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CORRELATION BETWEEN THYROID NODULE SIZE WITH CYTOLOGICAL CLASSIFICATION AND CANCER IN JORDANIAN PATIENTS

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ABSTRACT

Background: Confirmation thyroid lobectomy is recommended only based on nodule size. The confirmation of fine needle aspiration to recognize thyroid nodules with cancer is debatable. **Objective:** To evaluate thyroid nodule size with histopathology as anticipators of cancer risk. **Methods:** This retrospective investigation recruited 251 patients with thyroid nodules, with average age of 54.86 years (53.51–56.96), of both sexes (83.7% females [210] with 16.3% males [41]) and who had thyroid surgery at King Hussein hospital, King Hussein medical city, Amman, JORDAN, during the period 2016-2019. Before surgery, histopathology according to the British Thyroid Association was obtained containing the size of the dominant nodules. Thy 2(Bethesda II) was labelled negative and Thy 4 - Thy 5 (Bethesda V-VI) were labelled positive for cancer. For a single thyroid nodule, the most prominent cytology was counted and only the dominant thyroid nodule was counted according to the nodular size. **Results:** 48.2%(121/251) of thyroid nodules were malignant and 130/251 of thyroid nodules were benign (51.8%). The average nodule size was 3.183 cm and 2.311 cm for benign and malignant nodules, respectively. The malignancy for thyroid nodules < 2.5 cm was comparable to those for nodules of 2.5 cm or more ($P>0.05$). Class ($P<0.05$) and not nodule size ($P>0.05$), was correlated with increased malignancy risk. **Conclusion:** Thyroid nodule size couldn't precisely anticipate the risk of thyroid cancer. Confirmation thyroid lobectomy alone because of thyroid nodule size of 2.5 cm or more is not recommended.

KEYWORDS: Thyroid nodule size; Cancer; Fine needle aspiration.

INTRODUCTION

Thyroid malignancy is the main frequent endocrine cancer.[1-2] 5–15% of benign thyroid nodules transform malignant on final histopathology.[3] Most of thyroid malignancy features as thyroid nodules.[4]

The false-negative rate of fine-needle aspiration in spotting thyroid cancer is 0–5%.[5] Large nodule size (more than 3.0cm) has more false negative rate (10.4% - 25%).[6] Confirmation thyroid lobectomy is recommended only based on nodule size[7], although nodule size couldn't adversely influence the false negative rates of fine-needle aspiration.[8]

The objective of our investigation was to assess the confirmation precision and anticipate fine-needle aspiration using nodule size and cytology.

METHODS

This retrospective investigation recruited 251 patients with thyroid nodules, with average age of 54.86 years (53.51–56.96), of both sexes (83.7% females [210] with 16.3% males [41]) and who had thyroid surgery at King Hussein hospital, King Hussein medical city, Amman, JORDAN, during the period 2016-2019, after obtaining written informed consent from all participants and approval from our local ethical and research board review committee of the Jordanian Royal medical services.

The indication for surgery were: cytology of malignancy (Thy 5); doubted malignancy (Thy 4); follicular neoplasm (Thy 3f), undetermined with atypia (Thy 3a) in minimum two biopsies and benign cytology (Thy 2) but large-sized nodules (more than 2.0–3.0 cm).

Before surgery, histopathology classification according to the British Thyroid Association was obtained containing the size of the dominant nodules.[5] In the second fine-needle aspiration for a single thyroid nodule, the most prominent histopathology was counted. Only the dominant thyroid nodule was counted.

The outcome was the possibility of thyroid cancer according to nodule size. Thy 2(Bethesda II) cytology was labelled negative and Thy 4 - Thy 5 (Bethesda V-VI) were labelled positive for cancer. The thyroid nodules were labelled benign according to fine-needle aspiration and malignant according to final histopathology postoperatively. The possibility of malignancy was performed in terms of the nodule size only(n=251) and in terms of nodule size and fine-needle aspiration cytology(n=93).

Statistics

The possibility of cancer based on nodule size and fine-needle aspiration cytology was analyzed. P-value < 0.05 was considered as statistically significant.

RESULTS

There were no remarkable discrepancies in average age between females and males (54.56 and 56.21 years, respectively). The average size of thyroid nodule was 2.745 cm [2.25–3.24]. Table I. 15 of 93 (16.1%) of the nodules were malignant on final operative histopathology. The rates of malignant disease based on fine-needle aspiration cytology were 0%, 5.6%, 14.3%, 29.4%, 100% and 100% for patients in British Thyroid Association Classes Thy 1 - Thy 5 (Bethesda classes I - VI). Histologically, classic papillary thyroid carcinoma was the most frequent type of malignancy (46.6%) followed by follicular variant of papillary thyroid carcinoma at 33.3% then follicular thyroid carcinoma, FTC (Hürtle cell variant) with Medullary thyroid cancer at 6.7% for each (Table II).

There was no remarkable discrepancy in the rate of malignancy with nodule sizes. The rates of malignancy to every 1.0 cm increase in nodule size are shown in Table III. When the 2.5 cm cut-off was used, the rates of malignancy between nodules < 2.5 cm compared to nodules of 2.5 cm or more was not discrepant (P>0.05) and malignancy was comparable for nodules < 2.5 cm compared to nodules of 2.5 cm or more (P>0.05).

The possibility of malignancy was done on nodule size only (251) and nodule size with FNA (93). Actual nodule size was not anticipative of thyroid malignancy (P>0.05). Not every 1 cm increase in nodule size (Table III) was anticipative of malignancy (P>0.05), neither was the 2.5 cm cut-off (P>0.05). Both nodule size and fine-needle aspiration were assessed as anticipators of malignancy (n=93). Fine-needle aspiration cytology was anticipative of malignancy (P<0.005) but not the actual nodule size (P>0.05).

Table I: Features and thyroid nodule cytology of nodules more than 1 cm.

Variable	No.(%)	nodule size(cm)median(range)
No.	251	
Age (years) average(range)	54.86(53.51—56.96)	
Gender		
M	41(16.3)	
F	210(83.7)	
Primary thyroid nodule		
Overall (n)	251	
Size (cm)average(range)	2.745(2.25–3.24)	
Thy, n (%)		
1	8	2.7(1.1-4.3)
2	36	3.2(2.2-4.2)
3a	28	2.8(1.7-4.4)
3f	17	2.5(1.3-3.9)
4	1	3.1(2.3-4.1)
5	3	1.5(1.0-3.1)
total	93	

Table II: Histopathology according to fine-needle aspiration and rates of malignancy.

	Thy1	Thy2	Thy3a	Thy 3f	Thy 4	Thy 5	overall
Thyroid nodules, no. (malignant, no.)	8(0)	36(2)	28(4)	17(5)	1(1)	3(3)	93(15)
Rate of malignant neoplasm (%)	0	5.6	14.3	29.4	100	100	
Pathology of malignant nodules, (n):							
papillary thyroid cancer (PTC)	0	1	2	1	0	3	7
TC follicular variant	0	1	1	2	1	0	5
Follicular thyroid cancer (FTC)	0	0	0	1	0	0	1
FTC, Hürtle cell variant	0	0	0	1	0	0	1
Medullary thyroid cancer	0	0	1	0	0	0	1
Overall	0	2	4	5	1	3	15

Table III: Thyroid nodule malignancy based on size (every 1 cm increment).

TN size (cm)	Nodules (n)	Malignant, n (%)
1.0–1.9	55	10(18.2)
2.0–2.9	73	14(19.2)
3.0–3.9	77	15(19.5)
4.0–4.4	46	9(19.6)
All nodules	251	48(19.1)

DISCUSSION

Large nodule size more than 3.0–4.0 cm is correlated with high possibility of cancer and indicated operative removal.[9] Operation must not be done according to large nodule size only.[10] Small nodule size is correlated with increased rate of cancer up to 2.0–3.0 cm.[11] In small nodules (1.0–2.0 cm), the risk of cancer increases remarkably up to 2.0 cm.[11] The most increased cancer risk was in nodules < 2.0 cm.[12]

We found that nodule size was not anticipative of thyroid cancer for every 1.0-cm or if collected into nodules < 2.5 cm compared with those of 2.5 cm or more (malignancy rates of 18.1% vs 20.6%, respectively).[13] The discrepancy in malignancy rates between the various nodule sizes can be attributed to: one; smaller nodules are chosen for operation only if there is a doubt of cancer and so only nodules with high probability of cancer are exposed to operation. Two; Large nodules more than 3.0–4.0 cm are exposed to operation even if the cytology is benign[9] due to increased cancer rate[9] and increased false negative rates.[12]

A nodule size of 3.0 cm or more is correlated with increased false negative rates compared with a nodule size < 3.0 cm, of 5.8% - 17%.[12] Large nodules more than 3.0 cm are not correlated with any remarkable increase in false negative rate, although less false negative rate was found in a nodule size < 3.0 cm.[14] When 4.0 cm was taken as a cut-off, there were comparable results between the two groups.[7] The cut-off size of 2.5 cm was chosen in our investigation because most of nodules of 2.5 cm or more are exposed to thyroid operation. An increased rate of cancer in large nodules of more than 3.0 cm had remarkably increased false negative rates of 16.6%.[6]

The rates of cancer between nodules < 2.5 cm and those of 2.5 cm or more are similar. The follicular variant of papillary thyroid carcinoma had the criteria for non-invasive follicular thyroid neoplasm with papillary like nuclear aspect.

Sensitivity and specificity of 71.4% and 100%, respectively, were recorded earlier.[5] The rate of non-confirmation nodules (Thy1, Bethesda I) was 8.5%(the recommended rate is < 10%).[15] The total malignancy rate in nodules with benign cytology (n=36) was 5.6%. A nodule size of 3.0–5.9 cm had more risk of malignancy compared with a size of 3.0 cm or more.[16]

IN CONCLUSION

Nodule size couldn't precisely anticipate the risk of thyroid cancer indifferent of fine needle aspiration. Routine confirmation thyroid lobectomy alone for a nodule size of 2.5 cm or more is not indicated.

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