

EVALUATION OF GOITERS - A COMPARISON OF PALPATION AND ULTRASONOGRAPHY IN ASSESSMENT OF ENLARGED THYROID GLAND

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ABSTRACT

Objective: To determine the concordance rate in findings obtained on palpation and ultrasonography in assessment of goiters.

Methodology: This prospective study was conducted at the Departments of ENT and Head & Neck Surgery, Hayatabad Medical Complex, Peshawar from October 1, 2013 to December 31, 2014. A total of 350 patients with suspected and overt thyroid gland enlargement were included in the study. For the sake of comparison, the findings on palpation and ultrasonography were categorized each into; normal, diffuse hypertrophy, solitary thyroid nodule (STN) and multinodular goiter (MNG). The findings of clinical examination / palpation were compared with those of ultrasonography and the rate of concordance between the two modalities was calculated.

Results: The study included 350 patients; 74 males and 276 females. The M: F ratio was 1:3.73. The age range was 15 to 75 years with mean age of 34.47 years and a standard deviation of ± 12.264 . There were 49.4% MNGs and 29.4% STN as determined by palpation during physical examination. Ultrasonographic examination revealed MNGs in 75% and STNs in 12% of the cases. The comparison of the two modalities showed a concordance rate of 58% in the findings of ultrasonography and palpation during physical examination.

Conclusions: Neck palpation as primary screening modality in assessment of the thyroid gland gives limited information regarding its true nature. Ultrasonography is quick non invasive technique and gives valuable information about the gland which is unobtainable by palpation, therefore, its routine use is recommended.

Key words: Thyroid nodule, ultrasonography, palpation, clinical examination

INTRODUCTION

Goiter is a common presentation in clinical practice. Its true incidence is unknown but it is endemic in certain parts of our country especially Swat, Dir & Chitral districts of Khyber Pakhtunkhwa and Sukkur & Ghotki areas in Sindh^{1,2}. According to the World Health Organization (WHO) report 5% of the world's population suffers from goiter and 75% of these people live in iodine deficient areas³.

The formation of goiter is due to a variety of causes. The commonest cause is iodine deficiency. Other causes include heredity, inflammations, neoplasia, drugs and exposure to radiations. In a population survey of 2,749 persons in Northern England, Tunbridge et al found obvious goiters in 5.9%. Single and multiple thyroid nodules were found in 0.8% of men and 5.3%

of women. Routine autopsy surveys and the use of sensitive imaging techniques produce a much higher incidence⁴. In three reports nodularity was found in 30% to 50% of subjects in autopsy studies, and in 16% to 67% in prospective studies of randomly selected subjects on ultrasound⁵. Another study reported the prevalence of thyroid nodules in non endemic goiter areas and unselected populations varies between 2.2 - 51, 190 - 347 and 82 - 646 per 1000 population when investigated respectively by palpation, ultrasonography and autopsy⁶.

Thyroid gland enlargement poses challenges in detecting the type whether it is diffuse or nodular, more so, solitary or multinodular. Detection depends on the modality of screening and the population being screened. Palpation during physical examination is the first tool with which all such patients will be screened. Other modalities are ultrasonography, scintigraphy, CT scanning, MR imaging and autopsy examination. Clinical evaluations and epidemiologic studies have relied mainly on physical and ultrasonographic examination of thyroid gland. There is a general consensus that ultrasonography is capable of detecting reliably smaller nodules than can be found with physical examination and may lead to alteration of the management plan⁷. The aim of our study is to see agreement between the two most commonly used examination tools in assessment of thyroid gland.

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METHODOLOGY

Objective: To determine the concordance rate in findings obtained on palpation and ultrasonography in assessment of goiters.

Place and duration of study: This prospective study was conducted at the Departments of ENT and Head & Neck Surgery, Hayatabad Medical Complex, Peshawar from October 1, 2013 to December 31, 2014.

Sample Size: The study included 350 cases of suspected or overt thyroid enlargement presenting at the outpatient department and ENT ward. Sample size was calculated assuming 17% proportion of goiters, 95% confidence level and 5% margin of error under WHO software for sample size determination.

Study Design: It was a prospective and comparative study using the non-probability convenience sampling technique.

INCLUSION CRITERIA

1. Patients of all ages and belonging to both the sexes.
2. All patients undergoing evaluation of thyroid gland by physical examination followed by ultrasonography.
3. Patients with suspected thyroid enlargement and positive family history of goiter.

EXCLUSION CRITERIA

1. Patients with goiters having breathing difficulty.
2. Enlargement of thyroid due to local invasion by carcinoma larynx.
3. Patients with thyroglossal cysts.
4. Goiters with Retrosternal extension.
5. Patients assessed by untrained and non qualified sonologists.

DATA COLLECTION PROCEDURE

Patients fulfilling the laid down criteria were included in the study. The procedure was explained and Informed consent obtained from patients and the parents where the age was < 18 years. Ethical approval for the study was obtained from the institutional ethical committee. A detailed history was obtained regarding thyroid enlargement, onset & progression of symptoms, any sudden increase in size and family history of goiter. Enquiries were made to look for symptoms of thyrotoxicosis or hypothyroidism and other associated symptoms such as hoarseness of voice, difficulty in swallowing and difficulty in breathing.

Physical examination was carried out either as outpatient or inpatient. A general physical examination

was followed by detailed ENT and systemic examination. The site, size, shape and number of nodules was looked for in the gland on inspection and confirmed on palpation. Local examination of thyroid gland comprised inspection of the gland and neck, palpation from front and back, assessment for fixity and auscultation for any bruits. Movement of swelling was noted during swallowing. Retrosternal extension, deviation of trachea and displacement of great vessels were looked for. Signs of hypothyroidism and thyrotoxicosis were looked for. Indirect laryngoscopy was undertaken to assess the mobility of the vocal cords and neck was examined to see for enlarged neck nodes. Other investigations such as ECG, X-ray Neck, X-ray thoracic inlet, thyroid function tests, Doppler studies of neck vessels and FNAC were carried out as and when appropriate. Patients were advised ultrasonographic assessment of the gland. Ultrasonography was carried out by trained and qualified sonologists either in the radiology department of the hospital or at their private clinics. Scans were obtained using either conventional or high resolution ultrasonography. All localized swellings of the gland were labeled as "nodules" irrespective of their size and whether they were cystic or solid. The findings on palpation were categorized into; 1. Normal; with no overt enlargement, where palpation was inconclusive, difficult due to obesity & short neck, gland found normal on palpation but sonography was indicated because of a positive family history of goiter and to clear doubt and allay patients' anxiety. 2. Diffuse goiter; visibly enlarged and palpable thyroid gland with no nodularity detected on palpation. 3. Solitary thyroid nodule (STN); when a single nodule was palpable in the thyroid gland and 4. Multinodular goiter (MNG); when more than one nodule was palpable irrespective of their number. The findings on and ultrasonography were categorized into; 1. Normal; gland of normal size, architecture and echogeneity. 2. Diffuse goiter; increase in size of the gland without any nodularity. 3. Solitary thyroid nodule (STN); when a single nodule was visualized in the gland irrespective of its size and nature and 4. Multinodular goiter (MNG); when more than one nodule was visualized irrespective of their number, size and nature. The findings on palpation were compared with those obtained on ultrasonography and the rate of concordance was calculated from the agreement (Yes) or disagreement (No) between these.

Statistical Analysis

The data was recorded on a proforma and the descriptive statistics were analyzed using SPSS 16 for Windows to determine frequencies for variables like gender, age, palpation, ultrasonographic findings and agreement rate. The concordance between the physical and sonological findings was calculated and expressed as percentages. Chi square test was applied to determine the significance of these results.

RESULTS

The study included 350 patients with males 74 and females 276 in number. The M: F ratio was 1:3.73. The age range was 15 to 75 years with mean age of 34.47 years and a standard deviation of ± 12.264 as given in Table 1 & 2. The commonest age group included in the study was 26-35 years (29.4%) followed by 15-25 years (29%) as shown in Table 3. There were 49.4% multinodular goiters (MNG) and 29.4% solitary thyroid nodules (STN) as determined by palpation during physical examination as depicted in Table 4. Ultrasonographic examination revealed multinodular goiters (MNG) in 75% and solitary thyroid nodules (STN) in 12% of the cases (Table 5). The cross tabulation of the findings of palpation and ultrasonography has been shown in Table 6. The comparison of the two techniques showed a concordance rate of 58% in the findings of ultrasonography and palpation during physical examination as shown in Table 7. Statistical analysis for significance revealed that there was significant difference between the two techniques with respect to assessment of the thyroid gland as shown in Table 8.

DISCUSSION

The normal thyroid gland is a fairly homogenous structure, but nodules often form within its substance.

Table 1: Gender of patients

		Fre- quen- cy	Per- cent	Valid Per- cent	Cumu- lative Per- cent
Valid	Male	74	21.1	21.1	21.1
	Female	276	78.9	78.9	100.0
	Total	350	100.0	100.0	

Table 2: Descriptive Statistics

	N	Mini- mum	Maxi- mum	Mean	Std. Devi- ation
Age	350	15	75	34.47	12.264
Valid N (listwise)	350				

Table 3: Age groups of the patients

		Fre- quen- cy	Per- cent	Valid Per- cent	Cumu- lative Per- cent
Valid	15-25	102	29.1	29.1	29.1
	26-35	103	29.4	29.4	58.6
	36-45	82	23.4	23.4	82.0
	46-55	46	13.1	13.1	95.1
	56-65	13	3.7	3.7	98.9
	66 and above	4	1.1	1.1	100.0
Total		350	100.0	100.0	

Table 4: Palpation Findings

		Fre- quen- cy	Per- cent	Valid Per- cent	Cu- mu- lative Per- cent
Valid	normal	12	3.4	3.4	3.4
	Diffuse hypertrophy	62	17.7	17.7	21.1
	STN	103	29.4	29.4	50.6
	MNG	173	49.4	49.4	100.0
Total		350	100.0	100.0	

Table 5: Ultrasonographic findings

		Fre- quen- cy	Per- cent	Valid Per- cent	Cu- mu- lative Per- cent
Valid	normal	28	8.0	8.0	8.0
	Diffuse hypertrophy	18	5.1	5.1	13.1
	STN	42	12.0	12.0	25.1
	MNG	262	74.9	74.9	100.0
Total		350	100.0	100.0	

Table 6: Palpation Findings * Ultrasonographic findings Crosstabulation

count		Ultrasonographic findings				
Palpation Findings	normal	normal	Diffuse hy- pertrophy	STN	MNG	Total
	Diffuse hypertrophy	3	7	0	2	12
	STN	24	10	10	18	62
	MNG	1	1	25	76	103
		0	0	7	166	173
Total		28	18	42	262	350

These nodules may be due to fusion of localized colloid-filled follicles or neoplasia. The accuracy of neck palpation as a screening test varies with the examiner's

Table 7: Concordance between palpation and ultrasonographic findings

		Fre- quency	Per- cent	Valid Per- cent	Cum- lative Per- cent
Valid	Yes	203	58.0	58.0	58.0
	No	147	42.0	42.0	100.0
Total		350	100.0	100.0	

Table 8: Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2.481E2a	9	.000
Likelihood Ratio	197.872	9	.000
Linear-by-Linear Association	150.761	1	.000
N of Valid Cases	350		

a. 5 cells (31.3%) have expected count less than 5. The minimum expected count is .62.

skills, site and size of the mass. Nodules larger than 1 cm are palpable. Careful examination can detect their presence in at least 4% of the general population. Nodules less than 1 cm in diameter are difficult to palpate unless located on the surface of the gland. Although a large proportion of thyroid nodules are benign, it is important to diagnose the nodules and apply appropriate treatment and follow-up, especially because of the possibility of thyroid cancer⁸.

Introduction of thyroid sonography has had a dramatic impact on clinical practice. It was shown by Marqusee et al. that in patients referred to a thyroid clinic due to palpable thyroid abnormalities, sonography altered the clinical management in two thirds of the cases⁹. It was also observed by Eden K and colleagues that the diagnosis obtained by physical examination was changed by ultrasonography in many patients. They observed that the sensitivity of the palpation method was 10-41% and increased with increasing nodule size¹⁰. The fact that 89% of the palpated nodules are 10 mm or more in size indicates that it is difficult to identify nodules smaller than 10 mm with physical examination¹¹. However, solid thyroid nodules as small as 3 mm in diameter and cystic nodules as small as 2 mm can readily be detected using high frequency ultrasonography^{12, 13}. In a similar study of 100 cases Brander A & colleagues were able to identify, on palpation, nodules in 21%, with solitary nodules in 9% and multiple nodules in 12%. In comparison, ultrasonography detected

nodules in 67% of subjects with solitary nodules in 22% and multiple nodules in 45%⁷. In a Turkish study of 907 patients by Fyrat M and colleagues, palpation and ultrasonography results were compared and it was found that in 261 patients having diffuse thyroid enlargement on palpation, 31.5% had single nodules and 59.2% of patients had multinodular goiter on ultrasonography. In 460 patients with solitary thyroid nodules on palpation, 56% had more than one nodule on ultrasonography. In the remaining patients who had multinodular goiter on palpation, multiple nodules were confirmed in 93.8% of subjects in ultrasonography and the diagnosis was not altered¹⁴. In our study the higher concordance rate of 58% could well be explained by the occurrence of a large number of multinodular goiters in the study sample. Ezzat S1 and colleagues in a similar study of 100 North American subjects found a concordance rate of 49% between ultrasound and palpation findings. They identified solitary nodules in 9% and multiple nodules in 12% on palpation. In comparison on ultrasonography detected solitary nodules in 22% and multiple nodules in 45%¹⁵.

In a larger study involving cleanup workers of Chernobyl nuclear disaster in Estonia, a total 2441 subjects were examined. Two hundred and forty-nine persons (10.2%) had one or more nodules detected by ultrasonography, as compared to 169 persons (6.9%) for palpation. The underestimation was not limited to small nodules alone even nodules measuring more than 2 cm on sonograms were missed half of the times on physical examinations by experienced clinicians who routinely performed thyroid evaluations. They found a poor agreement between the two methods and concluded that physical examination alone was an insensitive and relatively nonreproducible method for detecting thyroid nodules as opposed to high resolution ultrasonography¹⁶.

Conclusions: Neck palpation as primary screening modality in assessment of the thyroid gland gives limited information regarding its true nature. Ultrasonography is quick non invasive technique and gives valuable information about the gland which is unobtainable by palpation. Ultrasonography alters the management in a sizeable majority of patients whose clinical diagnosis is solitary thyroid nodule or diffuse hypertrophy. It is recommended that all patients with goiters should be managed with routine ultrasonography besides clinical examination.

Conflicts Of Interest;

We, the authors, have no conflicts of interest to declare in relation to this article.

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