

Comparative analysis of benign and malignant thyroid lesions in histopathology.

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Introduction

Thyroid lesions are a common clinical finding, and histopathological evaluation remains the cornerstone for distinguishing benign from malignant thyroid conditions. A comparative analysis of benign and malignant thyroid lesions provides critical insights into diagnostic criteria, morphological features, and prognostic implications, aiding clinicians in tailoring appropriate therapeutic strategies.[1].

Benign thyroid lesions include conditions such as nodular hyperplasia, follicular adenoma, and Hashimoto's thyroiditis. These lesions are often characterized by well-circumscribed nodules, lack of capsular or vascular invasion, and uniform cellular architecture. In contrast, malignant lesions such as papillary thyroid carcinoma (PTC), follicular thyroid carcinoma (FTC), medullary thyroid carcinoma (MTC), and anaplastic thyroid carcinoma (ATC) exhibit distinct histological features, including nuclear atypia, mitotic activity, invasion, and architectural disruption..[2].

Papillary thyroid carcinoma, the most common malignancy, is characterized histologically by papillary structures, nuclear grooves, intranuclear cytoplasmic inclusions, and psammoma bodies [1]. Its variants, such as tall cell and follicular variants, may present diagnostic challenges due to overlapping features with benign conditions. On the other hand, follicular adenomas and carcinomas both exhibit follicular architecture; however, malignancy is confirmed only by evidence of capsular or vascular invasion, which requires careful histological examination [3]

Immunohistochemical markers and molecular diagnostics play an increasingly important role in differentiating between benign and malignant lesions. Markers such as HBME-1, Galectin-3, and CK19 have been found to be more frequently expressed in malignant thyroid lesions, particularly in PTC . Moreover, molecular alterations like BRAF mutations (especially BRAF V600E) are highly specific to PTC and can assist in confirming the diagnosis in ambiguous cases. Histopathological evaluation is sometimes supplemented by fine-needle aspiration cytology (FNAC), though definitive diagnosis, especially in follicular neoplasms, often requires excisional biopsy. Therefore, histology remains the gold standard for diagnosis and classification of thyroid lesions.[4].

Hashimoto's thyroiditis, a chronic autoimmune condition, may mimic lymphoma or PTC due to lymphocytic infiltration and architectural distortion. However, its benign nature is confirmed by the absence of nuclear atypia and mitotic figures [7]. In some cases, however, Hashimoto's disease is associated with an increased risk of developing thyroid lymphoma or PTC, warranting close follow-up. Anaplastic thyroid carcinoma represents the most aggressive form, often showing pleomorphic giant cells, spindle cells, and extensive necrosis. Its diagnosis is crucial for prognosis, as it typically presents at an advanced stage with poor survival outcomes. [5].

Conclusion

The histopathological comparison between benign and malignant thyroid lesions is essential for accurate diagnosis and treatment planning. Awareness of specific morphological and immunohistochemical features, along with integration of molecular markers, can greatly enhance diagnostic precision.

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