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A Simplified Approach for Evaluation and Management of Thyroid Incidentalomas

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Abstract

The incidence of thyroid nodules has become exceedingly common seen in as many as one in seven adults owing to the increased detection through routine imaging studies. These are called incidental thyroid nodules or incidentalomas, many of which are occult differentiated micro carcinomas. There are conflicting guidelines in the management of incidentalomas which have not been answered despite comprehensive studies looking into this problem. By this review we attempt to simplify these guidelines and put forth a straightforward algorithm for practicing clinicians to decide the optimal strategy for treatment.

Introduction

Incidence of thyroid nodules nowadays is common seen in as many as one in seven adults [1]. Palpable nodules have been reported to occur in 5.3% of women and 0.8% of men [2]. Incidence of thyroid cancers have seen a continued upsurge throughout the world [3]. An analysis of the Surveillance, Epidemiology and End Results database from the United States has shown a steady rise in the incidence of thyroid cancers over the years beginning in 1975 [4]. Asian countries like Korea have also shown an upward trend in thyroid cancers with a dramatic increase of 15 times from 1993 to 2011 [5]. In a study documenting the trend of thyroid cancers in India over a decade, an increase of 62% was noted in the rates of thyroid cancer. The study brought out that the incidence of thyroid cancers has seen a rapid rise particularly among the younger population (age group<45) [6]. These global escalating trends in incidence can be explained by the increased detection of incidental thyroid cancers or incidentalomas [7-9].

Thyroid incidentalomas are defined as unsuspected, asymptomatic thyroid lesions that are discovered on an imaging study or during surgery unrelated to the thyroid gland which are usually less than 10-15 mm in diameter. If a malignancy is subsequently identified then the term micro carcinoma is used. Micro carcinomas are occult carcinomas that are small, <0.5 cm in diameter, usually papillary in type and show benign behavior [10].

Increased identification of thyroid nodules has been attributed to the easy availability of ultrasounds universally. These lesions are being discovered on neck ultrasound exams obtained during screening health evaluations, localization of abnormal parathyroid glands, evaluation of soft tissue masses, lymphadenopathy, carotid artery disease, and for assistance while insertion of central venous catheters.

Apart from this, other radiological tests of high sensitivity such as CT scan, CT-angiography, PET-CT being done for various non thyroid ailments have also led to the incidental detection of thyroid nodules. Positron Emission Tomography (PET) is increasingly being used for evaluation and follow-up of patients with known malignancy. With respect to detection of thyroid malignancies, PET CT has a sensitivity of 100% and specificity of 69% [11]. Re-

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cent meta-analysis looking into PET-CT detected Thyroid Incidentalomas (TI), identified a rate of malignancy of 19.8%, [12] while in other studies, the prevalence of TI detected by 18FDG (fluorodeoxyglucose)-PET/CT ranged from 0.1 to 4.3%. Varying rates of the risk of malignancy were noted in several studies ranging between 10.3 and 80.0% [13-21].

Thyroid incidentalomas may also be found during operations of the neck unrelated to the thyroid gland such as: parathyroidectomy, carotid endarterectomy, cervical spine surgery, exploration for trauma, and esophageal surgery [22].

How much should we be concerned about incidentaloma?

Incidentalomas pose a very valid concern among clinicians owing to complete change in treatment strategy. The discovery of TI within an otherwise normal thyroid gland increases concerns about malignancy both for the clinician and the patient [23,24].

Certain clinical features are regarded as highly suspicious of carcinoma in a patient with a TI. These include a nodule discovered in childhood or adolescence, [25] nodule being discovered in a male patient, [26] a nodule found in those with a history of exposure to radiation, a nodule in a patient having a family history of medullary carcinoma of thyroid. The patients from iodine-deficient areas are also at higher risk of thyroid malignancy [27].

Hamming et al. rated various clinical factors as having high, moderate, or low clinical suspicion for thyroid cancer, and showed that patients with one clinical factor with high suspicion for thyroid cancer had a 71% incidence of cancer in the nodule [28].

Studies have shown that the overall incidence of malignancy in irradiated glands to be as high as 32% to 57% [29]. A positive dose of low dose radiotherapy (i.e 6.5-4,000cGY) is associated with a 40% risk of thyroid cancer [14].

Thyroid incidentalomas detected with ^{18}FDG-PET/CT are relatively infrequent as mentioned earlier, but the potential risk of malignancy remains elevated. Many researchers postulated that malignant lesions tend to show higher [18F] FDG uptake on maximum standardized uptake value (i.e., SUV max) than that of benign lesions [30]. However, it is not easy to differentiate malignancy using SUV max only [31]. PET texture-derived features seem able to stratify the patients with thyroid incidentaloma [32]. It is also noted that when a PET-associated thyroid incidentaloma is found to be malignant, it is often a more aggressive histological subtype and associated with a worse prognosis [33].

Management of incidentaloma

There are a number of controversies regarding the management of these incidentalomas with conflicting guidelines. Concern has been raised about over-diagnosis and over-treatment of these thyroid nodules. Yet, authors agree that it is hard to predict whether a malignant asymptomatic nodule will progress to clinical disease or remain indolent [34].

By this review we attempt to simplify the existing guidelines and put forth an easy to follow algorithm for practicing clinicians to decide the optimal strategy for treatment.

The management of thyroid incidentalomas should begin with a thorough history and examination to identify those factors increasing the risk of malignancy such as age, male sex, family history of MTC or MEN 2, previous irradiation to the neck, previous thyroid surgery [35].

Neck ultrasound is now considered an extension of the physical examination having a sensitivity of detecting thyroid nodules as small as 3 mm. Suspicious USG features of malignancy include hypo-echogenicity, solid composition of the nodule, irregular margins, fine micro-calcifications, absence of halo, shape tall more than wide and central rather than peripheral blood flow on Doppler USG [36]. TIRADS (Thyroid imaging reporting and data system) is done as part of risk stratification of malignancy in thyroid nodules.

All thyroid incidentalomas <10 mm without high-risk factors or suspicious ultrasound features are not recommended to undergo FNAC. FNAC is the most cost-effective and reliable technique available.

In patients with a high-risk history and <10 mm nodule or suspicious USG features FNAC should be always performed [36]. FNAC should also be done for TIRADS categories corresponding to 4B (high suspicion) and 5 (malignant) irrespective of the size of the nodule. Ultrasound guided-FNAC is recommended for nonpalpable, predominantly cystic, or posteriorly located thyroid nodule. In case of multiple nodules, if none of the nodules have a suspicious sonographic appearance, it is reasonable to aspirate the largest nodules only and observe the others with serial ultrasound examinations [37].

FNAC detected benign thyroid nodules and micro carcinomas can be followed with serial ultrasound examinations for next 6-18 months after the initial FNAC. It is known that papillary tumors smaller than 1.5 cm in diameter have a slow growth rate with excellent prognosis. The recommendation is to observe tumors less than 1.5 cm in diameter especially in patients who have a low risk for thyroid cancer [38].

If nodule size is stable (i.e., no more than a 50% change in volume or <20% increase in at least two nodule dimensions in solid nodules or in the solid portion of mixed cystic-solid nodules), the interval before the next follow-up clinical examination or ultrasound may be longer, e.g., every 3-5 years.

However, if there is evidence of nodule growth either by palpation or sonographically, then FNAC should be repeated, preferably with USG guidance.

Decisions regarding the management of PET-CT detected thyroid incidentalomas in patients with a known malignancy depend on the stage of the primary malignancy, patients performance status, prognosis, and whether the thyroid disease is symptomatic. Given the indolent nature of thyroid cancer, incidentalomas found in patients with advanced malignancy and a poor prognosis are best left alone.

If the primary malignancy is stable with good prognosis, further evaluation with a neck ultrasound and a screening serum TSH level is recommended for patients with either focal or diffuse FDG uptake.

A dominant nodule confirmed on ultrasound should be evaluated with FNA biopsy and further decision making should be based on FNAC report. In a study by Kwak et al. it was noted that the probability of malignancy in PET detected incidentalomas is much lower (13.2%) when sonographic findings appear benign as opposed to 95.5% when suspicious for malignancy [39].

Most PET detected incidental nodules are Papillary Thyroid Cancers/micro carcinomas (PTC) which can be observed over a follow up period and as they have excellent prognosis. However a subset of these PTC's in which abnormal lymph nodes are detected clinically or with imaging at presentation should be managed pro-actively.

Follicular, medullary and anaplastic cancers carry a far worse prognosis and are required to undergo intervention unless patient has a poor prognosis from the primary. Cytology dictates the further management of the carcinoma in TI. Depending on the cytology a hemi thyroidectomy or a total thyroidectomy maybe planned followed by need of radio iodine ablation after the final histopathology report.

We deduce after a complete analysis of the available literature on thyroid incidentalomas that most of these nodules including micro carcinomas especially the papillary type can be best left alone. All thyroid incidentalomas <10 mm without high-risk factors or suspicious ultrasound features are not even recommended to undergo FNAC. Benign TI treated with intervening thyroid surgery have its own consequences such as lifelong hypothyroidism and need for hormone supplementation.

The need for continued surveillance of TI is emphasized and deemed essential. Surveillance should be done with routine clinical examination and ultrasound. Any change noticed on clinical or sonographic studies should prompt an immediate investigation in the form of FNAC.

Clinicians should proceed with higher index of suspicion in PET CT detected incidentalomas and investigate thoroughly without exception and plan a suitable treatment option keeping in mind the staging of the primary carcinoma.

Conclusion

With this review, we have attempted to simplify and put forth an algorithm for clinicians faced with a prospect of these incidentalomas of the thyroid with respect to evaluation, risk stratification and providing appropriate treatment of incidental thyroid nodules. Active surveillance is recommended for selected low risk cases thus avoiding a routine thyroidectomy in each case.

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