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Linical, sonographical and pathological evaluation of thyroid nodule

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Abstract
The thyroid gland is situated behind the voice box (larynx) just behind the collarbones at the lower front of the neck. There is a lump on the thyroid gland or thyroid gland. The diseases of thyroid form a major share of head and neck surgery. Total 50 cases of nodular thyroid were evaluated from May 2011 to May 2013, with respect to age, sex, duration of symptoms and investigated with routine hemogram, thyroid profile, fine needle aspiration cytology and USG thyroid. Majority of the patients were in the age group of 31-40 years. All the lesions diagnosed malignant on FNAC. The results of FNAC and USG were compared with histology. USG proved to be a more sensitive modality to evaluate the nodularity of the thyroid than clinical evaluation.

Keywords: thyroid, fine needle aspiration cytology (FNAC), thyroid gland, ultrasonography (USG)

Introduction
The sicknesses of thyroid is having a significant portion of head and neck medical procedure. Clinical assessment albeit extremely exact by and large, is insufficient in certain regions particularly in organizing of thyroid malignancies and in identifying the multinodularity of the organ. Infections of thyroid organ, particularly multinodular goiter because of insufficiency of iodine is pervasive in India. India has the world's greatest goiter belt in the Sub-Himalayan locale with about 55 million cases are assessed to be experiencing endemic goiter. As of now, no under 140 million individuals are assessed to be living in goiter endemic locales of the country [1]. Ultrasonologists have set out some ultrasonologic highlights that will help in the board in thyroid issues. There are sure highlights that will assist with recognizing generous from dangerous injuries.

Aims and Objective
To find relation of clinical diagnosis with investigative parameters, Ultrasonography, fine needle aspiration cytology and histopathology in the evaluation of thyroid nodule

Review of Literature
The name thyroid is derived from the Greek description of a shield shaped gland in the anterior aspect of neck (thyroids) [2]. Goiters (from the Latin, Gutter, and meaning throat) were known in China in 2700 B.C, but it was the Italians of renaissance period who first recognized the normal thyroid gland. In 1619, Fabricus ab Aquapendente (1537-1634) recognized that goiters arouse from the thyroid.

Parafollicular cells lie in the Parafollicular space and secrete thyocalcitonin. They are also known as C-cells. In 1960's the origin and function of these glands was clarified by Pierre and Pollock. It has been demonstrated that C cell are derived from the neural crest cells that migrate ventrally, seeding the ultimobranchial body. Subsequently they migrate into the ventral part of the neck and are incorporated into the thyroid glands. The thyroid stimulating hormone (TSH or thyrotropin) controls the thyroid epithelial cells. The TSH is secreted from the anterior pituitary into the circulation. The TSH binds to the receptors in the basement membrane of the thyroid cells, which release cyclic AMP within the foliicular cells. This cyclic AMP causes accumulation of iodine, iodination and synthesis of thyroglobulin (Tg). Endocytosis and hydrolysis of Tg are intensified causing increased secretion of the thyroid hormones. TSH is the most useful test in detecting subtle thyroid dysfunction [3]. To be functional Tg has to be iodinated. This occurs at the apical membrane interface between the colloid and the cells. An enzyme, thyroperoxidase (TPO) catalysis the iodination of Tg. This jodinated Tg undergoes further rearrangement (i.e. Coupling of two diiodotyrosine under the influence of TPO to form one to three molecules of tetraiodothyronine (Thyroxine, T4) which is released from Tg linkage only when foliicular cells ingest the Tg and hydrolyze it. Major constituent of colloid and precursor of thyroid hormones and elevated in most thyroid diseases and not recommended as an initial screening of thyroid nodules [4].

Thyroid Hormone [5]: Thyroxine is the primary transport form of the thyroid and is referred to as a pro-hormone. Normally 99.97% of serum T4 and 99.7% of serum T3 are firmly bound to the plasma proteins, which are, thyroxine binding globulin (TBG), pre albumin and albumin. These bound hormones are in dynamic equilibrium with the free T3 and T4. The hormones also enhances fat metabolism and in particular lipids are mobilized from the fatty tissues which increases the free fatty acid concentrations in the plasma. Computed tomography (CT) [6]. appearance of thyroid has been a subject of investigation from the earliest use of CT [5]. More recently the CT appearance of both the normal and abnormal thyroid glands has been extensively reviewed. The appearance of normal thyroid tissue is easily identified because of its higher

density relative to the adjacent structures due to its high iodine content. Thyroid tissue enhances typically by 25 HU in at least some parts of the gland. CT is also very useful in the identification of ectopic thyroid tissue. The lack of iodine is the stimulus to hyperplasia and when this gives place to involution both the acini and the gland may remain enlarged, condition which constitutes goiter.

Iodine excess goiter: Occurs in persons with certain predisposing conditions *viz.* familial predisposition, deranged thyroid parenchyma, no response of goiter to iodine withdrawal, un-suppressibility of exogenous thyroid hormone, increased sensitivity of the thyroid toiodine, or positive iodine perchlorate discharge and patients with chronic thyroiditis.

This mechanism is not completely understood, but seems probable in iodine goiter. There is persistently a high concentration of intrathyroidal iodide that occurs for some reason and induces a failure to escape from the acute Wolff Chaikoff effect. Thus blockade of hormone is sustained. It is also probable that iodide goiter is attributable to coincidental intake of goitrogens like lithium or antipyrium and sulfonamides.

An acute development of MNG gives rise to the suspicion of inflammatory thyroid disease which is painful in case of acute thyroiditis and the sub-acute thyroiditis of de Quervain, or painless in the case of granulomatous diseases such as sarcoidosis or tuberculosis [7].

Immunological disturbances occur in many thyroid diseases, including malignant conditions. The immune system may be primarily responsible for the disease process,the so called autoimmune thyroid disease (AITD), or the immunological changes maybe secondary to some other disease process. The major diseases included in AITD are Grave's disease, lymphocytic thyroiditis (including Hashimoto's thyroiditis and primary myxedema) and post-partum thyroid dysfunction.

In one series by Walters D A *et al* [8], ultrasound was used in the preoperative workup in the determination of a malignant nodule in 120 patients of goiter FNAC had a sensitivity, specificity and a positive predictive value of 86%, 85% and 58% respectively. In the study of Jones AJ *et al* the sensitivity, specificity and positive predictive value of FNAC, radioisotope scan and ultrasound was evaluated for thyroid cancer in solitary nodules. For FNAC it was 92%, 85% and 41% respectively. For ultrasound it was 75%, 61.1 % and 19% while for radioisotope scanning it was 820/0; 34% and 11 % respectively. The combined result of ultrasound and radionuclide scan was 82%, 34% and 11%. [9].

In one study of solitary nodules by Serga A *et al* only 64.3% of the carcinomas exhibited the typical malignant pattern on ultrasonography and in 21.4%. of the carcinomas a homogeneous nodule with a clear margin was observed which was often observed in benign nodules also.

The diagnostic accuracy of FNAC in differentiating benign from malignant thyroid nodules was found to be 92.4%. Thus it was concluded that though ultrasound provides useful information for the assessment of these nodules all ultrasound examination should be combined with FNAC for the final diagnosis [10].

The role of surgeon in the management of patients with anaplastic thyroid carcinoma is clearly to establish tissue diagnosis and to provide management of the airway. Surgical resection is generally not recommended, the only exception being a very small primary tumor contained within the capsule of the thyroid gland which happens to be histologically an anaplastic tumor. Tracheostomy is seldom indicated since it may prove to be a frustrating technical challenge and indeed may be quite hazardous. On the other hand, establishment of a safe airway can be accomplished with endotracheal intubation until further definitive is undertaken.

Materials and Methods

A prospective study was carried out on 50 patients of nodular thyroid swelling between 11-70 yr age group, attending department of surgery in our Hospital. Patients with thyroid swellings which are not nodular and unfit patients for surgery are excluded.

Inclusion Criteria

Patients with clinically solitary thyroid swelling. Patients willing for surgery with written and inform consent.

Exclusion Criteria

Patients with clinically diffuse thyroid swelling. Patients with clinically multinodular goiter. Patients in hypo / hyper thyroid state or unfit for surgery.

Observations and Results

Table 1: Comparison of clinical diagnosis with histopathology

Clinical	Histopathological	No. of cases
Solitary nodule of thyroid (n=50)	Hyperplastic thyroid nodule	1
	Colloid nodule	13
	Nodular goiter	3
	Benign cystic lesion	1
	Benign follicular adenoma	17
	Multinodular goiter	6
	Papillary carcinoma	9

In table no. 1 shows the comparison of clinical diagnosis with histopathology. Out of 50 patients diagnosed to have solitary nodule of thyroid, histopathology revealed 41 benign and 9 malignant.

Table 2: Correlation of FNAC lesions with Histopathology

Category	FNAC lesions	Histopathological diagnosis	
Benign (n=30)	Nodular goite (n=7)	Nodular goiter	2
		Benign follicular adenoma	1
		MNG	4
	Benign cystic lesion (n=8)	Colloid nodule	1
		Nodular goiter	1
		Benign cystic lesion	1
		Benign follicular adenoma	3
		MNG	2
	Colloid nodule (n=13)	Colloid nodule	10
		Benign follicular adenoma	3
		MNG	0
	Hyperplastic thyroid nodule (n=2)	Benign follicular adenoma	2
Malignant (n=7)	Papillary carcinoma (n=7)	Papillary carcinoma	7
Suspicious (n=13)	Follicular neoplasia (n=13)	Benign follicular adenoma	8
		Colloid nodule	2
		Hyperplastic thyroid nodule	1
		Papillary carcinoma	2

As shown in table no. 2, in 30 cytologically diagnosed benign cases, all proved to be benign, only malignant lesion found was papillary carcinoma in 7 cases. All the 13 cases of follicular neoplasia were subjected to surgery and correlated with histopathology. Eleven cases were found to be benign and two cases to be malignant. All 13 patient of follicular neoplasia on FNAC were given 2 option 1.direct proceed with total thyroidectomy or 2.proceed with hemithyroidectomy if HPR is benign surgery is sufficient. But if HPR is malignant proceed for total thyroidectomy. All 13 patients had hemithyroidectomy. Out of 13 two were malignant which proceeded with total thyroidectomy.

Table 3: Comparison of USG with FNAC

Category	USG Lesions	FNAC	
		Category	No
Benign (n=36)	Cystic (n=5)	Colloid nodule	3
		Benign cystic lesion	2
	Hyperechoic nodule (n=22)	Benign cystic lesion	4
		Colloid nodule	10
		Nodular goiter	1
		Hyperplastic thyroid nodule	2
		Follicular neoplasia	5
	MNG (n=9)	Nodular goiter	2
		Benign cystic lesion	2
		Follicular neoplasm	3
		Papillary carcinoma	2
Malignant (n=14)	Mixed echogenic nodule (n=14)	Nodular goiter	4
		Papillary carcinoma	5
		Follicular neoplasm	5

As shown in table no. 3, the USG diagnosis of benign lesion was confirmed in 26 out of 36 cases and was suspicious in 8 cases and malignant in 2 cases by FNAC. Out of 14 malignant cases 5 were proved by FNAC and 5 turned out to be suspicious and 4 turned out to be bening. Among total 50 cases of Solitary thyroid nodule, USG revealed multiple nodules in 9 cases. Thus USG is more sensitive diagnostic modality to detect nodularity.

Discussion

In the present study age of the patient ranged from 11-70 years with a median age of 35 years. Age distribution of the present study is comparable to Jose RJ *et al*. [11]. The thyroid nodules on USG were subdivided into two groups and malignant on the basis of various sonographic features. The number of males in the present study was 11(22%) and the females were 39 (78%) with a male to female ratio of 1:3.54 Sex distribution was close to Afroze *et al* [12]. when compare.

Conclusion

The present study was undertaken to evaluate the usefulness of clinical examination, FNAC and USG of thyroid in the management of thyroid nodule and compare the efficacy of each of the investigation. In our study, the sensitivity and specificity of USG was 66.66%and 80.48%respectively. Therefore use of ultrasound along with FNAC will improve diagnostic accuracy to higher level and help in better management. Minimal surgery was hemi-thyroidectomy, which help in establishing the histopathological diagnosis and in comparing the efficacy of above investigations.

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