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interest of fine-needle aspiration cytology in thyroid nodule:

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Abstract:

Thyroid pathologies, particularly nodular, are frequent. The rarity of thyroid cancer and its excellent prognosis should be sufficient arguments to reassure patients and prohibit us from performing unnecessary thyroidectomy. Thyroid fine needle aspiration is a screening test to detect among a large number of nodules, nodules which correspond to a malignant process. the aim was to assess the value of thyroid needle aspiration therapy in the management of thyroid nodules. This is a prospective study carried out at the Ibn Rochd CHU hospital in Casablanca, over a period of 24 months between 2016 and 2018, all patients having undergone thyroid cytopunctures were included, epidemiological, clinical and paraclinical data were collected, namely ultrasound and cytology data. The results concerned 158 patients. The average age was 47 years with a female predominance, (sex ratio of 0.05). Median cervical swelling was the main finding (73% of cases) and 5% of patients showed signs of compression. 56% of our patients had an isolated thyroid nodule, with an average nodule size of 2.7cm. They were solid echostructure in 16% of the cases and hypoechoic in 17% of the cases. The cytological examination revealed a rate of non-diagnostic results of 39%, benign of 18%, atypia of undetermined significance of 11%, vesicular neoplasm of 1%, suspected of malignancy of 29% and malignant of 3%. Fine needle aspiration cytology in our context is still unreliable in order to be able to select patients for surgical treatment.

Keywords: fine needle aspiration, cytology, thyroid nodule, EU-TIRADs.

Introduction:

Thyroid pathologies, particularly nodular, are frequent. The rarity of thyroid cancer and its excellent prognosis should be sufficient arguments to reassure patients and prohibit us from performing unnecessary thyroidectomy (1). Thyroid fine needle aspiration is a screening test to detect among a large number of nodules, nodules which correspond to a malignant process (2). the aim was to assess the value of thyroid needle aspiration therapy in the management of thyroid nodules.

Methods:

We conducted a prospective study, in the Ibn Rochd CHU hospital in Casablanca, over a period of 24 months between January 2016 and january 2018, all patients having undergone thyroid cytopunctures were included, epidemiological, clinical and paraclinical data were collected, namely ultrasound and cytology data. Using patients' files, consentment was taken from patients or their tutors. Statistical analysis was provided with spss 2.0.

Results:

The study concerned 158 patients. The average age was 47 years with a female predominance, (sex ratio of 0.05).

Median cervical swelling was the main finding (73% of cases) and 5% of patients showed signs of compression.

Fifty-six percent of our patients had an isolated thyroid nodule, located in the

right lobe in 48%, left in 32 %, isthmolobaire in 15%, and in the isthme in 8%, with an average nodule size of 2.7cm.

In the echography the echostructure of nodules was in 78% solido-cystic and in 15% of the cases it was cystic and the echogenicity was in 63% of cases hypoechogenic and isoechogenic in 30%.

Fifty-six percent of patient was staged EU-EU-TIRADS 4 and 41% EU-EU-TIRADS 3.

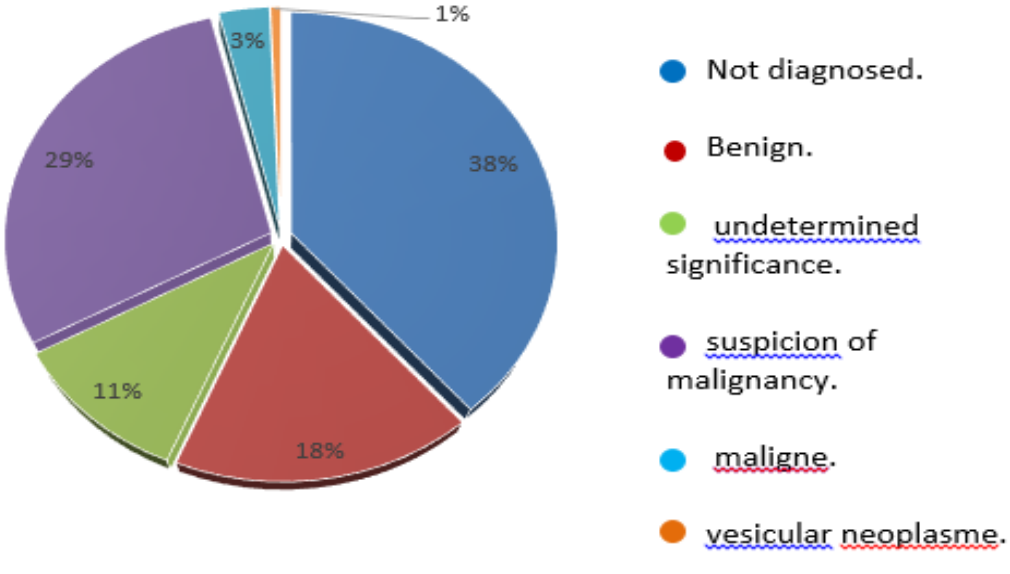
The cytological examination revealed a rate of non-diagnostic results of 39%, benign of 18%, atypia of undetermined significance of 11%, vesicular neoplasm of 1%, suspected of malignancy of 29% and malignant of 3%.

Cyto-radiologique correlation : table 1, figure 1 :

Table 1 : Relation between EU-TIRADS classification and cytologics reselts.

Scale EU-TI-RADS	Numbre%	CYTOLOGIQUES RESULTS					
		CATEGORIE					
		I	II	III	IV	V	VI
EU-TIRADS 1	-	-	-	-	-	-	-
EU-TIRADS 2	3(1,9%)	-	2(1,3%)	1 (0,6%)	-	-	-
EU-TIRADS 3	49(31%)	22(14%)	8(5%)	5 (3,2%)	-	14(9%)	-
EU-TIRADS 4	64(40,5%)	24(15,7%)	12(7,9%)	5 (3,4%)	8 (5%)	14(8,6%)	1(0,6%)
EU-TIRADS 5	2(1,3%)	2 (1,3%)	-	-	-	-	-
Non précisé	40 (25,3%)	12(8%)	6(3,8%)	6(3,8%)	1(0,6%)	11(7%)	3(1,8%)
Total	158(100%)	61(39%)	28(18%)	17(11%)	1(0,6%)	46(29%)	5(3%)

Figure 1: cytoponctions distribution according to the cytologique classification BETHESDA 2010.



Discussion :

The advent of ultrasound has made it possible to detect nodules which until then were not palpable. According to L. BALDET [3], the development of cervical ultrasound has detected thyroid nodules in 50% of the subjects examined over 40 years of age. According to HAFIDI [4] and A. FAROUQUI [5], the frequency of thyroid nodules on ultrasound is around 50% compared to 68% for GUTH and AL [6]. The risk of malignancy of a thyroid nodule varies from 7.56% for CANNONI [1], to 15.7% for CHOW (table 2).

Table 2 : malignancy's rate of thyroidal nodules.

Author	Number of patients	Malignancy risk (%)
CANNONI [1]	3862	7,56
CHOW [7]	1338	15,7
TOURNIAIRE [8]	407	9,6
MGHIRI [9]	262	15,6

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In our series, malignant cytopunctures represented 3% of all the cytopunctions examined.

Fine needle cytopunction:

Most specialized thyroid pathology centers around the world currently recommend cytology as the first step in the assessment of thyroid nodules; according to some authors when it is done with rigor, the needle aspiration is an element of orientation and sometimes constitutes a diagnostic and therapeutic gesture.

Its objective is to select from the many subjects carrying thyroid nodules, on the one hand, the malignant nodule in order to treat them surgically and to adequately and on the other hand benign nodules whose conduct is a simple surveillance.

Requirements for an efficient cytology: An effective thyroid cytology is based on an optimal puncture technique and a quality cytological interpretation. These 2 prerequisites are based on a series of essential steps.

1. Indication of the cytopuncture

The recommendations of the National Cancer Institute (NCI) published in 2008 on the indications of cytology in the case of incidenthalomas, propose to carry out a needle aspiration if the nodule has a larger diameter of at least.

10-15 mm except in the case of pure cysts or septated cysts with no significant solid component. Cytofunction is recommended, regardless of the size of the nodule, if it shows signs of malignancy on ultrasound. The American Thyroid Association (ATA), the Academy of Clinical Thyroidologists (ACT), the American Association of Clinical Endocrinologists (AACE) and the Society of Radiologists in Ultrasound (SRU) have issued more nuanced recommendations regarding indications for needle aspiration therapy taking into account the different ultrasound aspects. The Mc Cartney 2008 and Horvath 2009 series attempt to prioritize these indications for needle aspiration by evaluating the diagnostic profitability of different diagnostic approaches [10] or by establishing TIRADS ultrasound risk scores in order to avoid puncturing all the thyroid nodules. The systematic cytopuncture attitude of any supracentimetric nodule appears to be unprofitable [11].

According to the ATA 2009 recommendation, AACE / AME / ETA: The size of the nodule guides the indication of the needle aspiration [12]:

Nodule size> 20 mm: the needle aspiration is systematic.

5-7mm <Nodule <20mm; fine needle aspiration is performed if:

a. Context at risk:

- History of cervical irradiation in childhood and adolescence,
- History of Cowden's disease, familial polyposis,
- Carney complex, McCune-Albright syndrome,
- CMT or NEM2 family history,
- Basal calcitonin raised twice,
- Nodule + lymphadenopathy,
- Assessment of a metastatic context.

b. Nodule at risk:

- Nodule having increased by 20% in volume (or of which at least two dimensions have increased by at least 2 mm) since the last size estimate.
- Focal Focal hypermetabolism during PET-FDG
- Nodule with at least 2 ultrasound criteria of suspicion:
  - Solid and hypoechoic,
  - Microcalcifications,
  - Mixed vascularization,
  - Irregular contours,
  - Thicker than the
  - width…

For the Midi-Pyrénées Cancer Network, the indications for cytopuncture (adapted from the 2016 ATA recommendations) [13]:

- No indication for infracentrimetric nodules apart from an extra thyroid extension (Juxta-capsular)
- For supracentimetric nodules, the needle aspiration will be considered according to the size and the ultrasound suspicion (TIRADS score)

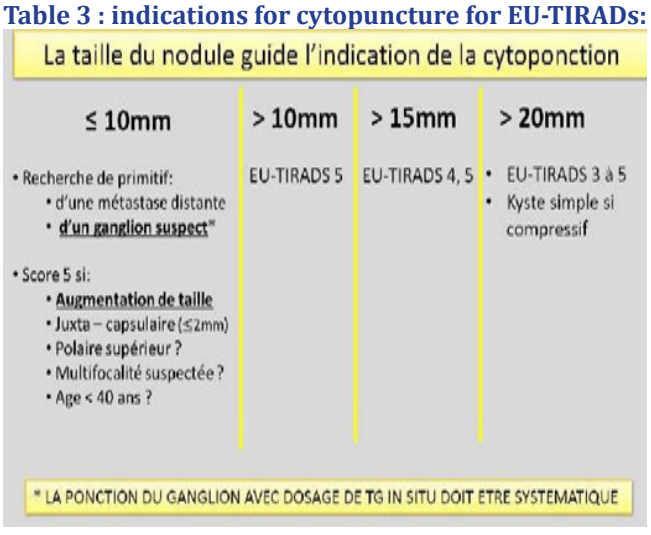
•> 1cm for TIRADS 4 and 5

•> 1.5cm for the TIRADS 3

•> 2cm for TIRADS 2 (except for the purely cystic form)

For EU TIRADS: table 3

Table 3 : indications for cytopuncture for EU-TIRADs:



The ACR recommends using the TIRADS ACR score and the size of the nodules to guide the management of thyroid nodules according to the following algorithm [14]:

Indications for ultrasound-guided aspiration

Ultrasound-guided aspiration can be performed by a single person who performs both ultrasound and aspiration, or by two people. The essential indication for ultrasound-guided aspiration is the non-palpable thyroid nodule, discovered by imaging of the cervical region (incidentaloma). The other indications are represented by:

- A deeply located posterior nodule
- A nodule that is difficult to locate by palpation in goiter
- A mixed nodule
- Lesions with suspicious calcifications

2. Contraindications of needle aspiration [15]

They are very rare, practically non-existent: patient not cooperating or with a severe hemorrhagic diathesis.

Prophylactic anticoagulant therapy (heparin) or platelet aggregation inhibitor therapy (aspirin) is not an absolute contraindication for thyroid cytology. Interruption of anticoagulant therapy can be considered at least 8 hours before the intervention, but we must balance the risk of bleeding which is very low and the thromboembolic risk which can be high when treatment is stopped. It is recommended in these cases to use a very fine needle and to practice an echographic control after the puncture to exclude a hemorrhagic complication.

4. Complications [15]

Complications from aspiration therapy are exceptional and minor in comparison to the benefit provided by this diagnostic method. The most frequent are:

- Local haemorrhages in the form of small bruises, which will be avoided by local compression for 5 to 10 minutes.

* Introcystic hemorrhage
* Syncopes

- Pain after cytopuncture is exceptional, disappearing quickly after analgesics.
- The puncture of the trachea is a rare complication, most often during the puncture of an isthmic nodule.
- Very rare and transient recurrent paralysis have been reported when using a large needle (23G)
- Post-cytopuncture infection is possible but exceptional, occurring in the event of non-compliance with the rules of asepsis or in the patient's immunocompromised area
- The implantation of tumor tissue along the path of the cytopuncture has been reported by some authors in anaplastic tumors punctured with a large needle, more exceptionally in differentiated tumors.

5. Limits: [16]

Vesicular cancers, which are well differentiated, cannot be identified by this method since their diagnosis is based on the presence of architectural abnormalities (intravascular tumor emboli, rupture of the thyroid capsule, lymph node metastasis).

Micro-cancers discovered incidentally during intervention on benign macronodules cannot be diagnosed by aspiration. It allows the diagnosis of Hurthle cell tumors, while being unable to specify their benign or malignant nature.

7- Cytological results

The lesional category, according to Bethesda's terminology, must appear clearly in the conclusion of any review of thyroid aspiration puncture. Each category corresponds to an estimated percentage of cancer risk cases. This estimate allows cytopathologists to self-assess their diagnostic practice. Certain categories are themselves divided into subcategories which must also be specified.

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a. Category „not diagnosed“ or „not satisfactory“

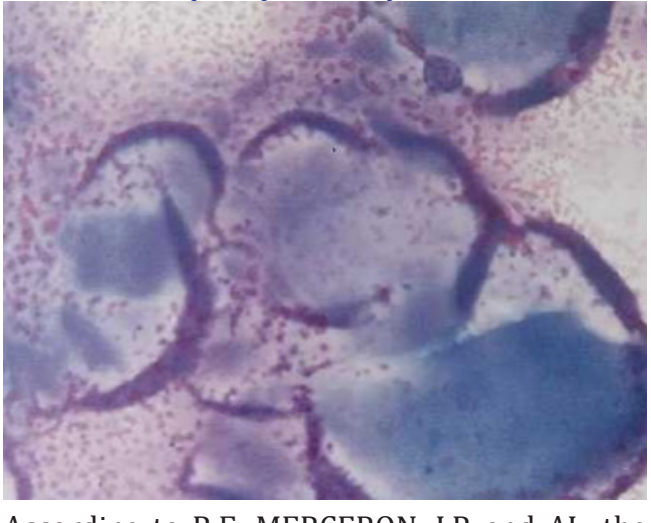
The frequency of these spreads varies according to the authors, between 3 and 31%. The risk of malignancy is 1 to 4%.

In our series, 61 (39%) of cases were of the unsatisfactory / non-diagnostic category.

The recommended course of action for this category is to perform a new needle aspiration, possibly under ultrasound guidance, within 3-6 months for solid nodules and 18 months for nodules with mixed structure In the case of repeated inadequate samples, surgical intervention can be considered, since 10% prove to be clever [15].

b. Category „benign“ (figure 2)

Figure 2: Benign Cytopuncture (colloid nodule). Abundant colloid (Diff-Quick, xMP).



According to R.E. MERCERON, J.P. and AL, the rate of benign cytology is 60-75%.

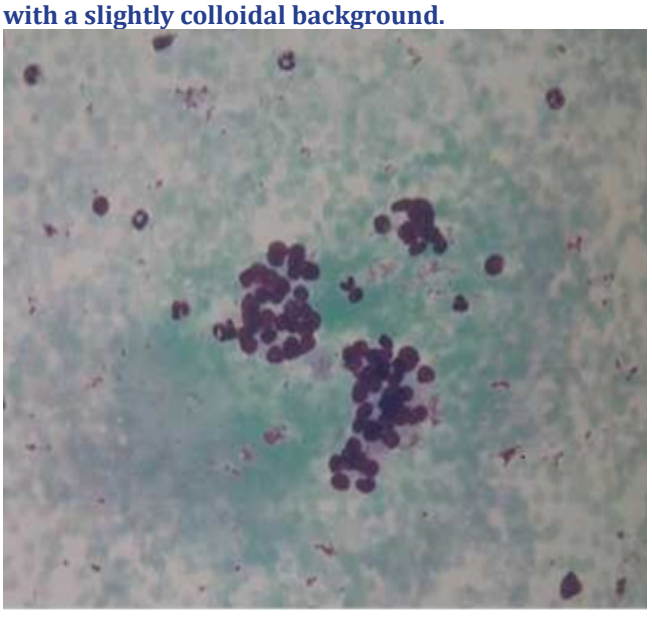
In our series, 28% of cytopunctures were classified as benign dominated by goiter nodules.

The estimated risk of cancer is very low, around 0 to 3% [15].

The recommended course of action is clinical monitoring and a new cytopuncture performed either by palpation or by ultrasound within 6 to 18 months [15].

c. Category „follicular lesion of undetermined significance“ or „atypical significance“ (AUS) (figure 3)

Figure 3: Atypia of undetermined significance. Microvesicular architecture in a paucicellular spread with a slightly colloidal background.



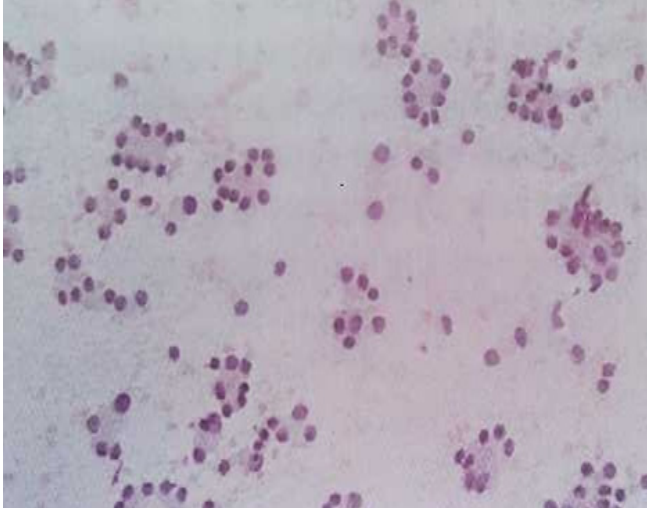
This category should not be a “catch-all”. We must strictly respect its definition and the elements that lead to this diagnosis; cases thus classified should not exceed 7% of thyroid punctures. The publications concerning this category report a percentage varying from 3.3 to 14.9% [17].

In our series, this rate is 10.7%.

Further studies will see if the diagnostic criteria are refined or if indeed an increasing percentage should be accepted. The estimated cancer risk is around 5 to 15%. It is recommended to perform a second puncture under ultrasound control within three to six months.

d. Category “follicular neoplasm” and “follicular neoplasm with oncocytic cells” (figure 4)

Figure 4 : Néoplasme vésiculaire : aspect d’architecture microvésiculaire. Les noyaux des cellules vésiculaires sont ronds et uniformes, avec discrètes superpositions (Papanicolaou).



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This category represents 7 to 18% of thyroid cytopunctures. In our series, this category was 0.6%.

Whether it is follicular neoplasm or follicular neoplasm with oncocyte cells, the estimated risk of cancer is 15 to 30%. This risk, noted in the literature, is probably overestimated and should be assessed downward in the coming years, given the decrease in vesicular carcinomas.

The procedure to follow is surgical control (total thyroidectomy or lobectomy).

e. Category "suspected of malignancy":

This category includes the different types of thyroid cancer, with the exception of nodules suspected of being able to correspond to a vesicular carcinoma or to an oncocytic carcinoma to be classified in the previous category. A. Raji has found a rate of suspected malignant cytopuncture in the order of 10% [18].

In our series, this category represents 29.1% of all the cytopunctions examined.

The estimated cancer risk is around 60 to 75%.

The recommended clinical attitude is surgical: lobectomy or total thyroidectomy.

f. "Smart" category:

This category includes all tumors for which a cytopathological diagnosis of malignancy is possible. Its use supposes that all the cytological criteria of malignancy are present.

Thyroid cancer is rare and therefore a diagnosis of malignancy will only be made in only 3 to 7% of cytopunctions. In our series, this category was 3.3%.

The estimated cancer risk is around 97 to 99%.

The subcategory should be mentioned.

The recommended course of action is total thyroidectomy, with some exceptions for anaplastic cancer, non-Hodgkin's lymphoma.

8- The reliability of the cytopuncture:

It has been demonstrated by results published by several authors that fine needle aspiration is a reliable method provided that its technique is rigorous and that the samples obtained are read by trained cytologists. Ella was recognized as the primary means of exploring thyroid nodules by the National Agency for Development and Medical Assessment (ANDEM) in 1997 [19].

Cytopuncture is a sensitive and specific method, with less than 5% of false negatives [10]. This rate corresponds to the real negatives. In the literature series, the rate of false negatives varies from 3 to 26%. In the literature, this rate varies from 94 to 100%, this rate is very variable in the literature, ranging from 23 to 46% [20].

In total:

The place of fine needle aspiration in the management of thyroid nodules is well established. It is indeed a rapid, non-invasive, inexpensive examination, considered as a screening test making it possible to detect among a high number of nodules, lesions which correspond to a malignant process. The difficulty of cytology in thyroid pathology is mainly represented by the category of vesicular neoplasm which is dominated by thyroid lesions of microvesicular and oncocytic architecture, the diagnosis of which is based on purely histological criteria [21].

Conclusion:

Fine needle aspiration cytology in our context is still unreliable in order to be able to select patients for surgical treatment. And to improve its reliability, we propose to broaden its practice by raising awareness among the practitioners concerned, to puncture only the nodules eligible according to the latest recommendations, to use ultrasound to guide the aspiration, to repeat the samples if the result returns not significant and to work in collaboration with cytopathologists.

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Conflict of Interest:

No conflict of interest exists

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