A Study on Tirads Classification System in the Risk Stratification of Thyroid Swellings

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ABSTRACT

BACKGROUND: Thyroid Imaging Recording And Data System (TIRADS) is a classification system for thyroid nodules,which classify them into benign or malignant, based on ultrasound characteristics. Still histopathological examination is the goal standard for the classification of thyroid swellings. This study aims to assess the accuracy of TIRADS classification in the evaluation of thyroid swellings by comparing with cytological examination reports

METHODS: A proforma was drafted for the study of all patients presenting with history of palpable thyroid swelling in our hospital. Clinical presentations, FNAC and Ultrasound findings of all cases were documented. Based on ultrasound findings, patients were grouped into different classes of TIRADS and findings compared with FNAC.

RESULTS: 100 cases who presented with thyroid swellings were studied and their TIRADS class was compared with the FNAC. Out of the 100 cases, 93 were females and 7 were males, being 13.3 : 1.TIRADS 4b showed maximum frequency with 40 patients. TIRADS 4a included 16 patients, TIRADS 4c included 15 patients, TIRADS 2 included 11 patients, TIRADS 5 included 10 patients, TIRADS 3 included 6 patients and TIRADS 1 included 2 patients. TIRADS 4b, 4c and 5 showed malignant cases. TIRADS 4b showed 7.5% malignant cases. TIRADS 4c showed 66.7% malignancy. TIRADS 5 showed 100% malignancy.

CONCLUSION : Addition of TIRADS score to clinical suspicion is very much helpful in picking up high risk cases, especially in a country like India where the rural patient load is very high and follow up is not standardized.

INTRODUCTION

Thyroid swellings is a common presentation in surgery department. Majority of these are benign diseases of which goiter is the commonest and a few are malignant. India too, is no exception. It has been estimated that about 42 million people in India suffer from thyroid diseases. Thyroid swellings are common clinical findings and have a reported prevalence of 4% to 7% in the adult population. Discrete thyroid swellings are common and are present in 8.5% population in India. Thyroid swellings are four times more common in females. Thyroid swellings can be isolated or dominant. True incidence of thyroid nodularity is less apparent on clinical classification. When such glands are exposed at operation, clinically impalpable nodules may be detected.. Importance of solitary thyroid nodule is that the risk of neoplasia when compared to other thyroid nodules is high. Fifteen percent of STN are malignant.The available tools to know the nature of a thyroid nodule are thyroid function tests, thyroid antibody titers, isotope scans, ultrasonography and fine needle aspiration cytology. Cytological and histopathological examination still remains the goal standard in evaluation of thyroid nodules. Ultrasonography is an important component in the work up of thyroid nodules. Ultrasonography provides advantages including portability, cost effectiveness, lack of ionizing radiations, non invasiveness. Hence clinical suspicion when coupled with ultrasound features , to a great extent , can categorize the patients into high risk or low risk. In a developing country like India , patient load is high, man power available in health care is out of proportionally low and cost effectiveness is very important. Thus ultrasound renders an important role in evaluation of thyroid nodule. To standardise ultrasound findings TIRADS classification can be used. TIRADS scoring system classifies thyroid nodules into 6 classes, based on certain sonographic features and thus help differentiate benign from malignant. Nevertheless ultrasound has lot of limitations including the difference in resolution of the equipment, observer variations, overlapping of findings. TIRADS classification tries to minimize these shortcomings.

MATERIALS AND METHODS

The study includes those patients admitted in the surgical wards of Tirunelveli Medical College Hospital from January 2014 to June 2015 for treatment of thyroid diseases. This is a prospective study.

STUDY SAMPLE: A total of 100 patients with thyroid swelling were studied.

STUDY PERIOD: From January 2014 to June 2015.

INCLUSION CRITERIA:
The study includes those patients-

1. Getting admitted in the surgical wards for the treatment of various thyroid swellings.
2. Who are willing to co-operate for the study.

EXCLUSION CRITERIA:
The study excludes those patients with-

1. children below 12 years.
2. Not willing for FNAC.
3. Lost for follow up.

EVALUATION PARAMETERS:
Patients with goiter was evaluated clinically. Relevant aspects of patient's history included age, sex, rapidity of growth, recent onset of hoarseness, dysphagia, dyspnoea, symptoms of hypo or hyperthyroidism, history of head and neck irradiation, family history of endocrine diseases was included. Physical examination to determine whether the gland was diffusely enlarged, solitary, nodular or multinodular with symmetric or asymmetric enlargement was done. In nodular swelling, the size, shape, consistency, location and mobility was assessed. The patient was also be examined for the presence of cervical lymphadenopathy.

A thyroid function test and an ultrasound was performed using a 7.5 MHZ high frequency linear array transducer. FNAC was carried out in the Department of Pathology Tirunelveli Medical College Hospital.

The ultrasound findings were classified into various classes of TIRADS and the same compared with FNAC diagnosis.

RESULTS

100 patients were studied from January 2014 to June 2015. The TIRADS Class was compared with the cytological diagnosis in these cases. Majority of thyroid cases (58%) were in the 4th and 5th decades of life (31-50) yrs, 93 were females and 7 were males, Females : Males = 13.2 : 1 .Of the 100 cases 80 were benign and 20 malignant. Papillary carcinoma was the most common malignancy (60%) , follicular - 20% , nonspecified malignancy 15%

, anaplastic - 5%. Incidence of malignancy in TIRADS 4a was 0%, TIRADS 4b - 7.5% , TIRADS 4c - 66.7% , TIRADS 5 - 100%. Sensitivity, specificity, positive predictive value, negetive predictive value and accuracy, respectively, for each of the suspicious sonographic features were :

1.solid components : 100, 18.7, 24.7, 100, 35.8
2.Hypoechogenicity : 100, 26.4, 27.4, 100, 42.4
3.Microcalcification : 75, 91.3, 71.4, 92.7, 87.6
4.Taller than wider : 60, 94.2, 75, 89, 86.5
5.Irregular margins : 80, 94.2, 80, 94.2, 91

Table -1; . Distribution of differential diagnosis of thyroid swellings

	COL-LOID GOITRE	HASHI-MOTOS	ANA-PLASTIC CA	PAPILLRY CA	ADENO-MA	MALIG-NANCY	NORMAL	LYM-PHOC-ITIC	FOLLI-CULR	HURTHLE CELL	TOTAL
FREQUENZY	62	11	1	12	2	3	2	3	3	1	100

CHART-1 ; Component Bar diagram showing Age distribution in differential diagnosis
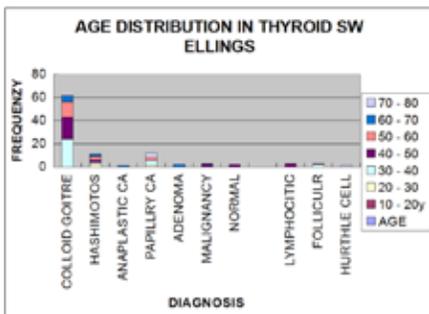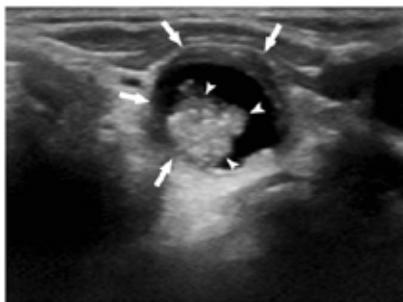

CHART 2- Bar diagram showing Distribution in TIRADS scoring system

Fig-1;thyroid nodule USG-solid components

qFig-2; thyroid nodule USG- Hypoechogenicity
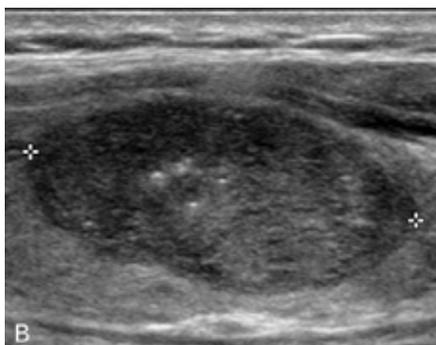

Fig-3; ; thyroid nodule USG- Taller than wide

DISCUSSION;

Ultrasound Neck [1] is an excellent noninvasive imaging modality. Thyroid Imaging and Reporting System (TIRADS) was proposed similar to BIRADS classification{5}. It was proposed by Howarth. The classification is used to differentiate thyroid swellings into benign or malignant without invasive procedures, based on ultrasound evaluation of thyroid using suspicious Sonographic features.

CLASSIFICATION

TIRADS 1 - Normal thyroid gland ,TIRADS 2 - Benign gland ,TIRADS 3 - Probably benign ,TIRADS 4 – Suspicious lesion ,TIRADS 5 - probably malignant ,TIRADS 6 - proven malignant

SUSPICIOUS SONOLOGICAL FACTORS
1. Solid components [FIG-1]
2. Hypoechogenicity [FIG-2]
3. Microcalcification
4. Taller than wider [FIG-3]
5. Irregular margins

TIRADS 1 -Normal thyroid gland with no features of nodularity or enlargement of thyroid.

TIRADS 2 -Thyroid nodule without suspicious sonographic features but,iso / hyperoechoic, vascular,expansile and capsulated.

TIRADS 3 -Thyroid nodule without suspicious sonographic features but heteroechoic, and partially formed capsule and periph-

eral vascularization.

TIRADS 4 -TIRADS 4a - one of the suspicious sonographic features. TIRADS 4b - two suspicious sonographic features. TIRADS 4c - three / four suspicious sonographic features.

TIRADS 5- All of the suspicious sonographic features.

TIRADS 6 -Biopsy proven malignancy.

Thyroid swellings was seen to affect females within the age group of 30-40 years in the above series.

Female to male ratio was found to be 13.2:1. 20% of the cases were found to have malignancy ,of which papillary carcinoma {2}accounted for 60%, follicular neoplasm 20%, not specified malignancy 15% and anaplastic carcinoma 5%. When classified into TIRADS, majority of them fell into TIRADS 4 (71%). TIRADS 4b showed incidence of malignancy of 7.5%, TIRADS 4c - 66.7% , TIRADS 5 - 100%.

Study by Horvath et al {4}showed malignancy rate in TIRADS 3 - <5%; TIRADS 4a- 5-10%; TIRADS 4b - 10-80%; TIRADS 4c - >80%. The suspicious sonographic features were evaluated . Solid components and hypoechogenicity were found to be maximum sensitive but less specific. Sensitivity , specificity ,positive predictive value,negative predictive value were found to be maximum for irregular margins (80, 94.2, 80, 94.2, 91 resp.).

Significance of suspicious sonographic features i.e sensitivity, specificity, positive predictive value, negetive predictive value,accuracy were also analysed by Hong YJ, Son EJ, Kim EK, Kwak JY, Hong SW, Chang HS {3}.

LIMITATIONS OF STUDY

The study sample selected is not a representative of the general population. Therefore the true incidence of various thyroid pathologies could not be assessed.. The number of malignant cases studied during this limited period was not sufficient enough to make concrete conclusions, as regard to the sensitivity, specificity and accuracy of various sonographic features. The experience of the Radiologist is an important factor affecting the outcome of the study.

CONCLUSION:

Ultrasound thyroid plays a major role in the evaluation of thyroid swellings as it provides suspicious sonolgraphic features to classify patient into high risk. Further when ultrasound guided FNAC is used, it enhances the diagnostic outcome.TIRADS classification can standardise the ultrasound findings so as to select at risk patients requiring detailed evaluation.The significance of various suspicious sonographic features studied showed irregular margin as most accurate feature suggestive of malignancy. Taller than wider and microcalcifications also have high chance of malignancy when compared to solid components and hypoechogenicity.Ultrasound is simple, safe, quick and noninvasive. it should be exploited to its maximum benefit for all thyroid swellings.

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