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ORIGINAL RESEARCH

Evaluation of Cyto-Histopathological Correlation in Thyroid Lesions at a Tertiary Care Centre

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ABSTRACT

Background: The thyroid hormones play a crucial role in regulating metabolism, growth, and various other physiological processes. The presence of goitrous thyroid lesions is hypothesized to act as a precursor to thyroid carcinoma, particularly in regions where endemic goiter poses a substantial health issue. Hence, under the light of the above-mentioned data, the present was undertaken to evaluate cyto-histopathological correlation in thyroid lesions at a tertiary care centre.**Materials &Methods:**Total sample size for the present study included 100 patients.All patients underwent a comprehensive clinical examination in accordance with the established proforma, which included a meticulous palpation of the thyroid to accurately determine the site for aspiration. The procedure was thoroughly explained to each patient. Aspiration was conducted with the patient in a comfortable supine position, with the neck extended using a pillow placed under the shoulder to enhance the visibility of the thyroid swelling. Fine-needle aspiration cytology (FNAC) was performed under strict aseptic conditions, utilizing a 23-gauge needle along with disposable 5ml or 10ml syringes. In cases where it was deemed necessary, ultrasound-guided FNAC was employed. Smears were prepared, fixed in 95% ethyl alcohol, and stained with hematoxylin and eosin. The FNAC smears were meticulously analyzed and classified into non-neoplastic and neoplastic lesions.**Results:**A total of 100 cases were evaluated. Mean age was 45.3 years with majority proportion being males. On cytological analysis, neoplastic features were indicative in 33 percent of the patients while histopathology shows presence of neoplasm in 45 percent of the patients. Diagnostic accuracy, sensitivity and specificity of cytology for assessing thyroid lesions was 96.3 %, 95.1 % and 98.9 % respectively.**Conclusion:**Dysfunctions in thyroid function can also have repercussions on the nervous system, manifesting as sensations of numbness, tingling, pain, or burning in the regions affected. So early detection of thyroid lesions is necessary for reducing the morbidity associated with the disease.

Key words: Thyroid, Histopathologic.

INTRODUCTION

The thyroid hormone plays a crucial role in regulating metabolism, growth, and various other physiological processes. The thyroid gland, along with the anterior pituitary gland and the hypothalamus, forms a self-regulating system known as the hypothalamic-pituitary-thyroid axis. The primary hormones synthesized by the thyroid gland include thyroxine, also referred to as tetraiodothyronine (T4), and triiodothyronine (T3). The interaction of thyrotropin-releasing hormone (TRH) from the hypothalamus, thyroid-stimulating hormone (TSH) from the anterior pituitary, and T4 is essential for maintaining effective feedback mechanisms and ensuring homeostasis within the body.[1- 3]The thyroid gland, classified as an endocrine organ, plays a multifaceted role in human physiology, with its lesions raising significant concerns primarily regarding the potential for malignancy. Additionally, there are secondary considerations related to cosmetic and aesthetic implications. Thyroid lesions serve not merely as indicators of a singular pathological condition but rather as clinical manifestations of a diverse array of diseases. The presence of goitrous thyroid lesions is hypothesized to act as a precursor to thyroid carcinoma, particularly in regions where endemic goiter poses a substantial health issue. Furthermore, it is well established that the incidence of thyroid

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lesions correlates with iodine deficiency. Common complications associated with thyroid dysfunction include Graves' disease, Hashimoto's thyroiditis, adenomas, thyroid carcinoma, hypothyroidism, and hyperthyroidism, which represent the most frequently encountered thyroid disorders.[4- 6]Hence; under the light of above-mentioned data, the present was undertaken to evaluate cyto-histopathological correlation in thyroid lesions at a tertiary care centre.

MATERIALS & METHODS

Inclusion criteria for the present study included all the patients coming with thyroid lesions irrespective of age and sex. Total sample size for the present study included 100 patients.All patients underwent a comprehensive clinical examination in accordance with the established proforma, which included a meticulous palpation of the thyroid to accurately determine the site for aspiration. The procedure was thoroughly explained to each patient. Aspiration was conducted with the patient in a comfortable supine position, with the neck extended using a pillow placed under the shoulder to enhance the visibility of the thyroid swelling. Fine-needle aspiration cytology (FNAC) was performed under strict aseptic conditions, utilizing a 23-gauge needle along with disposable 5ml or 10ml syringes. In cases where it was deemed necessary, ultrasound-guided FNAC was employed. Smears were prepared, fixed in 95% ethyl alcohol, and stained with hematoxylin and eosin. The FNAC smears were meticulously analyzed and classified into non-neoplastic and neoplastic lesions. All the results were recorded in Microsoft excel sheet and were subjected to statistical analysis using SPSS software.

RESULTS

A total of 100 cases were evaluated. Mean age was 45.3 years with majority proportion being males. On cytological analysis, neoplastic features were indicative in 33 percent of the patients while histopathology shows presence of neoplasm in 45 percent of the patients. Diagnostic accuracy, sensitivity and specificity of cytology for assessing thyroid lesions was 96.3 %, 95.1 % and 98.9 % respectively.

Table 1: Cytological diagnosis

Cytological diagnosis	Number	Percentage
Indicative of neoplasm	33	33
Indicative of non-neoplastic	67	67
Total	100	100

Table 2: Histopathological diagnosis

Histopathological diagnosis	Number	Percentage
Neoplasm	45	45
Non-neoplasm	55	55
Total	100	100

Table 3: Diagnositc accuracy of cytology in comparison to histopathology

Variable	Value
Diagnostic accuracy	96.3 %
Sensitivity	95.1 %
Specificity	98.9 %

DISCUSSION

The thyroid gland comprises thyroid follicles that synthesize and store thyroid hormone. The epithelial cells, referred to as follicular cells or thyrocytes, surround the colloid in the lumen. The ultimo-branchial cells or neural cells accompanying them are the origins of the C-cells in the thyroid gland, which secrete the hormone calcitonin. The hypothalamus releases thyroid-releasing hormone (TRH), which stimulates thyrotrophs of the anterior pituitary to secrete thyroid-stimulating hormone (TSH). The anterior pituitary releases TSH and stimulates the thyroid follicular cells to release thyroxine, T4 (80%), triiodothyronine, or T3 (20%). The synthesis of thyroid hormones depends on the availability of iodide, TSH stimulation, and tyrosine residues on thyroglobulin.[7- 9] Hence; under the light of above-mentioned data, the present was undertaken to evaluate cyto-histopathological correlation in thyroid lesions at a tertiary care centre.

A total of 100 cases were evaluated. Mean age was 45.3 years with majority proportion being males. On cytological analysis, neoplastic features were indicative in 33 percent of the patients while histopathology shows presence of neoplasm in 45 percent of the patients. Diagnostic accuracy, sensitivity and specificity of cytology for assessing thyroid lesions was 96.3 %, 95.1 % and 98.9 % respectively. de los Santos ET et al, in a previous retrospective study assessed 221 surgically resected thyroid nodules, which disclosed that 71 (32%) were cystic and 150 (68%) were solid lesions. Ultrasonography correctly characterized cystic nodules in all but one case. Comparing cystic and solid nodules, there were no differences in patient demographics (mean ages, 47.7 +/- 1.8 SEM vs 45.9

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+/- 1.2 years; sex, 78% females both groups), the proportion that were solitary (39% vs 40%), or the nodule size (49% vs 47% greater than or equal to 2 cm in diameter). Of cystic thyroid lesions, 4% were simple cysts, 82% were degenerating benign adenomas or colloid nodules, and 14% were malignant compared with 23% of solid lesions that were malignant. Most cystic lesions (81%) contained bloody fluid. One benign true cyst was filled with thick brown fluid, while clear yellow fluid was repeatedly aspirated from one malignant cystic nodule. Malignant fine-needle aspiration cytology was the best predictor of cancer (100%). Much less predictable were signs of local compression or invasion (43%), a history of head or neck irradiation (33%), cyst recurrence after aspiration (29%), or an increase in the cystic nodule's size (7%). Indeterminate cytology identified malignancy with about half the frequency in cystic lesions as compared with solid nodules (13% vs 27%). The only false-negative fine-needle aspiration cytology occurred in a cystic lesion. In patients with cystic papillary cancers, needle aspirates contained insufficient material for diagnosis in 20% that occurred in no patient with solid papillary carcinoma. The sensitivities and specificities of fine-needle aspiration cytology for solid nodules were 100% and 55%, and for cystic nodules were 88% and 52%.[11]

Syed M et al determined accuracy of cytological diagnosis in comparison with the corresponding histopathological diagnosis of thyroid lesions. Both Haematoxylin and Eosin stain slides and cytological smears were reviewed. Of the total 36 cases, 5(13.9%) were non-diagnostic or unsatisfactory for cytological assessment. Cytological diagnosis achieved sensitivity of 82.3%, specificity 64.3%, positive predictive value 73.6%, negative predictive value 75%, false positive rate 35.7% and false negative rate 17.6%. The diagnostic accuracy of cytological diagnosis was 63.9%. There was significant cytological and histopathological concordance of thyroid lesions.[12]Machała E et al compared the correlation, accuracy of fine needle aspirational cytology (FNAC) in the diagnosis of thyroid lesions with the final histopathologic diagnosis in the surgical specimens.On cytological examination 1070/1262 were reported as benign, 49 malignant and 143 suspicious. On histopathological examination, 956/1070 cases were confirmed as benign but there were 114 discordant cases. Among the other cases histopathology diagnosis of malignancy matched in 45/49 and 128/143 cases.The sensitivity and specificity were 60,28% and 98,05% respectively. False positive rate was 1.95% and false negative rate was 39.72%. The positive predictive value was 90.1% and negative predictive value was 89.35%. Accuracy of FNA in differentiating benign from malignant thyroid lesions was 89,46%. Fine needle aspiration cytology is a simple, cost-effective and popular procedure for the diagnosis of thyroid cancer. It is recommended as the first line investigation for the diagnosis of thyroid lessions.[13]

CONCLUSION

The thyroid gland plays a crucial role in influencing nearly all organ systems within the body. It impacts the cardiovascular system by modulating cardiac output, stroke volume, heart rate, and myocardial contractility. Dysfunctions in thyroid function can also have repercussions on the nervous system, manifesting as sensations of numbness, tingling, pain, or burning in the regions affected. So early detection of thyroid lesions is necessary for reducing the morbidity associated with the disease.

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