

Analysis of Fine Needle Aspiration Cytology of Pediatric Thyroid Lesions: A Study from Western India

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Abstract

Background: Thyroid lesions are rare in childhood and youth and incidence of thyroid malignancy is higher in pediatric age group than in adults. As approach to thyroid lesions in general is multidisciplinary, fine needle aspiration cytology (FNAC) forms an important indispensable tool.

Objective: To analyze retrospective data of pediatric thyroid FNAC, identify spectrum of benign and malignant thyroid lesions and to evaluate its correlation with ancillary thyroid investigations.

Materials and Methods: Retrospective data of 37 pediatric thyroid FNAC in age group of 0-15 years was analyzed over a 4-year period from April 2012 to June 2016. Cytology findings from air dried and alcohol fixed smears stained with Giemsa and Papanicolaou stain respectively was correlated with ultrasonography (USG), thyroid function tests (TFTs), and anti-thyroid antibodies if present.

Results: Pediatric thyroid FNAC formed 2.43% of total thyroid FNAC done in the tertiary care center over 4 years period. Females formed the majority with female:male being 2.3:1. Benign thyroid lesions were seen in 33 (89.18%) cases comprising equal number of cases of nodular goiters and thyroiditis. Benign thyroid cyst including thyroglossal cysts formed 13.5% and well differentiated papillary thyroid carcinoma formed 5.4%. USG thyroid and TFTs correlated well with benign thyroid lesions.

Conclusion: FNAC forms an important diagnostic tool in analyzing pediatric thyroid lesions when used along with other multidisciplinary thyroid approaches. It forms a crucial tool in identifying malignancy and thereby any unnecessary surgery.

Key words: Paediatric, Thyroid, Cytology

INTRODUCTION

Pediatric fine needle aspiration cytology (FNAC) has always been a challenge technically as well as diagnostically due to wide variety of lesions at different age groups and at different sites.

Incidence of thyroid lesions in general population is 19-35%¹ and in pediatric age group as per the literature

search has been 0.05-1.8%.¹ Although malignancy in thyroid lesions is <5% but can go up to 25% in childhood presentation of thyroid nodules. Thyroiditis presents as the most common childhood thyroid lesions or nodule (2-48%).² Niedziela and Stevens *et al.* have reported 8-50% incidence of malignancy in childhood thyroid nodules in their comparative meta-analysis.^{3,4} Hence, we decided to evaluate pediatric thyroid lesions in a tertiary care center to identify the spectrum of thyroid lesions in childhood. Reporting criteria on FNAC of thyroid malignancy, thyroiditis, and nodular goiter remains the same as done in adult population.

Aims and Objectives

To analyze FNAC results of thyroid lesions in pediatric age group from 0 to 15 years over 4 years period from April 2012 to June 2016. To evaluate its association with thyroid

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function tests (TFTs), ultrasonography (USG) of thyroid, and anti-thyroid antibodies.

MATERIALS AND METHODS

The study was retrospective in nature. Data from cytology section of Department of Pathology in a tertiary care center were analyzed over a period of 4 years from April 2012 to June 2016. Study group comprised patients in 0-15 years who underwent a thyroid FNAC examination at our center. Prior consent was taken from parents or guardians for FNAC as patients were under 15 years of age. All thyroid FNAC beyond 15 years of age were excluded from the study. All FNAC were done under sonography guidance and using a 23 g needle. Ultrasound details, TFT were noted and analyzed. None of the cases had any post procedural complication. Air dried and alcohol fixed smears for Giemsa and Papanicolaou stains done respectively were evaluated. A detailed analysis of a total of 37 pediatric thyroid cases identified from a total of 1520 thyroid FNAC done over 4 years was carried out. Histopathology data was looked up for follow-up in all the surgical operated thyroid nodules.

RESULTS

Out of 1520 total thyroid FNAC performed over a period of 4 years, 37 were in pediatric age ranging from 6 to 15 years of age. Females outnumbered over males with 70.3% (26) females as compared to 29.7% (11) males. The female to male ratio was 2.3:1 (Figure 1). The FNAC results showed majority of cases, i.e. 33 (89.18%) having benign cytological features of which maximum were formed by nodular goiters 14 (37.8%) cases and 14 (37.8%) cases of thyroiditis including a single case of Hashimoto's thyroiditis. All cases of thyroiditis showed cellular smears with clusters of benign thyroid follicular cells being destroyed by lymphocytes (Figure 2). The benign thyroid lesions also included 5 (13.5%) cases of colloid cysts including three cases of thyroglossal cysts. One case showed features of grave's disease. Papillary carcinoma was identified in two (5.40%) cases. Smears from papillary carcinoma showed cellular smears with scant colloid, clusters of thyroid follicular cells with clear nuclei, powdery chromatin, intranuclear inclusions, and nuclear grooves (Figure 3). Both the cases underwent total thyroidectomy and showed papillary carcinoma on histopathology examination. No opinion was given in 2 cases. Goiter was seen in 14/37 (37.8%) cases with 11 cases seen in age group of 10-15 years (Table 1). Applying Bethesda categories on reporting of thyroid FNAC, 33(91.6%) cases had Bethesda category 2, Bethesda category 5 for the two cases of neoplastic lesions, and one

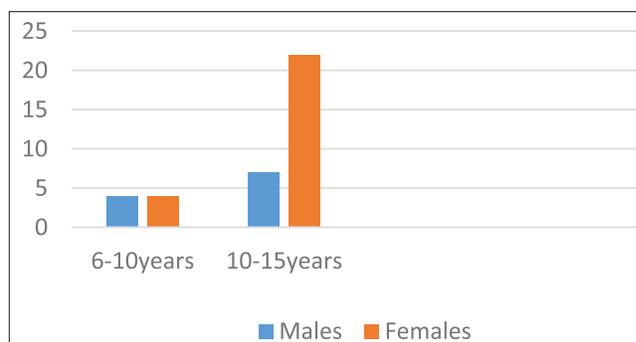


Figure 1: Age wise gender distribution

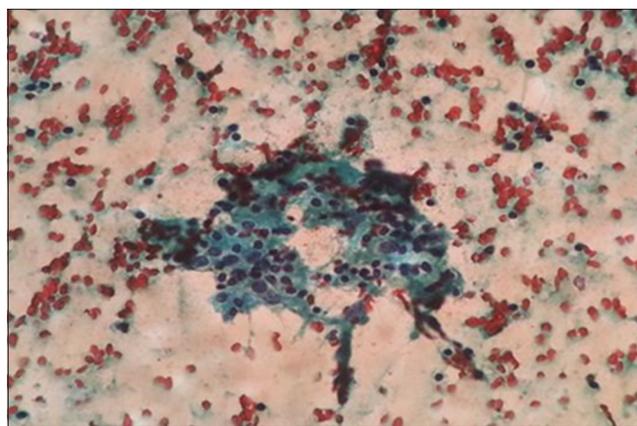


Figure 2: Clusters of benign thyroid follicular cells infiltrated and destroyed by lymphocytes (PAP stain 10X)

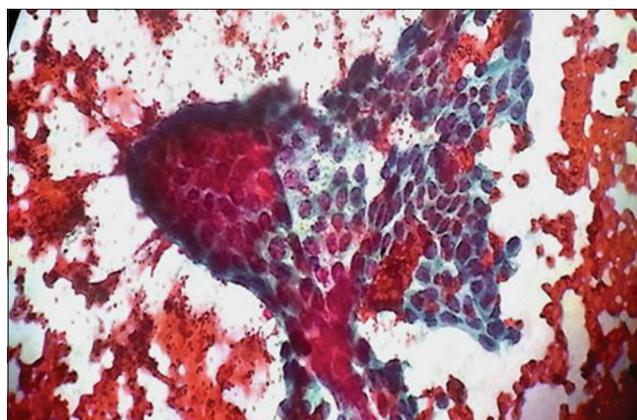


Figure 3: Clusters of thyroid follicular cells with nuclear features of papillary carcinoma (PAP stain, x40)

benign thyroid cytology showed Bethesda category 1. No opinion possible in two cases.

USG Results

Thyroid sonography details were available in 33/37 cases. Majority showed bulky thyroid in 10/37 (27.02%) cases, all of which showed thyroiditis on FNAC. Single thyroid nodule was noticed in 5 cases which composed of two cases of neoplasm and rest nodular goiter. Cystic lesions were identified in 5 cases which includes

three cases of thyroglossal cyst where thyroid gland was normal.

Laboratory Results

TFTs were available in 31/37 patients, they were correlated with thyroid lesions. Majority of the lesions were euthyroid 22 (70.9%) cases followed by hypothyroid 7 (22.5%) cases and hyperthyroid 2 (6.4%) cases. The euthyroid included 12 cases of nodular goiter, 6 cases of lymphocytic thyroiditis, 2 cases of cysts, and 2 cases of neoplasms. All 7 cases that were hypothyroid on TFT were diagnosed as lymphocytic thyroiditis on FNAC. Two cases of hyperthyroid results on TFT included 1 case each of lymphocytic thyroiditis and Grave's disease (Table 2).

DISCUSSION

Thyroid lesions vary widely in various age groups with a majority being a wide spectrum of benign lesions over malignancies comprising of nodular goiters with or without cystic change, thyroiditis, solitary colloid cysts, and developmental anomaly such as thyroglossal cyst. Advent and usage of FNAC in evaluation of thyroid lesions has found to be superior when used along with well-established battery of non-invasive diagnostic methods such as USG thyroid, TFTs, and anti-thyroid antibodies especially in cases of malignancies.

FNAC of thyroid in adult population has been a well-established tool in evaluation of thyroid nodules which has drastically brought down the necessary surgical resections. The need for using the same in pediatric population brings down its prevalence to 0.05-1.8%.¹

This retrospective study was undertaken to identify spectrum of thyroid lesions in pediatric age group as

Table 1: Age wise distribution of thyroid lesions

Age	Goiter (%)	Thyroiditis (%)	Graves' disease (%)	Neoplasms (%)	Cysts (%)
6-10 years	3 (8.1)	1 (2.7)	0	1 (2.7)	2 (5.4)
10-15 years	11 (29.7)	12 (32.4)	1 (2.7)	1 (2.7)	3 (8.1)
Total 35	14 (37.8)	13 (35.1)	1 (2.7)	2 (5.4)	5 (13.5)

Table 2: Correlation of thyroid function tests and lesions on FNAC

Lesions	Euthyroid n=22	Hypothyroid n=7	Hyperthyroid n=2
Nodular goiter	12	0	0
Thyroiditis	06	06	01
Hashimotos thyroiditis	0	01	0
Grave's disease	0	0	01
Cyst	02	0	0
Neoplasm	02	0	0

FNAC: Fine needle aspiration cytology

they are challenging with respect to clinical presentation, common age related thyroid disorders, high incidence of thyroid malignancies, and challenges during surgery too. Literature search on pediatric thyroid FNAC series studied showed that these lesions are more common in females.^{5,6} In our study, majority of pediatric thyroid lesions evaluated were found to be more common in females (70.3%) with female:male being 2.3:1. Similar results were found in thyroid series analyzed by Kacar *et al.* who had 66.6% females in his study.⁷ Siddegowda *et al.* found higher incidence in females with higher female:male in various age groups more towards youth.⁸ Distribution of lesions in both childhood and youth is found to behave like a preponderance of benign thyroid lesions with thyroiditis being more common in childhood compared to adults.⁵⁻⁸ In the present study, 89.1% cases were benign thyroid lesions of which 37.8% were of thyroiditis. Majority of cases of thyroiditis were in the age group of 10-15 years. Vasudev *et al.* had 36% cases of thyroiditis in age group of 7-12 years and 75% in age group between 12 and 15 years.⁶ Thereby suggesting a higher incidence in adolescent age group. A single case each of Hashimoto's thyroiditis and grave's disease were seen in 15 years and 13-year-old females respectively.

We had 3 (8.1%) cases of thyroglossal cyst, youngest was in a 7-year-old female. Pindicura *et al.* had 12% thyroglossal cyst in his study of 389 pediatric thyroid cases in age group of 0-14 years.⁹ It is essential to identify these lesions on FNAC and radiology for the rare papillary carcinomas arising from thyroglossal cyst. There is 1% incidence of papillary carcinoma arising in thyroglossal cyst.^{5,6,9}

Although the prevalence of pediatric thyroid lesions is 10-fold less, the incidence of well differentiated thyroid neoplasms is much more than in adults. Our study had 2 (5.4%) cases of papillary carcinoma seen in a 6-year-old female and in a 15-year-old male. Pindicura *et al.* reports an incidence of 2-50% thyroid neoplasms in pediatric age group.⁹

CONCLUSION

FNAC being the most cost effective and outpatient department procedure serves as a useful diagnostic tool in evaluation of differential diagnosis of pediatric thyroid lesions used along with other non-invasive diagnostic methods of thyroid studies such as TFTs, radiology, and anti-thyroid antibodies. Benign thyroid lesions form the majority with a steady rise in thyroiditis as age advances. Awareness and identification of thyroid malignancies in solitary thyroid nodules or in thyroglossal cysts is essential due to higher incidence of malignancy in childhood thyroid

lesions and better prognosis. We highlight and suggest pediatric thyroid lesions form an important part in thyroid FNAC and encourage more ancillary techniques to be used to cytology specimens.

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