

Evaluation of Thyroid gland by high resolution Ultrasonography

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Abstract

Introduction: Many thyroid diseases can present clinically with one or more thyroid nodules. Such nodules represent a common and controversial clinical problem. Much of the nodular disease is clinically occult (less than 1.5cm) but can be readily detected by high resolution ultrasonography. Evaluation of gland is important to assess whether the thyroid is normal or abnormal. The main objective of our study was to evaluate the patients with clinically palpable thyroid lesions using high resolution ultrasonography and to evaluate it either solitary nodule or a multinodular goiter and to differentiate thyroidal from extrathyroidal mass. The ultimate goal was to establish the role of high resolution ultrasonography as an adjunct to clinical evaluation, hormonal assay, FNAC, and histopathology in the diagnosis of thyroid pathologies. This is a prospective study of two years in which 60 patients were under consideration. **Methods:** All the patients of clinically palpable thyroid lesions were referred to us for ultrasonography examination. The patients were in the age group of 11 years to 60 years. The sonographic findings were compared with clinical diagnosis. All patients underwent fine needle aspiration cytology and 19 patients underwent surgery. **Results:** Females were more commonly involved. Multinodular goitre and diffuse goitre were most common findings. **Conclusion:** Thus high resolution ultrasonography is important modality for detection and characterization of thyroid nodules and is highly sensitive in detecting small nodules, cervical lymphadenopathy, carotid sheath and strap muscle invasion, the specificity is low

Keywords: Goiter, Nodule, thyroid gland, ultrasonography scanning.

Introduction

The application of modern electronic techniques of signal processing, display and improvement in transducer materials have resulted in the development of advanced ultrasonic scanner, has led to superior image quality which has further enhanced the sensitivity of detection of thyroid pathologies [1]. The thyroid gland is endocrine gland and has a function of synthesis of thyroxine and tri-iodothyroxine which increase the rate of chemical reaction ultimately increasing the level of body metabolism. It is the most superficially located and accessible organ in human body. Though thyroid is the most superficially located organ but most of the time it is difficult to diagnose single nodule or multiple nodules in thyroid gland by clinical examination. Clinically it is also difficult to distinguish simple cyst from solid tumors. There are multiple nodules present in thyroid gland

in 20-40 % of patients presenting with a clinically solitary lesion [2,3]. The three primary clinical applications of high resolution ultrasonography for thyroid pathology included detection, characterization and therapeutic monitoring of clinically suspected nodule. Ultrasonography is important for mass localization (intrathyroid vs extrathyroid) and is the best modality for detection of residual or recurrent tumors. It is sensitive for detection of thyroid nodules however it is not specific for discrimination of benign and malignant masses. Incidence of malignancy in solitary thyroid nodule is only 10-20% [4]. Incidence is 10 % in multinodular goiter. Changes in thyroid gland can be recognized by high resolution ultrasonography with either increased or decreases reflectivity distribution and nature of such changes help to define disease process [5]. It is an adjunct to clinical and pathological diagnosis. FNAC is the gold standard for determining the benign and malignant nature of thyroid nodules. Other modalities used to image thyroid gland are

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scintigraphy, computed tomography(CT,CAT Scan) and MRI. Fluorescent thyroid imaging is rarely used. The major advantages of ultrasonography is the rapidity with which the images are obtained. It is non-invasive, relatively inexpensive and can be performed even at bed side. It does not involve the use of ionizing radiation and is safer even in pregnant patients

Material and methods

This was prospective study of two years. Number of patients studied were 60 (50 females, 10 male) from age group of 11 years to 60 years. All patients of clinically palpable thyroid lesions referred for ultrasound were under consideration. The findings were observed considering the gender, age, presenting signs and symptoms, correlation of ultrasound findings with clinical diagnosis of patients were

observed. The patients were examined in the supine position with the neck hyperextended, resting on a pillow kept under the shoulders and the lower neck. This allows the neck to be somewhat stretched and fixed. The gland was evaluated for its size, contour, single or multiple nodules. The nodules were further classified as solid, cyst, and mixed pattern [2,6]. The surrounding structures were also studied for secondary change or encasement of carotid sheath and strap muscles. Presence of lymphadenopathy was also evaluated. All the patients were examined with 7.5 MHZ, hand held linear array real time transducer on Color doppler ECCOCEE machine from TOSHIBA. All the patients underwent fine needle aspiration cytology ,few patients undergone hormonal assay and some of these patients underwent surgery. Post –operative patients for detection of residual or recurrent tumors were excluded in the study.

Results

In the present study of 60 patients clinically diagnosed patients of having palpable thyroid mass were considered. It was observed that female patients were more commonly involved as compared to males. Out of 60 patients females were 50 (83.34%) and males were 10 (16.66). Most common age group involved between 21 to 30 years followed by 31-40 years.

In this study all the patients were complaining of neck swelling. The second commonest complaint was dyspnoea seen in 13.34% of cases follow by palpitation in (8.34%). Signs of toxicity like exophthalmus and fine tremors were seen in only 5% of cases. Out of total 60 patients, 35 patients were clinically diagnosed as solitary nodule of which only 22 patients (62.87%) were found to have solitary nodule on ultrasound, 10 (28.57%) were multinodular.

Out of 60 patients 11 were clinically diagnosed as multinodular goiter, of which 6 patients were found to have multinodular goiter, 1 patient had diffuse goiter and 4 patients were found to have solitary nodule on ultrasound.

Out of 60 patients 10 patients were clinically diagnosed as diffuse goiter of which 4 had diffuse goiter, 3 had a multinodular goiter and 3 had thyroiditis on ultrasonography .

In this study of 60 patients, 26 patients underwent hormonal assay and ultrasound of which 19 were having normal levels while 07 patients were found to have abnormal hormonal levels. Of these 7 patients with abnormal levels, 3 patients were of diffuse goiter and 2 patients of thyroiditis and 2 patients are of multinodular goiter.

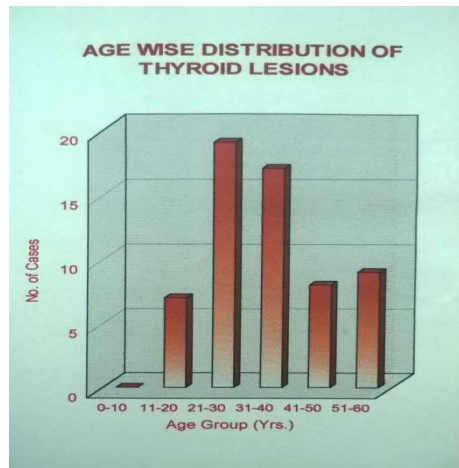
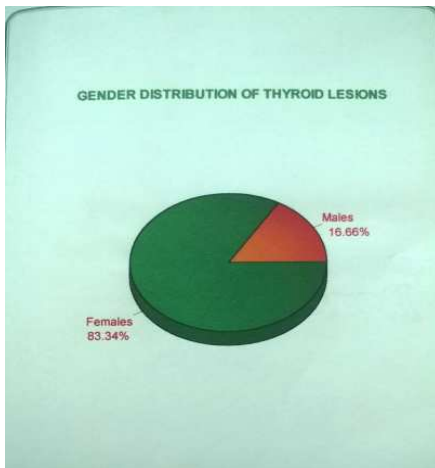


Fig 1: Gender distribution of patients

Fig 2: Age wise Distribution of patients

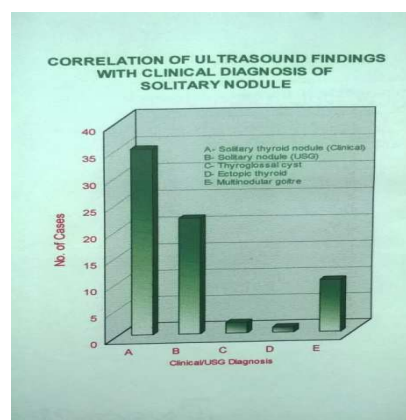
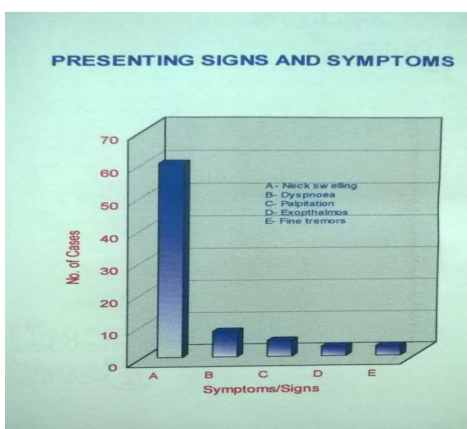


Fig 3: Presenting complains

Fig 4: USG finding in patients

Discussion

This was a prospective study based on High Resolution Ultrasonography in 60 patients with clinically palpable thyroid disorders. All the patients were followed by Fine Needle Aspiration Cytology. 19 patients underwent surgery and hormonal assay was performed in 26 patients. The various abnormalities detected in our study by ultrasonographic imaging were as follows.

1. Thyroid nodules: Hyperplasia or goiter is the most commonly observed pathologic entity of the thyroid gland. Iodine deficiency & Physiological due to puberty, Pregnancy, Lactation are most common causes. When there is an inadequate circulating thyroid hormones T3 and T4 there is rebound increase in secretion of TSH by pituitary gland which causes diffuse enlargement and leading to goiter. It may be solitary or multinodular goiter. In our study goiter was found in 43 out of 60 (71.67%) patients as compared to the study by Mandel SJ [8].

2. Follicular adenoma: This is one of the benign neoplasms of thyroid gland. It is frequently found in women. They are outnumbered by the colloid nodule(10:1) but unlike the colloid nodule, the adenoma is a true neoplasm. On scintigraphy, they are typically non functional but occasional warm or hot nodules may be detected. Adenomas were the next common group of thyroid lesions encountered being 7 out of 60 (11.66%). The adenomas are usually solitary, slow growing and well encapsulated. In our study on ultrasound a well defined, 1-2mm, sonolucent rim or halo is seen around adenomas. Pathologically the halo is probably due to combined effect of a thin capsule investing the adenoma plus compression of surrounding normal tissue. The halo when seen indicates that the lesion is benign and slow growing, but it may also be seen in few malignant lesion [9]. Therefore it is not specific for adenomas. The study of Simeone et al demonstrated a predominance of hypoechoic nodule in follicular adenomas whereas William Scheible et al

demonstrated 2 hypoechoic, 4 isoechoic and 1 hyperechoic nodule in a total of 7 patients [2,8].

3. Thyroiditis: Thyroiditis means diffuse inflammation of thyroid gland. It is classified according to the rapidity of onset, the severity of sign and symptoms and its duration into acute, sub acute & chronic thyroiditis. In our study 3 out of 60 (5%) patients were found to have thyroiditis. In all these cases, the thyroid gland was diffusely enlarged and both the lobes were involved. There was decreased echogenicity of the thyroid gland as compared to strap muscles. 2 patients showed uniformly decreased echotexture while one patient showed nodular involvement. In such patient differentiation from multinodular goiter is important. The differentiating point is that the appearance of non-nodular parenchyma is always abnormal in thyroiditis and is normal in multinodular goiter

4. Thyroglossal Cyst: This is one of the developmental anomalies of thyroid gland. It typically presents as a common neck mass within the pediatric age group but may escape detection into adult years. This sac-like cystic structure represents the remnants of the primitive thyroglossal duct. In our study two patients of thyroglossal cyst were found. Ultrasound showed a well-defined rounded midline cystic lesion anterior to the trachea and above the isthmus. The thyroid gland was otherwise normal. Surgical excision was done, confirming the diagnosis.

5. Ectopic thyroid: It is the rare anomaly of thyroid gland in which thyroid tissue is seen in abnormal location. We encountered a rare condition in a 12-year-old female child who presented with midline neck swelling. Ultrasound showed a well-defined rounded structure of the same echogenicity as that of thyroid gland measuring 1.2 x 2.5 cm and lying anterior to the upper half of trachea. The thyroid gland was not seen in its normal position. No other thyroid tissue was seen in the rest of the neck, therefore an ultrasound diagnosis of ectopic thyroid was made. Hormonal levels were done and were found to be normal. Thus ultrasound has proved to be a useful modality to detect an ectopic or hypoplastic gland [10].

6. Thyroid Carcinoma: Thyroid malignancies involving the thyroid gland comprise < 1% of all malignancies. A solitary nodule may be malignant in 10-25% of cases. Carcinoma was another group of disorders observed in our study. Patient of papillary carcinoma showed well-defined rounded hypoechoic lesion 2.1 cm in diameter in right lobe of thyroid,

rest gland was normal. Enlarged hypoechoic cervical lymphnode (1 – 2 cm) were found. There were fine non-shadowing calcific foci were noted in the lesion. Lin et al. noted 76/109 (69%) cases were of papillary carcinoma [11]. The role of ultrasonography in patients with occult papillary carcinoma lies in the extraordinary high sensitivity of this technique in detecting small masses and lymph node enlargement. Since most of the patient of papillary carcinoma present with cervical lymphadenopathy without clinically enlarged thyroid gland. Although ultrasound is highly sensitive in detecting small nodules, cervical lymphadenopathy, carotid sheath and strap muscle invasion, the specificity is low. So also it is difficult to differentiate between the types of thyroid malignancies with this modality. It is the best modality for detection of residual or recurrent tumors.

Conclusion

The present study is the prospective study of two years to evaluate the thyroid gland by high resolution ultrasonography. All the patients with clinically palpable thyroid lesions were examined by high resolution ultrasonography. The final diagnosis was established in all cases by FNAC. Thus high resolution ultrasonography is important modality for detection and characterization of thyroid nodules and is highly sensitive in detecting small nodules, cervical lymphadenopathy, carotid sheath and strap muscle invasion, the specificity is low. So also it is difficult to differentiate between the types of thyroid malignancies, type of thyroiditis with this modality. The major advantages of ultrasonography is the rapidity with which the images are obtained. It is non-invasive, relatively inexpensive and can be performed even at bed side. It does not involve the use of ionizing radiation and is safer even in pregnant patients.

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