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SONOGRAPHIC DETECTION AND DYNAMIC MONITORING OF THYROID NODULAR LESIONS

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Abstract: Thyroid nodular lesions are a widespread pathology in endocrinology practice. Sonography is the primary instrumental examination method for detecting these lesions, performing differential diagnosis, and conducting dynamic monitoring. This article discusses the sonographic assessment criteria for thyroid nodules, risk stratification systems, and principles of dynamic monitoring.

Keywords: thyroid gland, nodular lesion, sonography, TI-RADS, dynamic monitoring.

Introduction

Thyroid nodular lesions occur in a wide range of the population, from 20% to 76%. With the introduction of high-precision ultrasound devices, the detection rate of clinically insignificant, small-sized nodules has increased significantly. Sonography is considered the "gold standard" for detecting thyroid nodules, assessing their characteristics, and conducting dynamic monitoring.

Although the majority of nodular lesions are benign, there is a risk of malignant transformation in 5-15% of cases. Therefore, early detection of dangerous nodules based on sonographic examination results and determination of appropriate management is of great importance.

Sonographic examination methodology

Sonographic examination of the thyroid gland is performed using high-frequency (7-15 MHz) linear transducers. During the examination, the gland's volume, structure, parenchymal echogenicity, and presence of nodular lesions are assessed.

The following parameters are described for each detected nodule: size (in three dimensions), localization, contour, structure, echogenicity, calcifications, blood supply, and relationship with surrounding tissues. Based on the sonographic characteristics of the nodules, their risk level and subsequent management are determined.

Sonographic differential diagnostic criteria

Features of benign nodules:

Benign nodules are typically well-defined, round or oval-shaped, and have hypoechoic or isoechoic structure. Peripheral (rim) vascularization may be observed around them. Signs of cystic degeneration, coarse calcifications, and spongiform (sponge-like) structure indicate a benign process.

Suspected features of malignant nodules:

Sonographic features that raise suspicion of malignancy include: indistinct, irregular contours; hypoechogenicity; taller-than-wide shape; microcalcifications (psammomatous calcifications); central blood supply; pathological changes in lymph nodes.

Ti-rads systems

Various TI-RADS (Thyroid Imaging Reporting and Data System) systems have been developed to standardize the risk assessment of thyroid nodules. The most widely used is the ACR TI-RADS (American College of Radiology) system, which categorizes nodules into 5 categories based on point totals:

TR1 - benign (0 points)
TR2 - not suspicious (2 points)
TR3 - mildly suspicious (3 points)
TR4 - moderately suspicious (4-6 points)

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TR5 - highly suspicious (≥7 points)

Based on this classification, indications for FNA (fine-needle aspiration) biopsy and dynamic monitoring intervals are determined.

Principles of dynamic monitoring

Depending on the TI-RADS category and nodule size, dynamic monitoring periods are recommended as follows:

TR3 category nodules measuring 2.5 cm and larger are reassessed after 1 year. In TR4 category, nodules 1.5 cm and larger are monitored after 12 months, and nodules larger than 1 cm are recommended for FNA. All nodules 1 cm and larger in TR5 category require FNA.

During dynamic monitoring, attention is paid to nodule volume (growth exceeding 20%), changes in sonographic characteristics, and the appearance of new suspicious features. Significant growth in nodule volume or deterioration of sonographic characteristics is an indication for repeat FNA.

Monitoring of small nodules:

Nodules smaller than 1 cm ("incidentalomas") are usually not clinically significant. The need for monitoring them depends on the presence of suspicious sonographic features. Small nodules without suspicious features generally do not require monitoring.

SPECIAL SITUATIONS

Multinodular goiter:

In multinodular goiter, each nodule larger than 1 cm should be evaluated separately, and biopsy should be performed on the most suspicious-appearing nodules. Biopsying all nodules is not appropriate.

Cystic nodules:

Pure cystic lesions have minimal malignant risk and require dynamic monitoring. In mixed (cystic-solid) nodules, the solid component is evaluated, and the need for biopsy is determined according to the risk level.

Nodules in autoimmune thyroiditis:

Evaluating nodules developed against the background of Hashimoto's thyroiditis becomes difficult because diffuse parenchymal changes are present. In such cases, a more cautious approach is required.

Modern diagnostic capabilities

Elastography allows assessment of tissue elasticity characteristics and increases the effectiveness of detecting malignant nodules. Stiff tissues with low elasticity may indicate a malignant process.

Contrast-enhanced sonography enables detailed study of nodule vascularization characteristics. These additional methods increase the diagnostic value of standard sonography, but their application depends on clinical necessity and available resources.

Results and recommendations

Sonographic assessment and dynamic monitoring of thyroid nodular lesions should be based on the following principles:

1. All nodules larger than 1 cm should be evaluated according to standardized protocol
2. Using the TI-RADS system ensures objective risk assessment and selection of appropriate management
3. Dynamic monitoring periods should be determined according to nodule size and risk category
4. FNA indications must be strictly followed to avoid unnecessary invasive procedures
5. A multidisciplinary approach (endocrinologist, sonologist, cytologist) provides optimal results
6. **Conclusion**

Sonography is an essential, safe, and effective method for detecting and monitoring thyroid nodular lesions. Using standardized assessment systems (TI-RADS), it is possible to identify dangerous nodules and reduce unnecessary diagnostic interventions. Proper organization

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of dynamic monitoring serves to detect pathological changes at early stages and improve patient prognosis.

The development of modern sonographic technologies, implementation of new assessment criteria, and multidisciplinary collaboration create opportunities for further improving the quality of thyroid nodular lesion management.

References

1. Haugen BR, et al. 2015 American Thyroid Association Management Guidelines for Adult Patients with Thyroid Nodules and Differentiated Thyroid Cancer. Thyroid. 2016;26(1):1-133.
2. Tessler FN, et al. ACR Thyroid Imaging, Reporting and Data System (TI-RADS): White Paper of the ACR TI-RADS Committee. J Am Coll Radiol. 2017;14(5):587-595.
3. Durante C, et al. The Diagnosis and Management of Thyroid Nodules: A Review. JAMA. 2018;319(9):914-924. Russ G, Bonnema SJ, Erdogan MF, Durante C, Ngu R, Leenhardt L. European Thyroid Association Guidelines for Ultrasound Malignancy Risk Stratification of Thyroid Nodules in Adults: The EU-TIRADS. European Thyroid Journal. 2017;6(5):225-237.
4. Shin JH, Baek JH, Chung J, et al. Ultrasonography Diagnosis and Imaging-Based Management of Thyroid Nodules: Revised Korean Society of Thyroid Radiology Consensus Statement and Recommendations. Korean Journal of Radiology. 2016;17(3):370-395.
5. Gharib H, Papini E, Garber JR, et al. American Association of Clinical Endocrinologists, American College of Endocrinology, and Associazione Medici Endocrinologi Medical Guidelines for Clinical Practice for the Diagnosis and Management of Thyroid Nodules--2016 Update. Endocrine Practice. 2016;22(5):622-639.
6. Brito JP, Gionfriddo MR, Al Nofal A, et al. The Accuracy of Thyroid Nodule Ultrasound to Predict Thyroid Cancer: Systematic Review and Meta-Analysis. The Journal of Clinical Endocrinology & Metabolism. 2014;99(4):1253-1263.
7. Moon WJ, Jung SL, Lee JH, et al. Benign and Malignant Thyroid Nodules: US Differentiation—Multicenter Retrospective Study. Radiology. 2008;247(3):762-770.