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Analysis of Clinicopathologic Characteristics of Gastric Cancer

Zhao Xueyu, Li Donghai, Liu Ming

Department of General Surgery, Affiliated Hospital of Inner Mongolia Medical University, Huhhot, P. R. China

Email address:
liumingfy@163.com (Liu Ming)

Abstract: Objective Western Inner Mongolia is a high risk area of gastric cancer. However, detailed clinical and pathological data of gastric cancer has been lacking. Our hospital is one of the largest gastric cancer diagnoses and treatment centers in western Inner Mongolia. This study was designed to investigate the characteristics of clinical data of patients with gastric cancer in Western Inner Mongolia at our hospital over the past eight years. Methods Data of 1548 cases of gastric cancer patients from 2007.01.01 to 2015.01.01 in our hospital was retrospectively analyzed for their clinical characteristics. Results Of the 1548 patients, 1251 cases (80.81%) were male and 297 (19.19%) were female, and the average age was 60.94 ± 10.90 years old. The cancer location was mainly on the antrum, accounting for 40.76%. Different ages of gastric cancer location constituent ratio was different, and the difference was significant (χ^2=39.836, P=0.000). Poorly differentiated adenocarcinoma was a major histological type, accounting for 46.58%. Different ages of histological classification and the differentiation constituent ratio was also different, and the difference was significant (χ^2=67.300, P=0.000). There were 144 cases of early gastric cancer, accounting for 9.30%; 1404 cases of advanced gastric cancer, accounting for 90.70%. The majority pathologic type of advanced gastric cancers were Bormann Ⅲ(53.92%). Ⅲ+Ⅳ stage was a majority of TNM stage, accounting for 72.41％. Different ages of TNM stage was different, the difference was significant (χ^2=9.013, P=0.029). Conclusion Advanced gastric cancer is the major type of patients with gastric cancer in Western Inner Mongolia. Gastric cancer has a higher incidence in older male patients. Poorly differentiated adenocarcinoma and cancer in antrum have a larger probability. Compared with older patients, there is higher occurrence of malignant cancer and earlier TNM stage in younger patients. Mongolian patients and Han patients showed no significant difference.

Keywords: Gastric Cancer, Data Base, Clinic Pathologic Characteristic, Western Inner Mongolia

1. Introduction

Gastric cancer is the 4th commonest cancer in the world. It is also the 2nd deadliest malignant tumor. World widely, more than 70% of new cases of gastric cancer and deaths occur in developing countries, while the highest incidence is in the East of Asia. [1] Japan, Korea and China all have high incidence of gastric cancer. There are about 400,000 new cases each year in China, accounting for 42% [2-3] of the total number of cases in the world. According to statistics, the incidence rate of gastric cancer in China was 36.21/100,000, mortality rate is 25.88/100,000, which are both higher than the world average level. [3] Located in northern China, Inner Mongolia is an autonomous region with a high incidence of gastric cancer. Its economy, medical conditions and other conditions are relatively backward. Our hospital is the largest center of diagnosis and treatment for gastric cancer in the western part of Inner Mongolia. A database of clinical and pathological data of octal gastric cancer was analyzed to understand the characteristics of gastric carcinoma in the area, and provide a basis for prevention and treatment of gastric cancer.

2. Materials and Methods

2.1. Research Object

1548 cases were selected from January 01, 2007 to January 01, 2015 in the database of gastric carcinoma patients in our hospital. All cases were clearly diagnosed. And their clinical and pathological information is complete.

2.2. Diagnosis and Staging

2.2.1. Pathological Diagnosis

Histopathology in accordance with WHO (2000) classification standard divides the gastric cancer into adenocarcinoma, papillary adenocarcinoma, tubular adenocarcinoma, Mucinous Carcinoma, Signet-Ring cell carcinoma and other types; and according to the degree of cell differentiation, into high, medium and low levels of differentiations.

2.2.2. TNM Staging

Using the 7th Edition AJCC TNM staging standard of gastric cancer in 2010, with pre-surgery examinations, intraoperative and postoperative pathological findings to determine depth of tumor invasion (T), violations of lymph nodes (N) and metastasis (M) stage 0, I, II, III, IV.

2.2.3. Tumor Locations

Tumor location sites are divided into the gastric antrum (sinus lesser curvature of stomach, Big Bend and the angle of the stomach), body of stomach, Cardia and fundus of stomach, stomach (including extensive involvement of 2 or more locations) and stomach stump.

2.3. Statistical Methods

Statistical analysis software SPSS 17.0 will be used. Statistics for count data, using χ^2 test, test level $\alpha = 0.05$.

3. Results

3.1. Comparison of Changes of 2007-2014 Gastric Cancer Patients

The number of diagnosis and treatment for gastric cancer in those 8 years showed an increasing trend. In years 09-10 show the biggest increase. Fixed base ratio increased by 32.2%; link relative ratio increased by 32.2%. As shown in table 1.

Table 1. Comparison of treatment of patients with gastric cancer in 2007-2014.

Year	Cases	Absolute growth (cases)		Development speed (%)		Growth rate (%)	
		Total	Year by year	Relative ratio with fixed base	Link Relative ratio	Relative ratio with fixed base	link Relative ratio
07-08	273	-	-	100	-	-	-
09-10	361	88	88	132.2	132.2	32.2	32.2
11-12	420	147	59	153.8	116.3	53.8	16.3
13-14	494	221	74	181.0	117.6	81.0	17.6

3.2. Gender and Age Distribution

Among the 1548 cases, 1251 were male (80.81%) and 297 were female (19.19%). The gender ratio of male: female is 4.21:1. Patients aged 25-91 years, median age of 61 years old. Average age is 60.94 ± 10.90. Gender composition of patients of all ages is shown in table 2.

Table 2. 1548 cases of gastric cancer with age and gender composition.

Gender	Year				Total
	<45 (%)	45-59 (%)	60-74 (%)	>74 (%)	
male	87 (6.95)	471 (37.65)	597 (47.72)	96 (7.67)	1251 (100)
female	56 (18.86)	107 (36.03)	112 (37.71)	22 (7.41)	297 (100)
total	143 (9.24)	578 (37.34)	709 (45.80)	118 (7.62)	1548 (100)
M-F	1.55:1	4.40:1	5.33:1	4.36:1	4.21:1

3.3. Pathological Features

3.3.1. Tumor Locations

The data shows in gastric carcinoma 631 cases (40.76%) in gastric antrum; 414 cases (26.74%) in the body of the stomach; 467 (30.17%) cases in cardiac and gastric fundus, 12 cases of total gastrectomy (0.78%), and 24 cases (1.55%) in stomach stump.

With the analysis of cancer sites grouped by ages, it was found that gastric lesion in different age ratio is different, with a statistically significant difference (x^2=39.836, P=0.000). Cancer of the Cardia and stomach fundus ratio gradually increases with age, from the 18.18% of the < 45-year age group to the 36.44% of the >74-year age group. In both groups there was a significant difference (x^2=11.082, P=0.001). Gastric cancer as the location has the highest percentage of all ages. As shown in table 3.

Table 3. Comparison of lesion of gastric cancer in different age.

Location	<45 (%)	45-59 (%)	60-74 (%)	>74 (%)	χ^2	P
Fundus and Cardiac	26 (18.18)	143 (24.74)	255 (35.97)	43 (36.44)	31.352	0.000
gastricum	52 (36.36)	163 (28.20)	179 (25.25)	20 (16.95)	13.970	0.003
antrum	62 (43.36)	258 (44.64)	259 (36.53)	52 (44.07)	9.784	0.020
stomach	1 (0.70)	4 (0.69)	5 (0.71)	2 (1.69)	-	-
gastric stump	2 (1.40)	10 (1.73)	11 (1.55)	1 (0.85)	-	-

3.3.2. Histological Types and Differentiation

In the 1548 cases of gastric cancer, regarding the tissues of patients, most had low differentiated adenocarcinoma with 721 cases, accounting for 46.58%. This was followed by a moderately differentiated adenocarcinoma of 451 cases, accounting for 29.13% of the total. 112 cases had malignant with higher levels of Signet-Ring cell carcinoma, accounting for 7.24%. Other organization types include squamous cell carcinoma and adenosquamous carcinoma and carcinoid etc.

By age group and tissue type, gastric cancer tissue types vary in different age groups, there was a significant difference (x^2=67.300, P=0.000) in <45-year group. Compared with other groups of poorly differentiated adenocarcinoma ratio is high, there was a significant difference (x^2=8.030, P=0.045), Signet-Ring cell carcinoma constitute a relatively high portion compared with other groups, there was a significant difference (x^2=24.793, P=0.000), see table 4.

Table 4. *Type of gastric cancer patients and the degree of differentiation.*

Histological type Adenocarcinoma	<45 (%)	45-59 (%)	60-74 (%)	>74 (%)	χ^2	P
poorly differentiated	80 (55.94)	278 (48.10)	310 (43.72)	53 (44.92)	8.030	0.045
moderately differentiated	16 (11.19)	149 (25.78)	248 (34.98)	38 (32.20)	37.726	0.000
well differentiated	3 (2.10)	21 (3.63)	37 (5.22)	10 (8.47)	7.948	0.047
signet ring cell cancer	24 (16.78)	45 (7.79)	37 (5.22)	6 (5.08)	24.793	0.000
mucinous adenocarcinoma	17 (11.89)	71 (12.28)	64 (9.03)	8 (6.78)	5.659	0.129
other	3 (2.10)	14 (2.42)	13 (1.83)	3 (2.54)	-	-

3.3.3. Staging and Bormann Type

In the 1548 cases of gastric cancer, 144 cases were early gastric cancer (9.3%), 1404 were advanced gastric cancer (90.7%). Most cases were Bormann type Ⅲ up advanced gastric cancer with 757 cases, accounting for 53.92%; the rest is I-183, 13. 3%; 394 cases of type Ⅱ, 28.06%; and type IV 70, 4.99%.

Using TNM staging of gastric cancer, T stage T4 had 662 patients. In N staging, 653 cases were N1 stage, accounted for 42.18%. In M staging, 1201 were in MO stage, which accounted for 77.58%. Staging in patients with early gastric cancer 0 + primary + secondary period reached a total of 427 cases of 27.58%. Patients in + late stage III and Ⅳ gastric cancer was the majority, with a total of 1121, accounting for 72.41%. According to the age groups, in TNM staging the <45 age group had more cases in earlier stages than in other groups. There was a significant difference (x^2=9.013, P=0.029), see table 5.

Table 5. *Comparison of TNM staging of gastric cancer patients.*

Staging	<45 (%)	45-59 (%)	60-74 (%)	>74 (%)
0+I+II	54 (37.76)	161 (27.85)	182 (25.67)	30 (25.42)
III+IV	89 (62.24)	417 (72.15)	527 (74.33)	88 (74.58)

3.4. Comparison Between Han and Mongolian

In the 1548 patients, there were 1440 Han patients, accounting for 93.02% (1440/1548). 108 patients were Mongolian, accounting for 6.98% (108/1548). The number of Mongolian patients was relatively small. The ethnic group comparison of relevant clinical information found no statistically significant differences between the Han and Mongolian patients.

4. Discussion

Western region of Inner Mongolia is an area of high incidence of gastric cancer in China. However, with such high incidence rate, detailed clinical and pathological information report had been lacking. Our hospital is located in the western part of Inner Mongolia, and is the region's largest centre for diagnosis and treatment of gastric cancer. A gastric cancer database in the hospital was built in 2007. Analyzing the database can indirectly reflect the characteristics of gastric carcinoma in Western Inner Mongolia, to provide the scientific basis for decision-making in prevention and treatment of gastric cancer in the region.

4.1. Patient Trends and General Information

This research shows that in the past 8 years in our hospital the number of patients with gastric cancer increased year by year. This may be related to economic improvement in Western Inner Mongolia, and the launch of early gastric cancer screening. According to the different regions of the country reported in various studies, [4-11]the average age of patients with gastric cancer is 55.70-64.89 years. This research shows a similar result. Jiangsu, Henan, Hunan, Guangdong, Beijing, and other regions have shown, male and female gender ratio was approximately (1.84-3.04): 1. This was close to the WHO released [12] ratio of the incidence rate of gastric cancer in men and women worldwide 2.32:1. Similar with studies about Xinjiang and Shanxi, in this group there was a bigger proportion of male patients; the gender ratio is 3.36:1, 3.86:1. Life habits in different regions also has an effect, that the higher proportion of male patients may be connected with their smoking, drinking, preference of salted and smoked food over fresh fruits and vegetable. [13-14]

4.2. Tumor Locations

Foreign researches in recent years [12] showed a decreased incidence of distal gastric cancer, and the increase of Cardia and fundus stomach cancer, which became the most incidence site. Smoking, drinking, obesity, reflux are risk factors for Cardia cancer. Meanwhile, the popularity of Helicobacter pylori eradication treatment contributed to the

controlling of gastric cancer [15] and the relative increase in the incidence of cardiac carcinoma cancer. Many Chinese researches showed that, [5-11] incidence sites for gastric cancer differ in different regions. Cardia fundus and antrum now have the highest occurence in China.

Through this set of data it can be seen among patients with gastric cancer, gastric distal gastric cancer still occurs the most in this region. This was followed by proximal stomach. Compared with older patients, incidence site of young people is lower. With the increase of age, under the lesion of gastric cancer, location to the proximal stomach increases. According to research, [16] this was mainly because of the moving on of the fundic glands atrophy, junction, increased intestinal metaplasia, predilection to move high gastric cancer as the patients' age increased. In addition, the lower esophageal sphincter tension in the elderly is poorer, causing gastroesophageal reflux; plus the influence of physical and chemical stimuli such as eating, causing inflammation, repairing, hyperplasia, carcinoma of gastric Cardia and a series of pathological changes.

4.3. Pathologic Types

Most histological types were poorly differentiated adenocarcinoma. This is generally in consistence with the majority of researches in China. [4-11] Stomach carcinoma in the young tissue-typing is bad. Poorly differentiated adenocarcinoma and Signet Ring cell cancer is higher than the other age groups. Moderately differentiated adenocarcinoma is also higher than the other group, which is also in consistence with earlier studies. [5-9, 17] It is possible that younger patients may themselves be genetically susceptible. As researches has found that hereditary diffuse type gastric cancer more < 45 age group, its onset is based on coding of epithelial type calcium sticky protein of CDH1 gene embryo Department mutation. Based on this experience, including promoter methylation, somatic mutation and loss of heterozygosity, including a "two-hit", led to wild-type CDH1 allelic loss of function that caused the disease; while later onset are more likely to be the result of long-term effects of external factors.

4.4. Bormann and Staging

Currently the early gastric cancer detection rate is about 9.6%-13.2%; [18] this is much lower compared with Korea, and Japan and other countries. In Japan, early gastric carcinoma in gastric cancer has accounted for more than 50% of their total cases [3]. In the data used by this paper, early gastric cancer accounted for 9.3% of the total, which only reaches the national low level. The majority are advanced gastric cancer. Most cases are Bormann type III or above advanced gastric, followed by type II. From the perspective of TNM staging of gastric cancer, most patients are at relatively late stages, and the prognosis is poor. Under age stratification was found that young people are in relatively earlier TNM staging. This may be related to the improvement of young people's health consciousness in recent years.

Stomach cancer is a disease with high mortality rates. Early diagnosis and treatment is important. Promoting the gastric cancer screening and crowd of gastric cancer awareness in this area will help to improve the early detection of gastric cancer in the region.

4.5. Ethnic Background

Inner Mongolia autonomous region in which Han Chinese is the major population; while Mongolian is the major minority group. This study found no significant differences in clinical and pathological features between Han and Mongolian people. Still Mongolian patients with gastric cancer needs further study.

5. Conclusion

To sum up, by reviewing the information on diagnosis and treatment of patients with gastric cancer in the past 8 years in our hospital, clinical and pathological characteristics of gastric cancer in this region was studied. This can be referred to make the next step of gastric cancer prevention programs, improve the detection of early gastric cancer and ultimately reduce the mortality rate and improve the quality of life. However, this study has certain limitations, including a short time span of study, small sample sizes, especially that of Mongolian patients. Also long term surviving patients were not included in the study, which require further additional researches.

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