ORIGINAL RESEARCH PAPER

General Surgery

"A STUDY ON SIZE OF THE THYROID NODULE IN USG AS A PREDICTOR FOR TURNING FNAC PROVEN FOLLICULAR NEOPLASM INTO FOLLICULAR CANCER AFTER THYROIDECTOMY"

KEY WORDS: Size Of Thyroid Nodule In Ultrasound, Follicular Carcinoma

Dr. Naveen Kumar S M Resident in Surgery Government Medical College, Thrissur

Dr. Abdul Siyad A K* Professor of Surgery Government Medical College, Kannur(Formerly GMC Thrissur) *Corresponding Author

ABSTRACT

In community, population older than fifty years of age, about 50% develop thyroid nodules. Among them 5% of these nodules are malignant. Usual B mode USG cannot differentiate benign nodules from malignant nodules. FNAC is not conclusive in upto 28% of samples. Moreover FNAC cannot differentiate follicular adenoma from follicular carcinoma as capsular or vascular invasion cannot be identified. Many patients have to undergo a second procedure (completion Thyroidectomy) if the Lobectomy /Hemi-Thyroidectomy histopathology report came as Follicular carcinoma. **Objectives** To find out whether size of the thyroid nodule in USG can predict the chances of FNAC proven follicular neoplasm becoming follicular carcinoma after Thyroidectomy. **Methods** 50 Patients with FNAC proven neoplasm who are admitted in MCH for Thyroidectomy were studied. FNAC, HPR and USG REPORTS done were recorded using a preformed proforma. Data collected was analysed. After discharge, investigator followed up patients until HPR reports available. **Results And Discussion** Out of the 50 participants, only19 (38.0%) were males and rest 62% were females. The size of thyroid nodule of the participants ranged from 1.3 to 6 cm. Around 36% of participants have a nodule size of >4cm .Size of the nodule was significantly higher among those with malignant lesions compared to those with benign lesions with p-value <.001. Average size of the malignant nodule in this study is 4.2 cm Also it was found that microcalcifications and Cervical node positivity was significantly associated with malignancy. **Conclusion** The size of the thyroid nodule in USG is significantly higher among those with malignant lesions (with an average size of 4.2 cm according to this study) as compared to the benign counterpart. However, other ultrasound features like Micro calcifications, presence of cervical nodes, etc. can also be considered as independent predictors of malignancy

INTRODUCTION

Thyroid nodules are quite common and often USG is used to evaluate the nodules. The size of nodule, location of nodule in the thyroid gland, echo-texture of the nodule, margins of the nodule, presence of halo around the nodule, calcification within the nodule, vascularity of the nodule, accessory nodules and associated cervical nodes and contents of the nodule (solid, cystic or mixed) are characterized in order to differentiate from benign and malignant nodule.

Certain ultrasound characteristics of nodules (e.g., hypo echogenicity, micro-calcifications, and blurred & nodular margins) are associated with malignancy.

FNAC also plays a vital role for the evaluation of thyroid nodule. But, FNAC is not always diagnostic (e.g. suspicious findings, insufficient materials, false positive or non diagnostic results).This can occur up to about 28% of samples.

But FNAC cannot differentiate follicular adenoma from follicular carcinoma as capsular or vascular invasion cannot be identified

Thyroid carcinoma is the most common malignancy involving the endocrine glands and is responsible for approximately 1.5% of new cases and 1,500 deaths from cancer annually in the United States [1],[2].The histopathologic classification of these tumours includes Papillary thyroid cancer (60–80%), Follicular carcinoma (15–18%), Anaplastic carcinoma (3–10%), Medullary carcinoma (4–5%), lymphoma (5%), and metastases [3]

Follicular neoplasm (consisting of the combination of high numbers of follicular cells, micro follicular arrangement, and scant or absent colloid) is a cytologic term used to encompass both the benign proliferation of thyroid follicular cells in adenoma and the malignant proliferation in carcinoma. Follicular adenomas are much more common than follicular carcinomas, occupying a histologic (if not biologic) niche between follicular hyperplasia and follicular carcinoma.

Unlike carcinomas, adenomas have no vascular or capsular invasion but otherwise have similar cytologic features. In general, when a biopsy specimen of a thyroid nodule reveals a follicular neoplasm, approximately 80–90% of such lesions will be adenomas and 10–20% will be carcinomas [4][5][6]

Microscopically, most follicular carcinomas are composed of fairly uniform cells forming small follicles of high cellularity containing scant colloid, reminiscent of normal Thyroid but lacking the diagnostic features of papillary cancer, which has characteristic nuclear features and often contains psammoma bodies [7],[8],[9]. Invasion of adjacent thyroid parenchyma may be grossly apparent or can be limited to microscopic foci of capsular or vascular invasion [10]. These lesions may require extensive histologic sampling before they can be distinguished from follicular adenoma.

A noninvasive method of evaluating thyroid nodules identified as containing follicular neoplasia that could reliably differentiate between benign follicular adenomas and malignant follicular carcinomas would be invaluable in avoiding both the risks (including laryngeal nerve injury and hypoparathyroidism) and expense of surgery [11]. Rarely does physical examination help in the differentiation of the benign and malignant thyroid nodule and, although certain clinical features (including male sex, size greater than 4 cm, and solitary nodule) [12],[13],[14]. may be helpful in risk stratification, a cytologic finding of follicular neoplasia often mandates surgery.

Sonography is attractive in the evaluation of palpable Thyroid nodules given its high resolution, absence of exposure to ionizing radiation, portability, and ease of use. Several retrospective studies have described the sonographic appearance of follicular neoplasms. Two studies [15],[16] reported no value of sonography in distinguishing follicular carcinoma from follicular adenoma. Another study [12] described a total of nine and eight follicular carcinomas, respectively, and combined the findings with the follicular variant of papillary carcinoma to describe hypoechogenicity as a useful feature of malignancy. The purpose of our study

was to find the relation between size of thyroid nodule in Ultrasound (follicular neoplasm) and chances of getting a positive HPR (as follicular carcinoma) after Thyroidectomy.

OBJECTIVES

To find out whether size of the thyroid nodule in USG can predict the chances of FNAC proven follicular neoplasm becoming follicular carcinoma after Thyroidectomy

Study Setting

METHODOLOGY

Department of General Surgery, Government medical college, Thrissur.

Study Design

Prospective observational study

Study Population

Patients with FNAC proven neoplasm who are admitted in MCH for Thyroidectomy should be enrolled in the study

Inclusion Criteria

- Age more than 18 and less than 80
- Consenting Patients with FNAC proven Follicular Neoplasm, admitted in MCH for Hemi/Total Thyroidectomy

Sample Size Calculation

Sample size (n) calculated by the formula Where
p = expected proportion of follicular neoplasm of thyroid (7%) ; according to the study by Sophia C. Kamran et al
d = absolute precision (5%)
Here,
Expected proportion is 0.07 Precision (%) is 5
Desired confidence level (%) 95
Therefore, Sample size(n) = 50 (maximum available cases in 1 yr)

Study Procedure

Patients with FNAC proven neoplasm who are admitted in MCH for Thyroidectomy were considered. After getting consent, patients were interviewed using a self-designed proforma. A detailed clinical history was taken and investigations (FNAC, HPR and USG REPORTS) done were recorded. Data collected was and analysed. After discharge, investigator followed up patients until HPR reports were available.

Study Period

6 months from the date of getting ethical committee approval

RESULTS

50 Patients with FNAC proven neoplasm who are admitted in MCH for Thyroidectomy are studied. Important parameters like age, sex, ultrasound features like size of thyroid nodule, presence of halo, presence of cervical lymph nodes, vascularity, visible invasion and microcalcification were compared with Histopathology results

Age distribution of study participants

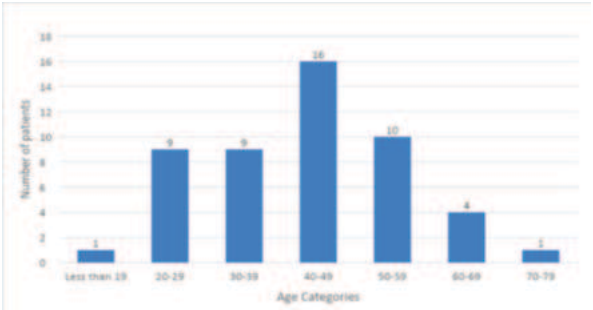

Fig. 1 Age distribution of study participants

The age of the participants ranged from 19 to 73 years. The mean (SD) of the participants age was 42.8 (12.9) years.

Sex distribution of study participants

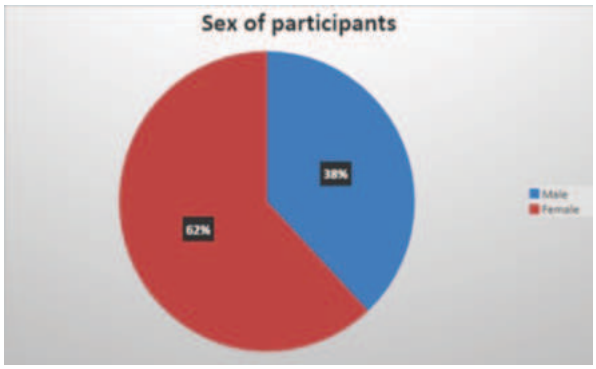

Fig 2 Sex distribution of study participants

Out of the 50 participants, 19 (38.0%) were males.

Distribution of study participants based on size of nodule

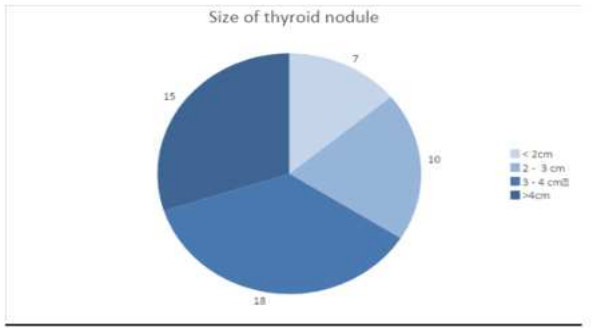

Fig 3.Distribution of study participants based on size of nodule

The nodule size in usg of the participants ranged from 1.3 to 6 cm. The mean (SD) of the size of nodule was 3.4 (1.1) cm.

Distribution of patients based on characteristics of nodule

Table 1.Distribution of patients based on characteristics of nodule

	Yes	No
Presence of Halo	16 (32.0)	34 (68.0)
Increased vascularity	34 (68.0)	16 (32.0)
Visible invasion	4 (8.0)	46 (92.0)
Microcalcification	21 (42.0)	29 (58.0)

Distribution of study participants based on HPR results

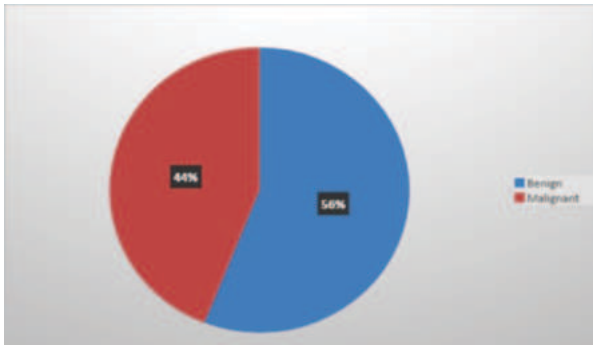

Figure 4 Distribution of study participants based on HPR results

Out of the 50 participants, 28 (56.0%) had benign thyroid nodule

Association of USG features with malignant thyroid nodule

Table 2. Association of USG features with malignant thyroid nodule

	Odds ratio	Confidenceinterval	p value
Halo	0.2	0.04 – 0.76	.02
Increase dvascularity	3.4	0.9 -12.6	.07
Visible invasion	4.3	0.4 – 44.2	.22
Microcalcification	20.4	4.8 – 87.3	<.001

Macrocalcification was positively associated with malignancy with odds ratio 2.0 (95% CI 4.8 – 87.3, p-value <.001). Halo in echo was negatively associated with malignancy with odds ratio 0.2 (95% CI 0.04 – 0.76, p-value = .02). Increased vascularity and visible invasion was not significantly associated with malignancy.

Association of presence of cervical node with malignant thyroid nodule

Table 3. Association of presence of cervical node with malignant thyroid nodule

	Malignant	Benign	p value
Cervical node positive	7 (100.0)	0 (0)	.002
Cervical node negative	15 (34.9)	28 (65.1)	

Cervical node positivity was significantly associated with malignancy with Fisher's exact p-value .002.

Association of maximum size of nodule with malignancy

Table 4.Association of maximum size of nodule with malignancy

	Malignant (n = 22)	Benign (n = 28)	p value
Size of nodule	4.2 (0.9)	2.8 (0.8)	<.001

Size of the nodule was significantly higher among those with malignant lesions compared to those with benign lesions with p-value <.001.

DISCUSSION

Follicular neoplasms of Thyroid usually presents as a thyroid swelling without any local symptoms. The patients have been primarily evaluated by FNAC and Ultrasonography. FNAC cannot differentiate Follicular adenoma and Carcinoma. Hence most of the patients undergo Hemi Thyroidectomy (unless high risk features are present). Depending on the histopathology report, he/she may require a second surgery (completion Thyroidectomy). (if biopsy report came as follicular carcinoma)

Age distribution of study participants

- The age of the participants ranged from 19 to 73 years. The mean (SD) of the participants age was 42.8 (12.9) years.
- 32% of patients belongs to age group between 40 to 50 while 20% of patients belongs to age group 50 to 60

Sex distribution of study participants

- Out of the 50 participants, 19 (38.0%) were males and the rest 62% are females

Distribution of study participants based on size of nodule

- The size of thyroid nodule of the participants ranged from 1.3 to 6 cm. The mean (SD) of the size of nodule was 3.4 (1.1) cm.
- Around 36% of participants have a nodule size of >4cm

Distribution of patients based on characteristics of nodule

- Presence of echogenic halo is seen only in 32% of study subjects, while increased vascularity is noted in 68% of study subjects
- Visible invasion is seen in only 8% of cases while Microcalcifications are seen in 21% of study population
- Out of the 50 participants, 7 (14.0%) had cervical nodules.

Association of ultrasound findings with malignant thyroid nodule

- Microalcifications was positively associated with malignancy with odds ratio2.0 (95% CI 4.8 – 87.3, p-value <.001).So the presence of microcalcification in USG strongly suggest malignancy.
- Halo in echo was negatively associated with malignancy with odds ratio 0.2 (95% CI 0.04 – 0.76, p-value = .02)So the presence of an echogenic halo suggest benign nature of the neoplasm
- Increased vascularity and visible invasion was not significantly associated with malignancy
- Cervical node positivity was significantly associated with malignancy with Fisher's exact p-value .002.
- Size of the nodule was significantly higher among those with malignant lesions compared to those with benign lesions with p-value <.001 (average size of nodule in USG in malignancy according to this study is 4.2 cm)

CONCLUSION

Follicular neoplasm of Thyroid is seen in general population with a female preponderance.

The size of the Thyroid nodule in USG is significantly higher among those with malignant lesions (with an average size of 4.2 cm according to this study) as compared to the benign counterpart.

However, other ultrasound features like Microcalcifications, presence of cervical nodes, etc can also be considered as independent predictors of malignancy.

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