Sensitivity and specificity for identifying malignancy using color Doppler ultrasound vary across studies but generally range from 60% to 90%. However, the technique is not definitive on its own and is often used in combination with conventional ultrasound features such as size, shape, and margins of the nodule.

Conclusion: Color Doppler ultrasound is a valuable adjunct in the evaluation of thyroid nodules, helping to differentiate benign from malignant lesions based on vascular patterns. While it enhances diagnostic accuracy, especially for nodules with uncertain characteristics, it is not a standalone diagnostic tool. Color Doppler should be used in conjunction with other imaging modalities like conventional ultrasound and fine needle aspiration biopsy (FNAB) to improve the overall diagnostic approach for thyroid nodule evaluation.