Learning objectives

To present, through clinical cases from our hospital, the key points we must know when approaching the thyroid pathology, focusing on the most frequent ones, such as functional goitre, thyroiditis and nodules.

To describe the most characteristic radiological findings of these entities, focusing especially on those warning signs that lead us to suspect malignancy and that result in the advice of biopsy of the nodules.

Background

The thyroid gland may show very different pathologies. In addition, due to the increase in radiological examinations performed in the neck for reasons other than thyroid pathology, the detection of thyroid disease has increased tremendously, thus raising the prevalence of incidental detection of this pathology to 67%.

This is why it is essential for the radiologist to know the thyroid gland pathology and how to respond to it, and to be able to recognize both benign pathology as well as the warning signs of malignancy.

The most common findings, which we will focus on, are inflammatory disease or thyroiditis, goiter and nodular pathology.

Findings and procedure details

Thyroiditis

The inflammatory diseases of the thyroid gland are acute infectious thyroiditis, Hashimoto or lymphocytic thyroiditis, granulomatous or Quervain thyroiditis and Riedel thyroiditis. Radiological findings in these entities are often nonspecific, making image-based differential diagnosis very difficult.

Infectious thyroiditis is radiologically characterized by a diffuse enlargement of the gland by edema, which can sometimes progress to abscess formation that is visible on MRI or CT scans.
Hashimoto thyroiditis is an autoimmune disease in which there are antibodies to thyroglobulin and thyroid peroxidase enzyme. Sonographically, it appears as a diffuse enlargement of the gland with small hypoechochogenic nodules that may coalesce, associated with hyperechochogenic fibrous bands. On CT scans, it shows as a diffuse enlargement of the gland, while on MRI a diffuse signal increase is observed with hypointense linear bands related to fibrosis areas.

Riedel Thyroiditis is characterized by a fibrosis extending to adjacent tissues, so that on CT scans the gland appears hypodense, presenting a slight enhancement after contrast administration. On MRI the gland is hypodense in all sequences due to fibrosis.

Granulomatous or Quervain thyroiditis is manifested as an asymmetric size increase of the thyroid gland, sometimes simulating a mass, thus often requiring a confirmation biopsy.

*Fig. 1:* Thyroid ultrasound in longitudinal and transverse planes in a patient with Hashimoto thyroiditis. Note the increase in size of the gland, the small hypoechochogenic nodules and the increased vascularity in Doppler (thyroid hell).
Fig. 2: Young man with increase size of the thyroid gland. Note the diffuse enlargement of the gland with the small hypoechogenic nodules, in the context of fibrosing variant of Hashimoto thyroiditis.

References: Carlos Haya - Malaga/ES

Nodules

Nodules are the most common incidental findings in thyroid pathology and, at the same time, the ones causing more doubts to the radiologist.

In the event of an accidental discovery of a thyroid nodule, we must assess whether it is a cyst or a solid nodule, its size, location and sonographic features.

Although some signs are highly specific, there is no single sonographic data that will allow us to determine the malignancy of a thyroid nodule, so it becomes necessary to evaluate the different features as a whole in order to identify the suspicious nodules.

With respect to their consistency, nodules may be classified into solid, mixed (solid - cystic) and cystic. Malignant tumors are almost always completely solid, whereas cystic lesions are rarely malignant.

Solid nodules that are markedly hypoechogenic with respect to the thyroid gland or the infrahyoid musculature are associated with malignancy; thus, the presence of a marked hypoechogenicity is a sign of alarm. However, the sensitivity is low given the rarity of this sign.

With regard to the borders, the presence of a hypoechogenic halo surrounding the nodule is usually related to benignity, usually related to the formation of a pseudocapsule,
inflammatory infiltrate or a partially compressed thyroid parenchyma. While smooth borders usually indicate benignity, irregular borders indicate malignancy in most cases.

On the other hand, the presence of ill-defined or microlobulated borders is associated with both malignant and benign tumors.

Lesions with an anteroposterior diameter greater than their transverse diameter are more frequently malignant.

Coarse calcifications are frequent in multinodular goiters, especially in those called "eggshell" calcifications, although they must also be considered suspicious when observed on a single nodule. "Snowstorm" microcalcifications are usually indicative of multiple psammoma calcified bodies, which are typical in papillary carcinoma.

Centripetal vascularity is more suggestive of malignancy, while a node with little vascularization is rarely malignant.

The existence of suspicious adenopathy associated to a thyroid nodule increases suspicion of a malignant lesion.
Fig. 3: Benign thyroid nodule in a young women. Note the solid consistency, the smooth borders, hypoechogenic halo and a medium calcification.

References: Carlos Haya - Malaga/ES
Fig. 4: 31 years old women with a thyroid nodule. Note the markedly hypoechogenicity and the anteroposterior diameter, greater than the transverse diameter in the context of papillary carcinoma.  
References: Carlos Haya - Malaga/ES

Fig. 5: Solid and hypoechoic nodule with irregular composition, in the context of papillary carcinoma.  
References: Carlos Haya - Malaga/ES

FNPA

FNPA is the most efficient and cost-effective technique to study the thyroid nodule, with a sensitivity and specificity in the diagnosis of malignancy greater than 90%.

It consists of a thyroid nodule puncture with a 20 to 23 G fine needle. Once the needle penetrates the nodule, aspiration can be performed or a sample may be obtained through capillarity.

Ultrasonography-guided FNPA has demonstrated to be more efficient in reaching a correct anatomopathological diagnosis than manual palpation-guided FNPA, allowing to substantially diminish the non-diagnostic and false negative results.
On which nodules should FNPA be performed?

This is, probably, the most controversial decision in the management of the thyroid nodule. Multiple strategies have therefore been proposed to select patients for whom puncture is not necessary, such as those set out in the guidelines of the Society of Radiologists in Ultrasound, the American Association of Clinical Endocrinologists, the Kim criteria, the 2009 clinical guide of the American Thyroid Association and the TIRADS classification system.

Images for this section:

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Fig. 5: Solid and hypoechoic nodule with irregular composition, in the context of papillary carcinoma.
Conclusion

Due to the increase in radiological examinations performed in the neck, the detection of thyroid disease has increased.

The most common findings are inflammatory disease or thyroiditis and nodular pathology.

In the event of an accidental discovery of a thyroid nodule, we must assess its consistency, size, location and sonographic features like the borders, calcifications and vascularity.

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Personal information

References


