Galectin-3 &MCM2 Expression and DNA Analysis In Fine Needle Aspiration of Thyroid Epithelial lesions

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The proliferative activity was assessed by two measures; the MCM2 immunostain and the proliferation index (PI) calculation by image analysis system.

To our knowledge, this study is the first to evaluate MCM2 in cell block of thyroid aspirate, and is the first to use the image analysis system to count the stained nuclei and calculate the labeling index LI.

Although MCM2 LI were significantly higher in malignant cases, however, the notable heterogeneity, the wide range of events and the great overlapping of values between the individual cases rather than groups blurred the distinct line between the diagnostic groups. Moreover, the absence of an established scoring system for MCM2 hinders the calculation of its sensitivity, specificity or diagnostic accuracy.

As regard proliferative index (PI) calculation in the present study it was found to be significantly high in the malignant lesions versus benign ones with sensitivity 72.7% and specificity 75%.

From the results of this study we can consider that the ancillary techniques used in the study (Galectin-3 and DNA ploidy) could refine the FNAC results and increase its sensitivity as a screening test from sensitivity(60%) to reach sensitivity (93.3%), thus decreasing the false negative cases.

CONCLUSION& RECOMMENDATION:

Despite limitations, FNA has become the mainstay of thyroid nodule evaluation; being safe, cost effective and of great patient compliance.

As the ability to perform further ancillary techniques is one of the major advantages of FNAC. It is recommended therefore that sufficient material to be aspirated in each case to prepare cell block for further studies whenever needed, for this aim at least two passes per nodule are recommended.

The variability of thyroid FNAC reporting terminology and the variability in the calculation of reported FNAC statistics highlight the need for universally accepted terminology and uniformity in statistical reporting for accurate understanding of thyroid FNAC clinical utility.

SUMMARY

Fine needle aspiration (FNA) cytology has emerged as a valuable, accurate and routine investigation for thyroid nodules, with no or minimal complications. While the overall accuracy of FNAB is excellent, an indeterminate or suspicious biopsy can pose a diagnostic and management dilemma. Generally, the diagnosis of the follicular neoplasms is a demanding task in cytology and the distinction between follicular adenoma and follicular carcinoma can only be done on histopathological level to assess invasion. Similar difficulties may be present in cytological differentiation between hyperplastic papillae and papillary carcinomas. Therefore, there is a need to refine the results of conventional cytology.

This study aimed at investigating the value of galectin-3 immunostain , DNA image analysis as well as MCM2 proliferative marker in the preoperative evaluation of thyroid epithelial lesions , aiming at better patients selection to surgery and to prevent as much as possible of unnecessary thyroid surgeries .

In the present study 79 Samples were obtained prospectively from patients presenting with thyroid enlargement and referred by clinicians for FNA. According to the inclusion criteria, only 60 cases were included in the study, 50% of which were malignant and 50% were benign.

According to the patient's demographic data and clinical findings in the present study, it was screened that old age, male gender and single nodularity may be risk factors for thyroid malignancy.

Conventional FNAC of the cases could diagnose malignancy with **sensitivity** of 60%, **negative predictive value(NPV)** 71.4%, **specificity** and **positive predictive value(PPV)** 100%(no false positive cases),and overall **diagnostic accuracy** of 80%.

On using Immunocytochemical stain by galectin-3 - on cell blocks prepared from FNA material the values were improved to sensitivity of 93.3%, specificity 86.7%, and overall accuracy90%, and it was noticed that galectin -3 over-expression was significantly associated with malignancy.

DNA ploidy measurement was done using Leica Qwin500 image analyzer. Aneuploidy was significantly associated with malignancy, achieving sensitivity 90.9%, specificity 83.3% and accuracy 88.3%.

The application of ancillary techniques particularly galectin-3 immunocytochemical marker may become a reliable indicator for surgical intervention. , DNA ploidy on the other hand may be of value in galectins -3 negative cases, according to the suggested algorithm to refine the preoperative assessment by ruling out the false negative cases.

It was also noted that assessment of the proliferative activity (by MCM2 immunostain or PI) may predict the biological behaviour of the lesion and support the FNAC and other studies results.

Further verifications and possible modifications of the suggested algorithm are recommended and have to be based on larger scale studies using other immunocytochemical markers and updated molecular biomarkers.