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Original Research Article

Clinicopathological study of asymptomatic thyroid swelling and its correlation with thyroid function tests

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ABSTRACT

Background: Thyroid swelling without symptomatic manifestation is common occurrence and could affect 5 to 20% patients in endemic areas. Majority of them are non neoplastic and may not require surgery. Less than 5% of thyroid nodules are malignant.
Methods: Present study was conducted to correlate clinical findings, HRUSG findings, thyroid profile and FNAC findings in patients of asymptomatic thyroid swelling.
Results: Proportion of euthyroid patients was higher compared to hyperthyroid and hypothyroid diagnosed as colloid goiter on FNAC findings (82.4% vs. 0.0% and 12.9%). Proportion of hypothyroid was higher compared to euthyroid and hyperthyroid diagnosed as Follicular adenoma (3.2% vs. 0.0% and 1.2%) and colloid goiter with cystic changes (48.4% vs. 0.0% and 10.6%). Proportion of hyperthyroid compared to hypothyroid and euthyroid patients were higher diagnosed as thyroiditis (75.0% vs. 32.3% and 5.9%) and papillary/medullary CA (25.0% vs. 3.2 and 0.0%). A statistically significant association of FNAC diagnosis and thyroid profile of patients with asymptomatic thyroid swelling was found.
Conclusions: The present study showed that thyroid dysfunction could play a significant role in determining the underlying pathology behind thyroid swelling and must be evaluated at the earliest using thyroid function tests as the first line of diagnostic tool. In case of suspected thyroid profile; USG neck and FNAC should be done. In view of lack of studies correlating thyroid and clinicopathological profiles of thyroid swellings, further studies to potentiate the present study findings are recommended.

Keywords: Ultrasonography, Thyroid function tests, Asymptomatic diseases, Fine-needle aspiration

INTRODUCTION

A Thyroid swelling is defined as enlarged thyroid gland. Thyroid swelling can mean that all the thyroid gland is swollen or enlarged, or one or more swellings or lumps have developed in parts or part of thyroid gland.[1] The thyroid functions as an endocrine gland and is responsible for producing thyroid hormone and calcitonin, thus contributing to the regulation of metabolism, growth, reproduction, metabolic enhancement and serum concentrations of electrolytes such as calcium.[2] The thyroid has evolved to specialize in synthesizing and secreting thyroxine (T4) and tri-iodothyronine (T3) into the circulation. The regulatory process is thyroid stimulating hormone (TSH) dependent, which is secreted from the anterior pituitary and, in turn, is under the control of thyrotropin releasing hormone (TRH) from the hypothalamus. TRH and TSH both are regulated in a negative feedback loop by T4 and T3 in the circulation.[3] These hormones are directly related to body metabolism and play a particularly important role in brain maturation during fetal development.[4]

Thyroid swelling without any symptomatic manifestation is a common occurrence and could affect up to 5 to 20% patients in endemic areas swelling may be noticed by family members, friends or physician.[5] It is generally associated with iodine deficiency.[6] Majority of thyroid swellings are nonneoplastic and do not always require surgical intervention. Less than 5% of thyroid nodules are malignant.[7] In clinical ENT practice neck swelling is one of the common presentations. Enlargement of thyroid accounts for the significant number of cases.[8]

The prevalence of thyroid swelling is more than 40 million in India and more than 2 billion in the world.[9] Goiter rate among primary school children had been reported to be 4.83%.[10] They are 3-4 times more frequent in women than men.[11] An increase in prevalence rate in women was observed particularly in age group 21-30 years which might be associated with infertility, pregnancy and other complications.[12] Most of the thyroid nodules are benign and fewer than 5% of them are actually malignant.[13-15] In December 2015, Union health minister of India informed the Lok Sabha that over 71 million people in the country are suffering from goiter and other iodine-deficiency disorders, he further informed that government was planning to bring down the prevalence of the deficiency to below 5% by 2017 by ensuring 100% consumption of adequately iodized salt at the household level. Sample surveys conducted all over the country found that of 324 districts included in the study, 263 districts were Iodine deficiency disorder endemic, that is, where the prevalence of Iodine deficiency disorder is >10% but there was a significant reduction in visible goiter.[16]

Thyroid ultrasonography (USG), estimation of serum total T3, T4 & TSH and fine needle aspiration cytology (FNAC) are common diagnostic tests to assess the severity of thyroid nodules. Thyroid stimulating hormone (TSH) – Measurement of TSH has become principal test for evaluation of thyroid function in most circumstances.[17] A TSH value within the reference interval excludes majority of the cases of primary overt thyroid disease.[18] High-resolution ultrasonography (USG) is the most sensitive imaging modality available for examination of the thyroid gland and associated abnormalities.[19] Ultrasound scanning is non-invasive, widely available, less expensive, and does not use any ionizing radiation. The major limitation of ultrasound in thyroid imaging is that it cannot determine thyroid function, i.e., whether the thyroid gland is underactive, overactive or normal in function; for which a blood test or radioactive isotope uptake test is generally required.[20,21] FNAC is preferred as an initial diagnostic test because of its superior diagnostic reliability and cost-effectiveness, before both thyroid scintigraphy and ultrasonography.[22]

Medical guidelines for clinical practice as set forth by the American thyroid association and national comprehensive cancer network states that FNA should be used as the initial diagnostic test because of its superior diagnostic reliability and cost effectiveness. [23] Its use has markedly decreased the number of unnecessary thyroid surgeries.[24]

The present study was conducted to find a correlation between FNAC, HR USG findings and thyroid profile in patients of asymptomatic thyroid swelling.

METHODS

Present study was conducted from January 2017 to June 2018, in the Department of Otorhinolaryngology, Era's Lucknow Medical College & Hospital to correlate clinical findings, high-resolution ultrasonography findings, thyroid profile and FNAC findings in patients of asymptomatic thyroid swelling

Inclusion criteria

Inclusion criteria were patients with asymptomatic anterior midline neck swelling; patients aged above 18 years.

Exclusion criteria

Exclusion criteria were patients with history of systemic diseases like chronic renal disease, cardiac disease, hepatic diseases.

A total of 120 patients presenting with asymptomatic thyroid swelling were enrolled in the study. Personal and clinical history of the patients was obtained and was recorded on a case record form for each individual

Detailed history of the patient was taken with special emphasis on duration of swelling, onset of swelling, rate of growth, sudden changes in size, dysphagia, and change in voice.

Thyroid swelling was carefully examined for its site, size, consistency, mobility, fixity to surrounding structures. Careful search for palpable cervical lymph nodes was made and carotid pulsations were checked on both sides followed by indirect laryngoscopy to know the vocal cord status.

Thyroid function tests were done in all the cases followed by ultrasonographic examination of the neck and FNAC of the swelling.

Statistical tools employed

The statistical analysis was done using SPSS (Statistical Package for Social Sciences) version 21.0 statistical analysis software.

The statistical formulas used were Mean, Standard Deviation, Chi square test, Analysis of Variance (ANOVA).

RESULTS

120 patients fulfilling the inclusion criteria and giving their consent for enrolment in the study were enrolled as study subjects. All the patients were subjected to thyroid function test (TFT) and based on the findings of TFT were classified as euthyroid, hyperthyroid or hypothyroid.

Out of 120 patients with asymptomatic thyroid swelling, based on thyroid function test majority (70.8%) were found to be euthyroid, only 4 (3.3%) patients were found to be hyperthyroid and rest 31 (25.8%) were found to be hypothyroid (Table 1).

Table 1: Distribution of study population according to thyroid function test (n=120).

SN	Description	No.	Percentage (%)
1	Hyperthyroid	4	3.3
2	Hypothyroid	31	25.8
3	Euthyroid	85	70.8

Age of patients enrolled in the study ranged between 18 and 72 years, mean age was 36.08±13.15 years. Proportional differences among hyperthyroid, hypothyroid and euthyroid patients in age groups were found but these differences were not found to be statistically significant. Mean age of hypothyroid patients (37.29±14.68 years) was found to be higher as compared to hyperthyroid (34.50±7.72 years) and euthyroid (35.72±12.86 years) but this difference was not found to be statistically significant (Table 2).

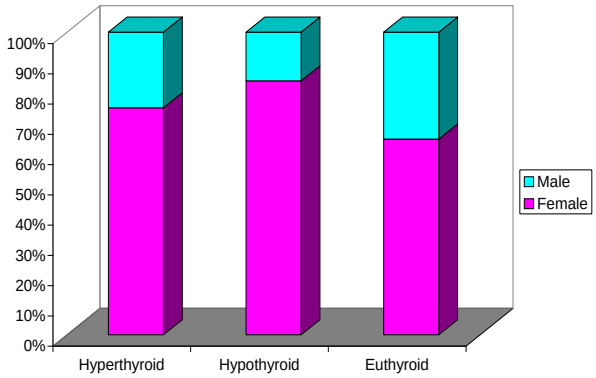

Figure 1: Gender-wise distribution of study population.

Majority of the patients were females hyperthyroid (75.0%), hypothyroid (83.9%) and euthyroid (64.7%) Though proportion of males among euthyroid (35.3%) as compared to hyperthyroid (25.0%) and hypothyroid (16.1%) was higher but this difference was not found to be statistically significant (Figure 1).

Table 2: Association of age with thyroid function test.

Age group (in years)	Total (n=120)	Hyperthyroid (n=4)		Hypothyroid (n=31)		Euthyroid (n=85)	
		No.	%	No.	%	No.	%
≤20	19	0	0.0	7	22.6	12	14.1
21-30	31	1	25.0	6	19.4	24	28.2
31-40	27	2	50.0	3	9.7	22	25.9
41-50	28	1	25.0	10	32.3	17	20.0
51-60	10	0	0.0	3	9.7	7	8.2
>60	5	0	0.0	2	6.5	3	3.5
		χ^2=8.926 (df=10); p=0.539					
Mean age±SD	36.08±13.15	34.50±7.72		37.29±14.68		35.72±12.86	
Min-Max	18-72	27-45		18-66		18-72	
		F=0.190; p=0.827 (ANOVA)					

Table 3: Association of consistency of swelling and thyroid function tests.

Consistency of swelling	Total (n=120)	Hyperthyroid (n=4)		Hypothyroid (n=31)		Euthyroid (n=85)	
		No.	%	No.	%	No.	%
Cystic	2	0	0.0	2	6.5	0	0.0
Firm	105	4	100.0	22	71.1	79	92.9
Hard	1	0	0.0	1	3.2	0	0.0
Soft	12	0	0.0	6	19.4	6	7.1
		χ^2=13.788(df=6); p=0.032					

Table 4: Comparison of HR USG diagnosis.

Diagnosis	Total (n=120)	Hyperthyroid (n=4)		Hypothyroid (n=31)		Euthyroid (n=85)	
		No.	%	No.	%	No.	%
Benign diffuse enlargement	5	2	50.0	3	9.7	0	0.0
Benign thyroid nodule	104	0	0.0	21	67.7	83	97.6
Ill defined margins anechoic? Malignancy	1	0	0.0	1	3.2	0	0.0
Neoplasia	3	1	25.0	2	6.5	0	0.0
Thyroiditis	7	1	25.0	4	12.9	2	2.4
χ^2=53.871(df=8); p<0.001							

Table 5: Comparison of FNAC diagnosis.

Diagnosis	Total (n=120)	Hyperthyroid (n=16)		Hypothyroid (n=21)		Euthyroid (n=83)	
		No.	%	No.	%	No.	%
Colloid goiter	74	0	0.0	4	12.9	70	82.4
Colloid goitre with cystic changes	24	0	0.0	15	48.4	9	10.6
Follicular adenoma	2	0	0.0	1	3.2	1	1.2
Thyroiditis	18	3	75.0	10	32.3	5	5.9
Papillary/ medullary CA	2	1	25.0	1	3.2	0	0.0
χ^2=73.417(df=8); p<0.001							

Range of size of swelling of thyroid gland among patients enrolled in the study was 1-5 cm and mean size of swelling was 2.57±0.92 cm. Maximum swelling was observed among Hyperthyroid (2.75±0.96 cm) followed by euthyroids (2.65±0.93 cm) and minimum swelling was observed among hypothyroid (2.32±0.87 cm) (Figure 2).

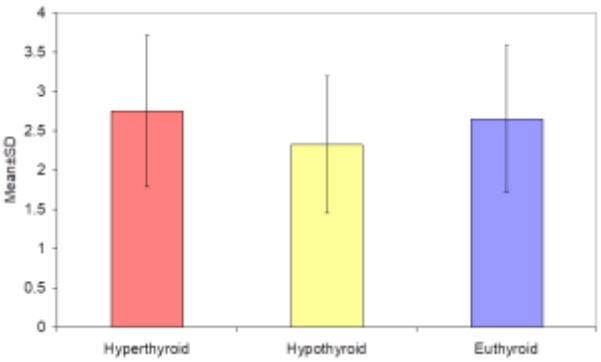

Figure 2: Mean size of swelling.

Thyroid gland swelling was found to be firm for all the patients diagnosed as Hyperthyroid (100.0%) and majority of hypothyroid (71.1%) and euthyroid (92.9%) patients. Softness was observed in thyroid gland swelling among higher proportion of hypothyroid (19.4%) patients as compared to euthyroid (7.1%) and hyperthyroid. Among 6.5% and 3.2% hypothyroid patients swelling of thyroid gland was found to be cystic and hard respectively. Difference in consistency of swelling among hyperthyroid, hypothyroid and euthyroid patients was found to be statistically significant (Table 3).

Based on HR USG findings benign thyroid nodule was diagnosed among significantly higher proportion of patients diagnosed as euthyroid (97.6%) and hypothyroid (67.7%) as compared to hyperthyroids (0.0%) while proportion of hyperthyroids was higher as compared to hypothyroid and euthyroid patients based on USG diagnosis as benign diffuse enlargement (50.0% vs. 9.7% and 0.0%), neoplasia (25.0% vs. 6.5% and 0.0%) and thyroiditis (25.0% vs. 12.9% and 2.4%). Anaechoic ill defined margins with malignancy were diagnosed for 3.2% of hypothyroid patients only. Association of HR USG diagnosis and diagnosis based on Thyroid profile was found to be statistically significant (Table 4).

Proportion of euthyroid patients was higher as compared to hyperthyroid and hypothyroid diagnosed as Colloid goiter on FNAC findings (82.4% vs. 0.0% and 12.9%). Proportion of hypothyroid was higher as compared to euthyroid and hyperthyroid diagnosed as Follicular adenoma (3.2% vs. 0.0% and 1.2%) and Colloid goiter with cystic changes (48.4% vs. 0.0% and 10.6%). Proportion of hyperthyroid as compared to hypothyroid and euthyroid patients were higher diagnosed as thyroiditis (75.0% vs. 32.3% and 5.9%) and papillary/ medullary CA (25.0% vs. 3.2 and 0.0%). A statistically

significant association of FNAC diagnosis and thyroid profile of patients with asymptomatic thyroid swelling was found (Table 5).

DISCUSSION

In clinical ENT practice neck swelling is one of the common presentations. Enlargement of thyroid accounts for the significant number of cases.[8] Despite their asymptomatic nature, thyroid swelling might have some underlying pathology or some hormonal changes. In order to understand the exact pathophysiological mechanisms and in order to make appropriate surgical or medical interventions, it is essential that the evaluation of asymptomatic thyroid swellings should be done appropriately in order to rule out both physiological as well as pathological etiologies.

All the patients underwent thyroid function test assessment as the preliminary investigation. Based on thyroid profile, majority (70.8%) were diagnosed as euthyroid. However, 31 (25.8%) were diagnosed as hypothyroid and 4 (3.3%) were diagnosed as hyperthyroid. Similar to findings of present study, Bamanikar et al. too found majority of their patients as euthyroid (56.5%).[25] However, proportion of hyperthyroid patient was higher in their study (23%) as compared to hypothyroid patients (20.5%). In another study, Siddegowda et al reported majority (52.9%) of 327 patients as euthyroid, 41% as hypothyroid and 6.1% as hyperthyroid.[26]

In present study, age of patients ranged from 18 to 72 years. Mean age of patients was 36.08±13.15 years. Majority of patients were ≤40 years of age (64.2%). Compared to present study, Poudel et al reported the age of patients in 14 to 70 years range and mean age as 38.8 years.[27] Similar to present study, in their study too, majority of patients (61.5%) were ≤40 years of age. Siddegowda et al on the other hand reported the age range of patients as 11 to 80 years but found most of the cases (56.0%) in age range 21-40 years itself.[26] Bamanikar et al reported the age of patients in 20 to 70 years range with majority in 21-40 years and a mean age of 38.6 years.[25] All these findings suggest that thyroid swelling is common in young adults.

In present study, majority of patients were females (n=84; 70.0%). Sex ratio of study population was 1:2.33. Statistically, there was no significant difference among different thyroid profile strata with respect to gender with a dominance of females in each group. A dominance of females has been reported in almost all the studies evaluating thyroid swelling. Kamra et al in their study reported 93.4% to be females.[28] Sood and Nigam reported a male to female ratio of 1:10.[29] Bamanikar et al in their study had 89.7% females.[25] Other studies also reported proportion of females to be higher ranging from 84.2% to 95.4%.[30,31]

In present study, size of swelling ranged from 1 to 5 cm. Mean swelling size was 2.57±0.92 cm. Statistically, there was no significant association between swelling size and thyroid function strata. Similar to findings of present study, Hafez et al. too reported the swelling size in 1 to 6 cm range and mean size of swelling as 2.9±1.63 cm.[32] Nazir et al on the other hand reported the swelling size in 0.5 cm to 5 cm and a mean size of 2.14±1.03 cm.[33]

In present study, majority of swellings were firm in consistency (n=105/120; 87.5%). In euthyroid group all the 4 cases had firm swelling, whereas in hypothyroid and euthyroid groups this proportion was 71.1% and 92.9%. Overall there was a significant difference in consistency pattern among different thyroid function strata. Most of the studies have not provided detail regarding the consistency of the swelling. However, Hassan et al. similar to present study, reported dominance of swellings with firm consistency (99.3%).[34] However, their study was carried out in a study population that was exclusively euthyroid. In our clinical experience, soft palpable nodules are generally benign in nature.

As far as USG diagnosis is concerned, the present study found majority of cases in benign category (5 benign diffuse enlargements and 104 benign thyroid nodules and 7 thyroiditis; n=116/120; 96.7%). Malignancy and neoplasia were detected in 1 and 3 cases only. Thus neoplastic and malignant lesions as per USG diagnosis were seen in 4 out of 120; 3.3% cases only. Presence of neoplastic and malignant conditions was significantly more common in thyroid dysfunction cases as compared to euthyroid cases. Similar to these findings Marwaha et al also found USG detected abnormalities to be more common in patients having thyroid dysfunction. [35]

In present study, on FNAC assessment, colloid goitre was the most common diagnosis (n=74; 61.7%) followed by colloid goitre with cystic changes (n=24; 20%), thyroiditis (n=18; 15%), follicular adenoma (n=2; 1.7%) and papillary/medullary carcinoma (n=2; 1.7%) respectively. Neoplastic conditions were more common in patients with thyroid dysfunction as compared to euthyroid patients. As far as profile of FNAC findings is concerned, a number of studies showed dominance of colloid goiter and colloid goiter with cystic degeneration and non-neoplastic conditions as the most common diagnoses in their studies.[25,26,28, 30] The findings of present study also endorsed these findings.

In present study, the USG and FNAC findings were highly correlated especially for conditions like thyroiditis (USG sensitivity and specificity 100%), neoplastic conditions (USG sensitivity and specificity 75%), and benign thyroid conditions, viz. colloid goiter and colloid goiter with cystic changes (USG sensitivity 98.0%). Similar to findings of present study, a high diagnostic efficiency of USG has also been reported by Singh et al too.[36]

CONCLUSION

The findings of present study showed that thyroid dysfunction could play a significant role in determining the underlying pathology behind thyroid swelling and must be evaluated at the earliest using thyroid function tests as the first line of diagnostic tool and in case of suspected thyroid profile; USG neck and FNAC should be done. In view of lack of studies correlating thyroid profile with clinicopathological profile of thyroid swelling cases, further studies to potentiate the findings of present study are recommended.

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