



Ultrasonography and Fine Needle Aspiration Cytology Correlation of Thyroid Lesions

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Abstract

Background: *Thyroid gland disorders are amongst the most common endocrine and surgical problems encountered in clinical practice. In India the prevalence is about 8.5%. Thus the evaluation of patients with thyroid nodule requires detailed examination including imaging and cytological evaluation for proper decision making.*

Methodology: *The study population included 200 patients who presented with thyroid swelling and also those detected incidentally on routine examination who are then subjected to radiological imaging and FNAC after detailed clinical history and examination.*

Results: *Among the 200 patients examined majority of the study population had benign lesion followed by malignancy. All the diagnosis made by ultra sound was compared with FNAC reports.*

Conclusion: *Although there is some overlap in the ultrasonographic findings, FNAC can aid in the accurate diagnosis and management.*

Keywords: *Ultrasonography; Fine Needle Aspiration Cytology ; Thyroid ; Benign ; Malignant.*

Introduction

The thyroid gland is a large endocrine gland amenable to direct clinical examination and its superficial location helps in better evaluation of its anatomy, including the pathology by high resolution real time grey scale sonography, with remarkable clarity.¹

Disorders of thyroid gland are amongst the most common endocrine and surgical problems encountered in clinical practice. The prevalence of thyroid nodules worldwide is 4-8 % by palpation alone and 19-67% by ultrasonographical examination. In India the prevalence is about 8.5%.²

Majority of thyroid nodules are benign. The malignancy is found in 5-15% cases and is more common in women. Though the prevalence is low in men, the nodules are very aggressive with higher malignancy risk.³

Thus the evaluation of patients with thyroid nodule requires detailed clinical history, examination, imaging and cytological evaluation to avoid confusion in decision making for the clinicians before the decision of any surgical procedure is considered.

Materials and Methods

The present study included a total of 200 patients of both the sexes and of all the age groups presenting with the swelling in the anterior aspect of neck associated with or without symptoms. The patients who had prior surgery or radiotherapy of the thyroid gland and those receiving radioactive iodine as well as non-consenting patients were excluded from the study.

Examination procedure included a brief history, physical examination followed by high resolution ultrasonographic examination. The lesions were then subjected to fine needle aspiration cytology after obtaining the patient consent.

The Ultra sound machine is Philips Epiq 7G with a 4-12 MHz linear probe. High frequency transducers provide both deep ultrasound penetration and high definition images with a better resolution. Linear array transducers are preferred to sector transducers.

The FNAC technique of the thyroid swelling is performed with a 23 G needle attached to a 10 cc disposable syringe. The material was aspirated from the swelling after taking adequate aseptic precautions and smears are made which are fixed in suitable fixative and stained with H&E.^{4,5}

The data thus obtained was tabulated and statistically analysed. Chi square test was applied and the P value of < 0.05 was considered statistically significant.

Results

In the present study, a female (96%) predominance was observed with 16 year old being the youngest patient 72 year old the oldest in the study population. Majority of the patients belonged to the age group ranging between 45 and 55 years followed by 25 and 35 years. 20% of people on detailed clinical history had patients with similar history in the family, majority of which were not evaluated or the medical records supporting the same was not available. 32 % of the patients on biochemical evaluation had normal TSH value. 70 % of the study population had swelling of thyroid gland either diffuse or focal

and the rest did not have any swelling. 26.12 % of patients had normal thyroid gland size and the remaining patients had enlarged thyroid gland. Majority of the study population on ultrasonography homogenous echotexture of the gland parenchyma while the remaining patients had heterogeneous echotexture. The vascularity was normal in 43.54% and the rest had increased vascularity. Those patients with increased vascularity on FNAC were reported to have Hashimoto's thyroiditis.

Most of the study population had nodules (89%) of which 32% were solitary nodule and remaining had two or multiple nodules. The nodules in majority of the patients were > 1 cm followed by micronodules i.e < 5 mm.

The margins were smooth and well defined in majority of the patients with > 5 mm nodules followed by ill defined margins and well defined speculated. The nodules were predominantly solid followed by cystic and the remaining had comet tail artefact.

Majority had micro calcification followed by rim and macro calcification.

The most common diagnosis on ultrasonography was diagnosed was thyroiditis, followed by colloid and multinodular goiter. Significant number of adenomatous nodules cases were also seen followed by papillary and medullary carcinoma. These findings showed significant correlation with the cytological findings on FNAC.

The malignant lesions on cytological examination by FNAC were found to be > 1 cm and had well defined spiculated margins. On echogenicity by ultrasonography correlation with FNAC showed benign lesions were cystic and had either anechoic or hyperechoic echotexture, whereas the hypoechoic nodules were predominantly malignant and solid.

Discussion

High resolution ultrasonography has become the first line imaging modality due to the excellent visualization of the thyroid parenchyma and is

highly sensitive in detecting cysts, impalpable nodules, calcified lesions and also helping in accurate diagnosis by improvising the cytological diagnostic procedures through USG guided FNAC technique.

Various ultrasonography features such as solid, hypoechoic lesions with irregular margins and calcification are mostly commonly associated with higher risk of malignancy of thyroid. However the statistical parameters like sensitivity, specificity, positive and negative predictive value vary between different studies.⁶

The positive predictive value for detecting malignant lesions was found to be as high as 100% in case of medullary carcinoma and correlated with the study conducted by Vikas et al.⁷

The ultrasonography and FNAC findings in detecting the malignancy correlated well, detecting as malignant by ultrasound which were confirmed to be the same on FNAC. The number of benign and malignant cases were similar to a study conducted by Bonovita et al.⁸ Bonovita et al study had a larger sample size of 1232 patients, of which 3-7% were malignant.

The sensitivity and specificity of the margin findings on ultrasonography was comparable with the study done by Ankush Danadia et al,⁹ whose margins which were well defined was 77.7% and 22.3% ill defined.

Malignant nodules with well defined spiculated margins correlates with the study conducted by Mary C. Frates et al¹⁰ where the study was conducted for an extensive period of eight years and showed >1 cm solitary nodule to have higher chances of being malignant and solitary and also correlated well with the FNAC findings.

Conclusion

Ultrasound is an extremely useful and excellent non invasive modality for investigating the thyroid gland as a whole and helps to characterise the nodules into various parameters which help in the prediction of the lesions comparably into benign and malignant lesions. Also highly

significant in detecting cervical lymph nodes associated with thyroid lesions a characterizing them as benign or malignant. However if super added with cytological diagnosis by FNAC, then it can give an accurate diagnosis as few specific characters of benignity and malignancy on ultrasound, overlaps in a few cases. Hence USG guided FNAC should be done which also helps the clinicians to correctly categorise the patients and decide on the management.

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References

1. Moon HJ, Kim E. Fine-Needle Aspiration Biopsy of Focal Thyroid Nodules. *Am J Roentgenol.* 2009; 345-9.
2. Khatawkar AV, Awati SM. Thyroid gland Historical aspects, Embryology, Anatomy and Physiology. *IAIM* 2015; 2(9):165-71.
3. BjorO T, Holmen J., Kruger O, Midthjell K, Hunstadv skrenier T, Sandnes L, Brochmann H. Prevalence of thyroid disease, thyroid dysfunction and thyroid peroxidase antibodies in a large, unselected population. The health study of Nord – Trondelag (HUNT). *European journal of endocrinology*, 2000; 143(5): 639-47.
4. Martin HE, Ellis EB. Biopsy by needle puncture and aspiration. *Ann Surg.* 1930;92:169-81.
5. Chavan US, Patil A, Mahajan SV. Cytological Profile of Thyroid Lesions and it's Correlation with Clinical and Ultrasonography Finding. *MVP J Med Sci* 2016;3(1):28-32.
6. V.P. Kharchenko, P.M. Kotlyarov, M.S. Mogutov, Alexandrov Y.K. *Ultrasound diagnostic of thyroid diseases.* Springer-Verlag Berlin Heidelberg, 2010.
7. Chaudhary V, Bano S. Thyroid ultrasound. *Indian Journal of Endocrinology and Metabolism* 2013;17(2):219-27.

8. Rumack CM, Wilson SR, Charboneau JW, Levine D, Diagnostic Ultrasonund. 4th edition. Philadelphia: Elsevier;2011.p709.
9. Dhanadia A, Shah H, Dave A. Ultrasonographic and FNAC correlation of thyroid lesions. Gujarat Med J 2014; 69:75-81.
10. Frates MC, Benson CB, Doubilet PM, Kunreuther E, Contreras M, Cibas ES, et al. Prevalence and distribution of carcinoma in patients with solitary and multiple thyroid nodules on sonography. J Clin Endocrinol Metab 2006;91(9):3411–7.