"Ultrasonographic Evaluation of Thyroid Lesions"

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Abstract:

Introduction: In rural area many people suffer from thyroid diseases. However they usually neglect it and present late only when they suffer from compressive respiratory pathologies. Therefore the present observational study was undertaken to identify various pathologies of thyroid and how best ultrasonography can provide solution with minimum expenditure to the patient as well as to arrive at correct diagnosis.

Study Design: Ultrasound showed abnormalities in 97(97%) out of 100 cases referred for ultrasound. Three cases were within normal limits. Out of 100 patients 83 (83%) were female and 17(17%) were male. The most common age group affected was between 31-40 years.

Observations & Results: In this study of 100 cases, multinodular goiter was found to be the most common thyroid pathology and next to it is colloid cyst in rural population. In our study 40 cases were diagnosed sonographically and 20 cases confirmed on FNAC as colloid goiter. It shows 100% USG and FNAC correlation. Out of 15 cases of diffuse hyperplasia of thyroid gland, 4 were diagnosed and confirmed by FNAC as Hashimoto’s thyroiditis. An ultrasound diagnosis and confirmation of 4 cases of papillary carcinoma of thyroid gland could be done; in which all 4 were males. Out of these 4 cases 3 showed peripheral pattern of color flow on color doppler study and 1 case was showed both peripheral and internal flow pattern. 2 cases showed coarse calcification. All 4 cases were purely solid in nature and hypoechoic in echogenicity.

Conclusion: Ultrasound provides valuable diagnostic information with a high degree of diagnostic accuracy.

Keywords: Thyroid Disorders, High Frequency Ultrasound, Thyroid Pathology

Introduction:

In rural area many people suffer from thyroid diseases. However they usually neglect it and hence present late only when they suffer from compressive respiratory pathologies. Ultrasonographic approach to the diagnosis of thyroid pathologies, being non invasive can help the patients in detection of pathologies and manage as per requirements. High-resolution ultrasound has become sensitive test for the evaluation of the thyroid. Because of the superficial location of the thyroid gland, high-resolution real-time grey-scale and Color Doppler sonography can demonstrate normal thyroid anatomy and pathologic conditions with clarity.

The superficial location of the thyroid gland makes high-resolution real time grey-scale and color Doppler sonography to demonstrate normal thyroid anatomy and pathologic conditions with remarkable clarity. The thyroid gland is critical in regulating metabolic functions of the body like cardiac output, skeletal growth and thermogenesis. Thyroid abnormalities are common in general population. Ultrasound may also distinguish between solid and cystic lesions or a congenital cyst from a lymphnode, neurogenic tumor or thyroid tissue.
Materials and Methods:
The present study was undertaken in the rural area and included all the patients who were detected/clinically suspected to have thyroid pathologies and were referred for ultrasound. It was a prospective study. The study sample was 100 cases. The study period was from August 2010 to July 2012. Inclusion criteria were patients from all age groups irrespective of sex. The equipment was high resolution ultrasound machine- SIEMENS SONOLINE G 60 S.

Consent for patients or information was taken in written on predesigned consent form in both English and local language including potential risk. A 7.5 to 10 MHz real time high frequency ultrasound probe with contact method was used. Patient was placed in a supine position with neck extended. A small pad was placed under the shoulders to provide better exposure of neck. Probe had placed over the lower part of neck with an intervening gel. Data was presented in graphic as well as tabulated forms and analysis was done to find out age, sex predilections as well as observations was drawn as to which are the common pathologies and early detection of the diseases which could have a malignant course.

Results:
Ultrasound showed abnormalities in 97 (97%) out of 100 cases. Three cases were within normal limits. Various patterns of thyroid abnormalities as seen on ultrasound are shown in Figure 1. Multinodular goiter was the commonest pathology and was seen in 40% of the cases. The females were most commonly affected by Multinodular goiter and constituted 90% of goiter cases. Similarly colloid cyst was more common in females and they constituted 20% of colloid cyst cases. Females also constituted 87% cases of diffuse thyroid hyperplasia.

![Pie Chart](image-url)

**Figure 1: Pattern of Thyroid Pathologies on USG**
Discussion:
Ultrasound can successfully and satisfactorily demonstrate various thyroid pathologies.

Multinodular goiter - Sonographically these appear as complex heterogenous nodules having both solid and cystic components. Very small nodules can be located near isthmus also. Most of them are hypoechoic. Few of them are isoechoic and hyperechoic. This is varied non-specific appearance in accordance with Scheible et al, Simone et al, Loevner, Tessler and Tublin et al,Gooding and Rumack et al.2-7 Few nodules showed bright echogenic foci with comet tail artifacts due to dense colloid material in degenerated goiterous nodules.

This was taken as sure sign of benignity and was in accordance to the findings described by Rumack et al and Ahuja et al. 2,8 Few nodules show fluid-fluid levels and these are diagnosed as degenerative changes in the form of hemorrhage in goiterous nodules. On microscopy benign looking cells filled with colloid are seen.

In the management of multinodular colloid goiter these are kept under observation and few of them require suppressive therapy. If there are pressure effects like compression of trachea or hoarseness of voice or for cosmetic purpose surgery in the form of total or subtotal thyroidectomy can be done.

In our study 40 cases were diagnosed sonographically and 20 cases confirmed on FNAC as colloid goiter. It shows 100% USG and FNAC correlation. Out of these 40 cases 20 cases were lost for follow up. Out of these 40 cases 25 cases showed peripheral flow pattern on color Doppler study and 13 cases showed both peripheral and internal flow patterns and 2 cases were avascular. Coarse calcification was present in 21 cases and eggshell calcification was present in 3 cases. Peripheral thin halo was present in 25 cases.23 cases showed mixed solid and cystic components and 17 cases were purely solid in nature. 22 cases were iso to hypoechoic, 12 cases were purely hypoechoic and 6 were iso to hyperechoic in echogenecity.

Colloid cyst- This degenerative change in goitrous nodules corresponds to their sonographic
appearances. Purely anechoic areas are caused by serous or colloid fluid. Echogenic fluid or moving fluid-fluid levels correspond to hemorrhage. Intracystic, thin septations probably correspond to attenuated strands of thyroid tissue. Bright echogenic foci with comet tail artifacts are likely to be due to presence of microcrystals. 

In our study 30 cases were diagnosed sonographically and 20 cases confirmed on FNAC as colloid cyst. Out of these 30 cases 10 cases were lost for follow up. It shows 100% USG and FNAC correlation.

**Hashimotos thyroiditis** - Sonographically appears as diffuse glandular enlargement with homogenous coarsened parenchymal echotexture. Multiple discrete hypoechoic micronodules and on Doppler study shows increased vascularity. On microscopy hurthle cells are diagnostic of Hashimotos thyroiditis. These findings are described by Rumack, Scheible and Simeone et al. 

The pseudolobulated appearance with thickened fibrous strands giving rise to coarse appearance. This was in accordance to findings described by Rumack, Hopkins and Reading and Loevner et al.

In our study, out of 15 cases of diffuse hyperplasia of thyroid gland, 4 were diagnosed and confirmed by FNAC as Hashimoto’s thyroiditis. All four were females. All 15 cases showed internal as well as peripheral pattern of vascularity on color Doppler. 2 out of 15 cases were dignosed to have thyrotoxicosis.

**Follicular adenoma:** Adenomas represent only 5% to 10% of all nodular disease of the thyroid and are seven times more common in females than in males. Most result in no thyroid dysfunction, a minority most result in no thyroid dysfunction, a minority hyperfunction, develop autonomy and may cause thyrotoxicosis. Most adenomas are solitary, but they may also develop as part of a multinodular process.

**Thyroglossal cyst** - Sonographically appears as anechoic lesion with posterior acoustic enhancement and moves with deglutition, situated in midline and extends up to the lobe of thyroid gland. These findings are in accordance with Ahuja et al, Simone et al and Rumack et al.

In our study we have diagnosed and confirmed by FNAC 2 cases of Thyroglossal cysts and both were treated by aspiration of the cyst.

**Papillary carcinoma** - Sonographically appears as hypoechoic mass (90%) due to closely packed cells with minimal colloid substance. There are punctate echogenic foci due to microcalcifications with or without acoustic shadows. These microcalcifications are diagnostic of papillary carcinoma of thyroid gland. It is exceedingly rare for papillary carcinoma to exhibit large amount of cystic change. This is seen in less than 5% cases of carcinoma. On microscopic examination the tumor is multicentric within the thyroid gland in 20% of cases. Round, laminated calcifications (psammoma bodies) in the cytoplasm of papillary cancer cells are seen in 35% of cases. Rumack et al.

In our study we have diagnosed and confirmed 4 cases of papillary carcinoma of thyroid gland. All 4 were males. Out of these 4 cases 3 showed peripheral pattern of color flow on color doppler study and 1 case was showed both peripheral and internal flow pattern. 2 cases showed coarse calcification. All 4 cases were purely solid in nature and hypoechoic in echogenicity.1 case showed presence of thick incomplete halo. Considering the above findings in our study, it is concluded that the sonographic features of papillary carcinoma of thyroid are non
specific.

**Anaplastic and Follicular carcinoma**-

1 Sonographically appear as hypo or hyperechoic lesions and cannot be differentiated. We can identify them as malignant lesions and able to differentiate from benign lesions. FNAC will be able to recognize it as to which type of malignant cells are present which helps in differentiating type of carcinoma. This is in according with Rumack et al.²

In our study there was 1 male patient diagnosed as neoplastic lesion in the thyroid gland and FNAC revealed Anaplastic carcinoma of thyroid gland. On microscopy anaplastic cell are seen. It showed peripheral pattern of vascularity on color doppler and presence of microcalcifications. It is purely solid in nature and hypoechoic in echogenecity.

Another 3 female patients were diagnosed as neoplastic lesion and FNAC revealed Follicular carcinoma of thyroid gland. Out of these 3 cases, 2 cases showed peripheral pattern and 1 case showed both peripheral and internal flow pattern on color doppler study. Egg shell calcification was present in 1 case and peripheral thin halo was present in 2 cases. All the three cases were hypoechoic in echogenecity. 2 cases were purely solid in nature and 1 case showed mixed solid and cystic component. Considering the above findings in our study, it is concluded that the sonographic features of follicular carcinoma of thyroid are non specific.

**Conclusion:**

Ultrasonography is very useful and noninvasive modality to evaluate thyroid lesions. Use of color Doppler further increases sensitivity and specificity. In rural population the multinodulargoiter is most common pathology and is most common in 31 to 40 yrs of age group and in females.

Ultrasonography is very handy to assess thyroid lesions, particularly so in apprehensive rural people. The added advantage is that the lesion can be shown to rural patients and he or she can be motivated to undergo invasive procedures like FNAC/biopsy as and when needed. It can be used as guidance for FNAC to obtain adequate material from appropriate location and to reduce chances of injury to adjacent vital structures. Non palpable lesions can be diagnosed by USG. It can avoid need for FNAC in lesions like colloid cyst.

Sonography proves to be the best tool of diagnosis in benign pathologies of thyroid such as multinodular goitre, diffuse hyperplasia of thyroid, follicular adenoma and Thyroglosal cyst.

A limitation is that sonographic features of malignant pathologies of thyroid are not specific. Hence it should be put to use cautiously. FNAC proves to be investigation of choice for malignant pathologies of Thyroid gland.

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