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Images in Endocrine Pathology: Psammomatoid Calcifications in Oncocytic Neoplasms of the Thyroid, a Potential Pitfall for Papillary Carcinoma

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Case History

A 73-year-old woman presented with a 2.1-cm thyroid nodule in the left lobe previously diagnosed as "atypia of unknown significance" by fine-needle aspiration (FNA) biopsy. A left thyroid lobectomy was performed.

What Is Your Diagnosis?

Pathological diagnosis was follicular adenoma with oncocytic (Hürthle cell) features (1.8 cm) and psammomatous calcifications.

The left thyroid lobe contained a 1.8×1.4×1-cm, well-circumscribed, solid, tan thyroid nodule. Histologically, the nodule was well demarcated from the adjacent normal thyroid parenchyma by a thin fibrous capsule (Fig. 1), without evidence of capsular or vascular invasion. The tumor consisted of a solid to microfollicular proliferation of Hürthle cells with characteristic abundant granular eosinophilic cytoplasm. Numerous microcalcifications were present, often within the lumens of the microfollicles (Fig. 1). Many of these microcalcifications were laminated, resembling psammoma bodies (Fig. 2). In other areas, microscopic droplets of dense and partially calcified colloid could be seen within follicle lumens (Fig. 3). The nuclei of the tumor cells were enlarged, round, and regular with coarse chromatin and prominent nucleoli, without longitudinal nuclear grooves or intranuclear pseudoinclusions. Immunostaining for HBME-1 and galectin-3 was negative.

Comment

Psammoma bodies within the thyroid gland are typically associated with papillary thyroid carcinoma (PTC), being found in approximately 65 % of cases [1, 2], and their detection in an otherwise normal thyroid gland or within a cervical lymph node is a strong indicator of the presence of an occult PTC [2, 3]. Psammoma bodies are found most often in the classical form of PTC, but have also been

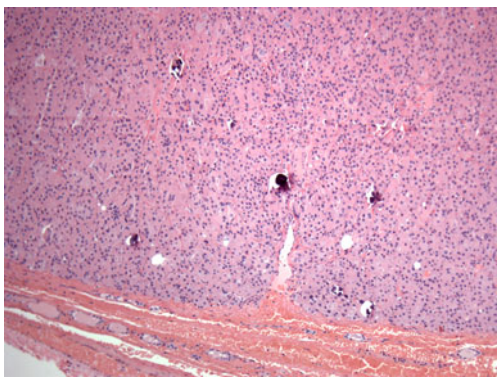

Fig. 1 Follicular neoplasm with oncocytic features which is well circumscribed by a thin fibrous capsule and containing scattered psammomatoid calcifications (×100x, H&E)

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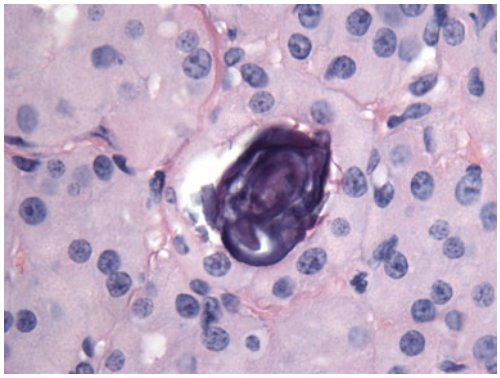

Fig. 2 Higher magnification of a psammomatoid calcification with a laminated appearance (×600, H&E)

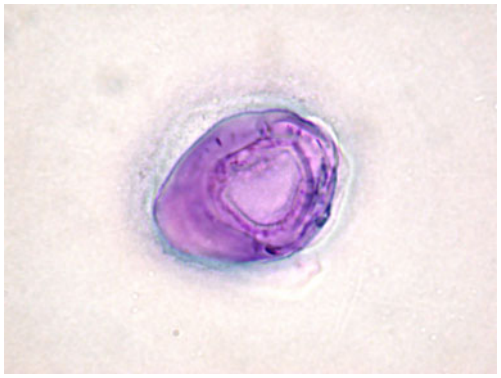

Fig. 4 Isolated psammomatoid calcification within the thyroid FNA of an oncocytic neoplasm (×600, Papanicolaou)

reported in other PTC variants (e.g., diffuse sclerosing) and in rare cases of other non-papillary thyroid neoplasms (e.g., medullary carcinoma, mucoepidermoid carcinoma) [1, 2]. Microscopically, psammoma bodies are round to oval calcifications with discrete concentric lamellations, and it is important to distinguish true psammoma bodies from dystrophic calcification and calcified colloid.

Both benign and malignant Hürthle cell neoplasms can show dystrophic calcifications, which on occasion can even be lamellated, mimicking psammoma bodies and therefore raising concern for PTC, especially the oncocytic variant [3–6]. However, in contrast to true psammoma bodies associated with PTC, which are found in the tumor stroma and are thought to represent necrotic papillae [7], the psammomatoid or pseudopsammoma bodies seen on occasion in Hürthle cell neoplasms are frequently present within the lumen of the follicles and sometimes in association with luminal colloid [3–6]. There is no known clinical significance to the finding of these calcifications within Hürthle cell tumors. The presence of these psammomatoid calcifications within follicles is a clue, although their exact location can sometimes be difficult to determine, adding to the diagnostic challenge. They may represent an unusual reaction in which biochemically modified colloid produced by the Hürthle cells attracts calcium, which precipitates within it [5]. The psammomatoid calcifications can also be seen in thyroid FNAs of Hürthle cell neoplasms (Fig. 4) where they can represent a diagnostic pitfall for PTC especially since occasional grooves and even pseudoinclusions can sometimes be found in some Hürthle cell tumors. As an isolated finding, the positive predictive value of psammoma bodies for PTC on thyroid FNAs is only 50 % [8]. Therefore, both histologically and cytologically, the nature of the accompanying cells (e.g., Hürthloid) and their qualitative and quantitative nuclear features is critical in order to achieve a correct diagnosis. When identified in association with follicular cells with otherwise classic features of Hürthle cells, psammomatoid calcifications should not raise concern for PTC.

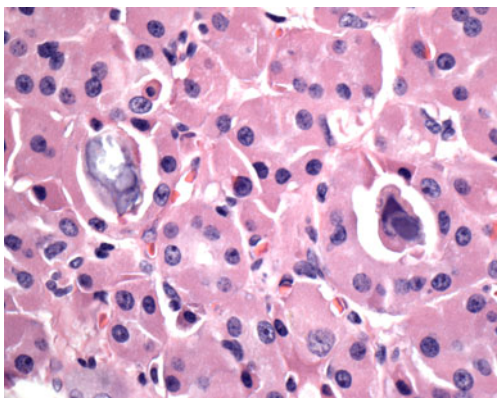

Fig. 3 Calcifications within microfollicular lumens associated with dense colloid (×600, H&E)

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