Introduction

Thyroid nodules often present a diagnostic challenge to the thyroid surgeon due to limitations in current pre-operative investigations. Indeed, Khalife et al. showed a false negative rate of 15.8% for ultrasound guided fine needle aspiration (USFNA) diagnoses at the McGill University Health Centre[10]. The McGill Thyroid Nodule Score (MTNS+) uses 23 risk factors for thyroid cancer to attribute a percentage risk for well-differentiated thyroid cancer in thyroid nodules. Currently, the MTNS+ overestimates the risk of benign USFNA nodules.

Aim

The aim of this study was to develop the McGill Thyroid Nodule Score Version 3 (MTNS V3), in order to better identify falsely negative USFNA results, while avoiding unnecessary surgery.

Methods

A retrospective analysis of 1189 patients undergoing thyroidecy for suspicious or confirmed malignant thyroid nodules at the McGill University Health Center and the Jewish General Hospital from Jan. 2010 to Mar. 2015 was performed. Inclusion criteria:
- USFNA biopsy result
- Sufficient data to assign a MTNS+ score
- Final pathology result
- Not a completion thyroidecy

MTNS+ results were calculated for all 1189 included patients. An optimal value of negative 3 points for a benign USFNA was determined through receiver operating characteristic curves, student t-tests, and the distribution of patients.

MTNS V3 results were calculated for all patients and compared to pathology results.

Results

The McGill Thyroid Nodule Score Version 3 (MTNS V3) adds a point value of negative 3 for a benign USFNA to the previously described MTNS+.

Clinical Parameters and Labs

1. Gender
2. Age
3. Follicular nodules
4. Thyroid antibodies
5. Size of largest nodule (mm)
6. Consistency
7. Calcifications (coarse vs. micro)
8. Size of nodule (mm)
9. Texture of nodule (hard vs. soft)
10. ultrasound & PCT find

The MTNS V3 increased the area-under-the-curve of the ROC from 0.782 to 0.788, p=0.024. There was an average gain in specificity of 3.40% and an average loss in sensitivity of 0.90% across the MTNS V3.

Positive predictive values (PPV) and negative predictive values (NPV) were improved by an average of 1.04% and 1.34% respectively.

Conclusions

False negative rates for benign USFNAS as high as 24.2% have been reported in the literature[8, 9, 11, 15]. The incorporation of a -3 point value for a benign USFNA increases the accuracy of the MTNS+ and minimizes the impact of a false negative USFNA.

Given the high cost of molecular testing for thyroid nodules, the MTNS V3 provides a low cost and rapid alternative to quantify the malignancy risk of a thyroid nodule.

Prospective studies are ongoing to validate the current reference values of the MTNS V3.

References


Fig. 1 MTNS V3 Scoring Template

Fig. 2 Malignancy Rate According to MTNS V3

Increasing MTNS V3 scores correlated closely with increasing malignancy risk, with an “r” coefficient of 0.964 with 95% CI (0.912, 0.984) for scores 1-25.

Fig. 3 Distribution of patients according to final pathology and MTNS V3

A score ≤10 corresponded to a 32% (217 in 679) risk, while a score >10 corresponded to an 80% (409 in 510) risk of malignancy. The relative risk of patients with scores >10 compared to patients with scores ≤10 was 2.51 with 95% CI [2.23-2.82], p < 0.001.

Fig. 4 Receiver Operating Characteristic (ROC) curve for the MTNS V3

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