

Histopathological Spectrum of Thyroid Neoplasm - A Retrospective Study Done at Tertiary Cancer Care Hospital

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ABSTRACT

Thyroid lesions are fairly common & have a wide spectrum of diseases ranging from functional, immune mediated to neoplastic lesions. All thyroidectomy specimens were included in the study period of 1.5 years from September 2019 to February 2021 at our institute, a total of 10,200 biopsies were sent to our department for histopathological examination, out of which 7200 were diagnosed as malignant cases, of which 408 (5.6%) cases were thyroid cancer (TC) cases. One hundred forty-five (35.53%) out of 408 TC cases underwent thyroid surgeries, fifty consecutive cases who fulfilled the inclusion criteria were registered in our study. All grossed, processed, stained sections of haematoxylin and eosin were reviewed and observed under microscope. Average age of the patients suffering from TC was found 44.80 years. Female preponderance seen with F:M-1.38:1. Most common location of tumor was Right lobe of thyroid (32%) followed by Left Lobe (26%). Malignant lesions (96%) predominated over Benign lesions (4%). Papillary carcinoma thyroid was the most common malignancy (72%) followed by Follicular carcinoma (14%). Both benign cases were of Trabaecular Adenoma (4%). Majority of tumors were Unifocal (62%) followed by Mutlifocal (38%).

Keywords: Thyroid Neoplasm, Benign and Malignant lesions

INTRODUCTION

Thyroid lesions are fairly common worldwide and are commonly encountered in clinical practice. The estimated occurrence of palpable thyroid nodules in the general population ranges from 4 to 7%.^[1] A survey conducted by World Health Organization (WHO) in 2010 revealed that there were around 44,670 new cases of thyroid carcinoma (TC) and 1,690 deaths caused by the disease every year.^[2] A Surveillance, Epidemiology, and End Results Program (SEER)-based study found that from 1975 to 2009 there was a three-fold increase in incidence rates, from 4.9 to 14.3 per 100,000 individuals, while mortality rates stayed constant at 0.5 deaths per 100,000.^[3] For the past several decades TC has been the most common endocrine tumor, being 9th leading type of cancer with a 5% increase in incidence each year. TC is the sixth most common cancer in women and are four times more common in females than males. In India, TC incidence rate in

women is increased from 2.4 to 3.9. The mean age of patients at diagnosis of TCs is 44 years, with risk group ranging from 33-55 years.^[4,5]

Majority of thyroid swellings are non-neoplastic, only <5% are malignant. Thyroid lesions may be developmental, inflammatory, hyperplastic and neoplastic.^[6] About 95% of the TCs happen sporadically and inherited in 55%. As it is a known fact, malignancies arise due to the accumulation of mutations in genes that directly monitor cell growth and death. It is reported that TCs are more localized in the right lobe as compared to left lobe however TCs arising from the isthmus have a worse prognosis compared with patients with lesions located elsewhere.^[7,8]

The dietary risk factors illustrated in literature are found to be associated with excessive caloric intake, excess of protein and carbohydrate, intake of nitrite, nitrates through drinking water or food intake along with reduced vitamin D, selenium levels and body fatness specially abdominal fatness. However substantial amount of alcohol intake is found to be protective for TCs. (>15gram /day alcohol specially wine).^[9,10]

The non-dietary risk factors of TC include smoking, pesticides, Persistent Organic Pollutants, Endocrine disrupting chemicals, Bisphenol A, phthalates (exposure more than 1.7–52.1 µg/kg/day), metals (such as chromium, copper, magnesium, iron, zinc) and Polychlorinated Biphenyl, Perfluorinated compounds. Radiation exposure, family history, lymphocytic thyroiditis (LT) predisposes for TC.^[11,12]

It usually presents as an asymptomatic neck mass or occasionally detected on routine radiological investigation. Hoarseness of voice, difficulty in deglutition, dysphonia or cough suggests locally advanced disease in symptomatic patients.^[13] Over 90% of thyroid cancers are sporadic, with less than 10% being familial. Tumors frequently have genetic alterations leading to the activation of the mitogen- activated protein kinase signaling pathway common mutations in are

point mutations of the *BRAF* and *RAS*, *TERT* gene and *RET/PTC* rearrangement.^[14]

Significant number of studies are available in the literature depicting the prevalence of statistically significant interobserver and intraobserver variation in histologically categorizing the benign and malignant thyroid malignancies with morphological overlapping.^[15] The gold standard in diagnosis of thyroid lesions is pathologic evaluation using routine hematoxylin and eosin (H and E) staining. However, diagnostic dilemma regarding the morphological overlap between various thyroid neoplasms presents a big challenge for the pathologists.^[16]

MATERIAL AND METHODS

A retrospective analysis based on data retrieved from the Pathology Department at Bhagwan Mahaveer Cancer Hospital and Research Centre across a study period of 1.5 years was conducted. The histopathology reports of thyroid neoplasm patients were undertaken from September 2019 to February 2021.

The following inclusion criteria of patients for this analysis were as follows: (a) All Lobectomies / Hemithyroidectomy / Subtotal Thyroidectomy / Near Total Thyroidectomy / Total Thyroidectomy specimens received at the Pathology department, BMCHRC during study period (b) All age group and both genders are included (c) All thyroid lesions including benign as well as malignant. The exclusion criteria included: (a) Incisional biopsies of thyroid lesions (b) Outside operated cases (where no details are available).

The study was approved by Ethical Committee and informed consent was obtained, a total of 14,507 patients visited the hospital for various ailments and 10,200 biopsies were sent to our department for histopathological examination, out of which 7200 were diagnosed as malignant cases. Of the 7200 malignant cases, 408 (5.6%) cases were thyroid malignancies.

One hundred forty five (35.53%) out of 408 thyroid cancer underwent thyroid

surgeries, Fifty consecutive cases who fulfilled the inclusion criteria were registered in our study. Relevant history, examination findings, age and clinical diagnosis were recorded from hospital registration form. Gross examination findings of specimens were recorded. All grossed, processed, stained sections of haematoxylin and eosin were reviewed and observed under microscope. All the cases were reported as per CAP protocol Thyroid.

RESULT

Age range in this study varies from 22 to 77 years. Youngest case was of 22 years and oldest was 77 years of age. Maximum cases were in >50 age group. The median age for both Male & Female was 44.80 years & standard deviation was 15.04 as illustrated in Table 1. 58% Patients were Female while remaining 42% were Male, Incidence ratio of Females: Males is 1.38:1 shown in Table 2. Most common Laterality for Malignancy was found in Right Lobe (32%) followed by Left Lobe (26%) then Bilateral Lobe (20%) and Bilateral Lobe along with Isthmus (14%) and each 4% by Isthmus and Left Lobe along with Isthmus. 4% of patient had Benign etiology where as 96% patients had Malignant tumors.

In present study, Histological subtypes were categorized. All Benign cases 4 % were Trabecular Adenoma whereas among Malignant majority were Papillary carcinoma around 72% followed by lesser common Follicular carcinoma 14% and least among all Follicular variant of Papillary carcinoma (FVPCT) 10% as shown in Table 3. (1/2) Benign case underwent Lobectomy and other (1/2) underwent Total Thyroidectomy. Majority of the patients underwent Lobectomy 58% followed by Sub- total Thyroidectomy 20%, Total Thyroidectomy 14% and 4% each cases undertook Hemithyroidectomy and Isthmectomy. Majority patients undergoing Lobectomies were stage I, with no contralateral neck and no capsular involvement and were kept under observation as per NCCN guidelines.

Lateral Neck Dissection (36%) was the most common type of Neck Dissection followed by Lateral and Central Neck Dissection (32%) and 4% had Central Neck Dissection. However in 28 % cases Neck was not addressed as shown in Table 4. In present study, Among Benign cases (1/2) cases were each Multifocal and Unifocal. Overall data shows Majority Tumors were Unifocal (62%) whereas Multifocal were 38%.

Table 1: Age wise Distribution of Cases

Age group (in years)	No.	%
< 30	8	16.00
31-40	13	26.00
41-50	12	24.00
> 50	17	34.00
Total	50	100

DISCUSSION

The present study was carried out in department of pathology at Bhagwan Mahaveer Cancer Hospital and Research

Table 2: Sex Wise Distribution of Case

Sex	No	%
Male	21	42.00
Female	29	58.00
Total	5	100.00

Centre, Jaipur from September 2019 to February 2021. Fifty consecutive cases who fulfilled the inclusion criteria were registered in our study. They were analyzed with respect to age, sex, laterality, type of surgery done, type of neck clearance, focality and histological subtype.

In a study done by Beigh et al, conducted on 282 thyroid specimens, reported the peak age of incidence reported was 40-49 years age group for benign neoplasms and 20-29 years age group for malignant neoplasms.^[17] Fatima et al conducted study on 120 cases, showed peak age of 30-40 years.^[18] Gopal MR et al^[6] did study on 72 cases of thyroid lesions, maximum number of lesions were seen in patients in the age group of 31 - 40 years for thyroid diseases and Islam et al showed the majority of the patients were within 21- 40 years of age.^[19] In present study among all 50 cases seen, 48 were malignant (96%) and only 2 were Benign (4%). The Benign lesions were found in age

group of 31-50 years, one being 33 years and other being 46 years which are consistent with above mentioned studies. Increased incidences of TC in females are observed across different countries and ethnicities. With incidence rate ratio of ranging from 5:1 to 3:1 (female to male) has been found.^[20,21] Study conducted by Sreedevi AR et al on 620 thyroidectomy specimens, classified them into neoplastic and non-neoplastic lesions based on histology, with female predominance over males.^[22] In present study, Male to female ratio was 1.38:1, with Male 42% and Females 58% which is consistent with above studies.

Study done by Modi M et al on 100 thyroid specimens ranging in age from 6-70 years stated Follicular Adenoma (FA) and Papillary thyroid carcinoma (PTC) is the most common type of Benign and Malignant thyroid tumor.^[23] Study conducted by Sreedevi AR et al on 620 thyroidectomy specimens, classified them into neoplastic and non-neoplastic lesions based on histology. PTC and FA are the commonest malignant & benign lesion respectively.^[22] Fatima et al conducted study on 120 cases classified thyroid lesions into neoplastic & non- neoplastic based on histological grounds, stated PTC and FA being commonest malignant and benign lesion.^[24] In present study, Only 4% Benign cases encountered were of Trabecular Adenoma and among malignant cases 72% cases were PTC followed by FVPCT 10% and 14% cases of FC. The findings are consistent with among mentioned studies.

Table 3: Histological Subtypes in 50 cases of Thyroid Neoplasm

HISTOLOGICAL SUBTYPE	No. of cases	%
Follicular carcinoma	7	14.0
Follicular Variant of Papillary Carcinoma	5	10.0
Papillary Carcinoma	36	72.0
Trabecular Adenoma	2	4.0
Total	50	100.0

Pastorello R et al conducted study on total 9535 thyroid lesions and It is reported that Thyroid lesions are more localized in the

right lobe as compared to left lobe and Isthmus subsequently.^[25]

In present study, the most common location of tumor was found in Right Lobe (32%), followed by Left lobe (26%), Both lobes were involved in 20% cases, All lobes comprising of Bilateral lobe and Isthmus were involved in 14% cases. 4% each cases were present in Left Lobe with Isthmus and Isthmus subsequently.

Table 4: Distribution of cases according to type of Neck Clearence

TYPE OF NECK CLEARENCE	No. OF CASES	%
Central	2	4.0
Lateral	18	36.0
lateral+central	16	32.0
Not Done	14	28.0
Total	50	100.0

Rageh TM et al study conducted on 50 cases each of multifocal and unifocal tumor stated the incidence of multifocal tumor incidence being ranging from 18 to 87 % cases supported by literature. However no specific proportionate individual incidence is commented.^[26] In present study done on 50 cases, 38% cases were multifocal followed by 62% cases unifocal. The findings are consistent with above findings.

The extent of surgery is debatable in thyroid context. Surgery being the main stay of treatment followed by I¹³¹ Radio-iodine therapy recommended in majority of the cases. Study done by Mazzaferri EL et al on 1355 TC had stated surgery being the main provision for stage II, III cases 51.55% comprising of total or near total thyroidectomies (Lobectomy, Isthmusectomy or contra-lateral subtotal thyroidectomy), 32.177% cases underwent minor biopsy procedures for lesions, the recurrence rate was significantly high in second group (40%) as compared to first (26%).^[27]

In present study, all cases including benign and malignant cases underwent surgical maneuvers. Majority of the cases 58% underwent Lobectomy followed by sub-total thyroidectomy in 20% cases, 14% underwent total thyroidectomy, 4% each underwent Hemithyroidectomy and

Isthmusectomy. In the follow-up done for 2 year study duration, 2% cases showed recurrence and 2% (PCT case with distant metastasis) showed mortality, Remaining (31/48) cases 64.58% were under I131 radio-iodine therapy and undergoing yearly thyroidal scans. However, 29.166% failed to follow-up following years. The findings were consistent with above study.

Contexts in regards to lymphadenectomy in TC especially PTC remain controversial. Selective lateral neck dissection should be performed when there is clinical evidence of nodal disease in the lateral neck compartments. The central neck dissection is found beneficial in various thyroid surgeries for reducing recurrence. However the central compartment addressing is found sufficient in cases of isthmus PCT.^[8] In present study, majority of the malignant cases 36% underwent selective neck dissection with clinically evident disease followed by 32% cases with lateral and central neck dissection, 2% cases undergoing central neck dissection with lesion located in isthmus. In 14% cases however the neck was not addressed. The findings are consistent with above study.

CONCLUSION

In present study, average age of the patients suffering from TC is 44.80 years. Female preponderance was noted (F:M=1.38:1). Most common location of tumor was Right lobe of thyroid (32%) followed by Left Lobe (26%). Among all thyroid neoplasms Malignant lesions (96%) predominated over Benign lesions (4%). PTC was the most common malignancy (72%) followed by Follicular carcinoma (14%) among Malignant lesions whereas both benign cases were of Trabecular Adenoma (4%). Majority of tumors were Unifocal (62%) followed by Multifocal (38%). The present study highlights the importance of histomorphological typing of thyroid lesions for their better management.

Declaration by Authors

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