PITFALLS OF THYROID CYTOLOGY IN DUHOK-IRAQ

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***Submitted* 06/11/2018*; accepted* 19/03/2019**

ABSTRACT

Background: The current study was undertaken to determine the validity of thyroid fine needle aspiration cytology (FNAC) in Duhok-Iraq to clarify its traded diagnostic errors locally and broadly.

Patients and Methods: All thyroid cytologic and histologic cases referred to Duhok Pathology Centers, between January 2013 and December 2016, were enrolled in this study. Cytologic findings were compared with their corresponding final histologic results. The validity parameters of cytology were assessed and cases showing cytologic and histologic non-conformance were re-evaluated to highlight the dependant cytologic pitfalls used locally and in the literature.

Results: Of 553 thyroid biopsies with 81.6% benign and 18.4% malignant, only 125 cases had preoperative diagnostic cytology and subsequent histologic final diagnoses. Of these, apart from 2 unsatisfactory cases, only 6 (4.9%) cytologic reports were proved not to be matched with their corresponding histologic results. The remaining 117 (95.1%) cases showed complete agreement between the two evaluation tests. Malignancy was predicted by cytology in 82.9%with a sensitivity of 94.3% and specificity of 95.5%. All the 6 unmatched cases were aspirated blindly with no image guide, 4 were false positive resulting in 3.2%false positive rate and 89.2% positive predictive value. The remaining unmatched 2 cases were false negative cytologies that gave 1.6% false negative rate and 97.7% negative predictive value. Cytologically, 5 (83.3%) unmatched smears, 4 false positive and 1 false negative, appeared in smears of lymphocyte-rich thyroid lesions, particularly Hashimoto's. The false positive pitfalls comprised 2 over diagnosis of hypercellular smears showing some features of papillary carcinoma, 1 overestimation of the large cells with nuclear atypia as follicular carcinoma and 1 over diagnosis of lymphoid hyperplasia as lymphoma. On the other hand, low cellular smears with unclear atypical lymphoid cells underdiagnosed low grade MALT lymphoma and unobvious cytologic criteria missed the diagnosis of papillary carcinoma.

Conclusions: Lymphocyte-rich thyroid smears should be interpreted by experienced cytopathologists in the context of clinical, radiological and cytologic findings as suchcases may give certain cytomorphologic pitfalls that may decrease the cytologic validity. In suspicious cases, further tests should be justified to overcome the limitations and pitfalls of features when applied alone.

Duhok Med J 2019; 13 (1): 83-95.

Keywords: Pitfalls, Thyroid Cytology, Duhok, Iraq.

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Due to its superior diagnostic reliability and cost effectiveness, thyroid FNAC remains the preferred first line preoperative diagnostic modality for investigations of different neoplastic and non-neoplastic thyroid lesions. Although its main role lies in differentiating benign from malignant thyroid lesions, however it greatly influences the treatment decision with a dramatic minimization of unnecessary surgical procedures and their sequential complications. Since its inception, the Bethesda System for Reporting Thyroid Cytopathology (TBS) has been widely adopted. Each category conveys its risk of malignancy and provides prognostic information as it recommends the next step in baseline management[1,2]. Yet like any other test, FNAC has its potential limitations with unavoidable diagnostic pitfalls that any cytopathologist should be aware of during interpretation [3,4,5,6,7]. To avoid these errors as much as possible, this study focuses on the validity of FNAC and highlights the common cytologic pitfalls in cases showing disparity between cytologic and histologic diagnoses in Duhok-Iraq. As well, the common cytologic errors reported in the literature were also discussed.

MATERIALS AND METHODS

In this study, all patients with thyroid lesions, referred to Duhok Pathology Centers between January 2013 and December 2016 (n= 553) were enrolled. Using 23-24-gauge disposable needles, 125 cases of thyroid swelling were aspirated under local anaesthesia (30 cases were ultrasound guided). The aspirated needle contents were expelled onto dry clean glass slides which were immediately fixed in 95% ethanol for a minimum of 30 minutes, and at least 4 slides were made for each case. Slides were stained with Papanicolaou's (Pap), Hematoxylin and eosin (H&E). Cytologic findings were categorized into 6 groups according to TBS[8]. Biopsy (tru cut, lobectomy and thyroidectomy) specimens were fixed in 10% formalin, paraffin embedded and stained with H&E. The histologic findings were categorized based on WHO criteria.

The pre-operative FNAC results were then compared with their corresponding definitive histological diagnoses and cases with cytologic-histologic disparities were further re-examined to detect the possible causes of cytologic errors. Cases which found to be malignant by cytology as well as by histology were labelled as True Positive (TP), while those diagnosed as malignant on cytology and turned to be benign on histology were False positive (FP). True negative (TN) cases were benign on both cytology and histology whereas false negative (FN) cases were negative on cytology but malignant on histology. Accordingly, cytologic validity parameters (accuracy, sensitivity and specificity in addition to the positive and negative predictive values) were calculated according to the following equations, knowing that the unsatisfactory FNA samples (Category I) were excluded from the statistical equations and suspicious lesions were clubbed with the malignant ones as both are managed as same, as far as treatment is concerned.

Numbers and percentages were provided for quantitative data whereas descriptive information were given for qualitative data.

 https://doi.org/10.31386/dmj.2019.13.1.9

Sensitivity (True positive rate) = True positive/True positive + False negative.
Specificity (True negative rate) = True negative/True negative + False positive.
Positive predictive value = True positive /True positive + False positive.
Negative Predictive value = True negative/True negative + False negative.
Total accuracy rate = True positive +True negative/Total number of cases.

RESULTS

Histologic details are shown in **Table** 1. In the present study, there were 553 thyroid lesions, 455 (82.2%) benign and 98 (17.8%) malignant. Of the benign lesions, multinodular goiter (MNG) formed the majority of cases (49.2%) followed by follicular adenoma (18.4%), different types of thyroiditis (13.9%) and benign Hurthel cell neoplasm (0.7%). The malignant cases included papillary carcinoma (14.3%), follicular carcinoma (1.4%), anaplastic carcinoma (1.3%), medullary carcinoma (0.4%) and Non-Hodgkin's lymphoma (0.4 %).

Table 1. Final Histologic Diagnosis (Total number= 553)

Benign		Malignant	
Lesion	**Number (%)**	**Lesion**	**Number (%)**
MNG	**272 (49.2)**	**Papillary carcinoma**	**79 (14.3)**
Follicular adenoma	**102 (18. 4)**	**Follicular carcinoma**	**8 (1. 4)**
Hashimoto's thyroiditis	**52 (9.4)**	**Anaplastic carcinoma**	**7 (1.3)**
Grave's disease	**21 (3.8)**	**Medullary carcinoma**	**2 (0.4)**
DeQuervain thyroiditis	**4 (0.7)**	**Non-Hodgkin lymphoma**	**2 (0.4)**
Hurthle cell neoplasm*	**4 (0.7)**	----------	----------
Total	**455 (82.2)**	**Total**	**98 (17.8)**

*: Hurthel cell neoplasms were benign tumors (adenomas) in this study

Of these 553 thyroid pathologies, only 123patients had preoperative diagnostic thyroid FNAC with subsequent histologic reports after excluding 2 inconclusive cytologic cases. The mean patient's age was 46.2 years and female gender formed about 70 % of cases (n= 87).

Malignancy was predicted by cytology in 82.9% of cases. Complete agreement between cytologic and histologic reports was demonstrated in 117 (95.1%) cases. Only 6 (4.9%), 4 false positive and 2 false negative, FNAC reports were proved not to be matched with their corresponding histologic results.

Table 2 illustrates the detailed cytologic pitfalls in cytologic-histologic disparities. Two false positive results of papillary carcinoma were reported in hypercellular smears showing scant colloid and papillae-like structures that formed cells showing inconspicuous nucleoli with nuclear grooving (**Figure** 1).

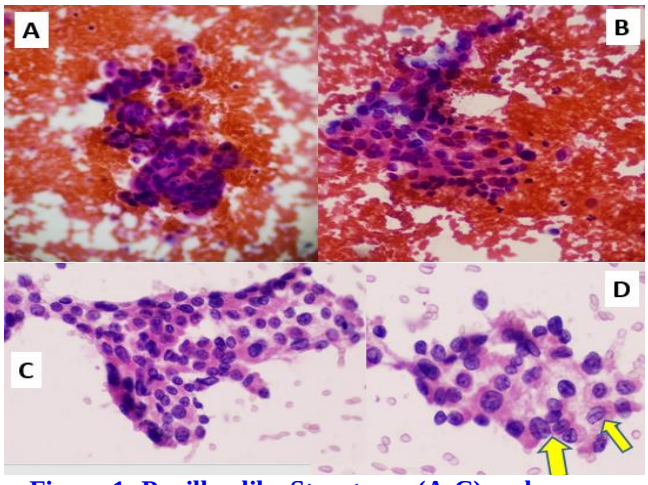

Figure 1: Papillae-like Structures (A-C) and Atypically Large nuclei, some show Nuclear Grooving (arrowed in D) Resulting in False Positive Papillary Carcinoma (H&E, A-C: X200; D: X400).

Histologically, these cases were found to show exaggerated papillary hyperplasiain a case of Grave's disease and another case

of multinodular goiter with early Hashimoto's thyroiditis (**Figure**2).

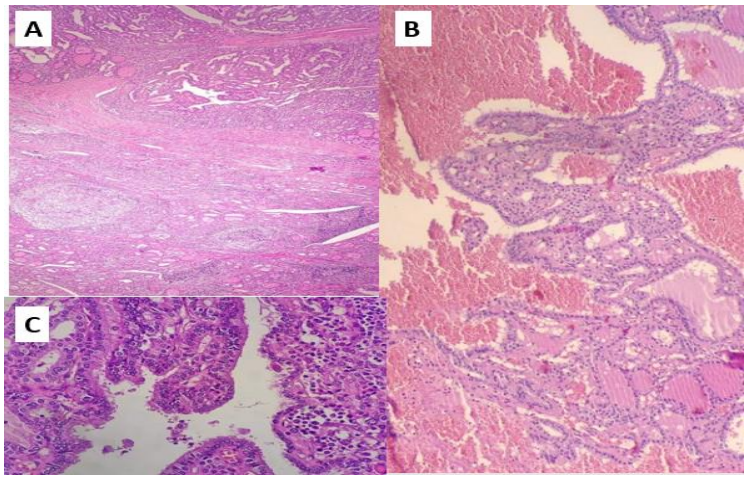

Figure 2: Histologic Sections of Papillary Hyperplasia in Multinodular Goiter with Early Hashimoto's Background (H&E, A: X100, B: X200, C: X250).

The third false positivity was attributed to the hypercellular smear with focal microfollicular pattern. The cells have large atypical, darkly stained nuclei showing course, irregularly distributed chromatin. This smear gave a false impression of follicular carcinoma but turned to be Hashimoto's thyroiditis showing focal nuclear atypia (**Figures** 3 and 4). The fourth false positive smear was hypercellular, rich in large lymphoid cells with atypical nuclei and lack of tangible body-laden macrophages (**Figure** 5); this smear resulted in over diagnosis of non-Hodgkin lymphoma in Hashimoto's thyroiditis with exaggerated lymphoid hyperplasia. On the other hand, one false negative smear that missed the diagnosis of papillary carcinoma was due to inconspicuous nuclear changes (**Figure** 7).

Table 2: Detailed Results in Mismatched Cytologic and Histologic Diagnoses (n= 6)

Cytologic diagnosis	Number	Final histopathology	Smear pitfalls
False positive cases (n= 4)			
Papillary carcinoma	**2**	**- Grave's disease - MNG with papillary hyperplasia**	**Hypercellular, scant colloid, nuclear overlapping, papillae-like structures, inconspicuous nucleoli, psammoma bodies resembling (Figure 1 and 2).**
Follicular carcinoma	**2**	**Follicular adenoma in a hashimoto's background**	**Hypercellular, large cells, course irregularly distributed chromatin (Figure 3 and 4).**
Lymphoma	**1**	**Hashimotos thyroiditis with exaggerated lymphoid hyperplasia**	**Smear rich in lymphocytes with dominant large cells (Figure 5 and 6).**
False negative cases (n= 2)			
Follicular neoplasm	**1**	**Follicular variant of papillary carcinoma**	**Inconspicuous nuclear features of papillary carcinoma (Figure 7 and 8).**
Hashimoto's thyroiditis	**1**	**Lymphoma**	**Diminished lymphoid cells in the aspirate with dominance of small lymphocytes (Figure 9).**

Histologically, this case was found to be follicular variant of papillary carcinoma with infrequent papillary components and relatively low characteristic nuclear changes (**Figure**8). The second false negative case was under estimation of non-Hodgkin lymphoma owing to the unobvious atypical lymphoid cells in a case of low grade MALT lymphoma within Hashimoto's background (**Figures**9).

 https://doi.org/10.31386/dmj.2019.13.1.9

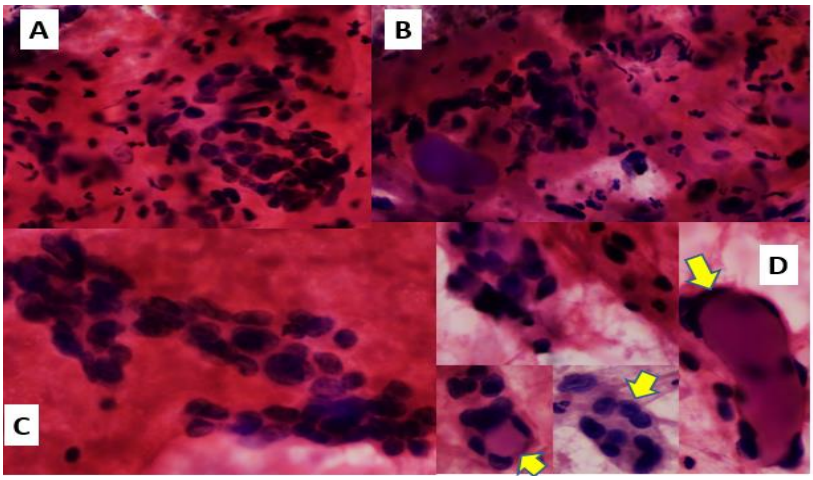

Figure 3: Cytologic Views Showing Atypical Epithelial Cells Forming Follicle-Like Structures (Arrowed in D) Giving a False Positive Follicular Carcinoma (H&E, X400).

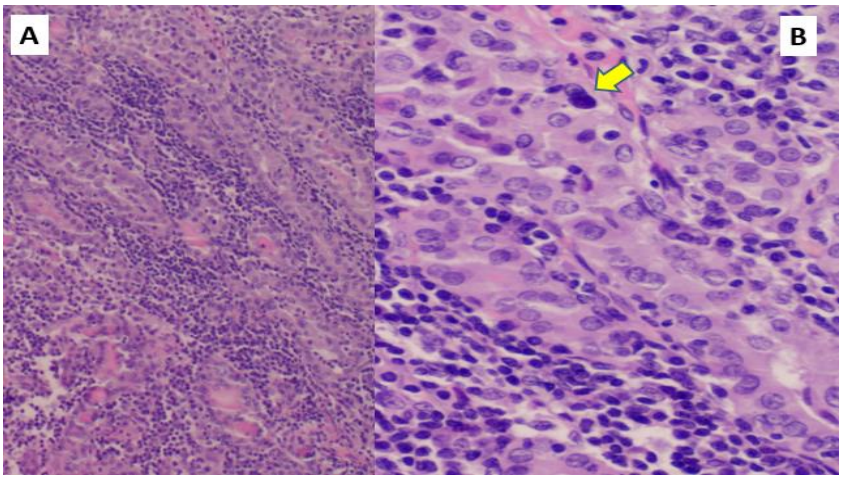

Figure 4: Histologic Sections of Hashimoto's Thyroiditis Showing Nuclear Atypia, Arrowed in B (H&E, A: X100, B: X400).

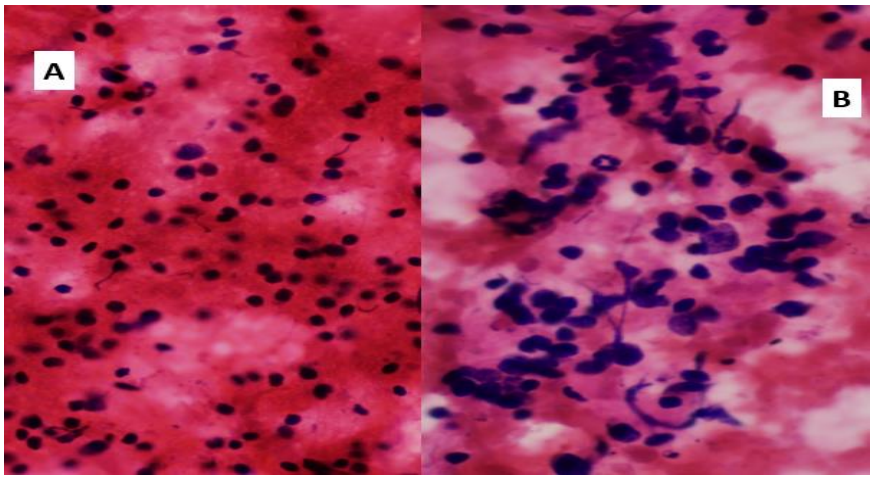

Figure 5: (A, B) Cellular Smear Showing Large Sized Lymphoid Cells with Atypical Nuclei Giving a False Positive Lymphoma (H&E, X400).

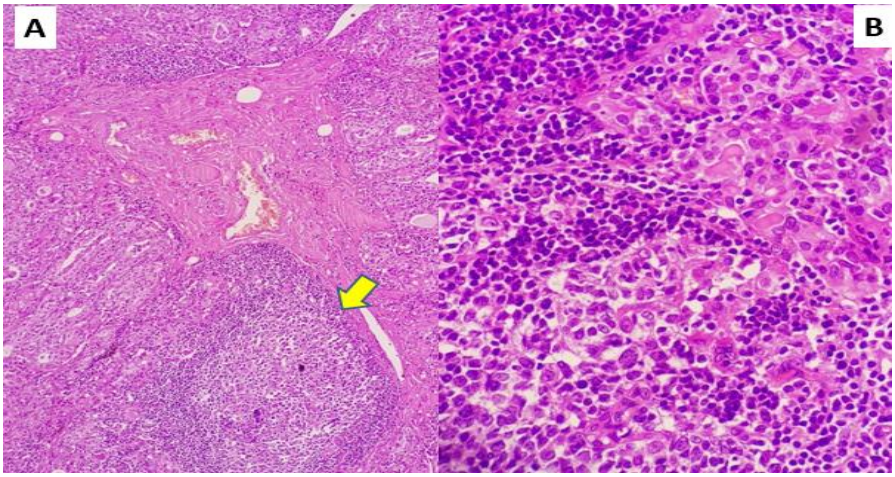

Figure 6: Histologic Sections of Hashimoto's Thyroiditis Showing Exaggerated Lymphoid Hyperplasia, Arrowed in A (H&E, A: X100, B: X400).

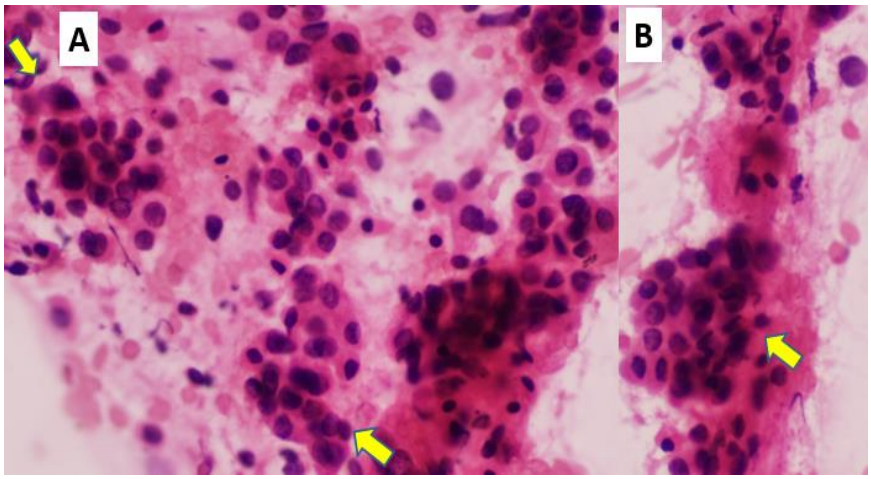

Figure 7: Cellular Smear Showing Large (Hurthel-Like) Epithelial Cells, Arrowed, Lacking the Characteristic Nuclear Changes of Papillary Carcinoma Giving False Negative Result (H&E, X400).

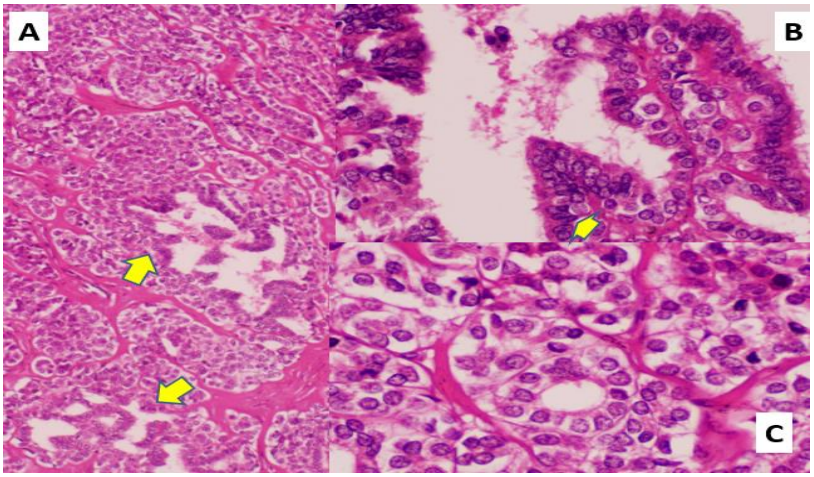

Figure 8. Histologic Sections of Papillary Carcinoma with Infrequent Papillary Foci (Arrowed In A), Magnified in B. C Demonstrates the Follicular Background that Lack the Clear Cut Nuclear Changes of PTC (H&E, A: X200; B And C: X400).

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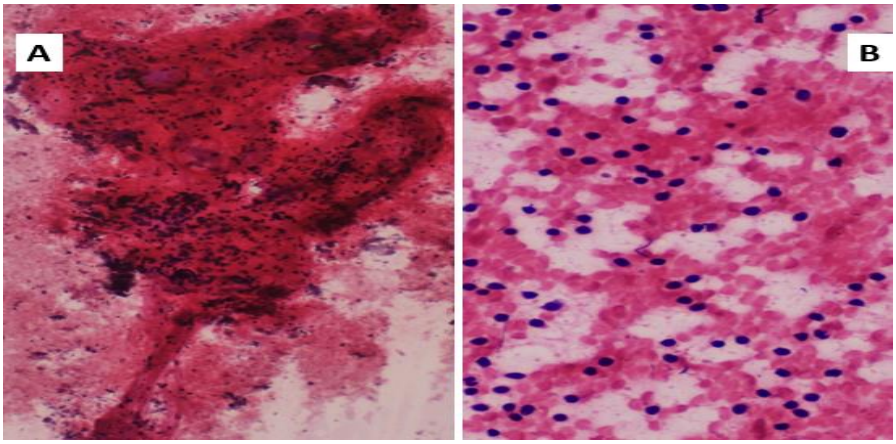

Figure 9: (A, B) Microscopic Pictures of Cellular Smear Showing Predominantly Mature Lymphocytes that Missed a Lymphoma Case (H&E, A: X100; B: X250).

DISCUSSION

Because of some reported limitations, there are debates regarding the validity of thyroid FNAC as a decision-making test [4,9,10]. Awareness of cytopathologists regarding these pitfalls can minimize the false negative and false positive diagnoses. Our purpose in this study was to highlight the traded pitfalls of thyroid FNAC in this locality and those reported in the literature. In the current study, the cytologic prediction of malignancy was 82.9% with an accuracy of 93.5%, sensitivity of 94.3%, specificity of 95.5%, 89.2% positive predictive value and 97.7% negative predictive value. The overall diagnostic accuracy reported in the literature ranged between 84%-97% and, as shown in **Table** 3, the current validity parameters, parallel the highest values reported in different studies. After exploring definite histologic diagnoses, we reported 4 false positive hypercellular smears with scant colloid. Two smears demonstrated papillae-like structures with some cells showing nuclear grooving and inconspicuous nucleoli. These cytologic features gave false impression of papillary carcinoma. However on subsequent final histologic sections, they turned to be papillary hyperplasia in Grave's disease, Hashimoto's thyroiditis and MNG with early Hashimoto's thyroiditis. Such cytological criteria are commonly described in hyperactive toxic thyroid, active nodules of MNG and in Hashimoto's thyroiditis, which lead to over diagnosis of papillary carcinoma[4].

Table 3. Validity results of thyroid cytology among different studies

Author	Sensitivity	Specificity	PPV	NPP	Accuracy
Current study, 2018	94.3%	95.5%	89.2%	97.7%	93.5%
Al-Hrout et al, 2015[11]	92.4%	80%	83.1%	90%	86.4%
Sharma, 2015[7]	89.5%	98%	84.6%	98.6%	97%
Sinna&Ezzal, 2012[3]	92.8%	94.9%	94.9%	91.8%	93.6%
Basharat et al,2011[12]	80%	97.7%,	97.7%	96%,	-
Haberal et al, 2008[5]	92.6%	91.6%	-	-	-
Mahar et al, 2006[13]	98%	70%	91%	93%	91%
Ko HM et al, 2001[14]	78.4%	98.2%.	99%	66.3%	84.4%
Tabaqchali MA, 2000[15]	98%	70%	91%	93%	91%

To facilitate cytodiagnosis of papillary carcinoma, smears should show 3 out of 5 features (papillae, psammoma bodies, nuclear grooving, intranuclear cytoplasmic inclusions (INCI) and fine powdery chromatin) despite the fact that none of these features are diagnostic in isolation or low frequency. In fact, presence of papillae with distinct anatomical borders and cells showing dense metaplastic cytoplasm with nuclear grooves and INCI in a high frequency are considered the most dependable cytomorphologic features. As shown herein, emphasis on cellularity and architectural patterns with too much stress on one or two nuclear criteria like nuclear grooving can lead to over diagnosis of papillary carcinoma[10, 16, 17]. Strict criteria for recognition of the longitudinal grooves are defined-grooves running along the length of the nuclei in more than 20% of the cells despite the fact that such grooves can be detected in a small number of non-neoplastic thyroid lesions, thyroid neoplasms other than papillary carcinoma and non-thyroid neoplasms especially those located in the vicinity of thyroid, like parathyroid neoplasms and paragangliomas[17]. Misinterpretation of focally papillary lesions with superimposed air bubbles or fat droplets over cells, air-drying artefacts and partly degenerative non-neoplastic follicular cells in cytologic specimens can lead to follicular cell enlargement with chromatin changes that may assume circumferential shapes with sharp borders (pseudonuclear clearing) and mimic intranuclear inclusions of PTC and thus may give false positive errors. Such pseudoinclusions of thyroid follicular cells are more pronounced in bloody smears which hinder proper fixation. Such artifacts can be avoided by multiple sampling, using thin gauged-needles, from different parts of the lesion[10, 16, 17]. In our third false positive case, the nuclei showed course irregularly distributed chromatin with focal microfollicular pattern that gave a false impression of follicular carcinoma. Histologically, this case was found to be follicular cell enlargement with focal nuclear atypia in a Hashimoto's thyroiditis.It has been noted that the follicular epithelial cells in lymphocyte-rich thyroid smears, may assume large syncytial fragments with cells having atypically large nuclei and irregularly thickened nuclear membrane. Such cytomorphologic changes can be easily mistaken for infiltrative carcinoma [10]. We have to emphasize that in endocrine glands like thyroid, nuclear atypia is not pathognomonic for diagnosis of malignancy[18]. Cytomorphologic features useful for diagnosing follicular neoplasms include non-macro follicular architecture with absence of colloid and lymphocytes in the background[16].

The fourth false positive case was diagnosed as non-Hodgkin lymphoma because of the highly cellular smear and dominance of large atypical lymphocytes. Indeed, exaggerated reactive lymphoid hyperplasia can be a common cause of false positive errors with over diagnosis of non-neoplastic lymphoid hyperplasia as NHL[19].

Regarding the 2 false negative cases in the present study, they were attributed to the scant aspirated material with missing of papillae and characteristic cellular changes of papillary carcinoma (follicular variant) in one case. It is worth mentioning here

 https://doi.org/10.31386/dmj.2019.13.1.9

that these characteristic PTC morphologic findings were also found to be not obvious in its histologic counterpart sections. In fact, intranuclear inclusions can be detected in up to 90% of cases if examined under high power light microscope and in more than 90% if examined under higher powers. As well, definite nuclear grooving along the length of the nuclei can be detected in more than 20% of PTC smears and thus the diagnosis can be missed in smears when papillae are absent with unclear characteristic architectures and nuclear features of PTC[17, 20]. Suboptimal material, cystic degeneration in malignancy with aspiration of only the cystic fluid can also result in under diagnosis of malignancy[5,10, 13, 20]. Increasing the number of needle passes image-guided FNAC can minimize many sampling errors[17, 20]. Under interpretation of cytologic specimens may be perpetuated by the lack of definite cut-off cytologic points. Indeed, the less the available necessary cytomorphologic criteria the higher the false-negative proportions [21, 22, 23, 24].

Concerning the second false negative case, the smear was hypocellular and the only cells seen were small to intermediate polymorphic lymphocytes with unclear nuclear atypia. This case histologically was turned to be MALT lymphoma which is considered as type of low grade non-Hodgkin that exhibits less monomorphic cellularity than the other lymphomas. It is worth mentioning that even histologic morphology alone is often not sufficient for definitive diagnosis of low grade lymphoma and they need more advanced techniques like immunohistochemistry and molecular studies [25].

Limitations of the study included inadequate number of the preoperative cytologic data to the already present histologic cases and all the mismatched cases were blindly aspirated without image guidance.

In conclusion, in spite of the high predictive values of FNAC in differentiating benign and malignant thyroid lesions, certain pitfalls should be kept in mind, mainly lymphocyte-rich thyroid smears which should be interpreted by experienced cytopathologist in the context of clinico-radiologic findings to increase the cytologic validity. As well in suspicious cases, further tests should be justified to overcome the limitations and pitfalls of FNAC when used alone.

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پوختە

شاشییَن سایتولوجی ییَن رذیَنا بةریزادة ل دهوك _ عیراق

پێشەکی و ئارمانج: ئةظ ظةكولينة هاتية ئةنجامدان بو دياركرنا دروستي ائةنجاميَن نموونيَن سايتولوجى ييَن هاتينة وةرطرتن ذ رذيَنا بةريزادىَ ل دهوك عيراق بو دياركرنا خةلةتييَن ئةنجامان لجةم دةظةرا مة و ذ دةرظة.

ريَكێن قەكولينێ: هةمى نمونيَن سايتولوجى و شانةزانى هاتينة هنارتن بو سةنتةرىَ دهوك يىَ ئاسولوجى دناظبةرا مةها ئيَك 2013 هةتا مةها 2016/12 هاتة دانان دناظ ظةكولينىَ دا. ئةنجاميَن سايتولوجى و شانةزانى هاتنة بةرامبةرئيَكرن. راستيا ئةنجاميَن سايتولوجي هاتنة هةلسةنطاندن و ئةو ئةنجاميَن نةوةك هةظجارةكا دى هاتنة هةلسةنطاندن بو دياركرنا شاشييَن سايتولوجى ل دةظةرامة و ل ذيَدةران.

ئەنجام: ذ كوما 533 نمونيَن ثةريزادىَ، 81,6 % د سظكبوون و 18,6 % ئةنجةشيَرى بوون، بتنىَ 125 ذ وان شلوظةكرنا سايتولوجى و شانةزانى يا ثيَشنشتةرطةريىَ بدوماهيك هةبوون. ذظان ذبلى 2 حالةتيَن نةسةركةفتى، بتنىَ 6 (4,9 %) ئةنجام سايتولوجي دياربوون نةوةك هنةظبوون دطةل ئةنجاميَن شانةزانى. ئةظ 117 (95,1 %) ييَندى دياربوو ئةنجاميَ نهةردوو شلوظةكرنا وةكى هةظبوون. شيَرثةنجة هاتة ثيَشبينكرن ب ريَكا سايتولوجى ل 82,9 % دطةل هويربينيا 94,3 % و تايبةتمةنديا 95,5 %. هةمى 6 حالةتيَن نةوةك هةظ نمونيَن سايتولوجى هاتبوونة وةرطرتن بكورةكى بيَى هاريكاريا ويَنةيى، 4 ذ وان ئةنجاميَن وان ثوزيتيظيَن خةلةتبوون كود بيتة ريَذا 3,2 % ثوزيتيظيَن خةلةت و (89,2 %) ثيَشبينيَن ثوزيتيظى ئةظ هةردووحالةتيَن دن نيطةتيظيَن خةلةتبوون كودبيتة ريَذا 1,6 % نيطةتظيَن خةلةت و 97,7 % ذ ثيَشبينيَن نيطةتيظ, لدةرئةنجاميَن سايتولوجي، 5 (83,3 %) ييَن نةوةكهةظ، 4 ييَنثوزيتيظيَن خةلةت و ئيَك ذ نيطةتيظيَن خةلةت ديار بو ل نمونةييَن ثةريزادىَ ييَن تيَر ليمفوسايت، بتايبةتى هاشيموتوس. شاشييَن ثوزيتيظيَن خةلةتثيَك هاتن ذ دوونموونةييَن زيَدةخانةيان دطةل هندةك نيشانيَن شيَرثةنجا ثاثيلةرى، ئيَك نموونة زيَدة دياركرنا خانةييَن مةزن دطةل نةدروستيا نيوكليةروةك شيَر ثةنجا فوليكيولةر. و ئيَك زيَدةديا‌ركرنا ليمفويروةكليمفوما. ذلايةكىَ دى نمونيَن كيَم خانة و خانةييَن ليموفييرييَن نةديار هاتنةدةسنيشانكرن وةك ريَذا نزم يا MALT ليمفوما و ئةنجاميَن سايتولوجى ييَن نةدراست بو ئةطةرىَ بةرزةكرنا دةسنيشانكرنا شيَرثةنجا ثاثيلةرى.

دەرئەنجام: نموونيَن ثةريزادى ييَن زيَدة ب ليمفوسايتان ثيَتظية ب هويرى بيَنة شلوظةكرن و خواندن ذلايىَ زانابيَن سايتولوجى ييَن شارةزا ذ ئالىَ كلينيك ظة، ئةنجاميَن تيشك و سايتولوجى هندةك شاشيان دكةن و ذبةروىَ ضةندىَ دبيتة ئةطةرىَ كيَمكرنا دروستيا وان. ل حالةتيَن نةبةرضاظ، ثيَتظية ثتر تيَست بيَنة راستظةكرندا شاشييَن وان بيَنة دةرباسكرن ئةطةر بتنىَ هاتنة بكارئينان.

 https://doi.org/10.31386/dmj.2019.13.1.9

الخلاصة

الاخطاء الخلوية للغدة الدرقية في دهوك ـ العراق

الخلفية والأهداف: أجريت الدراسة الحالية لبيان مدى ملائمة خزعة بالإبرة الدقيقة للخلايا الغدة الدرقية (FNAC) في دهوك العراق لتوضيح الأخطاء التشخيصية المتداولة محليا وعلى النطاق العالمي.

المواضيع و طرق البحث: في هذه الدراسة تم تسجيل جميع حالات الغدة الدرقية التي فُحِصَتْ نسيجيا وخلويا بين فترة كانون الثاني 2013 الى كانون الاول 2016 في مركز دهوك للأمراض. وتمت مقارنة النتائج الخلوية مع النتائج النسيجية المقابلة لها. وتم تقيم مدى كفائة المعلمات الخلوية، الحالات اظهرت عدم توافق الخلوي والنسيجي وقد تم اعادة تقيم الكفائة المعلمات الخلوية لتسليط الضوء على الاخطاء الخلوية محليا وفي عالميا.

النتائج: من مجموع 553 خزعة من الغدة الدرقية من ضمنها 81.6 ٪ حميدة و 18.4 ٪ خبيثة ، فقط 125 حالة اجري لها تشخيص خلوي قبل الجراحة والتشخيص النهائي النسيجية اللاحقة. من جميع الحالات ، كانت هناك حالاتان غير مقبولة، فقط 6 (4.9 ٪) تقارير خلوية لا تتطابق مع نتائجها النسيجية. وأظهرت 117 حالة المتبقية (95.1 ٪) اتفاق كامل بين اختباريين التقييم. تم التنبؤ بالخلايا الخبيثة بواسطة الفحص الخلوي في 82.9 ٪ مع دقة 94.3 ٪ وخصوصية 95.5 ٪. تم خزع جميع الحالات الستة التي لا تطابق الحالات الاخرى لها على نحو عشوائي دون وجود دليل صور، وكانت 4 حالات إيجابية كاذبة 3.2 ٪ معدل إيجابي كاذب و 89.2 ٪ قيمة تنبؤية إيجابية.
الحالتين المتبقيتين 2 الغير مطابقة اعطتت نتيجة خلوية كاذبة بمعدل 1.6 ٪ سلبية كاذبة مع 97.7 ٪ القيمة التنبؤية السلبية. خلويًا ، ظهرت 5 مسحات (83.3٪) غير مطابقة ، حيث ان 4 مسحات منها إيجابية خاطئة و 1 سلبية خاطئة في مسحات الآفات الدرقية الغنية باللمفاويات ، وخاصة هاشيموتوس. خلل التشخيص الايبجابي الخاطء تالفت من حالتين وكانت في تشخيص لطاخات مفرطة الخلايا تظهر بعض ملامح سرطان حليمي، وإفراط في تقدير الخلايا الكبيرة مع عدم الاتساق النووي مثل سرطان جريبي و حالة تشخيص تضخم اللمفاوية مثل سرطان الغدد الليمفاوية. من ناحية أخرى ، فإن المسحات الخلوية المنخفضة ذات الخلايا اللمفاوية غير النمطية الغير الواضحة ناقص تشخيص سرطان الغدد الليمفاوية منخفضة الدرجة MALT ومعايير خلوية غير واضحة فشلت في تشخيص سرطان الورم الحليمي.

الاستنتاجات: ينبغي تفسير مسحات الغدة الدرقية الغنية باللمفاويات من قبل أخصائيي الأمراض الخلوية ذوي الخبرة في سياق النتائج السريرية والإشعاعية والخلوية لأن مثل هذه الحالات قد تعطي بعض الاخطاء السيتومورفولوجية التي قد تقلل من مصداقيتها. في الحالات المشبوهة ، يجب تكرار الاختبارات الاخرى للتغلب على الاخطاء ومخاطر الميزات عند تطبيقها بمفردها.