Application of GATA 3 and TTF-1 in Differentiating Parathyroid and Thyroid Nodules on Cytology Specimens

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Introduction

- Differentiating parathyroid from thyroid lesions can be difficult on fine needle aspiration (FNA) due to overlapping cytomorphic features.
- While the traditional PTH assays can help in the distinction, these tests may be cumbersome, particularly when the lesion is unexpected clinically and a needle wash is not collected at the time of FNA.
- Immunohistochemistry / immunocytochemistry (IHC) is a well-known tool in pathology used to characterize the tissue origin of various lesions.
- Therefore, we chose to investigate the application of IHC with GATA 3 and TTF-1 on air-dried cytology smears to distinguish parathyroid and thyroid lesions.

Methods

- 2 - 5 air-dried Touch Preparation (TP) slides were prepared from consecutively selected parathyroid and thyroid specimens received fresh without formalin fixation in the surgical gross room at NYU Langone Tisch Hospital.
- Diff-Quik (DQ) stain was performed on each case in order to access the cellularity. Only cases with sufficient cellularity (more than 50 cells) were included in the study.
- Ultrafast Papanicolaou (UFP) stain was performed on randomly selected cases as described by Dr. Grace Yang.
- IHC for GATA 3 and TTF-1 were performed on unstained and ultrafast Papanicolaou (UFP) stained air-dried TP slides.
- IHC staining was evaluated by two authors (YS and WS). The cases were considered as positive only when they demonstrated more than 50% nuclear immunoreactivity. The IHC staining was compared between the unstained air-dried slides, UFP-stained slides and the positive controls.

Results

- GATA 3 expression was observed in all cases of parathyroid origin (n = 20) but no immunoreactivity was present in thyroid lesions.
- TTF-1 expression was observed in all cases of thyroid origin (n = 22), but not in parathyroid lesions.
- In comparison with surgical tissue sections used as positive controls, the staining intensity observed on TP slides was found to be equivalent.
- Unstained and UFP-stained TP slides perform equally well with GATA 3 and TTF-1 IHC.
- Based on our study we recommend the protocol depicted in Figure 3 for differentiating thyroid versus parathyroid lesions on FNA samples.

Conclusion

- Immunohistochemistry study with GATA 3 and TTF-1 on air-dried cytology smears is a simple and effective way to differentiate parathyroid versus thyroid lesions on FNA.
- Air-dried unstained and UFP-stained slides perform equally well with GATA 3 and TTF-1 IHC.
- UFP-stained slides provide the added benefit of morphologic evaluation and assessment of smear cellularity prior to IHC on the same slide.