PREVALENCE/INCIDANCE AND MANAGING THE INCIDENDAL THYRIOD NODULES DETECTED BY ULTRASOUND SCAN

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Abstract

Introduction : Incidental thyroid nodules that are found on an imaging study performed for reasons other than thyroid pathology represent a common scenario encounter by health care providers. The goal in managing ITNs is to differentiate malignant lesions from benign conditions and calculate the incidence and prevalence of ITN. **method** :Patients underwent sonography Scan for nonthyroidal cause involved in prospective study The sonographic nodule features evaluated in the study were composition, echogenicity, margins, and echogenic foci. Nodules were assigned points for each feature, and the points were totaled to determine the final TIRADS level (TR1–TR5). Calculation of the incidence and prevalence of the ITN is also done **.results**. incidence Rate = 4.75 new cases per 100,000 population and Prevalence Rate = 21% . increase the rate among the female (80.9 percent) , male (19.1 percent) ranging between (21-65) years old .According to the thyroid image reporting and data system (TIRAD-s) we found that 6 are TIRADs-2 (14.2%), 25 nodules are classified as TIRADs-3 (59.5%) ,9 nodules are classified as TIRADs-4 (21.5%), and just only 2 nodules classified as TIRADs-5 (4.8%).**Conclusion** :A TI-RADS classification based on the scoring system de¬scribed above should allow for and lead to unification of terminology and codes for TN classification among all physicians who evaluate the results of a thyroid ultrasound.

Key words : thyroid, incidentaloma, USS,TI-RADs.

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Introduction

The incidental thyroid nodule (ITN) is known to be one of the most common incidental findings on imaging studies that include the neck. As any nodule identified by an imaging study that was not previously detected or suspected clinically It is defined as ITN or incidentaloma.

There is currently a paucity of guidance from professional organizations on management of ITNs, and high variability in reporting of ITNs by radiologists (16)

The introduction of high-resolution sonography has made it possible to detect many non-palpable nodules in the thyroid. The incidence of such lesions in the general population appears to be high—approximately 10 to 40 percent in USA .

Most of these incidental thyroid nodules are benign,but the discovery of non-palpable nodules raises concerns about their possible malignancy.

Many studies have documented considerable overlap of characteristic findings in benign and malignant lesions. Some authors have recommended that sonography be used solely to determine the presence of the focal lesion, to determine whether a lesion is cystic or solid, and for needle guidance (1).

The possibility to have thyroid nodules increases with age, in females, or in area with iodine deficiency and radiation exposure; the prevalence of thyroid nodules varies from the population, studies and the methods that we used to detect them. With palpation, the prevalence varies from 2 to 6 percent and a high prevalence is seen on autopsy by 65 percent with wide uses of thyroid ultrasound the prevalence of nodules has been increasing varying from 20 to 67 percent (2)(7)

Ultrasound is considered as first choice for evaluation of thyroid nodules since it can detect:

- The presence of multinodular goiter.
- We can measure the size of the nodules and follow them,
- The characteristics of the nodules that suggest us for malignancy.
- Performed guided fine needle aspirate cytology FNAC.

Ultrasound is safe, painless easy to performed, fast and noninvasive medical test for thyroid nodule .

The ultrasound-based thyroid imaging reporting and data systems (TIRADS) classifications have been developed to clarify the risk for malignancy by conventional characterized ultrasound features.

The American College of Radiology TI-RADS (ACR TI-RADS) is a classification system predicting the probability of malignancy in TNs according to a scoring system that depend on multiple ultrasound parameters ;so higher scores are given for more

suspicious features. Although of the American Thyroid Association guidelines, no definite US feature alone or in combination can identify all malignant nodules. Histopathological diagnosis remains the gold standard for diagnosing thyroid lesions. The ACR-TIRADS classification is aimed to reduce unnecessary FNAC.(10)

Objective

The aims of our study were to see the prevalence of thyroid incidentaloma and thyroid cancer in healthy adult outpatients evaluated with thyroid ultrasound

use the ACR-TIRADs as standard guideline for incidental thyroid nodules management to reduce the number of the FNAC.

Method and material

Study design and duration

prospective descriptive study that had done at Hawari General Hospital and AL-Keesh polyclinic between(2016/2017).

sample population and inclusion criteria

200 adult outpatients, who do sonographic examination of the neck for non-thyroidal cause such as carotid Doppler ,LN enlargement , para-thyroid gland disease, neck swelling ..Seen in the clinic .

Exclusion criteria

we exclude the patient with known thyroid disease

study tool

All of them underwent thyroid ultrasound screening; all the patients performed the ultrasound in supine position and hyperextended neck using a high-resolution ultrasonography (Philips IU21 with 7-15 MHz).

Also we use the ACR-TIRADs to classified the thyroid incidentaloma and clarified the proper management .

The result

Two hundred patients were involved into this prospective study; one hundred thirty –eight were females (96 percent) and sixty two were males (14 percent),the mean+SD of their age was 43 ±12.7 years old , ranging between (18-85 years old).as table (4.1) and figure (4.1) reveal . All the patients are referred to the radiology department for non-thyroidal neck ultrasound examination. We found that ; one hundred –fifty eight patients (79 percent) were having a normal thyroid examination and the incidental thyroidal nodules (ITN) were found in forty- two patients (21 percent) that showing in figure (4.2) incidence Rate = 4.75 new cases per 100,000 population and Prevalence Rate = 21% . 34 female (80.9 percent) and 8 were male (19.1 percent) ranging between (21-65) years old with age mean ± SD (48 ± 13) as table (4.2) and table (4.3) reveal .the nodules were solitary in thirty –six patients (85.7 percent) and two or more in six patients (14.3percent)figure (4.3).

Table (4.4) and figure (4.4) shows twenty-three patients have ITN in right lobe (54.7 percent) eighteen patients have ITN in the left lobe (45.3 percent) and one in the isthmus (2.4 percent). Twenty four patient underwent the USS examination for Carotid Doppler (57.1 percent),seven for LAP (16.6 percent) three for parathyroid examination(7.1 percent) and finally eight for neck swelling (19 percent).as figure (4.5) illustrated.

Thirty-three nodules (78.5percent) were isoechioc and just nine nodules were hypoechoic (21.5percent),and according to the shape ninteen nodules were oval in shape (45.2 percent)and twenty-three nodules had rounded shape (54.8 percent) ,also we found smooth margin in thirty-nine nodules(92.8 percent) and just three nodules were had macrolobulated margin(7.2 percent).The vascularity was noted in peripheral distribution in all nodules that we found (100 percent) as figure (4.6)(4.7)(4.8) reveal .

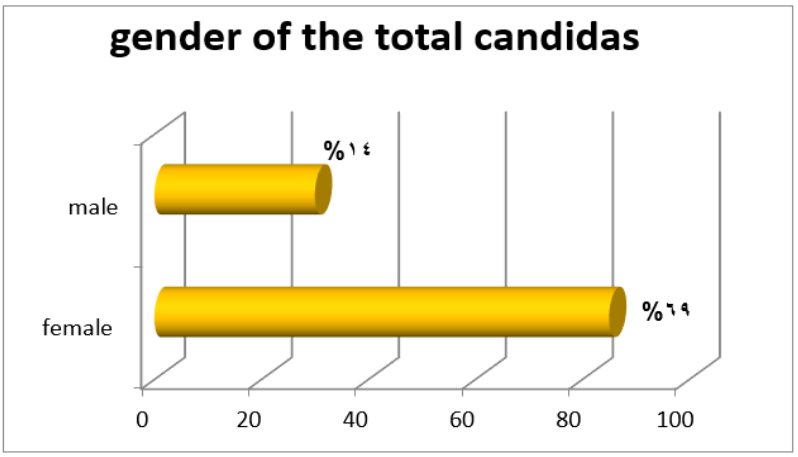
Another feature or criteria that we considered is the presence of the calcification and the type of the calcification; so we found thirty –seven nodules had no calcified foci (88 percent) and five nodules had calcification (12 percent) three nodules were non-punctuated type (60 percent) and two nodules were punctuate type (40 percent).

The size of the was equal to 1 cm in seventeen nodules (40.5 percent), four nodules were < 1 cm (9.5 percent) and twenty –one nodules were >1cm (50 percent) .also according to the cystic changes just eight nodules had cystic changes(18.1 percent) while the rest of the thirty-four nodules had no cystic changes (81.9 percent).as shown in figure (4.9)(4.10)(4.14)(4.13) respectively.

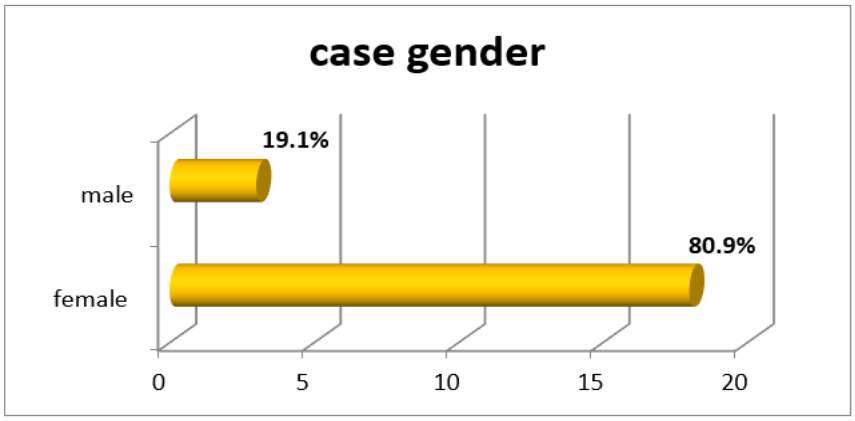
The lymph nodes (LN) presence is important criteria that we considered ;thirty- three nodules had not associated with LN enlargement(78.5 percent) while nine nodules associated with LN enlargement(21.5 percent) which eight of them were reactionary type (benign) (88.8 percent) and pathological LN enlargement was found in one patient (11.2 percent). Figure(4.11)(4.12)

Table (4.1) reveals the gender of the study groups

		NO (%)
gender of the total patients	Female	138 (69%)
	Male	62 (14%)
gender of the of incidentalomas group	Female	34(80.9 %)
	Male	8(19.1 %)



A



B

Figure (4.1) show the gender distribution in both(A) total candid's and (B) the ITN group

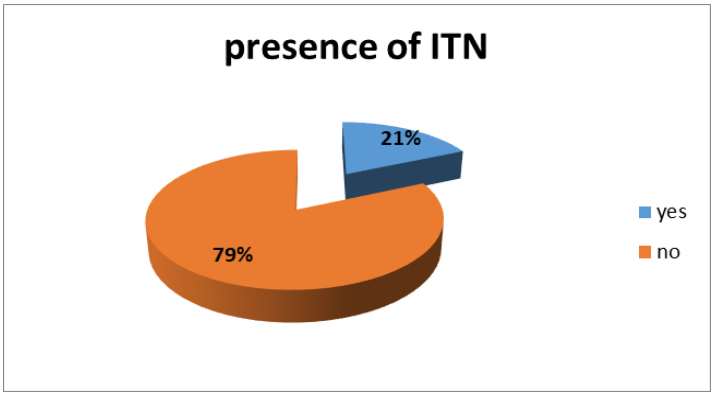
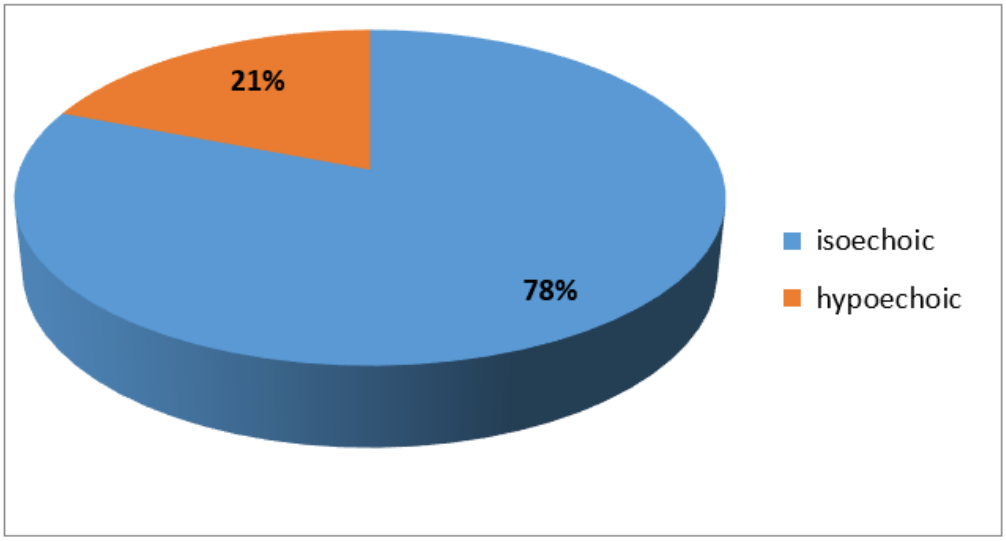


Figure (4.2) the presence of the ITN



Figure(4.6)the nodules echogenicity

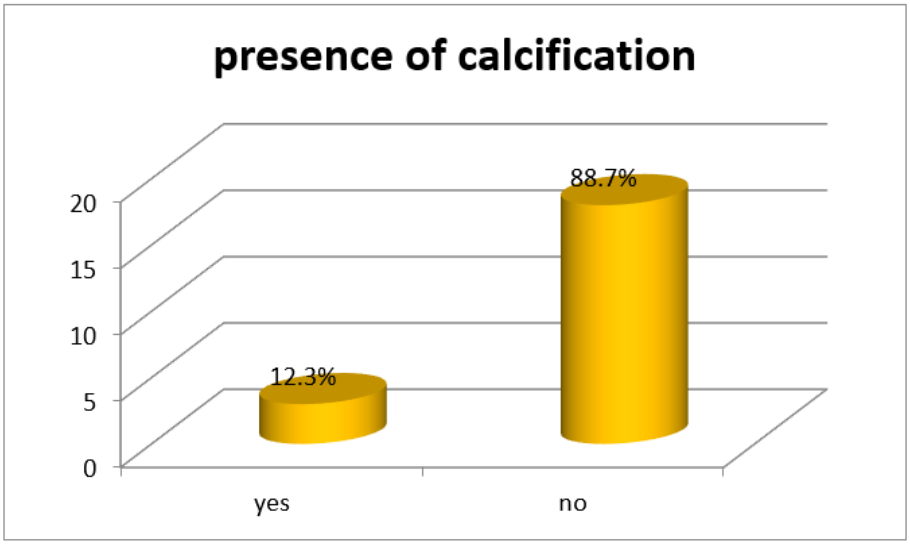


Figure (4.9) the presence of the calcification

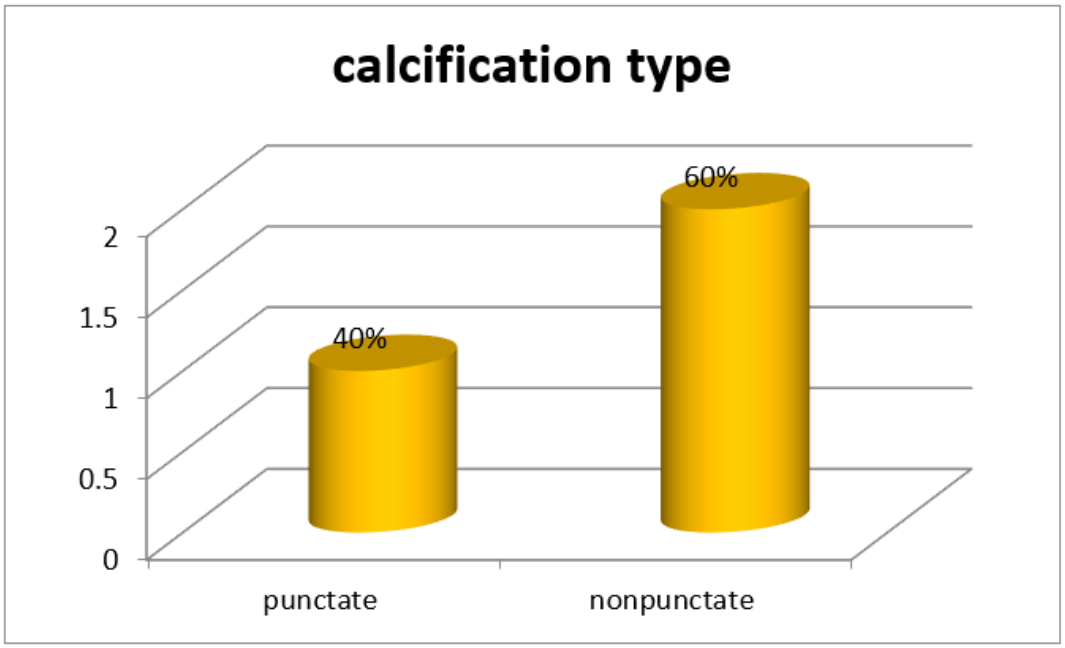


Figure (4.10) calcification type

Table (4.5) show the nodules features

Echogenicity	Shape	Margin	Size	Calcification	LN	Multiplicity	Cystic changes
Iso echoic 17(81%)	Round 8(38.1%)	Smooth 19(90.5%)	= 1cm 5(23.8%)	Yes 3(14.3%) Punctate 1(33.3%)	Yes 8(38.1%)	Solitary 16(76.2%)	Yes 1(4.8%)
			>1cm 14(66.7%)	Non-punctate 2(66.7%)	Reactive 7(87.5%)		
					Pathological (12.5%)		
Hypo echoic 4 (19%)	Oval 13(61.9%)	Lobulated 2(9.5%)	<1 cm 2(9.5%)	No 18(85.7%)		2 or more 5(23.8%)	No 20 (95.2%)

according to the thyroid image reporting and data system (TIRAD-s) we found that 6 are TIRADs-2 (14.2%), 25 nodules are classified as TIRADs-3 (59.5%) ,9 nodules are classified as TIRADs-4 (21.5%), and just only 2 nodules classified as TIRADs-5(4.8 %)

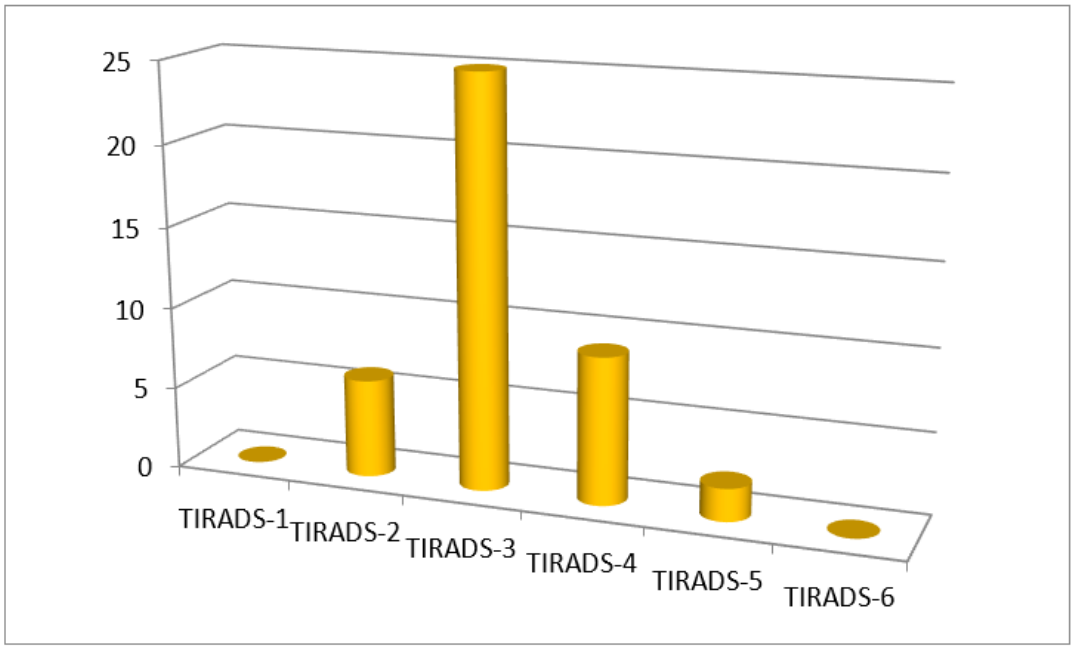


Figure (4.15) TIRADs classification of ITN in study population

Discussion

Thyroid nodule is a commonly encountered lesion, not always detected by palpation in the adult population. Ultrasound is considered as an accurate image technique for thyroid nodules examination and differentiating them according to their character as solid or cystic nodules (10).

The prevalent use of US techniques has generated an overwhelming increase in the identification of thyroid nodules.

The American College of Radiology TI-RADS (ACR TI-RADS) is a wide world classification system give us a clue about the possibility of malignancy in TNs by scoring system according to multiple Ultrasonographic features so higher scores are given for more suspicious (10) ; this system have been developed with to standardize reporting and make possible communication between practitioners, and to indicate when fine-needle aspiration biopsy (FNAB) should be performed .

ACR TI-RADS was extensively tested in multiple studies which showed its superior performance as compared to other similar risk stratification systems. As B. MOIFO et al (2013)(12) who found that the TIRADs classification is reliable in detection of malignancy. E. HORVATH et al (11) also found in their study that was done in 2009 that TIRAD system" has allowed us to improve patient management and cost-effectiveness, avoiding unnecessary FNAB. In addition, we have established standard codes to be used both for radiologists and endocrinologists".

A TI-RADS classification according to the scoring system described in figure (4.16) lead to unification of terminology and codes for TN classification among all physicians who evaluate the results of a thyroid ultrasound study ; that what J. FERNÁNDEZ SÁNCHEZ (14) reveals in his article that published in 2014.

XU et al in study done in 2015 was found that “ This system could be of great use in predicting the nature of thyroid nodules in a quantified and standardized way and also helping clinicians decide on the clinical management(15).

Management Recommendations for ITNs

Detected on Ultrasound

The Committee’s guidance for managing ITNs detected on ultrasound of extra thyroidal structures is illustrated by the flowchart in Figure 4.18. First, the ultrasound should be evaluated for suspicious features associated with the ITN. Suspicious features that have been described in the literature include microcalcifications, marked hypoechogenicity, Lobulated or irregular margins, and taller-than-wide shape on transverse view. In some cases, suspicious features may not be completely evaluated or recorded on the images, but if any suspicious features are present, patients should have a dedicated thyroid ultrasound. If no suspicious imaging features are present, and the patient has serious co morbidities or limited life expectancy, further evaluation is not recommended unless the referring (16)

clinician believes it is warranted or it is specifically requested by the patient or referring physician. In the general population without suspicious imaging features, patients age

< 35 years with nodules measuring_1 cm should have further evaluation with ultrasound. If the patient is age_35 years, the size cutoff for further evaluation is raised to 1.5 cm.

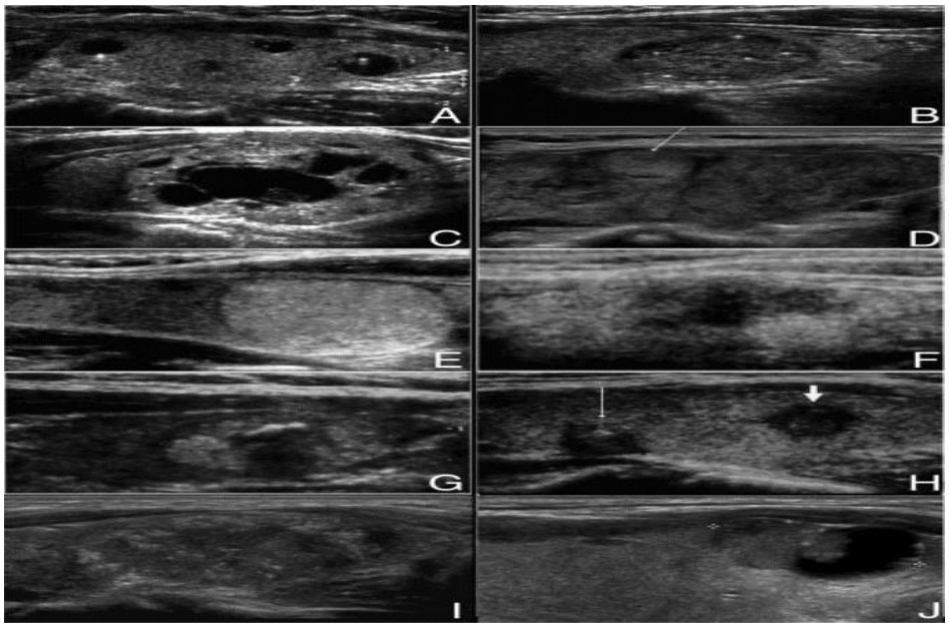


FIG. (14-17) A, US image of multiple typical colloid cysts: anechoic areas with hyperechogenic spots (type 1 colloid pattern). B, US image of a type 2 colloid nodule: a mixed, nonexpansile, nonencapsulated structure with a “grid” appearance given by isoechoic solid areas and hyperechoic spots. The gland is not enlarged. C, US image of a colloid type 3 pattern: a mixed, nonencapsulated, expansile, isoechoic nodule with hyperechoic spots and broad septa. D, US aspect of Hashimoto thyroiditis with a pseudo-nodule: normal size heterogeneous gland with lobulated borders and a hyperechoic pseudo-nodule (arrow), partially surrounded by a halo. E, US image of a simple neoplastic pattern (4A): a solid hyperechoic nodule without calcifications, surrounded by a thin capsule. F, A hypoechoic area with ill-defined borders, without calcifications. This pattern may be found in both subacute thyroiditis and carcinomas. G, US image of a suspicious neoplastic pattern (4B): an encapsulated heterogeneous nodule with coarse calcifications, surrounded by a thick capsule. H, US image of malignant pattern A: solid hypoechoic, irregular nodules with ill-defined margins, with calcifications (thin arrow) or without calcifications (thick arrow). I, US image of malignant pattern B: solid, nonencapsulated, isoechoic, ill-defined nodule with a “salt and pepper”aspect, due to peripheral microcalcifications. J, US image of malignant pattern C: a mixed, isoechoic, vascularized, nonencapsulated nodule with calcifications and no hyperechoic spots.(11)

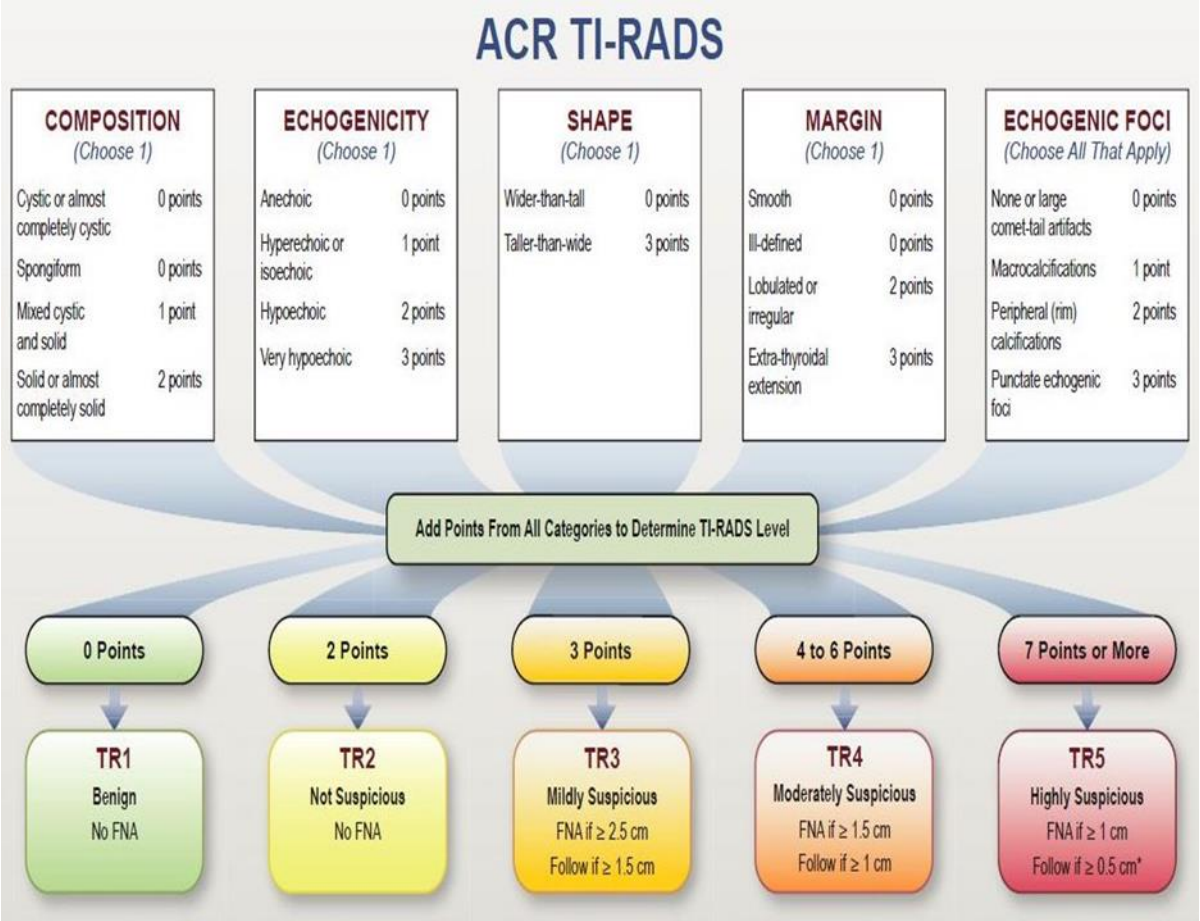


Figure (4.18) ACR TI-RADS framework (13)

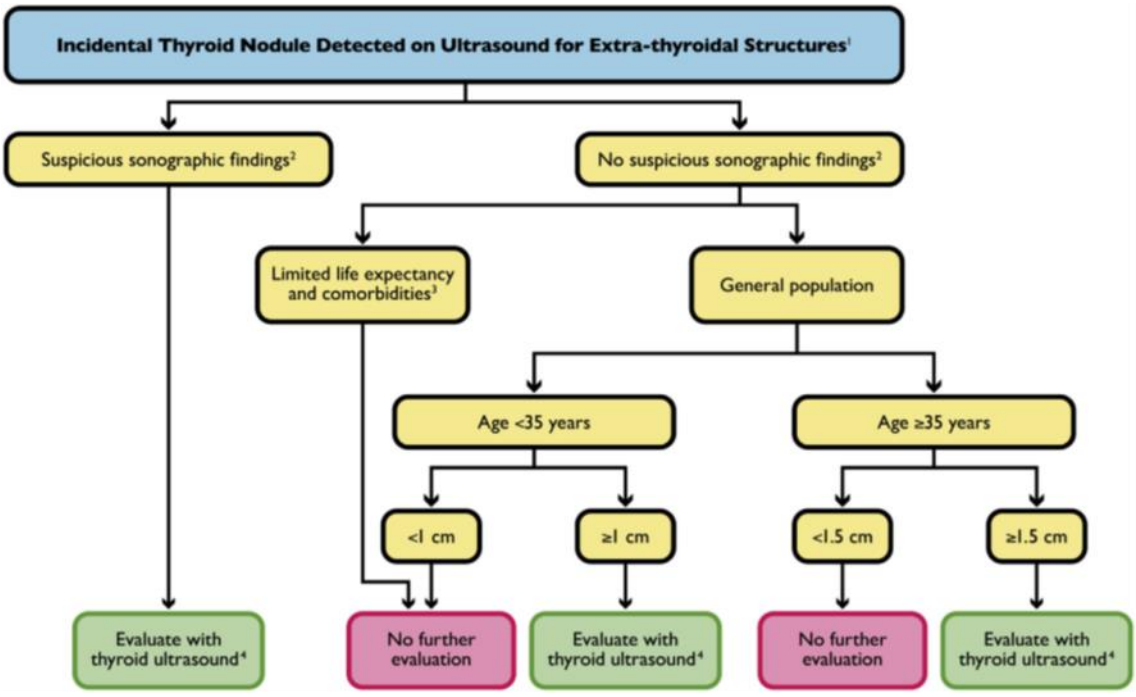


Figure (4.19) flowchart on ITN detected by USS (16)

According to the this strategy of managing the ITN ,we should perform FNA for each TIRADS-3 nodules that measured ≥ 1.5cm which are 12 nodules out of 25 nodules(48%) ,5 nodules classified as TIRADs-4 nodules out from 9 nodules(55%) should perform FNA and both 2 nodules scored as TIRADs -5 nodules .(%100)

Conclusion

A TI-RADS classification based on the scoring system described above should allow for and lead to unification of terminology and codes for TN classification among all physicians who evaluate the results of a thyroid ultrasound.

Recommendation

The usage of the TIRADS has improved the INT management as it easy and cost-effective method ; also avoiding unnecessary FNAB .

In addition, we have established standard terms to be used both for radiologists and endocrinologists.

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