International Surgery Journal
Moustafa AF et al. Int Surg J. 2019 Apr;6(4):1063-1067
http://www.ijsurgery.com
pISSN 2349-3305 | eISSN 2349-2902

DOI: http://dx.doi.org/10.18203/2349-2902.isj20191252

Original Research Article

Preoperative thyroid stimulating hormone level as risk factor for differentiated thyroid cancer

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Received: 07 January 2019
Revised: 23 February 2019
Accepted: 05 March 2019

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ABSTRACT

Background: The objective of the study was to explore the relationship between TSH and differentiated thyroid cancer.
Methods: From September 2017-September 2018, two groups included 247 euthyroid patients with thyroid swelling who had thyroidectomy studied retrospectively and prospectively by observing preoperative TSH level. Euthyroid adult patients with differentiated thyroid cancer and benign thyroid conditions and euthyroid patients with any thyroid diseases who will going to have thyroidectomy were included otherwise other thyroid conditions were excluded. Patients were classified into 192 retrospective cases (Group I) and 55 prospective cases (Group II).
Results: Increased age of malignant cases with a female predominance. All cases presented with a neck swelling. Clinically in group I nodular swelling in 156 cases (81.2%), diffuse swelling in 36 cases (18.8%) and in group II, nodular swelling in 47 cases (85.5%) and diffuse swelling in 8 cases (14.5%). Histopathology of group I thyroid adenoma in 5 cases (4.8%) and multinodular goiter in 100 cases (95.2%). In addition 80 cases (92%) were papillary carcinoma and follicular carcinoma in 7 cases (8%) while in group II; multinodular goiter in29 cases (100%) and papillary carcinoma in 21 cases (80.8%) as well as follicular carcinoma in 5 cases (19.2%) in malignant cases. Group I showed a significant increase in TSH in malignant cases with the same finding in group II.
Conclusions: TSH is an indicator for thyroid malignancy and FNAC biopsy is recommended for thyroid swellings showed elevated TSH.

Keywords: Thyroid stimulating hormone, Fine needle aspiration cytology

INTRODUCTION

Differentiated thyroid malignancy is the most common endocrine malignancy. The incidence of thyroid cancer is rising faster than any other malignancy in both men and women. Suppression of TSH is a mainstay of clinical thyroid cancer management, whether TSH exerts an influence on development of human thyroid cancer remains uncertain. The reasons for the observed increase in incidence have been widely debated and include enhanced detection of subclinical thyroid cancer due to the growing use of diagnostic imaging and exposure to a number of environmental factors.[1]

Thyroid cancer often presents as a solitary nodule or as a part of a multinodular goiter. This creates an important clinical dilemma as thyroid nodules are very common in 50-67% of the population, and more than 90% are benign.[2]

Although incidental thyroid neoplasm have long been recognized due to their presence during post-mortem examinations, there is a significant and increasing clinical burden associated with detecting this disease in patients[3], for whom the differentiation between aggressive and indolent diagnoses is crucial.[4]

There are a number of well-established and evolving clinical tools to discern malignant from benign thyroid nodules.[5] Most international guidelines recommend the use of a combination of diagnostic tools, including measurement of thyroid-stimulating hormone (TSH) to assess functional thyroid status, high resolution ultrasonography (US) scanning to assess the morphological characteristics of the thyroid and nodule(s) and fine needle aspiration for cytological evaluation of the presence of malignancy.[6,7]

Current guidelines recommend the medium-to-long-term use of TSH suppression in high-risk thyroid cancer but not in lower-risk tumours because of the health risks associated with the induction of subclinical and overt thyrotoxicosis.[6,7]

METHODS

From September 2017-September 2018. This is a combined retrospective and prospective study conducted for studying euthyroid patients who had thyroidectomy for benign thyroid disease and differentiated thyroid cancer retrospectively by collecting data about preoperative TSH level, and the prospective part of the study was done by observing preoperative TSH level in patients undergo thyroidectomy for benign and malignant thyroid disorders then exclude patients with undifferentiated thyroid cancer and medullary carcinoma.

Adult patient at different age and gender with normal TSH level; euthyroid patients that diagnosed as differentiated thyroid cancer (follicular and papillary) and other benign thyroid conditions as well as euthyroid patient with any thyroid diseases who will going to have thyroidectomy were included in this study.

Patients with undifferentiated thyroid cancer or medullary carcinoma; in addition to those with abnormal TSH level (Graves' disease, thyrotoxicosis, hashimotoo thyroiditis) as well as patients on thyroxin were excluded from this study.

Data were analyzed using IBM SPSS software package version 20.0 (Belmont, Calf, 2013). Data were collected in tables then analyzed in regarding to Chi square (x^2) and p value less than 0.05 were considered significant.

RESULTS

This study of cases of thyroid swelling conducted at the surgical department in the Damanhour Teaching Hospital and Menoufia University Hospital and included retrospective study of 192 cases (Group I) with prospective study included 55 cases (Group II).

The age of group I ranged between 17-85 years. In this group the age of benign cases ranged between 17-57 years while in malignant cases ranged between 27-85 years and the statistical analysis revealed a significant increase in the age of malignant cases than that of benign cases in this group (p=0.021) (Table 1).

The age of group II ranged between 20-76 years. In this group the age of benign cases ranged between 21-67 years while in malignant cases ranged between 20-67 years and the statistical analysis revealed no significant difference between the age of malignant and benign cases in this group (p=0.385) (Table 1).

Table 1: Age distribution in groups of the study.

Age (years)	Benign	Malignant	P value
Group I			
Range	17-57	27-85	0.021*
Mean±SD	38.2±8.9	54.1±9.4	
Group II			
Range	21-67	20-67	0.385
Mean±SD	40.6±11.9	43.4±12.4	

*= Significant.

Table 2: Sex distribution in groups of the study.

Sex	Male		Female		P value
	No	%	No	%	
Group I					
Total	38	19.8	154	80.2	0.021*
Benign	14	13.3	91	86.7	0.01*
Malignant	24	27.6	63	72.4	0.03*
Group II					
Total	6	10.9	49	89.1	0.01*
Benign	4	13.8	25	86.2	0.022*
Malignant	2	7.7	24	92.3	0.001*

*= Significant.

Thirty-eight of cases of group I were males (38/192, 19.8%) while 154 were females (154/192, 80.2%) with a male to female ratio of 1: 4.1. In benign cases of this group 14 cases were males (14/105, 13.3%) while 91 were females (91/105, 86.7%) with a male to female ratio of 1: 6.5 while in malignant cases 24 were males (24/87, 27.6%) and 63 were females (63/87, 72.4%) with a male to female ratio of 1: 2.6. The statistical analysis revealed that there was a female predominance in this group while total, benign or malignant cases (p=0.021, 0.01, 0.03 respectively) (Table 2).

In group II, 6 cases males (6/55, 10.9%) while 49 were females (49/55, 89.1%) with a male to female ratio of 1: 8.2. In benign cases of this group 4 cases were males (4/29, 13.8%) while 25 were females (25/29, 86.2%) with a male to female ratio of 1: 6.3 while in malignant cases 2

cases were males (2/26, 7.7%) and 24 were females (24/26, 92.3%) with a male to female ratio of 1: 12. The statistical analysis revealed that there was a female predominance in this group while total, benign or malignant cases (p=0.01, 0.022, 0.001 respectively) (Table 2).

Table 3: Clinical nature of the thyroid swelling in groups of the study.

Clinical examination	Nodular		Diffuse		P value
	No	%	No	%	
Group I					
Total	156	81.2	36	18.8	0.021*
Benign	92	87.6	13	12.4	0.01*
Malignant	64	73.6	23	26.4	0.023*
Group II					
Total	47	85.5	8	14.5	0.02*
Benign	25	86.2	4	13.8	0.03*
Malignant	22	84.6	4	15.4	0.01*

*= Significant.

All cases (100%) of group I and group II were presented with a neck swelling having the criteria of thyroid swelling. On clinical examination of cases in group I; 156 patients have nodular swelling (156/192, 81.2%) while 36 have diffuse swelling (36/192, 18.8%). In benign cases of this group 92 patients have nodular swelling (92/105, 87.6%) while 13 have diffuse swelling (13/105, 12.4%) while in malignant cases 64 patients have nodular swelling (64/87, 73.6%) while 23 have diffuse swelling (23/87, 26.4%). The statistical analysis revealed that there was nodular swelling predominance in this group while total, benign or malignant cases (p=0.021, 0.01, 0.023 respectively) (Table 3).

In group II, clinical examination revealed that; 25 patients of them have nodular swelling (47/55, 85.5%) while 8 have diffuse swelling (8/55, 14.5%). In benign cases of this group 25 patients have nodular swelling (25/29, 86.2%) while 4 have diffuse swelling (4/29, 13.8%) while in malignant cases 22 patients have nodular swelling (22/26, 84.6%) while 4 have diffuse swelling (4/26, 15.4%). The statistical analysis revealed that there was a nodular swelling predominance in this group while total, benign or malignant cases (p=0.02, 0.03, 0.01 respectively) (Table 3).

In cases of group I; histopathologic examination of the specimen revealed 105 patients of this group of benign nature five of them were thyroid adenoma (5/105, 4.8%) while one hundred cases were multinodular goiter (100/105, 95.2%). The statistical analysis revealed the predominance of multinodular goiter as a benign lesion in this group (p=0.01) (Table 4). While this group had 87 cases of malignant lesion on histopathologic examination 80 of them (92%) were papillary carcinoma while seven cases were follicular carcinoma (8%) and statistical analysis revealed the predominance of papillary carcinoma in malignant cases of this group (p=0.01) (Table 4).

Table 4: Histopathologic nature of the thyroid swelling in groups of the study.

Histopathologic examination	Group I		Group II	
	No	%	No	%
Benign				
Adenoma	5	4.8	0	0.0
MNG	100	95.2	29	100
Malignant				
Papillary carcinoma	80	92	21	80.8
Follicular carcinoma	7	8	5	19.2

In cases of group II; histopathologic examination of the specimen revealed 29 patients of this group of benign nature all of them were multinodular goiter (29/29, 100%), (Table 4). While this group had 26 cases of malignant lesion on histopathologic examination 21 of them (80.8%) were papillary carcinoma while five cases were follicular carcinoma (19.2%) and statistical analysis revealed the predominance of papillary carcinoma in malignant cases of this group (p=0.01) (Table 4).

Table 5: TSH level in cases of the studied groups.

TSH level	Benign	Malignant	P value
Group I			
Range	0.29-4.62	0.86-4.96	0.024*
Mean±SD	1.5±0.81	2.55±1.3	
Group II			
Range	0.51-4.62	0.73-5.01	0.01*
Mean±SD	1.59±0.85	2.36±1.1	

*=Significant.

The TSH level of group I ranged between 0.29-4.96 with a mean value of 1.99±1.18. In this group the level in benign cases ranged between 0.29-4.62 with a mean value of 1.5±0.81 while in malignant cases it ranged between 0.86-4.96 with a mean of 2.55±1.3 and the statistical analysis revealed a significant increase in the serum level of TSH in malignant cases than in benign cases in this group (p=0.024) (Table 5).

In group II, The TSH level ranged between 0.51-5.01 with a mean value of 1.95±1.14. In this group the level in benign cases ranged between 0.51-4.62 with a mean value of 1.59±0.85 while in malignant cases it ranged between 0.73-5.01 with a mean of 2.36±1.1 and the statistical analysis revealed a significant increase in the serum level of TSH in malignant cases than in benign cases in this group (p=0.01) (Table 5).

DISCUSSION

Our study revealed that the age was older in malignant cases and females were commonly affected than males

which is similar to the results of Santosh et al, Borsaikia and Patar and Halbhavi et al.[8-10]

Neck swelling was the main presenting symptom in our cases which was mainly nodular with little cases of smooth swelling which was in agreement with Santosh et al, Borsaikia and Patar and Halbhavi et al.[8-10]

The histopathologic examination of our cases revealed that the most common benign thyroid swelling was multinodular goiter followed by thyroid adenoma while the most common malignant thyroid swelling was papillary carcinoma followed by follicular carcinoma. Tamhane and Gharib, revealed in their study that the most common malignant carcinoma was the papillary carcinoma (97-99%) and follicular carcinoma constitute about little percentage which agreed with our results.[11] Also, Hirachand et al, found in their study that the most common lesion in the thyroid gland was colloid goiter.[12] Among the malignant neoplasms the commonest was papillary carcinoma which coincides with our results.

Our results disagree with what found by Santosh et al, were he revealed in their study that only 10% of cases of malignant and Halbhavi et al, who found also only 10.3% of his cases belonged to malignant group.[8,10] As well as Borsaikia and Patar, who found that follicular carcinoma (4.24%) was more commonly than papillary carcinoma (1.41%).[9]

Our results revealed increase serum level of TSH in malignant cases than in benign cases and this was agree with what reported by Tamhane and Gharib in their study that Boelaert et al, and Haymart et al, where they concluded in their studies that increased serum TSH or TSH even in the upper limit of normal is associated with increased risk and advanced stage of malignancy which.[13,14] Also, Gharib et al, documented in their study that Gerschpacher et al, concluded in his study that suppressed or low levels of thyrotropin (TSH) are associated with a decreased probability of malignancy, whereas increased levels of serum TSH, even when the levels are still within reference limits, are statistically associated with an increased risk of cancer in thyroid nodular disease.[15,16]

CONCLUSION

From our study we can conclude that: TSH level can be taken as an indicator for malignant transformation of thyroid swelling and also we recommend to do FNAC biopsy for any thyroid swelling that showed elevated level of serum TSH to its upper normal level for early detection of thyroid malignant tumors.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Moustafa AF, Ammar MS, El-Hantour A, El-Kased AF. Preoperative thyroid stimulating hormone level as risk factor for differentiated thyroid cancer. Int Surg J 2019;6:1063-7.