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RESEARCH ARTICLE

HISTOLOGICAL UPDATE OF THYROID LESIONS: A 5 YEAR STUDY

Dr. Shete Smita, *Dr. Khiste Jayashree, Dr. Pandit, G. A., Dr. Swati Jindal and Dr. Vidiya Gurude

Dr. VM Medical College, Solapur, Maharashtra

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ABSTRACT

The aim of this study is to review the histological types of thyroid lesions, their sex variation and mean age of presentation as well as toupdate available literature on prevalence of the common thyroid lesions. This study analyse the data from September 2008 to October 2013. Total 127 specimens of thyroid were studied. Non-neoplastic lesions (99 cases-78%) were more common than neoplastic lesions (28 cases- 22%). The most common entity was goiter (87.87%) amongst non-neoplastic lesions. Follicular adenoma was the most common benign lesion (14 cases-15%) and papillary carcinoma was the most common malignant lesion (9 cases- 32.15%). Common age incidence was 3rd to 5th decade of life with female predominance (F:M:8:1).

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INTRODUCTION

Thyroid gland is unique among endocrine organs in many ways. It is the largest endocrine gland in the body and first to develop in fetal life. (Chandanwale *et al*., 2012) Because of its superficial location, it is the only one that is amenable to direct physical examination and biopsy. (Carcangiu and DeLellis, 1996) It is estimated that there are at least forty million individuals with thyroid disease in India. Most of them are women (James and Vineeth Kumar, 2012). Thyroid gland has been the subject of intense research and considerable attention due to the wide spectrum of diseases, ranging from functional and immunologically mediated enlargements to neoplastic lesions (Vander *et al*., 1968). The enlargements may be diffuse or nodular at times causing obvious physiological changes. In contrast, patients having papillary carcinoma of thyroid with secondaries in lymph node may remain asymptomatic till a very late stage. (Carcangiu and DeLellis, 1996) Occasionally a patient may present with obvious metastatic disease with an undetectable primary lesion (occult/ hidden malignancy of thyroid). Thyroid carcinomas are the most common endocrine tumor. (NajumulHaq *et al*., 2009) It accounts for approximately 1% of all malignancies. (Vander *et al*., 1968; Najumul Haq *et al*., 2009) Thyroid cancer is more prevalent in females as compared to males and it is more common in third to fifth decade of life (Hussain *et al*., 2005). Hormonal factors, lactational suppressant drugs and fertility medications have been implicated for the high incidence of thyroid carcinoma in females. (NajumulHaq *et al*., 2009; Memon *et al*., 2002) World Health Organization (WHO) has classified seven percent of world population as suffering from clinically apparent goiter. Most patients are in developing countries, where the disease is attributed to iodine deficiency. (Kally and Snedden, 1985) Based on WHO classification (2004)[9] we have classified our neoplastic lesions.

Corresponding author: Dr. Khiste Jayashree,
Dr. VM Medical College, Solapur, Maharashtra

MATERIALS AND METHODS

All surgical specimens of thyroid lesions during the study period were studied. Thorough and meticulous gross examination was done. After fixation in 10% formalin, tissue bits were processed and paraffin embedded blocks were prepared. In case of encapsulated lesions, adequate representative area from tumor capsule-thyroid interface was given. On 5µ thick sections haematoxylin and eosin staining was done. Special stains (e.g. congo red) and immunohistochemistry were used whenever required.

RESULTS

During a period of 5 years from September 2008 to October 2013 a total number of 9868 surgical specimens were received, out of which 127 specimens were belonging to thyroid gland.

So the thyroid lesions in our study constituted 1.29% of all surgical specimens. Table 1 shows frequency of individual thyroid lesion.

Table 1. Frequency of individual thyroid lesion

Type of lesion	Total No.	Percentage (%)
NON-NEOPLASTIC	99	78
1.Thyroglossal duct cyst	05	3.94
2.Goiter	87	68.50
3.Hashimoto thyroiditis	07	5.51
NEOPLASTIC	28	22
A)Benign	15	11.81
1.Follicular adenoma	14	11.02
2.Hurthle cell adenoma	01	0.78
B)Malignant	13	10.24
1.Papillary carcinoma	09	7.09
2.Follicular carcinoma	01	0.78
3.Hurthle cell carcinoma	01	0.78
4.Medullary carcinoma	01	0.78
5.Undifferenciated carcinoma	01	0.78
Total	127	100

The commonest age group affected was 3rd -5th decade. Female predominance was noted with F:M ratio of 8:1 having 113 females (88.9%) and 14 males (11.03%). Neck swelling moving with deglutition was the most common presenting symptom followed by hoarseness of voice.

Maximum patients were euthyroid 111(87.40%), 12 patients were hypothyroid (9.44%) and 4 were hyperthyroid (3.14%). Table 2 shows distribution of non-neoplastic lesions of thyroid and Table 3 shows distribution of neoplastic lesions of thyroid.

Table 2. Distribution of non-neoplastic lesions of thyroid

Type of lesion	Total No.	Percentage (%)
1.Thyroglossal duct cyst	05	5.05
2.Goiter	87	87.87
3.Hashimoto thyroiditis	07	7.07
Total	99	100

Table 3. Distribution of neoplastic lesions of thyroid

Type of lesion	Total No.	Percentage (%)
A)Benign	15	53.57
1.Follicular adenoma	14	50
2.Hurthle cell adenoma	01	3.57
B)Malignant	13	46.43
1.Papillary carcinoma	09	32.15
2.Follicular carcinoma	01	3.57
3.Hurthle cell carcinoma	01	3.57
4.Medullary carcinoma	01	3.57
5.Undifferentiated carcinoma	01	3.57
Total	28	100

Table 4. Comparison of benign and malignant neoplasms of thyroid in different studies

Author	Year	Benign	Malignant
Nagori *et al*. (1992)	1992	80%	20%
Hussain *et al*. (2005)	2005	49.74%	50.26%
Khadilkar *et al*. (2008)	2008	38.24%	61.76%
Bukhari *et al*. (2008)	2008	40%	60%
Tarrar *et al*. (2010)	2010	86.67%	13.33%
Hanumanthappa *et al*. (2012)	2012	90%	10%
Ahmed *et al*. (2013)	2013	75%	25%
Present study	2013	53.57%	46.43%

Table 5. Comparative study of goiter in all thyroid lesions

Author	Year	Percentage (%)
Bron *et al*. (2004)	2004	72.54
Hussain *et al*. (2005)	2005	64
Khadilkar *et al*. (2008)	2008	66
Tarrar *et al*. (2010)	2010	69.23
Present study	2013	68.50

Table 6. Comparative study of Hashimoto thyroiditis in all thyroid lesions

Author	Year	Percentage (%)
Darwish *et al*. (2006)	2006	7
Swamy *et al*. (2011)	2011	6.66
Present study	2013	5.51

In the present study, there were 87 cases of goiter(68.50%) which were diagnosed as colloid goiter (51), multi- nodular goiter (36). The age range was 19-68 years, 82 were females and 5 were males.

All the 7 cases of Hashimoto thyroiditis were female with age ranging from 29 to 60 years. Grossly, cut surface was homogenous pale in appearance. Microscopically, follicles were atrophied and showed prominent oncocytic change of lining epithelium. Stroma showed dense and diffuse infiltration by lymphocytes forming lymphoid follicles with prominent germinal centers (Fig.1).

In follicular adenoma (14 cases- 11.02%) age ranged from 22 years to 42 years with 13 females and 1 male. Grossly, all adenomas were well circumscribed, encapsulated tumors with uniform gray-white cut surface. Microscopically, tumor was surrounded by thin fibrous capsule and thyroid tissue outside the capsule was compressed.

In single case of Hurthle cell adenoma (0.78%), cut surface was tan brown in colour. Microscopically, Hurthle cells having abundant granular eosinophilic cytoplasm arranged in follicular pattern were noted.

In the present study 9 cases of papillary thyroid carcinoma (32.15%) with age range 20-60 years were noted with 6 females and 3 males. On histological examination, 7 cases showed complex branching papillae and diagnosed as classical papillary thyroid carcinoma and two cases diagnosed as follicular variant of papillary thyroid carcinoma. All the nine cases of papillary thyroid carcinoma showed cells with ground glass nuclei, nuclear overlapping and nuclear grooving. Psammoma bodies were seen in 5 cases (Fig.2). Both cases of follicular variant of papillary thyroid carcinoma showed no evidence of metastasis. Two cases of classical papillary thyroid carcinoma showed cervical lymph node metastasis.

One case of follicular carcinoma (3.57%) was 66 years old female. Cut surface of tumor was light-tan to brown in colour. Microscopically, tumor showed round to oval cells having hyperchromatic nuclei with wide capsular as well as vascular invasion. One case of Hurthle cell carcinoma (3.57%) was 42 years female. Cut surface of tumor was tan-brown. Tumor cells were pleomorphic with abundant eosinophilic granular cytoplasm and showed capsular and vascular invasion. Single case of medullary carcinoma (3.57%) was 27 years

female with tumor having gray-white cut surface and microscopically polygonal and spindle shaped cells. Stroma showed amyloid deposits.

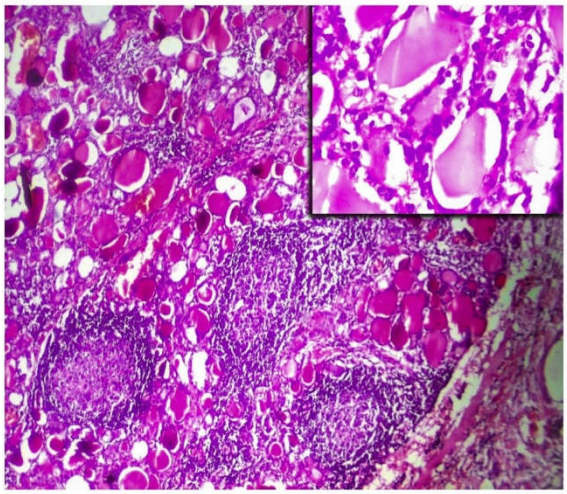

Fig 1: Photomicrograph of Hashimoto thyroiditis showing lymphoid follicles with germinal centers (H&E X 40). Inset shows follicles with Hurthle cell change (H&E X 400).

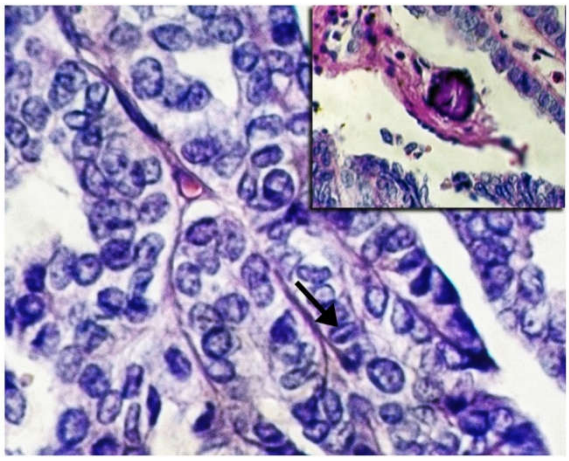

Fig 2 : Papillary carcinoma of thyroid showing papillary projections with fibrovascular cores and nuclear groove (arrow) (H&E X 400). Inset shows psammoma body.

Adjacent lymph node was replaced by tumor with amyloid deposition which was demonstrated by Congo red stain. Immunohistochemistry showed that the tumor cells were strongly positive for calcitonin and carcinoembryonic antigen (CEA) (Fig. 3,4).

Single case of anaplastic carcinoma (3.57%) was nodular with white-tan cut surface. Microscopically two types of cells, malignant spindle cells and squamous cells were noted. Areas of necrosis, capsular and vascular invasion were seen. Immunohistochemistry showed the spindle cells were positive for vimentin and epithelial component showed focal positivity for cytokeratin (CK19) (Fig.5).

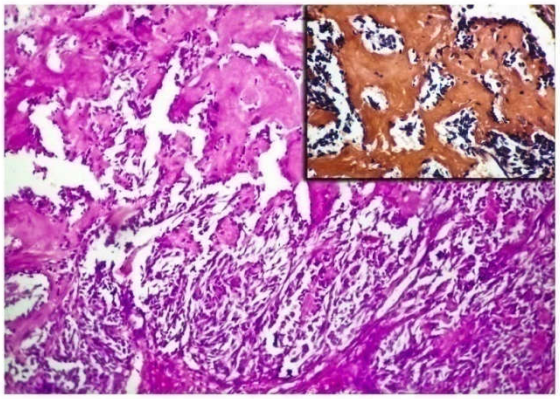

Fig 3 : Photomicrograph of medullary carcinoma showing amyloid deposition in stroma (H & E X100). Inset shows Congo red positivity.

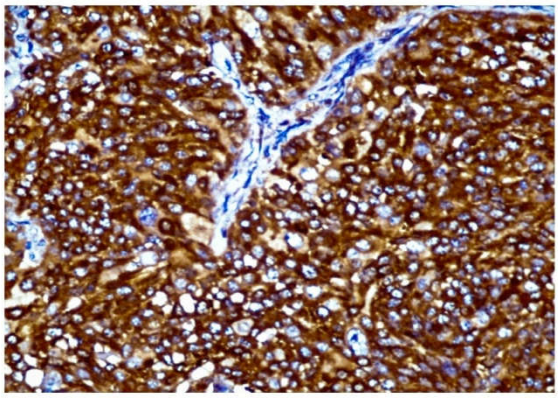

Fig 4 : Photomicrograph of medullary carcinoma tumor cells showing immunoreactivity for calcitonin.

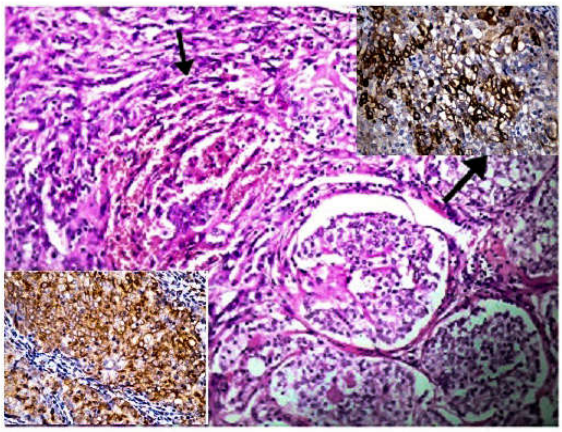

Fig 5: Photomicrograph of anaplastic carcinoma thin arrow showing spindle cells and thick arrow showing squamous cells component. (H&EX400) Left corner showing immunoreactivity for vimentinin spindle cells and right corner shows immunoreactivity for CK19 in squamous component

DISCUSSION

The thyroid lesions in our study constituted 1.29% of all surgical specimens which are correlated with the study of Arora *et al*. (2006), Ahmed *et al*. (2013) and Darwish *et al*.

(2006) In the present study, highest number of cases were seen in the 4th decade which was in accordance with Nagori *et al*. (1992), Khadilkar *et al*. (2008), Tarrar *et al*. (2010) studies. Female predominance was seen in both the non-neoplastic and neoplastic lesions in our study as well as in studies of Nagori *et al*. (1992), Khadilkar *et al*. (2008), Hanumanthappa *et al*. (2012) and Ahmed *et al*. (2013). Hanumanthappa *et al*. (2012) stated that the higher number of cases among females may be due to hormonal factors which are involved in its pathogenesis.

Thyroid function test in evaluation of thyroid lesions

In our study of 127 cases, 111 patients were euthyroid, 12 patients were hypothyroid and 4 were hyperthyroid. Most of the cases of neoplastic thyroid lesions were euthyroid. Chandanwale*et al*[1] stated that thyroid function test is just a preliminary tool in evaluation of nodular lesions of thyroid.

Goiter

In the present study, goiter was the most common lesion (87cases-68.50 %) In our study, the age ranged from 19 years to 70 years and female predominance was seen. Our findings were comparable with studies of Khadilkar *et al*. (2008) and Haq *et al*. (2009).

Hashimoto thyroiditis

Frequency of Hashimoto thyroiditis is comparable with other studies

Benign lesions
Follicular adenoma

We found 14 cases of follicular adenoma constituting 11.02% ofall thyroid lesions and 50% of all neoplastic lesions. Our observation was closely related with the studies by Hussain *et al.* (2005) and Tarrar *et al.* (2010) Female predominance was observed in the present study. The age ranged from 29 to 42 years with F:M ratio 13:1. Our findings were correlated with Ahmed *et al*. (2013), Shah *et al*. (1983) (F:M ratio 16:1) and Darwish *et al*[10].

Hurthle cell adenoma

Single case of Hurthle cell adenoma (0.78%) of all thyroid lesions and 3.57% of all thyroid neoplasms was observed in 45 years old male.

Malignant lesions

Table 7 shows comparative study of malignant lesions

Table 7. Comparative study of malignant tumors in all thyroid lesions

Author	Year	Percentage (%)
Benzarti *et al*. (2002)	2002	9.5
Bron *et al*. (2004)	2004	8.5
Abdelshaheed (2003)	2006	9.09
Hanumanthappa *et al*. (2012)	2012	10
Present study	2013	10.23

Papillary Thyroid Carcinoma (PTC)

Papillary thyroid carcinoma was the most common malignant tumor in studies of Hussain *et al*. (2005) (77.84%), Arora *et al*. (2006) (54.54%), Khadilkar *et al*. (2008) (61.90%), Iqbal *et al*. (2010) (65.95%), Ahmed *et al*. (2013) (75%) and our study (69.23%). Female predominance was seen in our study and in all the above studies.

Follicular carcinoma

Single case of follicular carcinoma constituted 0.78% of all thyroid lesions and 7.69% of all thyroid malignancies. The patient was 66 years old female. This finding is correlated with study of Haq *et al*. (2009).

Hurthle cell carcinoma

We got a single case of Hurthle cell carcinoma constituted 0.78% of all thyroid lesions and 7.69% of all thyroid malignancies.

Medullary carcinoma

Single case of medullary carcinoma in 27 years old female constituted 7.69% of all malignant tumors. Our result was comparable with Arora *et al*. (2006) (6.6%) and Iqbal *et al*. (2010) (7.4%). Immunohistochemical test was done, the tumor cells were strongly positive for calcitonin and CEA. Stroma showed amyloid deposition and showed positive staining for congo red.

Anaplastic (undifferentiated) carcinoma

Single case of anaplastic carcinoma in a 46 years female constituted 0.78% of all thyroid lesions and 7.69% of all malignant tumors. Our result was comparable with the study by Nagori *et al*. (1992) (9.09%) and Swamy *et al*. (2011) (9.09%). In our study immunohistochemical report showed the spindle cells were positive for vimentin and epithelial component showed focal positivity for CK19.

Conclusion

The present work is an attempt to study the frequency and histomorphological details of various thyroid lesions, to analyseand correlate them with clinical data. Histopathological studies not only help in pinpointing the diagnosis, but also help in deciding the line of treatment. The management of thyroid neoplasms depends upon the histopathological type of thyroid cancer, as the treatment offered to different thyroid cancer is different.

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