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Thyroid nodules: ultrasonographic stratification of malignant risk by TIRADS

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ABSTRACT

Background: Thyroid neoplasia is easily diagnosed with, noninvasive imaging modality like ultrasonography that is widely available. TIRADS scoring is a useful modality in establishing better stratification of cancer risk in thyroid nodules, particularly, papillary thyroid cancers (PTC) as well as papillary thyroid microcancers (PTMC).
Methods: All patients who presented with thyroid swelling and underwent surgery in the department of ENT were included in this study. All patients were evaluated with ultrasonographic examination of the neck. The decision of surgery was based on TIRADS scoring, size of swelling, or patient preference. Ultrasound features of the nodules, number of malignant features and TIRADS scoring were compared with final histopathology of the tumors.
Results: A total of 58 thyroid surgeries were performed from January 2014 to December 2017. On statistical analysis, we found that more the number of radiological features favouring malignancy more were the likelihood of finding malignant histopathology.
Conclusions: Ultrasonographic features of malignancy along with TIRADS scoring are an extremely useful tool in diagnosing thyroid cancers and will help in standardising all sonographic reports.

Keywords: TIRADS, Thyroidectomy, Papillary cancer thyroid

INTRODUCTION

Prevalence of thyroid malignancy is on the rise all over the world. Thyroid cancer exceeds one million every year and amounts to 20% of whole cancers detected.[1]

Papillary thyroid cancer (PTC) is the most common type of thyroid cancer.[1-4] Micro papillary cancer thyroid is another sub entity of PTC which has identical histopathological picture but is less than 1.0 cm in size. The prevalence varies according to diet, geographic region and nutrition. Prevalence of micropapillary thyoid cancer is similar to that of PTC in the world literature.[5,6] PTC is a cancer with high cure rate. So it becomes very important to diagnose and treat them at the earliest. Surgery is the primary treatment offered for PTC.

Availability and access to diagnostic procedures have increased the detection rates of thyroid cancers.[2]

Ultrasonography, which is a widely available and inexpensive investigation for diagnosing thyroid nodules and this has increased the incidence rates of thyroid cancer subsequently.[1]

Well sorted diagnostic criteria are helpful in detecting these cancers in the early stages. Ultrasound is also very simple and non-invasive method for stratifying malignant risk of thyroid nodules. There are several scoring systems and TIRADS is one such system of stratification of cancer risk in thyroid nodules, particularly, papillary thyroid cancers (PTC) as well as papillary thyroid microcancers (PTMC).

Table 1: TIRADS and number of features with risk of malignancy.

Features	Gland	Number of features	Risk (%)
TIRADS I	Normal thyroid gland	0	0
TIRADS II	Benign lesions	2	10
TIRADS III	Probably benign lesions	3	48
TIRADS IV	Suspicious lesions	4 to 6	85
TIRADS V	Probably malignant lesion	7 or more	100

Table 2: Features observed in ultrasound for TIRAD classification.

(A) Composition and echogenicity)			
Compostion	**Score**	**Echogenicity**	**Score**
Cystic or almost completely cystic	0	Anechoic	0
Spongiform	0	Hyper echoic or iso echoic	1
Mixed cystic and solid	1	Hypo echoic	2
Almost completely solid	2	Very hypoechoic	3
(B) Margins and Echogenic foci			
Margins	**Score**	**Echogenic focii**	**Score**
Smooth	0	None or large comet-tail artefact	0
Illdefined	0	Macro calcification	1
Lobulated or irregular	2	Peripheral calcification	2
Exta thyroidal extension	3	Punctate echogenic focii	3
(C) Shape of the lesion			
Shape		**Score**	
Wider than tall		0	
Tall than wide		3	

Table 3: ATA guidelines.

	ATA guidelines	Features	Risk (%)
1	High suspicion	Hypoechoic solid/ partially solid lesion with one or more features on ultrasound and or extra thyroid extension	79-90
2	Intermediate suspicion	Hypoechoic nodule without ultrasound features	10-20
3	Low suspicion	Isoechoic or hypoechoic with or without partially cystic eccentric solid and no ultrasound features	5-10
4	Very low suspicion	Spongiform or partially cystic nodules without any ultrasound findings	<3
5	Benign	Purely cystic	<1

Table 4: Comparison of TIRADS and ATA.

	TIRADS	ATA
Sensitivity	97.4	95.3
Specificity	29.3	37.4
Negative predictive value	98.1	97.3
Positive predictive value	23.3	25.2

TIRADS or thyroid image reporting and data system is a risk classifying system recognised by American college of radiology.[7,8] Recommendation as in 2017 is as follows in Table 1.

The points that are attributed to score every lesion in ultrasound were in Table 2A to C.

American Thyroid Association (ATA) periodically issues guidelines regarding the identification of malignant risk stratification, it is stratified as given in the Table 3.

Even though there is a quite an overlap of these two, the sensitivity of TIRADS and ATA are in Table 4.

Both these methods are similar in its abilities to detect malignancy of thyroid gland.[7-11]

Despite the availability of such scoring systems, often there is no standardisation in the reporting of ultrasonographic findings and often ultrasonography reports come without a TIRADS.

The objective of the study was to find out if descriptive ultrasonographic features as well as TIRADS scoring stratified the risk of malignancy in thyroid gland when final histopathology was looked at.

METHODS

This study was done from January 2014 to December 2017 in Al Azhar medical college Thodupuzha, Kerala, India (January 2014 to May 2016) and Believers Medical College (June 2016 to December 2017). All the patients who presented with neck swelling, who underwent thyroid surgery were included in this study. The decision to operate on was on the basis of descriptive features on USG as well as TIRADS scoring, large size of the tumor and / or preference of the patient. Surgery recommended was hemi or total thyroidectomy. Surgical procedure and possible complications were explained to the patients. After appropriate pre anaesthesia evaluation, all patients underwent thyroidectomy under general anaesthesia with a maximum of 2.5 inch skin crease incision. Drain was placed for all patients and was removed once the collection was below 10 cc per 24 hour. Sutures were removed on 6th postoperative day. Further treatment and follow up was decided in line with the histopathology report.

All the data was entered in Microsoft excel for statistical analysis. Statistical analysis was done using chi square test and a probability level 0.05, i.e. $p<0.05$ was considered significant.

Chi square test was performed and the level of significance was set at 5%.

RESULTS

316 malignancies were recorded in tumor registry during the study period.

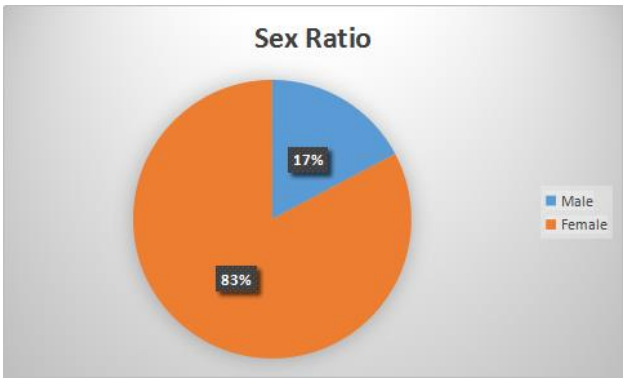

Figure 1: Sex ratio.

Total number of thyroid swelling operated was 58 during this period. Of which 10 (17.24%) and 48 (82.8%) were male and female respectively (Figure 1).

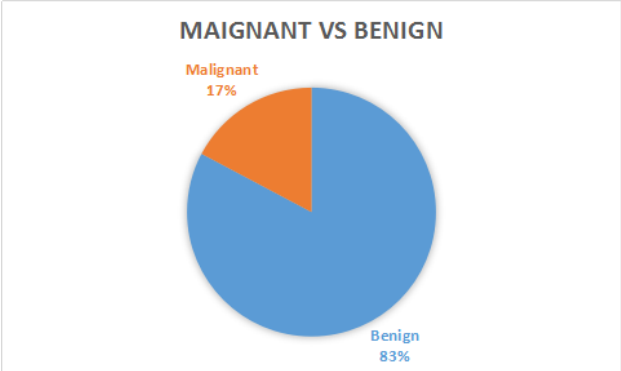

Figure 2: Malignant vs benign.

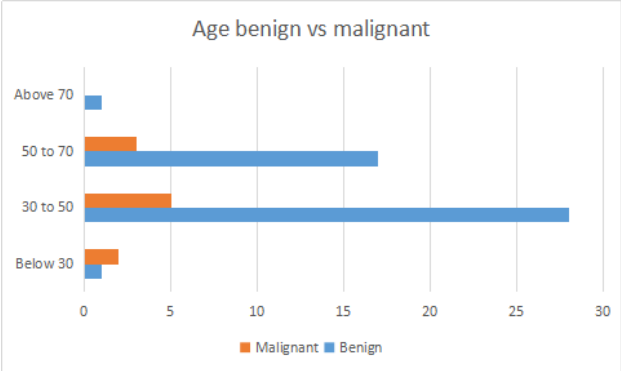

Figure 3: Age wise benign vs malignant.

There were ten thyroid malignancies. This is only 2% of the total cases. The number of males who had PTC were 2 (20%) and females were 8 (80%).

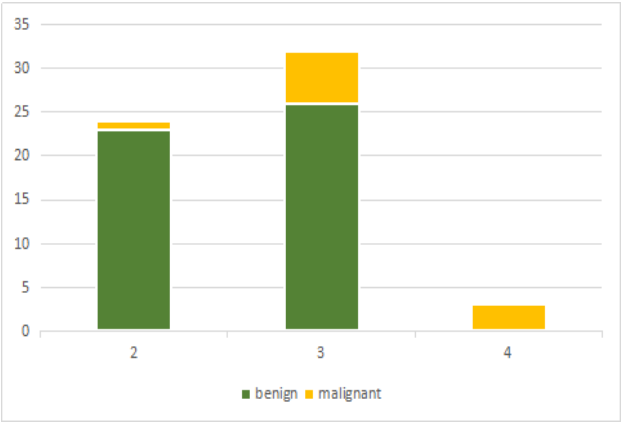

Figure 4: TIRADS scoring in benign vs malignant.

We know that TIRADS scoring, is a good predictor of malignancy especially PTC. However, among 32 (54.3%) lesions reported as TIRADS 3, eight had one feature, 20 had only 2 suspicious features and four had 3 suspicious features (Figure 4). This shows that within the TIRADS

scoring there may be differences in interpretation and reporting.

Eight patients underwent hemithyroidectomy and 50 had total thyroidectomy performed. None of the patients who had hemithyroidectomy needed completion surgery as they all turned out to have benign lesions. Among the 58 operated, 14 had autoimmune thyroiditis and 52 had multi-nodular goiters. One hyper thyroid gland was also encountered.

P value of <0.005 was obtained when the total number of significant ultrasonographic findings was considered against the diagnosis of malignancy obtained in histopathology. However there was no significance found on statistical test for the actual TIRADS score. Similarly age and size of nodule did not seem to have any significance statistically.

DISCUSSION

Thyroid tumor is one of the commonest endocrine tumor encountered, among which, 5-10% of all nodules are malignant.[12,13] The prognosis of thyroid malignancies are relatively good.

A total 58 cases were operated in ENT department from 2014 January to 2017 December. The decision to operate on these nodules are usually made by the TIRADS score and/or by the size of the gland.

The incidence of thyroid cancer increases with age. In our study 50% of the malignancies were in the 30 to 50 age group. It is crucial to note that 20% of malignancies were in the lower age group and 30% in 50-70 age group. A female predominance is seen as in the existing literature.[14]

Though TIRADS scoring is a good tool, in this study there was no statistical significance in the score per se, but the higher number of malignant ultrasonographic features seemed to have significance. However in order to standardise the ultrasonography reports, it is impotant to have TIRADS scoring in every report of thyroid ultrasonography.

Immediate complications faced were transient hypocalcemia in three cases, hematoma in one case and recurrent laryngeal nerve paresis in one case, which recovered in a month's time. All surgical incisions were of maximum length 2.5 inches. Division of strap muscles or sternocleidomastoid muscle was not needed in any of the cases.

Availability of adequate sonological facilities in Kerala state (India), helps in diagnosing malignancies at very early stage. Finding a clinically palpable nodal metastasis is rare in the current scenario as ultrasonography picks them up much earlier. In fact micro cancers are encountered more often. Doing a routine FNAC may not yield a positive result but an USFNA (ultrasound guided FNA) will be able to diagnose cancers early when used routinely in every case which is scored according to the TIRAD/ATA scoring.[12]

CONCLUSION

It is encouraging to see that, early diagnosis is possible in case of carcinoma thyroid with efficient and robust criterion laid down for identifying them. Ultrasonography reports that mention all the malignant features along with the TIRADS score, rather than a blanket TIRADS scoring will be more meaningful clinically. It is important to confirm all lesions by FNAC but since false negative results are common, USFNA may be a better solution to diagnose small lesions.

Limitations

This study is limited by small number of cases.

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