



THYROID NODULES

The Afirma Gene Expression Classifier increased the rate of indeterminate thyroid biopsy results and did not decrease surgical rates

BACKGROUND

Thyroid nodules are very common, occurring in up to 50% of the population. The concern with any thyroid nodule is the possibility of thyroid cancer. Thyroid biopsy is the best test to determine if a nodule contains a cancer. However, up to 15–20% of biopsies are read as being indeterminate, meaning that a diagnosis cannot be determined looking at the cells themselves. Traditionally, many of these biopsy results were treated surgically, with a relatively low risk for cancer (5–20%) pre-operatively. Examining molecular markers in biopsy specimens have gained favor in helping to determine need for surgery and even to guide extent of surgery in some cases. One such panel of molecular markers is the Afirma Gene Expression Classifier (GEC). The use of the GEC has been previously shown to decrease need for surgery in patients with indeterminate biopsy results when it returns benign. However, the helpfulness of the GEC has recently been questioned and it has been suggested that it may be over-utilized. This study was done to determine effect of the GEC on cytology diagnosis and rate of surgery as well as rate of cancer on indeterminate biopsy results.

THE FULL ARTICLE TITLE

Sacks WL et al. Impact of Afirma gene expression classifier on cytopathology diagnosis and rate of thyroidectomy. *Cancer Cytopathol* 2016, Epub

SUMMARY OF THE STUDY

From 2012–2014, 4292 total thyroid biopsy results were retrospectively studied at Cedars-Sinai Medical Center. The patients had an average age of 58 year, 73.5% were female and the average nodule size was 2 cm. The initial 18 months of the study included biopsies done before the availability of the GEC and these were compared with the last 18 months, when the GEC was used in 45.3% (140) of eligible cases. Of 4292 FNAs performed, 567 nodules

or 13.2% of the total were indeterminate. In the group that could utilize GEC, 140 (45.3%) of the 309 eligible indeterminate results were sent for GEC analysis. Of these, 37.1% had GEC-benign results, 55.7% had GEC-suspicious results, and 7.1% had GEC-No result.

Interestingly, there was an increase in indeterminate cytology results after the GEC became available. A total of 197 (41.6%) of the patients with indeterminate biopsies had thyroid surgery and 31.5% were cancerous. Of the patients with indeterminate results who had a repeat biopsy performed, 35.2% returned with non-indeterminate results, so did not require repeat GEC testing. However, the surgery rate for patients with indeterminate results were not different before and after the introduction of the GEC analysis. Further, the cancer rate in indeterminate nodules was not different with GEC availability either.

IMPLICATIONS OF THE STUDY

The use of the Afirma GEC previously was shown to decrease the rate of surgery in patients who have GEC-benign results. In contrast, this study did not demonstrate lower surgical rates with the GEC. However it did show that when molecular testing became available, the number of indeterminate biopsy results increased. The rate of cancer and the rate of surgery did not differ with GEC availability in this series. A repeat biopsy led to a more definitive result in 35% of cases, suggesting that this may be an alternative approach to the use of molecular markers in indeterminate nodule cytology.

— Julie Hallanger Johnson, MD

ATA BROCHURE LINKS

Thyroid Nodules: <http://www.thyroid.org/thyroid-nodules/>


THYROID NODULES, continued

ABBREVIATIONS & DEFINITIONS

Thyroid nodule: an abnormal growth of thyroid cells that forms a lump within the thyroid. While most thyroid nodules are non-cancerous (Benign), ~5% are cancerous.

Thyroid fine needle aspiration biopsy (FNAB): a simple procedure that is done in the doctor's office to determine if a thyroid nodule is benign (non-cancerous) or cancer. The doctor uses a very thin needle to withdraw cells from the thyroid nodule. Patients usually return home or to work after the biopsy without any ill effects.

Indeterminate thyroid biopsy: this happens a few atypical cells are seen but not enough to be abnormal (atypia of unknown significance (AUS) or follicular lesion of unknown significance (FLUS)) or when the diagnosis is a follicular or hurthle cell lesion. Follicular and hurthle cells are normal cells found in the thyroid. Current analysis of thyroid biopsy results cannot differentiate between follicular or hurthle cell cancer from noncancerous adenomas. This occurs in 15–20%

of biopsies and often results in the need for surgery to remove the nodule.

Molecular markers: genes and microRNAs that are expressed in benign or cancerous cells. Molecular markers can be used in thyroid biopsy specimens to either to diagnose cancer or to determine that the nodule is benign. The two most common molecular marker tests are the Afirma™ Gene Expression Classifier and Thyroseq™

Genes: a molecular unit of heredity of a living organism. Living beings depend on genes, as they code for all proteins and RNA chains that have functions in a cell. Genes hold the information to build and maintain an organism's cells and pass genetic traits to offspring.

microRNA: a short RNA molecule that has specific actions within a cell to affect the expression of certain genes.



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