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Follicular-patterned thyroid neoplasms encompass a spectrum of tumors characterized by predominant follicular architecture, including follicular adenoma, follicular thyroid carcinoma, and encapsulated follicular variant of papillary thyroid carcinoma, including noninvasive follicular thyroid neoplasm with papillary-like nuclear features (NIFTP). These entities share overlapping cytologic and architectural features and require histologic evaluation of the tumor capsule and vascular invasion for definitive classification. Consequently, the primary diagnostic challenge is not merely distinguishing benign from malignant disease, but rather recognizing and appropriately categorizing a lesion as a follicular-patterned neoplasm in the first place.
Fine-needle aspiration (FNA), the standard first-line diagnostic tool, is inherently limited in this context. Because FNA provides only cytologic material without architectural context, it cannot reliably identify the presence of a follicular neoplasm. Instead, many follicular-patterned neoplasms are distributed across indeterminate or benign cytologic categories, most commonly atypia of undetermined significance or follicular lesion of undetermined significance (Bethesda category III), rather than being classified as “suspicious for follicular neoplasm” (Bethesda category IV). This reflects a fundamental limitation of cytology: the inability to distinguish between a hyperplastic/adenomatous nodule and a true clonal follicular neoplasm based solely on cellular features.
Core needle biopsy (CNB) partially addresses this limitation by providing histologic tissue that preserves follicular architecture and allows for a more structured assessment of cellular arrangement and growth pattern. As a result, CNB more frequently categorizes lesions as follicular neoplasm and reduces the rate of indeterminate diagnoses. However, despite this advantage, CNB also has intrinsic limitations. Although it may sample portions of the tumor capsule or tumor–normal interface, it cannot comprehensively evaluate capsular or vascular invasion, which requires examination of the entire lesion. Furthermore, the distinction between hyperplastic nodules and follicular neoplasms may still be challenging in limited core specimens.
While CNB improves the recognition and categorization of follicular-patterned neoplasms compared with FNA, both modalities remain limited in their ability to reliably distinguish benign from malignant lesions. Accordingly, recent research has increasingly focused on risk stratification within nodules diagnosed as follicular neoplasm, aiming to predict malignancy and refine clinical decision-making beyond the initial biopsy result.