

# Association between Location of Thyroid Nodule and Risk of Malignancy

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**Abstract:- Introduction:** To identify the anatomical location of thyroid nodule and to find out association of this location with the risk of malignancy.

**Materials and Methods:** The prospective observational study was conducted in Bir Hospital from May 2020 to March 2021. A total of 35 patient with thyroid nodule were included. Ultrasonography of thyroid nodules was done to determine the laterality and polarity. Nodules of size  $\geq$ cm were considered and sent for fine needle aspiration cytology. Surgery was done for nodules with malignant features and histopathology was sent.

**Results:** The mean age was found to be 40.6 years. Thyroid nodules were common in female (82.9%) than male (17.1%). Considering laterality, 65.7% nodules were present in right lobe, 31.4% nodules were located in left lobe and 2.9% nodules were located in isthmus. When polarity was taken into consideration upper pole consisted 61.8% and lower pole consisted 31.2% nodules.

**Conclusion:** There was no association between laterality and polarity of nodules with malignancy.

**Keywords:-** Thyroid nodule; Malignancy of thyroid; Ultrasonography; fine needle aspiration cytology.

## I. INTRODUCTION

Thyroid nodule is a discrete lesion present in the thyroid gland which is radiologically distinct from the thyroid parenchyma.<sup>1</sup> It is noticed either clinically during self-palpation by the patient, or detected on physical examination or incidentally during radiologic procedure such as ultrasonography (USG) and computed tomography (CT). Thyroid nodules have been reported to be found in 4% to 7% of the population on palpation of the neck and in 30% to 50% of the population by USG examination.<sup>2</sup> While most of these nodules are benign, thyroid malignancy is found in 5–15% of cases.<sup>3</sup> USG is the most useful tool to identify suspicious features of malignancy<sup>4</sup> of thyroid. Ultrasound findings associated with malignancy are solid, hypoechoogenicity, irregular margins, microcalcifications, central vascularization, and taller than wider transverse view.<sup>5</sup>

Apart from above mentioned characters USG can also tell us about laterality of thyroid nodules i.e: left lobe, right lobe or isthmus and the polarity of nodules: upper pole, middle pole or lower pole. The next step in the evaluation of a thyroid nodule is a fine needle aspiration cytology. FNAC is considered the gold standard test for evaluating thyroid nodules.<sup>6</sup> FNAC of the thyroid nodule is reported using various classification systems and The Bethesda System for

Reporting Thyroid Cytopathology (TBSRTC) is the most commonly used system. FNAC is an accurate tool to differentiate between malignant and benign lesion with an accuracy of 89.46%.<sup>7</sup> Histopathological examination of thyroid nodule after surgery is the most accurate method to determine pathology. Hence this study was done to analyze the association between the location of thyroid nodule and risk of malignancy.

## II. MATERIALS AND METHODS

The prospective observational study was conducted from May 2020 to March 2021 in the Department of ORL - HNS, Bir Hospital after approval from Institutional Review Board of National Academy of Medical Sciences. Patients presenting to ORL -HNS outpatient with complains of thyroid swelling or cases detected by thyroid US incidentally fulfilling inclusion criteria were enrolled in the study after informed and written consent. Inclusion criteria was all patients with thyroid nodules undergoing USG, FNAC, Thyroid surgery and Histopathological evaluation within the study period. Exclusion criteria was diffuse nodule occupying whole lobe of thyroid, cases not willing to participate in study and cases not fit for surgery.

Detailed history was taken, neck examination, general physical examination was done.

USG of thyroid swelling was sent as initial investigation. USG was used evaluate the characteristics of nodules. Nodules were assessed for composition, echogenicity, margins, size, location, and multiplicity. The presence of suspicious lymph nodes was also determined and the laterality of nodules (left lobe, right lobe and isthmus). For each subject, at the time of first USG the nodules  $\geq$ 1 cm were documented. In patients who had more than one thyroid nodule, the nodule with most features of malignancy on the sonography was considered.

The location of nodules was determined (upper pole and lower pole). Assignment of the nodules to the upper vs lower pole was done by comparing the distance between the superior and inferior poles of the nodules and the corresponding pole of the gland. Upper pole lesions were those which were in upper half of the thyroid lobe and lower pole nodules were those which occupied lower half of the thyroid lobe. Thyroid nodules occupying the entire thyroid lobe were excluded from the analysis.

FNAC was generally recommended for all noncystic nodules  $\geq$ 1 cm. FNAC was performed with a 25-gauge needle after local anesthesia. Typically, two to four passes from different areas of the nodule constituted a single aspiration. The management of nodules that underwent

FNAC was determined according to Bethesda Classification of cytological results. Following this the nodules which met criteria for surgery were surgically operated, surgery was followed by histopathological examination.

A. Statistical analysis

SPSS software package (versions 16.0, SPSS, Inc., Chicago, IL, USA) was used for all statistical analyses. The results were expressed as the mean ± standard deviation. Chi - square test was used for categorical variables. P value < 0.05 was considered statistically significant.

III. RESULTS

A total number of 35 patients who underwent thyroidectomy were enrolled for the study. Out of total 35 patients, 6 were male (17.1%) and 29 were female (82.9%). Male to Female ratio was found to be 0.20.

Considering the laterality of nodules, most of the nodules were located in the right lobe (23) 65.7% followed by left lobe (11)31.4% and isthmus (1) 2.9%.

Laterality	Number	Percentage
Left lobe	11	31.4
Right lobe	23	65.7
Isthmus	1	2.9
Total	35	100

Table 1: Laterality of nodules

Of 34 nodules (1 nodule excluded as it was present on isthmus) 21 nodules (61.8%) were located in upper pole and 13 nodules (31.2%) were located in lower pole.

Out of 35 cases FNAC proved malignant cases were 16 (45.7%), benign cases were 16 (45.7%) and 3 (8.6%) were inconclusive.

FNAC Diagnosis	Number	Percentage
Benign	16	45.7
Malignant	16	45.7
Inconclusive	3	8.6
Total	35	100

Table 2: FNAC Diagnosis

In this study out of 35 nodules 15 (42.1%) were benign and 20 (57.1%) were malignant.

Histopathological diagnosis	Number	Percentage
Benign	15	42.9%
Malignant	20	57.1%

Table 3: Histopathological diagnosis Of the 20 malignant nodules, 17 were papillary thyroid carcinoma, medullary, anaplastic and others were one each.

Histopathological diagnosis	Laterality of nodules		
	Left lobe	Right lobe	Isthmus
Malignant	7	11	1
Benign	4	12	0
Total	11	23	1

Table 4: Association between laterality with histopathology:

From the study we concluded that among 23 nodules in right lobe 12 were malignant and 11 were benign. There were 11 nodules in left lobe of which 7 were malignant and 4 were benign there was one nodule in isthmus which was malignant laterality of nodules could not be associated with malignancy (p value 0.46).

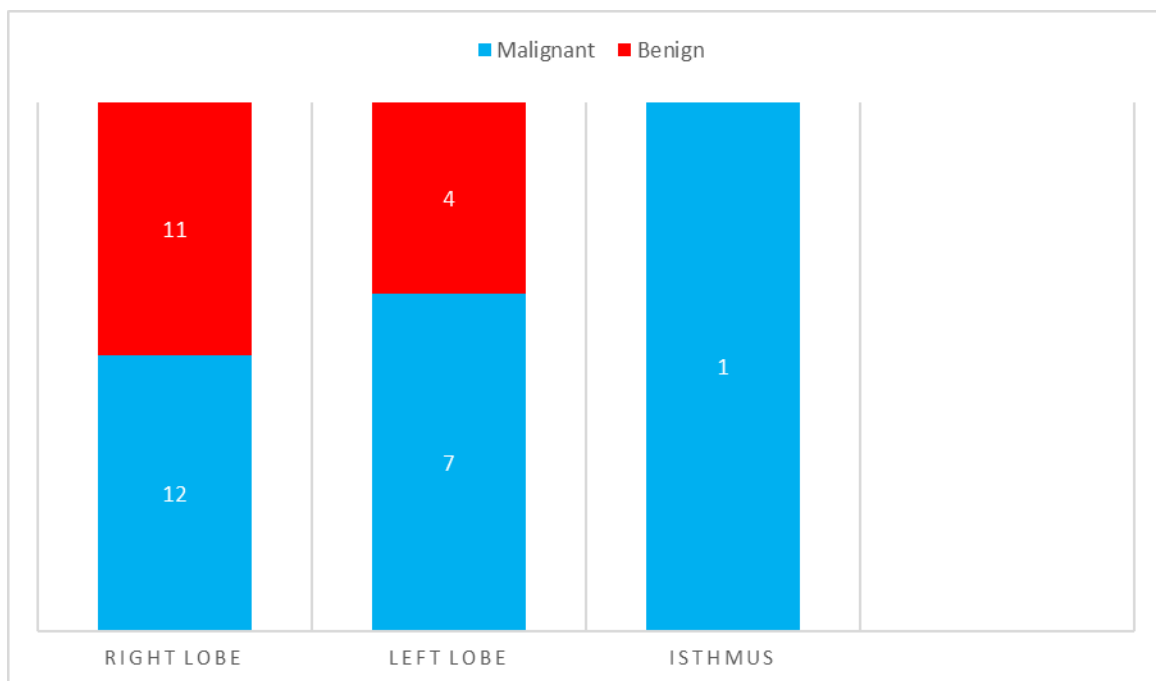


Fig. 1: Association between laterality with histopathology

Histopathology	Upper pole	Lower pole	Total
Benign	8	7	15
Malignant	8	11	19
Total	16	18	34

Table 5: Association between Polarity and Histopathology

Out of 15 benign nodules, 8 were present in upper pole and 7 in lower pole and out of 19 malignant nodules 8 were in upper pole and 11 were in lower pole while using Pearson chi square test p value=0.515, which is not significant, thus there is no association between polarity of nodules and malignancy.

#### IV. DISCUSSION

A total of 35 patients with thyroid nodules who fulfilled the inclusion criteria were included in the study. All the patients in the study underwent thyroid surgeries. Thyroid nodules have been reported to be found in 4% to 7% of the population on palpation of the neck and in 30% to 50% by USG.<sup>2</sup> The use of sonographic imaging for evaluation of the thyroid gland has led to the detection of a large number of non-palpable thyroid nodules in the general population. The main concern in evaluation of thyroid nodule is whether a lesion is benign or malignant. More aggressive treatment is needed for malignancy although only around 5% of these nodules will represent malignancy upon further evaluation.<sup>8</sup>

The minimum age of participants enrolled in the study was 18 years old while the maximum was 70 years. The mean age in this study was 40.6 years. Patients were divided into three age groups. The most common age group was 20 to 55 years age group. This was consistent with study done by Pang et al where the mean age of patients with nodular goiter was 48.1years.<sup>9</sup> In this study, out of total 35 patients, 29 were female (82.9%) and 6 were male (17.1%). In a study out of 94 cases, 87.2% of cases were female and 12.8% were male with M:F ratio 1:6.8.<sup>10</sup> According to our study, thyroid nodules were more frequent in females compared to male (29 in female and 6 in male). Similarly, 4 out of 20 malignant nodules were present in male and 16 out of 20 malignant nodules were present in females.

##### A. Laterality of nodules

Considering the laterality of nodules, most of the nodules were located in the right lobe (23) 65.9%, followed by left lobe (11) 31.4 % and isthmus (1) 2.9% as detected by USG in this study. Nodule was present in 60% in the right lobe and 32% in the left lobe in a study conducted by Majumder et al.<sup>11</sup> Psarras et al conducted a study in which the right lobe was one and a half times more frequently involved than the left.<sup>12</sup>

##### B. Polarity

Of 34 nodules (1 nodule excluded as it was present on isthmus) 21 nodules (61.8%) were located in upper pole and 13 nodules (31.2%) were located in lower pole in this study. In a retrospective study conducted in 2019 on 50 nodules by Sibai et al<sup>(13)</sup> 68% were located in the upper lobe and 32 % were located in the lower lobe which was similar to our study. The possible causes of this tropism are still unknown

except for medullary thyroid cancer, which is commonly located in the middle-upper portions of the lobes due to the normal aggregation of parafollicular C-cells<sup>14</sup>. In our study of 35 cases FNAC proved malignant cases were 16(45.7%), benign cases were 16 (45.7%) and 3 (8.6%) were inconclusive. Hang et al performed FNAC in 218 nodules and concluded that 29.5% of the nodules yielded no conclusive results as the aspirates contained only colloid materials or blood. In 68% patients, cytologic findings were benign and in 20% of cases, results of fine-needle aspiration biopsy were indeterminate .Malignant lesions were found in 60 (24%) patients in study conducted by Maxon H et al<sup>10</sup>.

In our study papillary carcinoma was 85%, medullary carcinoma was 5%, anaplastic carcinoma was 5% and others 5%. In study done by Pang et al the most common type of malignancy was papillary carcinoma (60%).<sup>9</sup> Another study by Majumder et al revealed that most common histopathological type of thyroid cancer was papillary (50%).<sup>11</sup>

##### C. Association between laterality and malignancy

From the study we concluded that among 23 nodules in right lobe 11 were malignant and 12 were benign. There were 11 nodules in left lobe of which 7 were malignant and 4 were benign. There was one nodule in isthmus which was malignant.

Jasim et al<sup>15</sup> concluded thyroid nodule location is an independent risk factor in predicting the risk of thyroid cancer. Naour et al<sup>16</sup> conducted a retrospective study, where the nodule location, size and hypoechoic features have not been associated with the thyroid cancer. V Ramundo et al conducted a prospective study in which, the prevalence of malignancy was not significantly different in isthmus, right, or left lobe.<sup>17</sup>

In our study out of 15 benign nodules, 8 were present in upper pole and 7 in lower pole and out of 19 malignant nodules 8 were in upper pole and 11 were in lower pole. Jasim et al concluded thyroid nodule location is an independent risk factor for predicting the risk of thyroid malignancy.<sup>15</sup> V Ramundo et al conducted a prospective study where he concluded that upper pole location demonstrated slight significant association with malignancy<sup>17</sup> In study done by Zhang et al higher frequency of malignancy was observed in upper pole nodules compared to lower pole nodules.<sup>4</sup> Sibai et al concluded that nodules in the upper lobe were 9.6 times more than in the lower lobe.<sup>13</sup> In the study by M. Andrioli et al they concluded that the localization of a thyroid lesion has no importance in distinguishing between benign and malignant nodules.<sup>18</sup> Psarras et al concluded the location of the thyroid nodule was not helpful in predicting malignancy.<sup>12</sup>

## V. CONCLUSION

There was no association between laterality of nodules and polarity of nodules with malignancy.

### • Abbreviations

CT- Computed Tomography

FNAC – Fine Needle Aspiration Cytology

ORL-HNS – Otorhinolaryngology head and neck surgery

TBSRTC – The Bethesda System for Reporting Thyroid Cytopathology

USG – Ultrasonography

• **Conflict of interests:** There is no conflict of interest

• **Author's Contribution:** Protocol development, Data collection and analysis, Manuscript writing and editing.

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