Application of the Bethesda Thyroid System in the Pediatric Population

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BACKGROUND

- Few studies have analyzed the Bethesda System for reporting pediatric thyroid nodules.
- The incidence of thyroid nodules in children is not as common as in adults. However, thyroid nodules in children are more likely to be malignant.
- The usefulness of molecular testing in the pediatric age group has been reported in few studies.
- This study aims to evaluate the usefulness of the Bethesda System and molecular testing in pediatric thyroid nodules.

METHODS

- All thyroid fine needle aspirations (FNAs) from patients 21 years of age or younger were collected from the pathology files at Yale University between the years of 2008-2012.
- Nearly all FNAs were performed under ultrasound guidance.
- The cytologic diagnoses were reviewed and retrospectively correlated with molecular testing results and histologic results in cases with surgical follow-up.
- Most cases were reviewed by at least two cytology board certified pathologists.
- All cases of FLUS, suspicious for PTC and positive for PTC were ordered for BRAF mutation test.
- BRAF mutations are tested by PCR-SSCP on FNA washing fluid.
- PCR primers target V600E mutation.

RESULTS

- 234 FNAs from 225 patients were identified, with 69 (31%) cases having histologic follow up and 17 (7.5%) cases having molecular analysis.
- The distribution of the ages of boys and girls is similar and the ratio of incidence of thyroid nodules in girls to boys was 4:1 (see Table 1).
- All malignant cases are papillary thyroid carcinoma (PTC).
- Not all cases of cytologically diagnosed malignancy had the surgery in our institute and eight of such patients were lost follow up.
- Two-third of surgical patients had thyroid neoplasm (10.2% were follicular adenoma and 56.5% were PTC) (see Table 3).
- The unsatisfactory rate in pediatric population (4.7%) is lower than the rate in adults (8-12%) (see Table 4).
- The Bethesda System is as sensitive and specific in diagnosing pediatric thyroid nodules as in adults.
- Thyroid nodules in children are more likely to be malignant than those in adults.
- Thyroid nodules in boys have higher incidence of malignancy than those in girls.
- Follicular adenoma is more likely to occur in girls than boys.
- All cases with BRAF mutations have PTC.
- BRAF test is a sensitive and predicative tool for managing pediatric thyroid nodules.
- BRAF mutation in FLUS cases can avoid repeat FNA.

DISCUSSION

- Bethesda System is very sensitive and specific in diagnosing pediatric thyroid nodules.
- PTC is the most common malignancy in pediatric thyroid nodules.
- Thyroid FNA in children is more likely to harvest enough specimen for making a definitive diagnosis than in adults.
- Thyroid nodules in children are more likely to be malignant than those in adults.
- Thyroid nodules in boys have higher incidence of malignancy than those in girls.
- Follicular adenoma is more likely to occur in girls than boys.
- All cases with BRAF mutations have PTC.
- BRAF test is a sensitive and predicative tool for managing pediatric thyroid nodules.
- BRAF mutation in FLUS cases can avoid repeat FNA.

CONCLUSIONS

- This studies have the largest population in pediatric thyroid cytopathology.
- Bethesda System is as sensitive and specific in diagnosing pediatric thyroid nodules as in adults.
- BRAF mutation has the diagnostic and predictive value in managing pediatric thyroid nodules.
- More data is required to understand the BRAF pathogenesis in thyroid nodules of pediatric population.