



RELEVANCE OF SONOGRAPHIC DIAGNOSIS IN THE MANAGEMENT OF THYROID DISORDERS: A CORRELATION WITH HISTOPATHOLOGY

Endocrinology

G. Mohanapriya* Rajiv Gandhi Government General Hospital Chennai. *Corresponding Author

M. Chandrasekaran Rajiv Gandhi Government General Hospital Chennai.

ABSTRACT

BACKGROUND: Ultrasonography forms an integral part and is the primary imaging modality in thyroid disorders.

AIM: To evaluate the diagnostic accuracy of ultrasonography in thyroid disorders by correlating with histopathology.

METHOD: The ultrasonographic report of 350 consecutive patients who underwent total thyroidectomy was correlated with the histopathology report.

RESULTS: USG had a statistically significant chi-square distribution of 95.795 by nonparametric ANOVA against variable HPE. It had a sensitivity, specificity, positive and negative predictive values for malignancy of 86.05%, 94.94%, 95.9%, 83.8% respectively.

CONCLUSION: The wide variations between the reports of USG and HPE could be due to overlapping areas and the gray zones in the two systems which can be overcome by a perfect understanding between the surgeon, radiologist and the pathologist.

KEYWORDS

Ultrasonography of thyroid, histopathology of thyroid disorders, imaging in thyroid diseases.

INTRODUCTION:

Thyroid disorders are a common clinical problem and imaging may be useful in assessing the thyroid. Ultrasonography is the primary imaging modality providing adjunctive anatomical information, in the evaluation of thyroid diseases. The technique is simple, easily accessible, providing the highest resolution thereby detecting and characterising diffuse and focal thyroid abnormalities.

Ultrasound provides accurate sizing and is sensitive in picking up nodules 2-3 mm⁽¹⁾. It can be used in distinguishing benign from malignant nodules, in assessing the nodal status and for detecting recurrence at the earliest in cancer surveillance. When coupled with fine needle biopsy in non diagnostic specimens it improves the accuracy for identifying malignancy. Final diagnostic and therapeutic decisions can be made based on this dynamic imaging study.

AIM:

The aim of the present study was to evaluate the diagnostic accuracy of ultrasonography in the diagnosis of thyroid disorders by correlating with histopathological report.

OBJECTIVE: Early intervention can be attempted in appropriate cases with the use of this adjunct which has become an integral part in the diagnosis of thyroid disorders.

METHOD:

This prospective investigational study was carried out over a period of two years in a tertiary care institute in Chennai. After ethical committee clearance 350 consecutive patients undergoing total thyroidectomy for thyroid disorders who gave informed consent were included in the study. Thyroid function tests, ultrasonogram of neck and FNAC of thyroid were done for all patients. Ultrasonographic diagnosis was made by radiology residents, similar to TIRADS, by pattern recognition using a constellation of characteristic features rather than using a single feature.

The post surgical specimen was grossed, fixed in formalin. Reporting of eosin haematoxylin stained slides was done as per the Pathology Department protocol. The sonographic diagnosis was compared with the histopathology report.

STATISTICAL ANALYSIS: The test parameters were ranked by the Kruskal Wallis test (nonparametric ANOVA test) and significance determined by the chi square test. The sensitivity, specificity, positive and negative predictive values were calculated.

RESULTS:

There were 45 (12.9%) male and 305 (87.1%) female patients. The mean age of presentation was 40 years. The clinical profile of the study group comprised of Multi- nodular goiter -225, Solitary nodule - 80,

Diffuse toxic goiter -10, Toxic MNG - 35. Of the 350 patients, 93 patients were diagnosed to have malignancy by histopathology.

The mean rank assigned for ultrasound with variable HPE in Kruskal Wallis test was 154.85 in benign disorders (count - 257) and 232.56 (count - 93) in malignancy. It had a statistically significant chi square distribution of 95.795 with a degree of freedom of 1.

The Spearman correlation for ultrasound against HPE was 0.524 (p<0.0001) There were 13 false positive cases and 47 false negative cases as shown in table - 1.

TABLE: 1 CORRELATION OF USG WITH HPE.

			Gross HPE		Total
			Benign	Malignant	
Gross USG	Benign	Count	244	47	291
		% within Gross USG	83.8%	16.2%	100.0%
	Malignant	Count	13	46	59
		% within Gross USG	22.0%	78.0%	100.0%
Total	Count	257	93	350	
	% within Gross USG	73.4%	26.6%	100.0%	

The sensitivity, specificity, positive and negative predictive values for malignancy were 86.05%, 94.94%, 95.9%, 83.8% respectively. The cross tabulation of sonographic findings and pathologic diagnoses are given in Table 2.

TABLE - 2 CROSS TABULATION OF USG AGAINST HPE

USG DIAG	HPE REPORT				
	PAP CA (93)	COLLOID (125)	THYROID ITIS (90)	ADENOM A (30)	HYPERPL ASIA (12)
PAPCA (59)	46(77.9%)	6(10.2%)	2(3.4%)	3(5.1%)	2(3.4%)
COLLOID (201)	35(17.4%)	97(48.2%)	43(21.4%)	17(8.5%)	9(4.5%)
THYROID ITIS (52)	3(5.8%)	6(11.5%)	43(82.7%)	0	0
ADENOM A (38)	9(23.7%)	16(42.1%)	2(5.3%)	10(26.3%)	1(2.6%)

The number within brackets denotes the count within each group.

Thus it becomes evident that though there is a statistically significant correlation between sonographic and pathological diagnoses, it is not 100%, and there is a significant difference between the two.

DISCUSSION:

Ultrasonography forms an integral part in the management of thyroid

disorders. However it is highly operator dependent and only points to a diagnosis of malignancy without giving tissue proof unlike FNAC and may be the reason for variations in interpretation of the images. Small lesions may be displaced by the transducer with a direct scanning technique and may never actually be imaged⁽²⁾. An anterior mass may be overlooked because of near field artifact and contact problems with high resolution ultrasound, thyroidal vessels – inferior thyroid artery and its branches can be mistaken for small cysts in the thyroid. A cystic component may occur in 13-26% of thyroid malignancies, and may be mistaken for cystic change in a hyperplastic nodule. In hashimotos thyroiditis many hypoechoic areas vary in size and location over time. These pseudonodules represent areas of inflammation that disappear on subsequent ultrasound and may be confused with a malignant nodule.

Benign follicular adenomas can have a heteroechoic appearance with calcifications and can be mistaken for malignancy. Microcalcifications which are pathognomonic of papillary carcinoma can also be present in about 7- 14% of benign nodules and can be misinterpreted as malignancy⁽³⁾. Coarse calcifications can be present in longstanding malignancy and in benign degenerative disorders. Egg shell calcifications though predominantly seen in benign lesions can present in malignancy. Halo sign does not always indicate benign nature of the lesion and may be present in papillary carcinoma as well⁽⁴⁾. These problems can be overcome if the clinician is present at the time of scanning to correlate the clinical findings with the sonographic images.

Histopathology is considered to be the gold standard in the diagnosis of tumors. However without clinical data even a pathologist can misinterpret the slides. The nuclear changes and microcalcifications in hashimoto's thyroiditis and the hyperplastic papillae of Graves disease may be mistaken for papillary carcinoma. Long standing Graves with nodules may also be mistaken for toxic multinodular goiter or a dysghormonogenic goiter for a papillary carcinoma. Only an experienced pathologist can differentiate the bead on string appearance of an adenomatoid nodule from the nuclear changes of papillary carcinoma

The distinction between follicular carcinoma and follicular adenoma rests on identification of vascular or capsular invasion. Clinically there are instances where cases undergoing hemithyroidectomy for follicular adenoma later present with distant metastases. This could be due to the fact that sections did not include the site of vascular or capsular invasion. Without a suggestion from the radiologist microcarcinomas may be missed in the sections included for the study.

The reproducibility in the diagnosis of encapsulated follicular lesions that show focal and or incompletely developed nuclear features of papillary carcinoma is very low⁽⁵⁾. The follicular variant must show typical nuclear features of papillary carcinoma. A follicular adenoma or adenomatoid nodule with delayed fixation, may result in artifactual blowing up and clearing of the nuclei seen in malignancy.

Thus it becomes evident that though histopathology is the gold standard in the diagnosis of tumours, it has its own gray zones and areas of overlap where a pathologist overdiagnoses malignancy using lax criteria to avoid being sued for missing a malignancy and another pathologist adopts a conservative policy because the prognosis of some of the variants is so good and no harm is done even if it is underdiagnosed as benign.

Each investigational procedure – ultrasonography or histopathology has its own overlap and gray zone. The incorporation of molecular methods of diagnosis and the search for newer modalities only goes on to prove this. All these investigations are only clinical adjuncts and cannot replace clinical judgement.

Complete tessellation between the surgeon, radiologist and the pathologist is mandatory for the benefit of the patient, to overcome the overlap zones. It will be more apt if the pathologist visits the operating room when the surgeon briefs on the clinical evaluation of the patient and the pathologist gains first hand information by grossing the specimen before it is formalin fixed and after reviewing the sonographic images. The surgeon can visit the pathology suite to discuss, understand the diagnostic challenges and review the diagnosis with the pathologist before final reporting is done. This avoids the misinterpretation and misrepresentation of samples.

CONCLUSION:

Ultrasound forms an integral part and an important clinical adjunct in the management of thyroid disorders. The sensitivity, specificity, positive and negative predictive values for malignancy were 86.05%, 94.94%, 95.9%, 83.8% respectively. Each modality of diagnosis in thyroid disorders be it USG or HPE- has its own overlapping areas and gray zones. A complete tessellation between the surgeon, radiologist and pathologist is mandatory to overcome these gray areas for the benefit of the patient.

REFERENCES:

1. Baskin, H. Thyroid Ultrasonography – A Review. *Endocrine Pract.* 3(1997) 153 – 157.
2. Michael R. Holtel – Emerging technology in Head and Neck Ultrasonography. *Otolaryngol Clin NA* 43(2010) 1267 – 1274
3. Kang HW, No. JH, Chung JH et al. Prevalence, Clinical and Ultrasonographic characteristics of thyroid incidentalomas Thyroid 2004; 14:29-33.
4. Propper, R, Skolnick, L, Weinstein, B, Dekker, A – The non specificity of halo sign. *J. Clin. Ultrasound* 8 (1980) 129 – 132.
5. Elsherikh TM, Asa SL, Chan JKC et al 2004. Interobserver variation among experts in diagnosis of follicular variant of papillary carcinoma. *Mod. Pathol.* 17; 1024 – 1034.