Investigating the Thyroid Gland

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Diseases of thyroid gland are the most common of all endocrine diseases with the exception of diabetes mellitus[1]. Estimation of thyroid hormones has come of age and the battery of tests now available for evaluating thyroid dysfunctionoffera unique opportunity of sorting out thyroid diseases with relative ease. Thyroid diseases basically need evaluation either for thyroid swelling or a disorder of thyroid hormone secretion. Perhaps the most exciting advance in recent years has been the development of sensitive methods of assay for TSH[2]. The sensitivity of this test is such that it is able to discriminate between normal, suppressed and elevated TSH secretion in vast majority of cases[3]. In some situations TSH assay alone will not suffice, e.g. newly diagnosed hypothyroids or hyperthyroid patients receiving antithyroid drugs, after radioactive iodine administration and pituitary and hypothalamic disorders[4]. It has rendered the 1'RH stimulation test largely redundant. Sensitive-TSH assay may well be used as a single screening test whenever thyroid dysfunction is suspected. The main disadvantage of estimating total T4 as a single screening test is thatit is easily affected by alterations in protein binding, non-thyroidal illnesses and certain drugs, without there being any underlying thyroid disease[5]. In conditions where alteration of protein binding is expected e.g., pregnancy, oral contraceptive therapy, cirrhosis and nephrotic syndrome. Free T4 estimation should be the preferred test. Free T4 level can also be estimated by calculating the free thyroxine index, an analogue free T4 assay or any of the other chemical techniques[6]. Total T3 and free T3 are subject.to the same interpretations as total and free T4 except in some 5% of cases of thyrotoxicosis which may show only T3 elevation in the early stages. The vast majority of cases of hypothyroidism are due to a hypofunctioning thyroid gland and therefore lead to an elevation of TSH level via the negative-feedback loop. In the assessment of hypothyroidism both T4 and TSH levels should be done as T4 levels may be nonnal in the presence of raised TSH levels indicating incipient thyroid failure. On the other hand a low TSH value in association with a low 14 value is suggestive of pituitary failure and usually occurs in the setting of a deficiency ofotherpituitaiy hormones as well. Secondary hypothyroidism therefore, warrants detailed investigation of other pituitary hormones. Thyroglobulin level can also be measured in the serum by radio-immunoassay. Raised thyroglobulin level is seen in thyrotoxicosis, large multinodular goitres and thyroiditis but this test has been most useful in the follow-up of patients with papillary or follicular thyroid carcinoma after total thyroidectomy. A rise in the thyroglobu. lin level in these circumstances denotes metastases or progression of an existing metastasis. Four imaging techniques are available for structural and functional assessment of thyroid gland : ultrasonography, scintigraphy, computed tomography and MRI. With the advent of high resolution ultrasonography routine scintigraphy is almost obsolete in the evaluation of thyroid enlargements[7,8]. While investigating a nodular thyroid enlargement demonstration of a clearly cystic lesion obviates the need for any further tests. Multiple echogenic nodules in a homogenously enlarged thyroid gland represents multinodular adenomatous goitre and requires no further tests. A solitazy echogenic or hypoechocic nodule needs scintigraphy and a possible FNA cytology. Radionuclide scan of thyroid can be obtained by administering radioactive iodine e.g., sodium I^{123} and obtaining an image with an appropriate gamma scintillation scanner. 99mTc pertechnetate is also concentrated by thyroid and is used for imaging with high resolution. This isotope, unlike radioactive iodine is not organified and stored by the thyroid and hence, scan is performed very shortly after (20 minutes) administration. Rarely some thyroid nodules identified as Scold' by radioactive iodine uptake scan may be missed with 99mTc scan[9]. When functional activity of a thyroid swelling is also to be determined, scintigraphy is very helpful e.g.. autonomous adenoma. It is

also the best method for demonstrating ectopic thyroid tissue. Scintigraphy is a very useful method for confirming thyroiditis as a cause of thyrotoxicosis. CT and MRI offer the advantage of providing excellent anatomical details of not only the thyroid but other neck structures e.g., lymph nodes. These two modalities are of particular value in investigating thyroid malignancies, especially when metastases is clinically suspected. FNA should be earned out on all non-functioning solitary nodules. Patients with an inadequate FNA cytology should have a repeat FNA biopsy. Inconclusive biopsy in patients at high risk e.g., young age, males rapid growth, cervical lymph node enlargement and radiation to the neck, should lead to an excision of the nodule. The false-negativity rate for FNA varies from 2 -35%10. Patients with a negative cytology should be followed and if there is any progressive change in the nodule FNA should be repeated. About a quarter of patients reported to have a suspicious cytology eventually turnout to have a maligancy. Differentiation between a follicular adenoma and carcinoma is particularly difficult on FNA cytology. Sensitive-TSH assay and thyroid scintigraphy are helpful in differentiating the two conditions, as a hot nodule with a suppressed TSH supports the diagnosis of follicular adenoma versus carcinoma. Measurement of thyroid autoantibodies is of value in the diagnosis and to some extent in the management of auto-immune thyroid diseases i.e., Grave's disease and Hashimoto's thyroiditis. Thyroid stimulating Inununoglobulin (TSI) level is raised in active Grave's disease and also rises when it relapses. Thyroglobulin autoantibodies are markedly raised in the early phase of Hashimoto's thyroiditis, but may disappear later to be followed by elevated microsomal antibodies, w'hich may persist for many years[9]. Although the spectrum of tests available for assessment of thyroid gland is quite wide, in a given case careful selection of tests can solve the problem with only a small number of appropriate tests being carried out. It would not be out of place to mention the futility of testing forthyroid function in patients with severe non-thyroidal medical and surgical illnesses unless thyroid dysfunction is deemed as the direct casuc of the serious ailment.

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