

DETECTION OF MALIGNANCY IN SOLITARY THYROID NODULE.

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ABSTRACT

Background: The presence of a solitary thyroid nodule is a risk factor for malignancy. The major challenge in management of the solitary thyroid nodule remains the assessment to which nodules require surgical excision and which can be followed conservatively. The fine needle aspiration cytology (FNAC) is one of the most important advances in the management of the thyroid nodules, it has an accuracy rate greater than 90%. **Objective:** to assess the predictive value of conventional clinical examination, laboratory investigation and cytology (fine needle aspiration cytology (FNAC) and histopathology) in the diagnosis of malignancy in the solitary thyroid nodule and its impact on the development of a surgical policy for proper management.

Patients and methods: a total of 100 patients with solitary thyroid nodules were thoroughly examined clinically after taking detail history and FNAC; all the patients were subjected to surgery after preoperative preparation and anesthesia checkup. Thyroidectomy specimen was evaluated by histopathological examination.

Exclusion criteria: multinodular goiter, hypo and hyperthyroidism, patients refuse FNAC, other investigation and patients unfit for surgery.

Statistical analysis: SPSS version 11. **Results:** In the present study both FNAC and histopathology was done in 100 patients of solitary thyroid nodule. Out of 100 cases, 86 cases were benign and 14 cases were malignant on histopathology. On cytology 84 cases were benign, 11 cases were malignant, and five cases were suspicious smear, two of them were (follicular adenoma) false positive case. Sensitivity was 100%, specificity was 97.6%, accuracy was 98%, positive predictive value was 87.5% and negative predictive value was 100%. **Conclusion:** Significant proportion of solitary thyroid nodule (14%) was malignant. So, careful assessment of thyroid nodule is important for early diagnosis. All cases with solitary thyroid nodules should have FNAC as pre-operative diagnostic method to reduce the number of patients referred for surgery.

Keywords: Solitary thyroid nodule, FNAC, Histopathology.

INTRODUCTION

Solitary thyroid nodule is a single discrete mass of abnormal tissue in an otherwise normal thyroid gland⁽¹⁾.

True solitary thyroid nodule (STN) is rather a common disease occurs in 4-7% of the adult population based on palpation and of 20-76%, based on ultrasound examination⁽²⁾.

The presence of a solitary thyroid nodule is a risk factor for malignancy. The reported incidence of carcinoma in solitary thyroid nodules varies from 2-20%⁽³⁾.

However thyroid carcinoma closely resembles its benign counterpart in physical characteristics, measurable physiological parameters such as serum T3/T4 levels and ultrasonic characteristics. Therefore the surgical excision of the nodule and its histopathological examination is the only way to differentiate between the more benign and much less frequent malignant nodules. Since most of the nodules are benign, symptomless and small in size, they do not require surgical excision.⁽⁴⁾

FNAC has becoming a common diagnostic procedure replacing other diagnostic methods as it requires no anaesthesia, it is easy to perform and can be repeated without much discomfort to the patient and has a high diagnostic accuracy.⁽⁴⁾

Objective

to assess the predictive value of conventional clinical examination, laboratory investigation and cytology (fine needle aspiration cytology (FNAC) and histopathology) in the diagnosis of malignancy in the solitary thyroid nodule and its impact on the development of a surgical policy for proper management.

PATIENTS AND METHODS

This prospective study was represented randomly on 100 patients who were complaining from solitary thyroid swelling who were selected from outpatient clinic of general surgery department of Zagazig University Hospitals in the period from June 2010 to June 2013.

Exclusion criteria:

Multinodular goiter, hypo and hyperthyroidism, patients refuse FNAC, other investigation and patients unfit for surgery.

100 cases of solitary thyroid nodules were thoroughly examined clinically after taking detail history, thyroid function tests along with ultrasound scan, and X-ray neck and all patients were subjected to FNAC by palpation (suction technique) using 20 gauge needle. Smears were prepared, and fixed by using 95% ethyl alcohol. And then stained by papanicolou's method and the cytological diagnosis

was made. The smears were classified into the following categories: inadequate, benign, malignant and suspicious.

After FNAC, all the patients were subjected to surgery [Hemi-thyroidectomy for benign smears, Total thyroidectomy was performed in malignant cases without lymphadenopathy and in suspicious smears and Total thyroidectomy with selective neck dissection for malignant cases if there is positive lymph nodes] after preoperative preparation and anaesthesia check up.

Thyroidectomy specimen was evaluated by histopathological examination. Specimens were

processed in automated tissue processing units and staining was performed with routine haematoxylin and eosin stain.

Follow up of all cases postoperatively at the general surgery department with good analgesia. All patients were discharged home on the second or third postoperative day after evaluation of serum calcium and vocal cord mobility; and removal of the drain on Eltroxineoral tablets oral analgesics and antibiotic for three days.

Statistical analysis:Data were coded, entered and analysed using SPSS version 11.

RESULTS

Table (1) : The age and sex distribution of our cases.

Age	Male	Female	Total
10- 20	0	01	01
21 – 30	5	19	24
31 – 40	8	24	32
41 – 50	6	21	27
51 – 60	2	09	11
More than 60	2	03	05
Total	23	77	100

Table (2) :The clinical presentation of our cases.

Clinical presentation	No	%
Swelling	100	100%
Pain referred to ear	3	3%
Dysphagia	6	6%
Dyspnea	4	4%
Hoarseness of voice	2	2%
Lymphadenopathy	9	9%

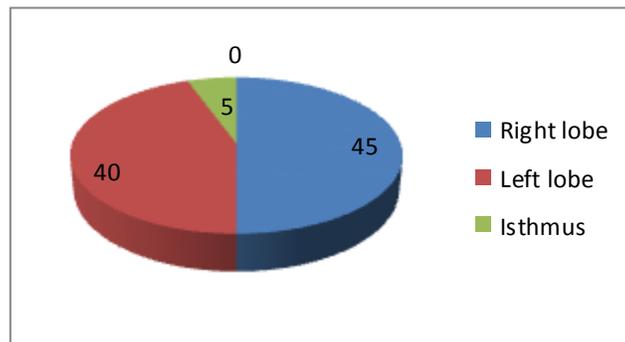


Figure (1): The site of the nodules in our cases.

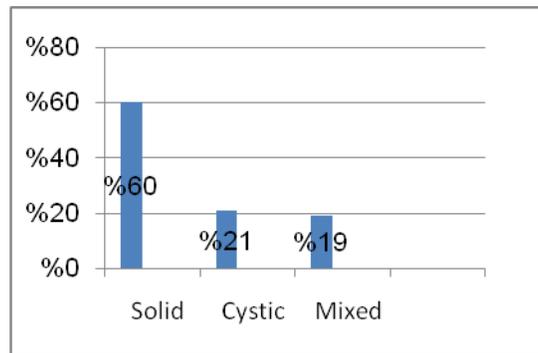


Figure (2): Findings of ultrasonic examination of our cases.

Table (3) : The relation between the size of the solitary thyroid nodules of our cases and the histopathological examination.

Size	Benign group	malignant group	P value
<2 cm	25	-	0.57
>2 cm	61	14	

Table (4): The results of cytology after FNAC

Most the studied smears (80%) were benign; but four cases showed inadequate smears even through taking different punctures by palpation so the technique was repeated again but guided with ultrasound and the results were benign . The total benign smears were (84%)

The results of cytology	N	%
Benign	84	84%
Malignant	11	11%
Suspicious	5	5%

Table (5): Surgical management of our cases.

Operation type	No.	%
Hemi- thyroidectomy	84	84%
Total thyroidectomy with selective LN dissection	09	09%
Total thyroidectomy	07	07%
Total	100	100%

Table (6): The histopathological findings of excised specimens and the incidence of different pathology

<i>Histopathological type</i>	<i>No.</i>	<i>%</i>
Colloid nodule	80	80%
Papillary carcinoma	9	9%
Follicular carcinoma	3	3%
Anaplastic carcinoma	2	2%
Follicular adenoma	02	02%
Non specific thyroiditis	04	04%
Total	100	100%

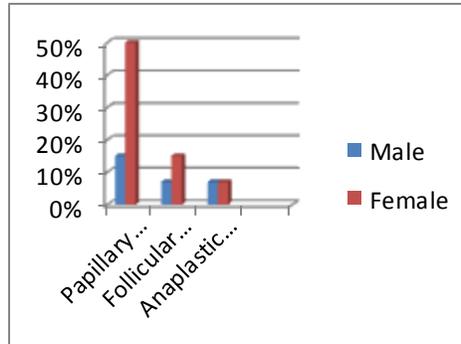


Figure (3):Frequency of malignancy in relation to sex.

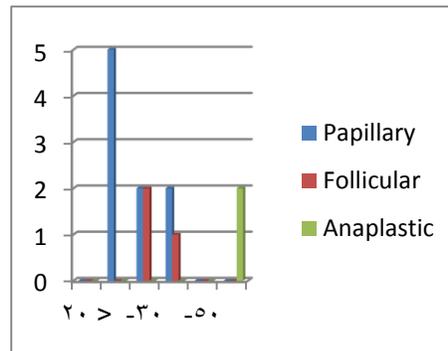


Figure (4):Frequency of malignancy in relation to age.

Table (7): The relation between FNAC and histopathological examination in diagnosis of solitary thyroid nodule of our cases.

		FNAC	Histopathological examination	X²	P Value
Benign		84	84	66.35	<0.001
Malignant		11	11		
Follicular lesion (5)	Adenoma	Suspicious	02		
	Carcinoma	Suspicious	03		
Total		100	100		

SENSITIVITY AND SPECIFICITY OF THE STUDY

TP-True positive, FP-False positive, TN-True negative, FN-False negative

TP-14, FP-2, TN-84, FN-0

Sensitivity= $TP/(TP+FN) \times 100 = 100\%$

Specificity= $TN/(TN+FP) \times 100 = 97.6\%$

Positive predictive value = $TP/(TP+FP) \times 100 = 87.5\%$

Negative predictive value = $TN/(TN+FN) \times 100 = 100\%$

Accuracy rate = $(TP+TN)/(TP+TN+FP+FN) \times 100 = 98\%$

DISCUSSION

This prospective study was carried out to detect malignancy in 100 cases presented with solitary thyroid nodule and its impact on the development of a surgical policy for proper management.

The age range from 19 to 66 years with mean of age is 35.2 years. The highest age incidence was found to be in the fourth decade of life (32 patients) and much less below 20 and above 60 years. This is similar with the other studies. **Huque et al**⁽²⁾; **Rains and Charles**⁽⁵⁾

In this study, out of 100 patients, male were 23(23%) and female were 77(77%). Male: female ratio is 1: 3.35. This is similar with the other studies. **Huque et al**⁽²⁾; **Sattar et al**⁽⁶⁾

Regarding presenting complaints we have found that all of the patients with neck swelling presents within variable durations. Some patient also presented with other symptoms like cervical lymphadenopathy in (9) patients, dysphagia in (6) patients, dyspnea in (4) patients, pain referred to ear in (3) patients,

and hoarseness of voice in (2) patients. It is well supported by others studies **Khan et al**⁽⁷⁾; **Tarrar et al**⁽⁸⁾.

In this study, we have seen that right lobe is slightly more affected than left lobe. There is yet no reported predilection for any specific site and no reason has been put forward for such a predilection. We found 45 nodules in right lobe, 40 nodules in left lobe and 5 nodules in isthmus which is consistent with other studies on STNs **Huque et al**⁽²⁾; **Gupta et al**⁽⁹⁾; **Tabaqchali et al**⁽¹⁰⁾.

Ultrasonographic study revealed 60 % solid nodules, 21 % cystic nodules and 19 % were mixed nodules. Malignancy was found more in hard nodule 9(64.3%). It is almost similar to other studies. **Huque et al**⁽²⁾; **Tarrar et al**⁽⁸⁾. Here

hardness of nodule was due to malignancy and inflammatory conditions.

Thyroid nodule size is routinely measured, although its impact on thyroid cancer risk is unclear. In this study: all malignant lesions were more than 2 cm. However, it differs from the studies of **Tai et al**⁽¹²⁾ revealed that there was no great significance between nodule size larger than 4 cm and nodule size less than 4 cm ($P = 0.5$) and in **Kamran et al**⁽¹¹⁾ revealed that, below 1 cm increasing thyroid nodule size impacts cancer risk in a nonlinear fashion but threshold is detected at 2.0 cm, beyond which cancer risk is unchanged.

Fine needle aspiration cytology (FNAC) is very important, highly sensitive and minimally invasive preoperative diagnostic tool. We divided our FNAC cases into four groups: inadequate, benign, malignant, suspicious. Inadequate smears (4) were repeated guided with ultrasound then the results were benign smears, and suspicious smears (5) as FNAC cannot distinguish between follicular adenoma and follicular carcinoma. FNAC diagnosis of this study was supported by postoperative histopathological report.

Final diagnosis in this study was on the basis of histopathological confirmation. Non malignant cases were 86 patients (86%). The commonest was colloid nodule 80 cases (80%) followed by the non specific thyroiditis (4%) and the least were follicular adenoma 2 cases (2%). which is compatible with other studies. **Al-Robbani**⁽¹⁾; **Chetan et al**⁽³⁾; **Gupta et al**⁽⁹⁾. However, it differs from the studies of **Tai et al**⁽¹²⁾ simple adenoma had the highest incidence of non malignant cases.

Malignant cases found in 14 cases (14%). In this study among 14 malignant cases, 9 cases (64%) were papillary carcinoma, 3 cases (21%) were follicular carcinoma and 2 cases (14%) were anaplastic carcinoma. It shows a clear predominance of papillary over follicular and anaplastic carcinoma. It is almost similar to other studies **Chetan et al**⁽³⁾; **Tarrar et al**⁽⁸⁾. It was reported in a study that papillary carcinoma comprises about 60% of all thyroid cancer and follicular carcinoma comprises 18% of all malignant thyroid neoplasm **Krukowski**⁽¹³⁾; **Robins**⁽¹⁴⁾.

In this study: carcinoma of thyroid gland may be diagnosed in patients of all ages, but most cases are seen in the 3rd to 5th decades and females were predominant (10/14) and female-male ratio was 2.5

: 1 .This result is similar with the other studies. **Huque et al⁽²⁾**; **Chandanwale⁽¹⁵⁾**; **Ergete and Abebe⁽¹⁶⁾**
 In this study the percentage of sensitivity, specificity, and accuracy was 100%, 97.6%, 98% respectively . This result is similar with the other

studies **Al-Robbani⁽¹⁾**; **Shere et al⁽⁴⁾**. However, it differs from the studies of **Gupta et al⁽⁹⁾**, the sensitivity, specificity and accuracy was 80%, 86.6%, 84% respectively and in **Musani et al⁽¹⁷⁾** was 61.5%,98.9%,94.3% respectively .

Table (8) : The post-operative complication in comparison to the operative technique

	Hemi-T	Total T.& LNs.	Total T	X ²	P value
No. of pts/operation	84	9	7		
Hemorrhage	1	-	-	6.8	0.24
Infection	2	-	-		
Seroma	1	2	-		
Hypoparathyroidism	-	2	1		
Recurrent laryngeal n. injury	-	1	-		
External laryngeal n. injury	-	-	1		

Complications occurred after total thyroidectomy with neck dissection was (56%) (two patient had tetany, one had recurrent laryngeal nerve injury and two had seroma) , after total thyroidectomy was (29%) (One had tetany and one had low pitched sound) and Complications occurred after Hemi-thyroidectomy was (5%) had complications: (one had reactionary heamorrhage, two had postoperative infection and one seroma). Thus, the type and the extent of the operation are to be considering as a major risk factor for developing complications. This result is similar with the other studies. **Al-Robbani⁽¹⁾**; **Ali et al⁽¹⁸⁾**.

CONCLUSION

Significant proportion of solitary thyroid nodule (14%) was malignant. So, careful assessment of thyroid nodule is important for early diagnosis. All cases with solitary thyroid nodules should have FNAC as pre-operative diagnostic method to reduce the number of patients referred for surgery.

REFERENCES

1-Al-Robbani AM (2013): Study of Thyroid Carcinoma in Solitary Thyroid Nodule, In :*(Dinajpur Med Col J 2013 Jan; 6 (1):58-63).*
 2- Huque SM, Ali MI, Huq M et al (2012): Histopathological pattern of malignancy in solitary thyroid nodule, *Bangladesh J Otorhinolaryngol 2012; 18(1): 5-10.*
 3- Chetan RV, Veeresalingam B, Kumar KM, et al (2013): A study on the clinical manifestations and the incidence of benign and malignant tumors in a

solitary thyroid nodule, In: *Int J Res Med Sci. 2013 Nov;1(4):429-434.*
 4- Shere SK, Kulkarni AS, Phulgirkar PP et al (2013): Correlation of fine needle aspiration cytology with histopathology in diagnosis of thyroid lesions. In: *journal of evolution of medical and dental science, vol, 12.issue, 26.july, 2013.pages; 4826-4831.*
 5- Rains AJH, Charles VM.(2004): The thyroid and parathyroid glands. In: *Bailey and Love’s short practice of surgery, edited by Williams NS, Bulstrode C and O’Connell PR (Eds) Twent third ed. London, ELBS, 2004; 707 –733.*
 6- Sattar MA, Alam MR & Haider A(2003):. Clinicopathological study of solitary cold thyroid nodule, *Bangladesh J Otorhinolaryngol. 2003; 9(1): 24 – 27*
 7- Khan SA, Gafur SA, Khan MK, et al (2012): Pattern of malignancy in clinically solitary thyroid nodule, *Mymensingh Medical Journal :MMJ, [2012, 21(1):1-7]*
 8- Tarrar AM, Khan OU, Wahla MS (2010): SOLITARY THYROID NODULE; FREQUENCY OF MALIGNANCY AT COMBINED MILITARY HOSPITAL RAWALPINDI. *Professional Med J Dec 2010; 17(4): 598-602.*
 9- Gupta M, Gupta S, Gupta VB (2010): Correlation of fine needle aspiration cytology with histopathology in the diagnosis of solitary thyroid nodule. *J Thyroid Res 2010; 2010:379051*
 10- Tabaqchali MA, Hasan JM, Johnson ST, Wadhwa V(2000): Thyroid aspiration cytology in Newcastle: a six year cytology/histology correlation study. *Amr Coll Surg Engl 2000;82:149.*

- 11-Kamran SC, Marqusee E, Kim MI et al(2013):Thyroid Nodule Size and Prediction of Cancer,In: The Journal of Clinical Endocrinology & Metabolism February 1, 2013 vol. 98 no. 2 564-570
- 12- Tai JD, Yang JL, Wu SC et al (2012): Risk factors for malignancy in patients with solitary thyroid nodules and their impact on the management. J Can Res Ther 2012;8:379-83
- 13- Krukowski ZH (2005) : The thyroid gland and thyroglossal tract; Baily and love's short practice of surgery ,edited by Williams NS, Bulstrode C and O'Connell PR (Eds) ; 24th edn. London, 2005; 797 – 98.
- 14- Robins SL, Cotran US, Kumar V(2004):Pathological Basis of Disease, edited by Robins SL, Cotran US, Kumar V; 6th ed.Philadelphia, WB Saunders Company 2004; 1201 – 1225.
- 15- Chandanwale S, Singh N, Kumar H, Pradhan P, Gore C, Rajpal M(2012). Clinicopathological correlation of thyroid nodules. Int J Pharm Biomed Sci 2012, 3(3), 97-102.
- 16- Ergete W and Abebe D (2002): Discordance rate between thyroid FNAC &histopathology diagnosis. Ethiopian J Health Dev. 2002;16:227.
- 17- Musani MA, Khan FA, Malik S et al (2011): FINE NEEDLE ASPIRATION CYTOLOGY: SENSITIVITY AND SPECIFICITY IN THYROID LESIONS, J Ayub Med Coll Abbottabad 2011;23(1)
- 18- Ali AM, Elkadi TT, Ali MM, Ali EM (2013): Total/near-total versus hemi-thyroidectomy for low risk well differentiated thyroid cancers: A retrospective study. In: Egyptian Journal of Surgery Vol. 32, No. 1, January 2013.