

ULTRASONOGRAPHIC AND CYTOLOGICAL EVALUATION OF 499 THYROID NODULES

LEONARDO PIBER^{1,2}, CARLA FREITAS², THIAGO TEIXEIRA², ARTHUR BEZERRA², MAYRA FERNANDES², REGINA YOSHIASSU²

ABSTRACT

OBJECTIVE: The goal of the study is to verify ultrasound and cytological findings in thyroid fine needle aspiration (FNA) punctures.

METHODS: Retrospective cross-sectional study in which 499 thyroid nodules were evaluated by ultrasound and cytological examination in a period from October 2018 to August 2019. FNA was performed in patients of both sexes, in a private diagnostic center in São Paulo.

RESULTS: Out of the 499 nodules punctured in 334 patients, 44 (8.8%) were male and 455 (91.2%) female. In considering the total amount of patients, 31 (9.3%) were men and 303 (90.7%) women, aged between 13 and 88. Three (0.6%) hemorrhagic samples were obtained; therefore punctures were performed again in such patients. The malignancy prevalence was 4.8% and the frequency of benign nodules in this was 92.4%.

CONCLUSION: The analyses show that the ultrasound and cytological profile of the thyroid nodules are in accordance with the current literature, which can assist in the audit of the results in the diagnostic imaging centers.

KEYWORDS: THYROID DISEASES, THYROID GLAND, NEOPLASMS, NODULE, IMAGE-GUIDED BIOPSY, ULTRASONOGRAPHY, ULTRASONOGRAPHY INTERVENTIONAL.

INTRODUCTION

The thyroid is a small gland that is found in the infrahyoid cervical region.¹

The thyroid gland is controlled by the thyroid stimulating hormone (TSH), which promotes a sign and through it regulators of great importance for the growth and development of metabolism are produced.²

Among the diseases that affect the thyroid, thyroid nodules are frequent, with a prevalence of 4 to 7% in the adult population, if the diagnosis is made through physical examination; and from 17 to 67% in cases of investigation using ultrasound (US).^{3,4} The high sensitivity of the US makes it an excellent form of screening.

Ultrasonographic characteristics predict a greater or lesser probability of benign or malignant nodules.³ The Thyroid Imaging Reporting and Data System published by the American College of Radiology (ACR TI-RADS) is a system for categorizing ultrasound findings of thyroid nodules⁵, which correlates these findings with the possible cytological classification, characterizing the potential of malignancy of the nodule according to the characteristics that are found. The US must be performed in mode B, to reduce variations between observers. The nodules are then classified into five categories, the last being the one with the highest risk of malignancy, therefore it has an increasing pattern of severity⁶ - (see figures 1-10).

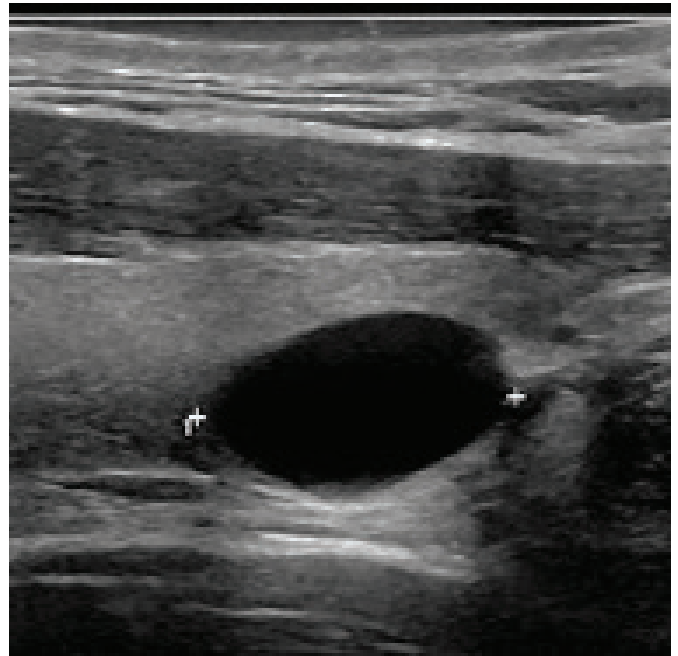


Figure 1 - Description: anechoic, cystic nodule, well-defined, without microcalcifications, measuring 1.5 cm. ACR TI-RADS¹.
Cytology: Colloid cyst. Bethesda I.

1. Universidade Santo Amaro
2. CDB Inteligência Diagnóstica



Mailing address:
Leonardo Piber
Rua Marechal Deodoro, 135 apt. 62B - Santo Amaro
São Paulo - CEP 04738-000
Email: lpiber@prof.unisa.br

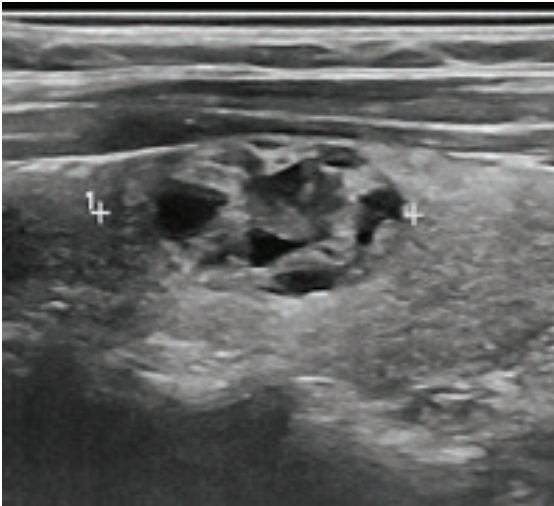


Figure 2 - Description: isoechogenic nodule, mixed, well defined, parallel to the skin, without microcalcifications, measuring 2.2 cm. ACR TI-RADS 2. Cytology: Colloid nodule, Bethesda II.

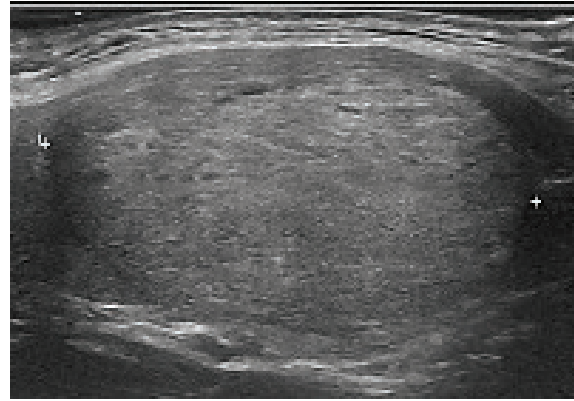


Figure 5 - Description: hypoechoic nodule, almost totally solid, well defined, regular, parallel to the skin, without microcalcifications, measuring 4.1 cm. ACR TI-RADS 4. Cytology: Colloid nodule, Bethesda II.

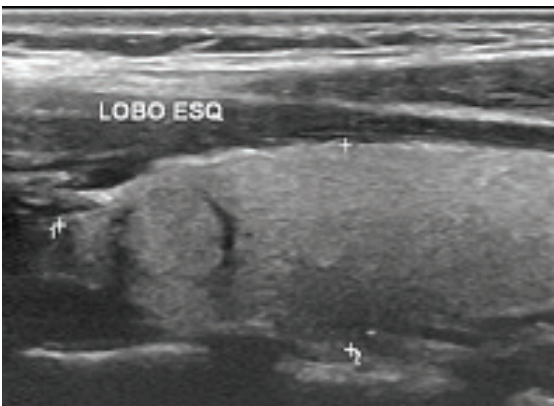


Figure 3 - Description: solid, well-defined isoechogenic nodule, parallel to the skin, without microcalcifications, measuring 0.8 cm. ACR TI-RADS 3. Cytology: Follicular lesion of undetermined significance, Bethesda III.

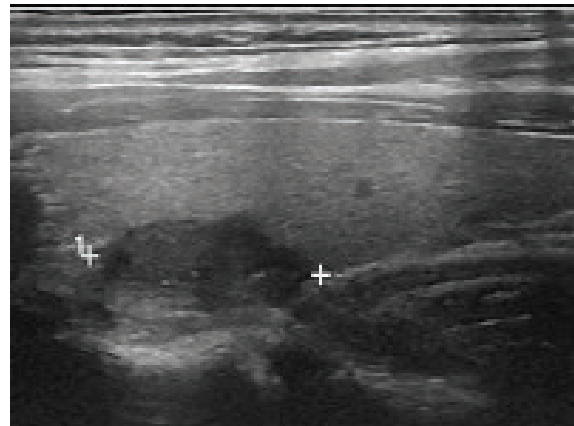


Figure 6 - Description: hypoechoic nodule, solid, well defined, irregular, parallel to the skin, without microcalcifications, measuring 1.6 cm. ACR TI-RADS 4. Cytology: Colloid nodule, Bethesda II.

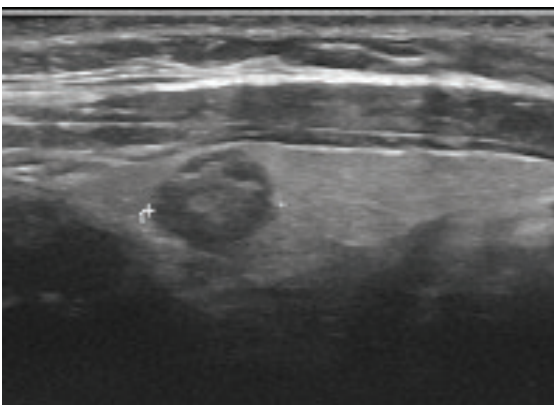


Figure 4 - Description: hypoechoic nodule, predominantly solid, well defined, regular, parallel to the skin, without microcalcifications, measuring 0.8 cm. ACR TI-RADS 3. Cytology: Colloid nodule, Bethesda II.

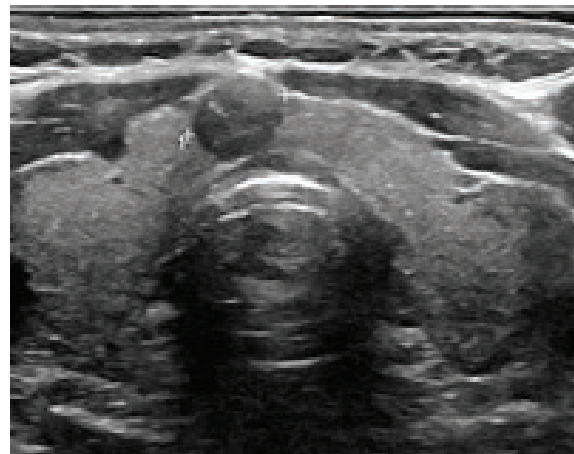


Figure 7 - Description: hypoechoic nodule, solid, well defined, irregular, parallel to the skin, without microcalcifications, measuring 0.7 cm, in the region of the isthmus. ACR TI-RADS 4. Cytology: Papillary carcinoma, Bethesda V.

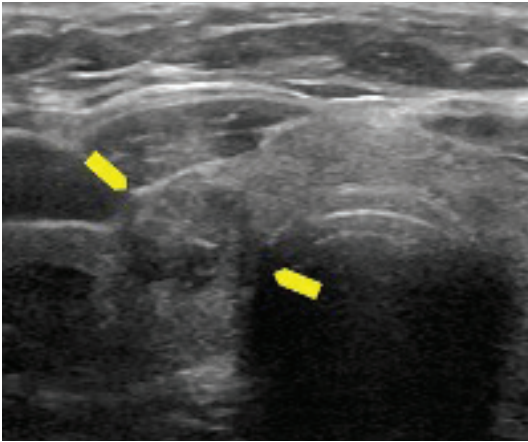


Figure 8 - Description: hypoechoic nodule, solid, well defined, irregular, parallel to the skin, without microcalcifications, measuring 1.2 cm (yellow arrows). ACRTI-RADS 4. Cytology: Papillary carcinoma, Bethesda V.

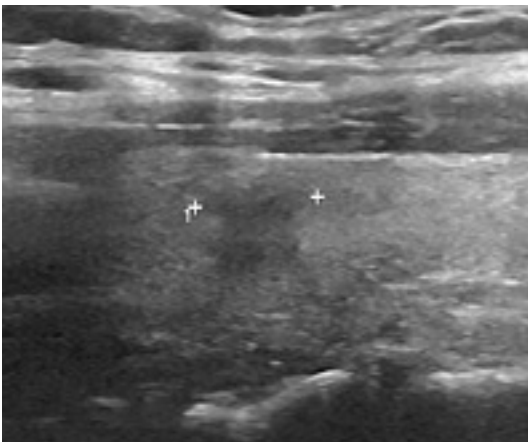


Figure 9 - Description: solid, hypoechoic nodule, with imprecise limits, irregular, parallel to the skin, without microcalcifications, measuring 0.7 cm. ACRTI-RADS 4. Cytology: Lymphocytic thyroiditis, Bethesda II.

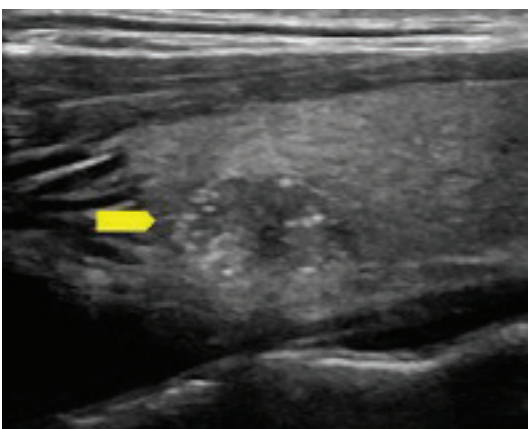


Figure 10 - Description: hypoechoic nodule, solid, well-defined, with microcalcifications, measuring 1.2 cm (yellow arrow). ACRTI-RADS 5. Cytology: Papillary carcinoma, Bethesda V.

The classification of ACR TI-RADS ranges from 1 (benign) to 5 (high suspicion of malignancy), from TI-RADS 3, depending on the size presented by the nodule, fine needle aspiration (FNA) or clinical follow-up are indicated. For example, FNA is indicated for nodules greater than or equal to one centimeter and TI-RADS 5, if the nodule is TI-RADS 3 (low risk of malignancy) the biopsy is indicated if the nodule is 2.5 cm or more. This was proposed to prevent indiscriminately invasive procedures, such as biopsies.⁷

The suggestive characteristics of malignancy seen on ultrasonography, mode B, are solid nodular composition greater than 50%, irregular shape, higher than wider, microcalcifications, solid eccentric portion, alteration in echogenicity as marked hypoechoogenicity, solid nodules.^{6,8,9}

The puncture is performed with a transdermal needle inserted in a specific region and if associated with US, it is possible to visualize in real time the positioning of the needle and therefore collect material from nodules characterized as potentially malignant.¹⁰

The collected material undergoes cytopathological analysis, and thus classified according to the Bethesda system, which is divided into six categories: non-diagnostic sample (I), benign (II), atypia / follicular lesion of undetermined significance (III), suspected of follicular neoplasia or follicular neoplasia (IV), suspected for malignancy (V) and malignant (VI)³. This helps the communication between cytopathologists, reducing unnecessary procedures and facilitates data exchange between laboratories and institutions.¹¹

The main interest of the aspiration biopsy is centered on its potential to distinguish nodules of benign nature from those that require surgical intervention. FNA's accuracy in identifying benign nodules leads to a reduction in the number of unnecessary surgical interventions.

METHODS

This is a cross-sectional study, of complete selection, with sampling by convenience. The target population was all patients who scheduled ultrasound-guided thyroid fine needle aspiration (FNA) for investigation of thyroid pathology in a private imaging center in the city of São Paulo, of both genders, as requested by their attending physician between October 2018 to August 2019.

Were excluded from the study those who did not accept to participate or be examined and those who did not sign the informed consent form. Data was extracted from the service's standard cytopathological analysis request form. The variables analyzed were: age, gender, nodule characteristics, such as composition, echogenicity, shape, margins, presence of calcification, size, location, ACR TI-RADS classification, result of cytopathology and Bethesda classification.

Ultrasound exams were performed in horizontal dorsal decubitus position, with cervical hyperextension to facilitate access to the gland, with longitudinal and transversal scans.

The procedure involved three stages: collection, preparation of the collected material and microscopic analysis and interpretation of the smear, by the cytology department.

This research was approved by the Ethics and Research Committee of Santo Amaro University, whose approval number is CAAE 97937018.1.0000.0081.

RESULTS

Of the 499 punctured nodules in 334 patients (ratio of 1.5 nodules per patient), 44 (8.8%) were nodules in men and 455 (91.2%) in women. Of the total number of patients, 31 (9.3%) were men and 303 (90.7%) were women, aged between 13 and 88 years. Three hemorrhagic samples (0.6%) were obtained, whose nodules were re-punctured. Table 1 shows the number of nodules punctured per patient. Most patients (67.0%) had one punctured nodule.

number of nodules	amount of nodules punctures per patient	Total amount of nodules
1	224	224
2	76	152
3	24	72
4	4	16
5	3	15
6	2	12
7	0	0
8	1	8
Total	334	499

Table 1 – Distribution of the amount of thyroid nodules, per patient, punctured between October 2018 and August 2019. São Paulo, 2020.

Table 2 shows the various results of the cytopathological analysis of the thyroid nodules. Of these, 4.8% were papillary carcinoma.

Cytopathology of thyroid nodules	N	%
Colloid nodule	395	79,2
Lymphocytic thyroiditis	59	11,8
Papillary carcinoma	24	4,8
Atypias of undetermined meaning	12	2,4
Colloid cyst	6	1,2
Hurthle cell follicular neoplasia	2	0,4
Adenomatous nodule	1	0,2
Total	499	100,0

Table 2 - Distribution, according to the cytopathological diagnosis, of the punctured thyroid nodules between October 2018 and August 2019. São Paulo, 2020.

To compare the variables, we chose to continue with two groups, nodules whose diagnosis was papillary carcinoma and colloid nodule. The other diagnoses did not present a sufficient absolute number for this descriptive biostatistical description.

Table 3 presents the studied variables, highlighting the characteristics of the nodules based on ACR TI-RADS. The Bethesda classification is directly related to cytopathological diagnosis.

Variables analyzed	carcinoma (N=24)		papillary nodule (N=395)	
	N	%	N	%
gender				
female	20	83,3	358	90,6
male	4	16,7	37	9,4
age				
median	42,5		48	
interval	18 a 59		17 a 88	

composition				
Solid or almost completely solid	18	75,0	163	41,3
mixed	6	25,0	205	51,9
cystic or almost completely cystic	0	0,0	27	6,8
echogenicity				
hypoechoic	23	95,8	252	63,8

isoechoic	1	4,2	134	33,9
hyperechoic	0	0,0	6	1,5
anechoic	0	0,0	3	0,8
form				
taller than wide	2	8,3	5	1,3
wider than tall	22	91,7	390	98,7
margin				
regular	17	70,8	368	93,2
lobulated	2	8,4	20	5,1
irregular	5	20,8	7	1,7
calcification				
absence	8	33,3	351	88,9
macrocalcification	9	37,5	29	7,3
peripheral	0	0,0	4	1,0
microcalcification	7	29,2	11	2,8

position				
isthmus	2	8,3	28	7,1
right lobe	10	41,7	217	54,9
left lobe	12	50,0	150	38,0

size				
< 5mm	1	4,2	5	1,3
> or = 5 mm	8	33,3	120	30,4
> or = 10 mm	7	29,2	126	31,9
> or = 15 mm	5	20,8	61	15,4
> or = 20 mm	3	12,5	83	21,0

ACR-TIRADS

T1	0	0,0	2	0,5
T2	0	0,0	79	20,0
T3	1	4,2	167	42,3
T4	11	45,8	135	34,2
T5	12	50,0	12	3,0

Bethesda Classification

I	0	0,0	0	0,0
II	0	0,0	395	100,0
III	0	0,0	0	0,0
IV	1	4,2	0	0,0
V	13	54,2	0	0,0
VI	10	41,6	0	0,0
Total	24	100,0	395	100,0

Table 3 - Comparison of the characteristics of punctured thyroid nodules, diagnosed with papillary carcinoma and colloid nodule, between October 2018 and August 2019. São Paulo, 2020

DISCUSSION

The incidence of thyroid cancer has increased in the past decades, considering the advance of diagnostic methods to detect aspects suggesting malignancy in non-palpable thyroid nodules.^{4,9} The characterization of the nodule according to the ultrasound aspect is classified according to the ACR TIRADS, which allows better understanding and communica-

tion between health professionals.⁵

Thyroid nodules are found in 19% to 67% of adult people, this by means of ultrasound, of which about 10% are malignant.^{4,9} In this study the rate of malignancy was 4.8%, which is in accordance with existing literature. Still, the frequency of benign nodules in this study was 92.4%, a higher prevalence if compared to that described by other authors, whose value is between 69 and 81%.¹²

There are certain situations such as insufficient cellularity for analysis and hemorrhagic samples, in which it is not possible to make a diagnosis. In the present study, the total of hemorrhagic samples was 0.6%; the expected percentage of hemorrhagic samples being 1 to 15%.¹²

Of all endocrine neoplasias, 96% are represented by thyroid cancer, which is more common in females. 4 What was also seen in this study was that 20 of the 24 nodules (83.3%) characterized as papillary carcinoma belonged to female patients, while only four were male (16.7%).

This study, as well as the ones mentioned above, has a larger number of female individuals with thyroid nodules, with the ratio between men and women being approximately 1:10. In a similar study, the proportion of men and women was 1: 11¹³. When the cytological profile in papillary carcinoma of this study is characterized, the proportion becomes 1: 5 between men and women.

In the present study, only 31 (9.3%) of the patients were male and 303 (90.7%) were female. The values found are similar to other studies carried out in São Paulo, as well as in other states. For example, the work of Ceratti¹², carried out in São Paulo, brought a percentage of 9.6% of men and 90.4% of women, similarly the study carried out in Aracaju-SE revealed that only 5.2% of patients were men while 94.8% corresponded to female patients.¹⁴

Among the most prevalent echographic characteristics for the diagnosis of papillary carcinoma, hypoechogenicity, solid consistency, irregular margins, and presence of micro and macrocalcifications can be highlighted, as foreseen by the ACR TI-RADS Classification.

The analyzes show that the ultrasound and cytological profile of thyroid nodules is in accordance with the current literature, which can help diagnostic imaging centers in the assessment of results.

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