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The Analysis of Clinical Biological and Pathological Features in Papillary Thyroid Carcinoma

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Abstract: Papillary thyroid carcinoma (PTC) is one of the most common thyroid tumors in clinic. The incidence of papillary thyroid carcinoma is increasing year by year, especially in Cangzhou area, which brings great physical and mental pain to patients. *Object:* The understanding is further strengthened, and the level of diagnosis and treatment is improved, through the analysis of the biological and clinicopathological characteristics of papillary thyroid carcinoma. *Method:* Hospitalized cases with papillary thyroid carcinoma were collectedand biological and pathological characteristics were analyzed. *Result:* Among 110 cases of papillary thyroid carcinoma, 11 cases were male (10%), 99 cases were female (90%). There was no significant difference in invasiveness, lymph node metastasis, proportion of papillary microcarcinoma, number of lesions and involvement of glandular lobe, which were divided into groups according to different ages and different genders, ($P>0.05$). The average age of 46 cases with invasion was younger than that without invasion ($P<0.001$). There was less invasion and lymph node metastasis in papillary microcarcinoma ($P<0.001$). 16 cases of Hashimoto's thyroiditis were female, the average age of onset was higher, the difference was statistically significant ($P<0.001$) and TSH level was also higher than the patients without Hashimoto's thyroiditis ($P<0.05$). *Conclusion:* There was no significant difference in the clinicopathological characteristics of papillary thyroid carcinoma in different age groups and gender groups, but in the invasive study, the average age of patients with invasion was lower. Patients with papillary microcarcinoma are less likely to have invasion and lymph node metastasis. TSH levels are generally high in patients with Hashimoto's thyroiditis.

Keywords: Thyroid Papillary Carcinoma, Pathological Features, Analysis

1. Introduction

The incidence of thyroid cancer (TC) is the first in the head and neck tumors, and it is the most common endocrine system malignant tumor in clinic. Worldwide, the incidence of TC has been increasing rapidly in recent decades, and the number of cases has increased sharply in the past 10 years. In 2018, there were 567,000 new cases of TC globally, accounting for 3.10% of all cancers, ranking ninth in the world and seventh in China [1]. Among them, papillary thyroid carcinoma (PTC) is the most common; PTC is divided into more than ten different subtypes, and its biological characteristics are different, including gender, age, invasiveness, lymph node metastasis, proportion of micropapillary carcinoma, and lesions The number and involvement of glands and so on. Some subtypes (such as high cell type, columnar cell type, etc.) are highly invasive and prone to recurrence or metastasis. People pay attention to this disease because it has a huge impact on patients' lives and brings great physical and psychological pain to patients, despite the degree of malignancy is lower [1-2]. It is of great significance for the diagnosis of this disease, the selection of treatment options and the prognosis, by studying the biological and pathological characteristics of papillary thyroid carcinoma. We have analyzed the incidence, the distribution, clinical characteristics and pathological characteristics and have looked for some disease laws and clinical characteristics by summarizing the case data of papillary thyroid carcinoma in a

hospital from January 1, 2019 to June 30, 2020 in order to further improve the level of specialist diagnosis and treatment of papillary thyroid carcinoma, and better respond to the prevention and treatment of tumors.

2. Materials and Methods

2.1. Materials

Retrieve the data on the home page of the medical record from a hospital's medical record management system and set the search conditions: the discharge time is from January 1, 2019 to June 30, 2020, and all cases whose main diagnosis code is C73 and pathologically diagnosed as papillary carcinoma are taken as research object. A total of 110 cases of papillary thyroid carcinoma were detected, in using the above search conditions.

2.2. Statistic Method

The SPSS19.0 software is used for date analysis and processing. The measurement data is expressed by (±s), the count data is expressed by frequency and percentage, the t test is used for the comparison of quantitative data, and the $\chi 2$ test is used for the comparison of qualitative data. The difference is statistically significant with $P<0.05$.

3. Results

3.1. General Situation

110 cases of papillary thyroid carcinoma were chosen to be study objects, among which there were 11 male cases (10%) and 99 female cases (90%), the male to female ratio is 1:9. The age of the cases ranges from 16 to 79 years, with an average age of (51.98±11.24 years). The average age of males is (52.43±10.56 years), and the average age of females is (54.62±10.26 years). The average age of females is higher than that of males and the difference has statistical significance (t=4.932, P=0.000).

3.2. Pathological Characteristics

Among 110 cases of papillary thyroid carcinoma, 61 cases were younger than 55 years old (55.45%), 49 cases were older than 55 years old (44.55%), Among the pathological types, there were 60 cases of micro papillary carcinoma, accounting for 54.55%, and 50 cases of non-micro papillary carcinoma, accounting for 45.45% (Figure 1); 46 cases (41.82%) had invasion, 64 cases (58.18%) had not invasion; 68 cases (61.82%) were single focus and 42 cases (38.18%) were multiple focus; 16 cases were associated with Hashimoto's thyroiditis, accounting for 14.55%. (Table 1)

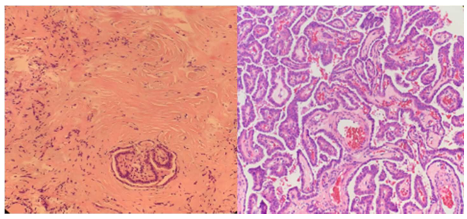

Figure 1. *The left is non-micropapillary thyroid carcinoma×200, and the right is thyroid micropapillary carcinoma×200.*

Table 1. *Statistics of pathological characteristics of papillary thyroid carcinoma.*

Item	Classification		Numbers	Total	Percentage
Age	Younger than 55 years		61	61	55.45
	Older than 55 years		49	49	44.55
Pathology	Micropapillary carcinoma		60	60	54.55
	Non-micropapillary carcinoma		50	50	45.45
Number of lesions	Single		68	68	61.82
	Multiple		42	42	38.18
Involved glands	Single	Left	43	84	76.36
		Right	39		
		Isthmus	2		
	Multiple	LeftandIsthmus	1	26	23.64
		Right and Isthmus	1		
		Left andRight	23		
		Left, Right and Isthmus	1		
Hashimoto's Thyroiditis	with		16	16	14.55
	without		94	94	85.45
Aggressive	without		64	64	58.18
	with	Envelope	9	46	41.82
		Surrounding Tissue	5		
		Lymph Nodes	25		
		EnvelopeandLymph Nodes	7		

3.2.1. Pathological Characteristics in Different Age Groups

The 110 cases of papillary thyroid carcinoma were divided into younger than 45 years old groupwithin 27 cases, 45-54 years old groupwithin 34 cases and more than 55 years old groupwithin 49 cases, among which were compared and analyzedin the infiltration, lymph node metastasis, the proportion of micro papillary carcinoma, the number of lesions and the involvement of glandular lobes. All the differences were not statistically significant ($P > 0.05$). (Table 2)

Table 2. *Pathological characteristics of papillary thyroid carcinoma at different age groups.*

Group	Infiltration of the envelope and surrounding tissues	Lymph node metastasis	Pathology	
			Papillary microcarcinoma	Non-micro papillary carcinoma
<45 years (n=27)	8 (29.63)	8 (29.63)	16 (59.26)	11 (40.74)
45—54 years (n=34)	6 (17.61)	11 (32.35)	18 (52.94)	16 (47.06)
≥55 years (n=49)	7 (14.29)	13 (26.53)	26 (53.06)	23 (46.94)
x^2	2.72	0.335	0.284	
P	0.257	0.846	0.884	

Group	Number of lesions		Involved glands	
	Single	Multiple	Single	Multiple
<45year-old (n=27)	17 (62.96)	10 (37.04)	22 (81.48)	5 (18.52)
45—54year-old (n=34)	23 (67.65)	11 (32.35)	26 (76.47)	8 (23.53)
≥55year-old (n=49)	28 (57.14)	21 (42.86)	36 (73.47)	13 (26.53)
x^2	0.958		1.391	
P	0.619		0.499	

3.2.2. Pathological Characteristics in Different GenderGroups

The 110 cases of papillary thyroid carcinoma were divided into different gender stratifications, 11 males and 99 females. Invasiveness, lymph node metastasis, proportion of micropapillary carcinoma, number of lesions, and gland lobes involved were compared and analyzed respectively. The differences were not statistically significant (P>0.05). (Table 3)

Table 3. *Pathological characteristics of papillary thyroid carcinoma stratified by gender.*

Group	Infiltration of the envelope and surrounding tissues	Lymph node metastasis	Pathology	
			Papillary microcarcinoma	Non-micro papillary carcinoma
Male (n=11)	1 (9.09)	5 (45.45)	8 (72.73)	3 (27.27)
Female (n=99)	20 (20.20)	27 (27.27)	52 (52.53)	47 (47.47)
x^2	0.235	0.828	0.917	
P	0.628	0.363	0.338	

Group	Number of lesions		Involved glands	
	Single	Multiple	Single	Multiple
Male (n=11)	7 (63.64)	4 (36.36)	8 (72.73)	3 (27.27)
Female (n=99)	61 (61.62)	38 (38.38)	76 (76.77)	23 (23.23)
x^2	0.000		0.000	
P	1.000		1.000	

3.2.3. Invasive Characteristics of Papillary Thyroid Carcinoma

There was no significant gender difference between 46 of 110 cases of papillary thyroid carcinoma developing capsule, surrounding tissue infiltration and/or lymph node metastasis, and no invasion cases, but the age of the former was relatively small, and the difference was statistically significant (P<0.001). In the pathological types, micropapillary carcinoma had less infiltration and lymph node metastasis, and the difference was statistically significant (P<0.001). The number of lesions and the involvement of glands were compared, and the difference was not statistically significant (P>0.05). (Table 4)

Table 4. *Analysis of aggressive characteristics of papillary thyroid carcinoma.*

Group	Number of cases	Gender		Age	Pathology	
		Male	Female		Papillary microcarcinoma	Non-micro papillary carcinoma
Invasion	46	6 (13.04)	40 (86.96)	52.72±10.91	17 (36.96)	29 (63.04)
No invasion	64	5 (7.81)	59 (92.19)	54.25±9.49	43 (67.19)	21 (32.81)
X^2/t		0.3089		9.178	9.865	
P		0.578		0.000	0.000	

Group	Number of cases	Number of lesions		Involved glands	
		Single	Multiple	Single	Multiple
Invasion	46	26 (56.52)	20 (43.48)	32 (69.57)	14 (30.43)
No invasion	64	42 (65.63)	22 (34.37)	52 (81.25)	12 (18.75)
X^2/t		0.940		2.025	
P		0.332		0.155	

3.2.4. Pathological Characteristics of Papillary Thyroid Carcinoma with Hashimoto's Thyroiditis

16 cases, all of which were women, were associated with Hashimoto's thyroiditis of the 110 cases of papillary thyroid cancer, and the age ofonsetwas higher than that of the papillary thyroid cancer group. The difference was statistically significant (P<0.001). The pathological type was micropapillary. The pathological type was micropapillarythyroid cancer accounted for 31.25%, which was lower than 58.51% of cases without Hashimoto's thyroiditis and the difference was statistically significant (P<0.05). TSH levels were significantly increased, respectively (3.673±1.382) and (2.595±2.021), with statistically significant (P<0.001), but there was no significant difference in pathological characteristics such as invasiveness, number of lesions, and involvement of glands (P>0.05). (Table 5)

Table 5. *Pathological characteristics of papillary thyroid carcinoma with Hashimoto's thyroiditis.*

Group	Age (X±S, years)	TSH (X±S, μ IU/ml)	Gender		Invasion	
			Female	Male	Yes	No
With Hashimoto's thyroiditis (n=16)	56.688±8.980	3.673±1.382	16 (100)	0 (0)	6 (37.50)	10 (62.50)
Without Hashimoto's thyroiditis (n=94)	54.102±10.475	2.595±2.021	83 (88.30)	11 (11.70)	40 (42.55)	54 (57.45)
x^2/t	6.689	3.427	--		0.143	
P	0.000	0.001	--		0.705	

Group	Number of lesions		Pathology		Involved glands	
	Single	Multiple	Papillary microcarcinoma	Non-micro papillary carcinoma	Single	Multiple
With Hashimoto's thyroiditis (n=16)	10 (62.50)	6 (37.50)	5 (31.25)	11 (68.75)	12 (75.00)	4 (25.00)
Without Hashimoto's thyroiditis (n=94)	57 (60.64)	37 (39.36)	55 (58.51)	39 (41.49)	71 (75.53)	23 (24.47)
x^2/t	0.02		4.098		0.002	
P	0.888		0.043		0.964	

4. Discussions

Thyroid cancer is a common malignant tumor in the endocrine system. It is found that there are significantly more women with thyroid cancer than men and the incidence of thyroid cancer in women is currently ranked fifth in malignant tumors, second only to Lung cancer, breast cancer, rectal cancer, cervical cancer, through the statistical analysis of the incidence and mortality of thyroid cancer in the United States in recent years by Siegel et al [3]. The incidence of thyroid cancer in my country ranked 10th among malignant tumors in 2006, and rose to 7th in 2012, with an incidence rate of 8.76 per 100,000 according to the data from the National Cancer Registry. Among them, the upward trend of women is the most significant, rising from 7.84/100,000 in 2006 to 13.58/100,000 in 2012 [4]. Thyroid cancer is divided into thyroid follicular carcinoma, papillary thyroid carcinoma, medullary thyroid carcinoma, and undifferentiated thyroid carcinoma according to histological morphology [5], among which, the incidence of papillary thyroid cancer is the highest, accounting for 80%-85% of thyroid cancer [6]. Papillary carcinoma is a common pathological type and has a tendency to develop multicentricity [6]. In the results of this study, the incidence of multifocal thyroid cancer accounted for 38.18%, and the incidence of polyglandular lobes accounted for 23.64%, which also supports this disease. It has the characteristics of multicentric disease, which should be paid attention to in clinical work to avoid missed diagnosis of multifocal disease. The development of diagnostic technology and the improvement of inspection technology are the main reasons for the increase in the incidence and detection rate, which are considered by some scholars for the analysis of the incidence trend of thyroid cancer increasing year by year. This is also one of the important reasons for the increase in the proportion of thyroid micropapillary carcinoma. It can be seen that the diagnosis of this disease is closely related to people's attention and the development of examination and diagnostic techniques [6, 7]. In this study, papillary microcarcinoma accounted for 54.55%, and the 2014 WHO Global Cancer Report showed that more than 50% of new cases of thyroid cancer were papillary microcarcinoma of the thyroid, which confirms that the proportion of papillary microcarcinoma of the thyroid is increasing year by year [8].

The cut-off point of diagnosis age increased from 45 to 55 years old in the eighth edition of the AJCC staging system for thyroid cancer. No statistical difference was found in the invasiveness of papillary thyroid carcinoma, lymph node metastasis, the proportion of micropapillary carcinoma, the number of lesions, and the involvement of the glands in each age group, which was analyzed in the study. The study on the age stratification of the characteristics of papillary thyroid carcinoma, conducted by Quan Pei Pei [9], found that there was no significant difference in the infiltration of the papillary thyroid carcinoma capsule, the number of lesions, and the involvement of the glands in each age group, which is consistent with the results of this research. In the cases of this study, it was found that the proportion of infiltration of the envelope and surrounding tissues increased as the age decreased, which still needed to be paid attention to in the clinic, although there was no statistical difference. In this study, it was found that there were certain differences in the pathological characteristics of papillary thyroid carcinoma in different age groups. It showed that the change in the age cut-off value of this diagnosis had positive significance for the diagnosis of this disease, especially for the judgment of the course and prognosis. It will be necessary to expand the sample size for research and analysisin the context of the continuous development of big data, if more in-depth study of the pathological characteristics of papillary thyroid carcinoma is needed.

It is more common in women for papillary thyroid carcinoma. GLOBOCAN2018 data shows that the global incidence of thyroid cancer in women is three times that of men [10], the reason of which may be affected by female estrogen, because estrogen is a cytokine that promotes the growth of thyroid cancer, and there are a variety of estrogen receptors on the surface of thyroid cancer cells [11]. In this study, women accounted for 90%, and the number of cases far exceeded that of men, but no statistical difference was found through comparative analysis of the invasiveness of papillary thyroid carcinoma, lymph node metastasis, micropapillary carcinoma, the number of lesions and the involvement of glands in each gender group. However, studies by Bin Wang and Jinfu Shen found that the risk of lymph node metastasis in male patients is higheral though women are more common in papillary thyroid cancer, and there is statistical significance between men and women, and men are one of the predictors of cervical lymph node metastasis [12, 13]. This may be related to the sample size of this study and the proportion of men and women enrolled in the group and increasing the sample size may make the ratio of men and women closer to the big data statistics.

There is statistically different in this study on the invasiveness of papillary thyroid carcinoma, and non-micropapillary carcinoma has a higher incidence of invasion. Some scholars advocate the choice of active monitoring in the treatment of papillary thyroid microcarcinoma [14], but the proportion of micropapillary cancer in this study still reached 28.33%. It is still necessary to comprehensively analyze the age, gender, number of lesions, infiltration of the envelope and surrounding tissues, and lymph node metastasis, and choose appropriate treatment strategies in the clinic for patients with papillary microcarcinoma, although some scholars believe that whether an invasion occurs does not affect long-term survival Rate and prognosis [15]. In the case of this study, it is not statistically significant in data analysis although papillary thyroid carcinoma with multiple lesions or multiple glandular lobes is more aggressive. However, some studies have found that multifocal lesions are more aggressive [15], which may be related to the sample size. There was no significant gender difference between 46 cases with capsule, surrounding tissue infiltration and/or lymph node metastasis and the cases without invasion of the 110 cases in this study. However the age of onset was relatively small, which was statistically significant ($P<0.001$).

Hashimoto's thyroiditis (HT) is a common thyroid-specific autoimmune disease characterized by cellular immunity based on diffuse lymphocyte infiltration and humoral immunity based on the production of auto-specific antibodies by the thyroid, which eventually leads to the destruction of thyroid follicular epithelial tissue with fibrosis and hypothyroidism. In recent years, the incidence of HT has increased year by year, with 3 to 15 cases per 10,000 people, mainly in middle-aged women between 30 and 50 years old [16]. Thyroid cancer is one of the malignant tumors with the fastest growing incidence in recent years, among which papillary thyroid carcinoma (PTC) is the most common. It is often accompanied by infiltration of immune inflammatory cells such as macrophages, mast cells, and lymphocytes. In recent years, the incidence of HT combined with PTC has also increased significantly as the incidence of HT and PTC has increased year by year, and the correlation between the two has also become a hot spot in medical research [17]. Some scholars studied the pathological tissue sections of PTC and found that the surrounding area of PTC was often accompanied by infiltration of immune inflammatory cells such as macrophages, mast cells, and lymphocytes [18]. HT and PTC coexist frequently and both have immune inflammatory cell infiltration, which proves that there is a certain immunological relationship between them. In this study, 16 cases of papillary thyroid cancer combined with Hashimoto's thyroiditis, accounting for 14.55%, and analysis of the data found that all patients with papillary thyroid cancer combined with Hashimoto's thyroiditis were women, whose average age of onset and TSH level were higher. However there is no significant difference in the characteristics of invasiveness and multifocal disease. According to research by Yan Zhang [19], it is more common in women for papillary thyroid carcinoma combined with Hashimoto’s thyroiditis, and there is no statistical difference in multifocal and aggressive aspects ($P>0.05$), which is consistent with the results of this study. In terms of age of onset, there is no significant difference in whether Hashimoto's thyroiditis is associated or not, which is different from the results of this study. Studies have suggested that elevated TSH in Hashimoto’s thyroiditis can stimulate the hyperplasia of follicular epithelium, which is a driving factor in inducing cancer. Therefore, patients with papillary thyroid cancer and Hashimoto’s thyroiditis have higher TSH levels [20], which supports the results of this research.

5. Conclusion

From the results of the study, it can be found that there are no significant differences in clinical biology and pathological characteristics among cases of different age and gender groups. In terms of invasiveness, the average age of cases of invasive papillary thyroid carcinoma is lower, among which the patients with papillary microcarcinoma have a lower probability of infiltration and lymph node metastasis. In cases of papillary thyroid carcinoma with Hashimoto's thyroiditis, TSH levels are generally higher, and the number of female patients is absolutely dominant, and the average age of disease is higher than that of patients without Hashimoto's thyroiditis. It will help improve the ability to diagnose and treat this disease and provide patients with personalized treatment plans through in-depth study of the pathological characteristics of papillary thyroid carcinoma.

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