Discovering Incidental Thyroid Disease by Imaging Studies

It is not surprising that there is a high incidence of incidental thyroid disease (ITD) discovery during carotid color Doppler ultrasound examination. However, ITD prevalence is variable. As reported in this issue and in a previous study, 21.8–51% of ITD cases were diagnosed during neck ultrasound for carotid artery examination [1]. ITD includes diffuse thyroid and nodular thyroid disease. Most ITD patients were euthyroid. Patients with hyperthyroidism or hypothyroidism, such as in Graves’ disease or Hashimoto thyroiditis, may coexist with ITDs such as incidental thyroid carcinoma [2]. ITD may be diagnosed during an examination for nonthyroid disease by different imaging studies. Thyroid diseases are detected by head and neck ultrasound, chest radiography, computed tomography (CT), magnetic resonance imaging, fluoro-18-deoxyglucose positron emission tomography CT (PET-CT), and other examinations [3]. The incidence of thyroid cancer, especially papillary thyroid carcinoma, has increased in recent decades [4]. Part of the reason may be due to an increase in the detection rates of ITD during examinations. In addition, ITD may be diagnosed during surgery or during a final histopathological examination for head and neck surgery [5].

Because of the increased ITD incidence, a differential diagnosis between benign and malignant lesions is warranted. It is not unusual for endocrinologists to follow-up and examine patients who have ITD. History and physical examination may reveal thyroid dysfunction, and family history of thyroid cancer or radiation exposure is an important indicator. Functional studies with free T4, thyroid-stimulating hormone, antithyroid peroxidase antibody, and thyroid ultrasonography are the first-line examinations. For diffused thyroid disease in ITD, many cases may be diagnosed as simple goiter, Hashimoto thyroiditis, autoimmune thyroid disease, or Graves’ disease. A recent series by Rho and Kim [6] showed that thyroid ultrasound and neck CT have similar diagnostic values for differentiating incidental diffuse thyroid disease presenting as ITD from normal thyroid. This will be more complicated when nodular thyroid disease is diagnosed by thyroid ultrasound. High-resolution thyroid ultrasound can illustrate very small thyroid nodules measuring <5 mm. Thyroid nodules presenting with hypoechogenicity, microcalcification, irregular margins, or perinodular and intranodular hypervascularity usually suggest malignancy. The next step after thyroid ultrasound for the patient is fine-needle aspiration cytology (FNAC) from a thyroid nodule suspicious for malignancy.

In a previous study, a total of 8806 patients underwent 11,618 thyroid ultrasound examinations to analyze the risk of thyroid cancer associated with thyroid nodules identified on ultrasound imaging [7]. There are three important ultrasound nodule characteristics that were associated with the risk of thyroid cancer: microcalcifications, size >2 cm, and an entirely solid composition (odds ratios, 8.1, 3.6, and 4.0, respectively). In clinical practice, patients with hypoechoic nodules, intranodular vascularization detected at Doppler ultrasound, nodules with irregular margins, increased volume, and microcalcifications are always suggested to undergo FNAC. Results of echo-guided FNAC or fine-needle aspiration after ultrasonography without guidance and the nature of the thyroid nodule (e.g., vascularity, cystic content in a complex mass) are important indicators for obtaining enough cells for interpretation. For cases diagnosed as malignant, suspicious for malignancy, or a follicular neoplasm, surgical intervention is indicated [8].

Previous studies have reported the frequency of incidental papillary thyroid carcinoma to be 4.6–10% of operatively treated benign thyroid diseases. Among these incidental papillary thyroid carcinomas were 12% of patients with Hashimoto thyroiditis and 40% with contralateral follicular adenoma [2].

ITD or incidental thyroid cancer may present during neck surgery for nonthyroid disease. One study reported that thyroid nodules were identified in 159 of 217 patients (73.3%) who underwent surgery for hyperparathyroidism [9]. Among the 159 patients, four had papillary thyroid carcinoma, including one with papillary thyroid microcarcinoma and one with Hurthle cell carcinoma. ITD may be
detected during diagnosis and treatment of nonthyroidal head and neck cancer. For example, in another study, of the 690 head and neck cancer patients evaluated, 234 (33.9%) had incidental thyroid lesions on ultrasonography and 9.4% had thyroid cancer. Occasionally, papillary thyroid carcinoma in the lymph nodes of patients with head and neck cancer required radical neck dissection. Characteristic findings of a thyroid origin were demonstrated by follicular structure and thyroglobulin staining in immunochromic studies [10].

To evaluate subsequent management and outcome of the incidental thyroid cancer found during surgery for head and neck squamous cell carcinoma, a retrospective review of 2538 neck dissections was performed [11]. Twenty-nine patients had an incidental pathologic finding of thyroid cancer at surgery. Seven patients, all of whom are still alive, received further treatment for their thyroid cancer: two underwent completion thyroidectomy, two received radioactive iodide \(^{131}\)I ablation, and three underwent both. There was no clinical evidence of thyroid cancer recurrence, and no one died due to of thyroid cancer. These results suggest that further management of incidental thyroid cancer detected in patients receiving neck dissections for head and neck cancer is unnecessary.

Increased incidence of thyroid cancer in developed and developing countries is well-known, most of which are papillary thyroid carcinoma. An increased percentage of papillary thyroid microcarcinoma with a tumor size <1.0 cm has been reported [12]. Some of these cases are incidental papillary thyroid microcarcinoma diagnosed during final histopathologic studies after surgery. A systematic review and meta-analysis of 21,329 person-years including 854 cases with incidental papillary thyroid microcarcinoma and 2669 cases of nonincidental papillary thyroid microcarcinoma showed that the recurrence rate in the incidental group was significantly lower than that in the nonincidental group [13]. The management protocol between these two groups is different, however.

Clinical features and presentations of incidental thyroid cancer depended on the examination tool. A large series study of incidental thyroid cancer diagnosed from focal thyroid incidentalomas using PET-CT showed that approximately one third of focal thyroid uptakes were malignant. The maximum standardized uptake value cut-off useful in differentiating benign from malignant incidentalomas varied from 4.8 to 7 [14]. Comparison of incidental thyroid cancer detected by PET-CT with non-PET-CT incidental thyroid cancer showed no significant differences in clinicopathologic features except for age and TNM staging. More incidental thyroid cancer than nonincidental thyroid cancer patients were aged ≥45 years and there were more incidental thyroid cancer patients with TNM stage III/IV tumors [15]. A comparison of other incidentally discovered thyroid cancer by nonthyroid-related imaging with nonincidentally discovered thyroid cancer studies that were nonspecific in PET-CT imaging illustrated similar results. Patients with incidental thyroid cancer tend to be older and have higher TNM stage disease and are more likely to be male compared with patients with nonincidental thyroid cancer. In addition, there does not appear to be a significant difference in the size, pathology, or behavior of the tumor at presentation between these two groups [16]. The results of these studies suggest that incidental thyroid cancer detected by PET-CT should be treated in the same manner as nonincidental thyroid cancer.

Incidental thyroid nodules have been found in approximately 16% of chest CT scans, and more commonly in women. Most incidentally found thyroid lesions are benign, with an approximate 9–11% prevalence of malignant lesions [17]. No CT feature is reliable for distinguishing benign from malignant thyroid nodules; in addition, CT has been reported as unreliable in distinguishing simple cysts, complex cysts, and solid nodules. CT underestimates the number of nodules compared with ultrasonography, suggesting that ultrasonography is a useful adjunctive test after incidental detection of a thyroid nodule on CT. In conclusion, most ITD in imaging studies are benign lesions. Otherwise, differential diagnosis and treatment would be the same as that for nonincidental thyroid disorders.

References


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