RESEARCH ARTICLE

Eradication therapy for gastric cancer in Inner Mongolia: A single-center study over 10 years

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Abstract

Objective: To understand the characteristics, diagnosis and treatment of gastric cancer in a specific geographical region.

Methods: The retrospective study was conducted at the Affiliated Hospital of Inner Mongolia Medical University, China, and comprised clinical and pathological data of patients with gastric cancer treated from 2007 to 2017. Data was analysed according to the patients' ethnicity, gender, age, tumour location, differentiation degree, Bormann classification, tumour-nodes-metastases staging and pathological type. Statistical analysis was done using SPSS 22.

Results: Of the 2,049 patients, 1619(79.01%) were males and 430(20.99%) were females. The overall mean age of the sample was 60.94±10.90 years. The incidence of gastric antrum was the highest, with 830(40.51%) cases. The proportion of gastric cancers was different in different age groups (p=0.001). Of the total, 922(45%) cases were poorly differentiated adenocarcinoma. There were significant differences in the histological types of gastric cancer in different age groups (p=0.001). There were 130(6.3%) cases of Mongolian patients, and the composition ratio of each age group was not significantly different from that of Han ethnicity (p>0.05). However, location was different with 55(42.31%) cases involving oesophago-gastric junction.

Conclusion: The diagnostic rate of gastric cancer in Western Inner Mongolia was relatively low. The incidence of gastric cancer among both Mongolian and Han patients was higher in elderly men. The incidence of gastric antrum was dominant in Han patients, followed by oesophago-gastric junction, while the reverse was true of Mongolian patients.

Keywords: Gastric cancer, Database, Clinicopathological characteristics, Western Inner Mongolia, Mongolian.
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Introduction

Gastric cancer is one of the most common malignant tumours of the digestive tract, with a certain degree of heterogeneity.[1] It is the fifth most commonly diagnosed cancer in the world, and over a million new cases of gastric cancer are diagnosed each year.[2] According to 2019 data, gastric cancer is the third leading cause of cancer deaths worldwide, following lung and colorectal cancer in overall mortality. Characteristics of gastric cancer vary in different regions, and its occurrence is closely related to living habits and environmental factors.[3]

The population of Inner Mongolia, which spans across three major regions of north-eastern, northern and north-western China, is about 25,395,600.[4] The Mongolian is the main ethnic group with a population of about 4.22 million, accounting for 17.11% of the total population of Inner Mongolia and six times that of other minor ethnic groups in the same region. There are certain habitual and lifestyle differences between the Hans and the Mongolians.

The current study was planned to analyse clinical and pathological data of gastric cancer over 10 years to understand the different characteristics between Han and Mongolian patients.

Materials and Methods

The retrospective study was conducted at the Affiliated Hospital of Inner Mongolia Medical University, China, and comprised clinical and pathological data of patients with gastric cancer treated from 2007 to 2017. The hospital is the largest clinical diagnosis and treatment centre in western Inner Mongolia with a gastric cancer database established in 2007.

Data included related to all cases that were confirmed pathologically by gastroscopy, and had early or advanced gastric cancer having undergone six months of chemotherapy. After the diagnosis was confirmed, surgery was performed, and clinicopathological data was completed. Data excluded related to cases of distant metastasis, preoperative neoadjuvant chemotherapy, incomplete data, repeated examinations, unclear diagnosis, and other gastric malignancies. Stratified

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analysis was done according to the patients' ethnicity, gender, age, tumour location, differentiation degree, Bormann classification,[5] tumour-nodes-metastases (TNM) staging[6] and pathological type. Follow-up, wherever necessary and possible, was conducted by telephoning patients in person or asking their families, or through in-patient and out-patient re-examination. Pathological diagnosis and histological classification was done according to the World Health Organisation (WHO) classification, categorising gastric cancer into adenocarcinoma, papillary adenocarcinoma, tubular adenocarcinoma, mucinous adenocarcinoma, signet ring cell carcinoma and other types. Degree of cell differentiation was used to divide them into high, medium and poorly differentiated ones.

Data was analysed using SPSS 22. Chi-square or t-test were applied, as needed. P<0.05 was considered statistically significant.

Results

Of the 2,049 patients, 1619(79.01%) were males and 430(20.99%) were females. The overall mean age of the sample was 60.94±10.90 years (range: 25-91 years). The number of patients aged 61-75 years made up the largest group 937(45.73%). With the increase in age, the male-female ratio increased, with the highest among the 61-75 years old (Table-1).

Table-1: Gender and age composition ratio of 2049 gastric cancer patients.

	Age				Total
	< 45	45-60	61-75	> 75	
Male	116(7.16%)	598(36.94%)	774(47.81%)	131(8.09%)	1619
Female	82(19.07%)	145(33.72%)	163(37.91%)	40(9.30%)	430
Total	198(9.66%)	743(36.26%)	937(45.73%)	171(8.35%)	2049
M-F	1.41:1.	4.12:1.	4.75:1.	3.28:1.	3.77:1.

Overall, gastric antrum was the location in 830(40.51%) cases, body of the stomach 501(24.45%), oesophago-gastric junction 623(30.41%), total gastrectomy 55(2.68%), and stomach stump 40(1.95%). The proportion of gastric cancer locations in different age groups was significantly different (p=0.001). The ratio of

Table-2 Distribution of tissue types of gastric cancer patients at different ages.

Tissue types	N	< 45	45-60	61-75.	>75	χ^2	P
Poorly differentiated	922	106	349	397	70	10.757	0.013
Moderately differentiated	566	19	184	310	53	50.171	0.000
Well differentiated	125	4	39	65	17	12.244	0.007
Signet ring cell carcinoma	166	40	63	53	10	47.773	0.000
Mucous adenocarcinoma	220	24	92	89	15	4.683	0.197
Other	50	5	16	23	6	-	-

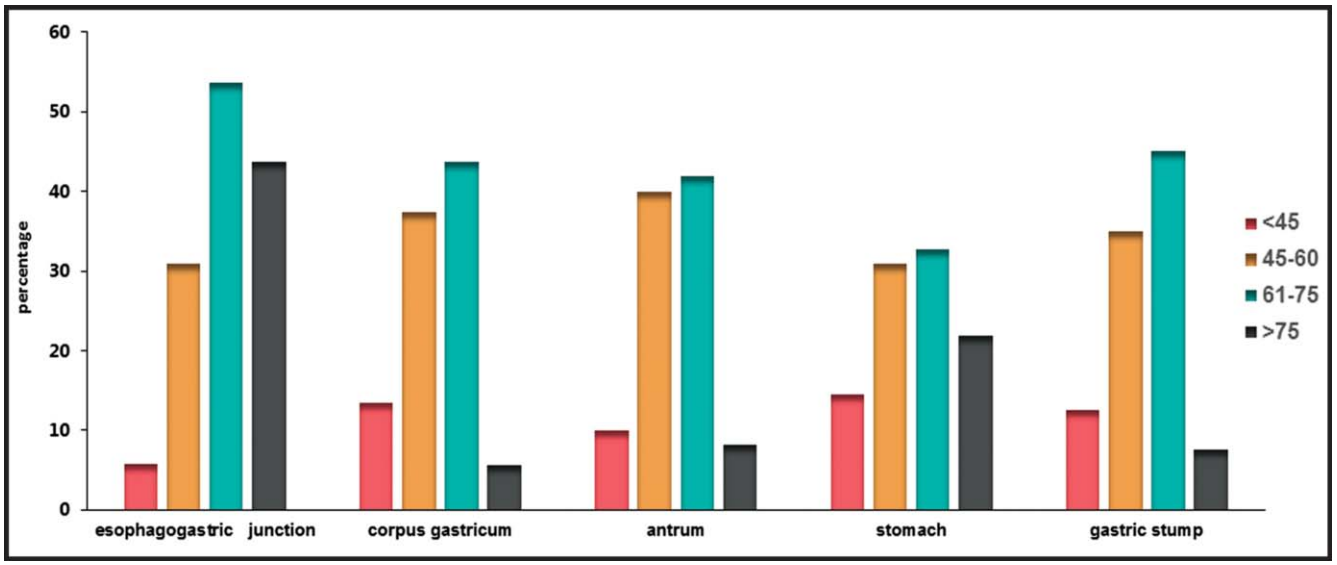

Figure-1: Composition ratio of different age groups of gastric cancer patients.
(The composition ratio of the tumour located in oesophago-gastric junction gradually increases with age. And the composition ratio of gastric cancer gradually decreases with age).

Table-3 Clinicopathological features of Mongolian patients.

The Variables	Mongol (n = 130)	Han (n = 1919)		P
Gender, n			χ^2= 0.533	0.465
Male	106 (81.54%)	1513 (78.84%)		
Female	24 (18.46%).	406 (21.16%)		
Age/years	61.25±11.38	60.94±10.90	T = 0.314	0.633
Location				
Oesophago-gastric junction	55 (42.31%).	568 (29.60%)	χ^2= 9.293	< 0.005
Gastricum	27 (20.77%).	474 (24.70%)	χ^2= 1.019	0.313
Antrum	41 (31.54%).	789 (41.11%)	χ^2= 4.634	< 0.005
Stomach	4 (3.07%)	51 (2.66%).	χ^2= 0.082	0.775
Gastric stump	3 (2.31%)	37 (1.93%)	-	-
Histological type				
Poorly differentiated adenocarcinoma	71 (54.62%)	1237 (64.46%)	χ^2= 1.191	0.275
Moderately differentiated adenocarcinoma	40 (30.77%).	526 (27.41%)	χ^2= 0.381	0.537
Well differentiated	19 (14.61%).	106 (5.52%)	χ^2= 14.472	< 0.005
Other	0	50 (2.61%).	-	-

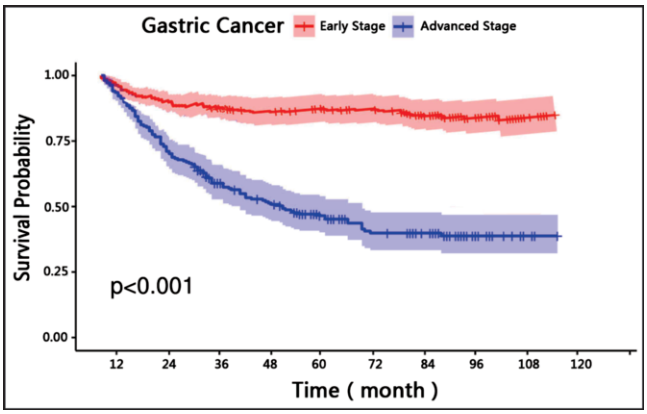

Figure-2: Comparison of survival curves between patients with early gastric cancer and those with advanced gastric cancer.

esophagogastric junction cancer increased with age (p=0.001). The difference between gastric body cancer and gastric antrum cancer was significant (Figure-1).

In terms of Bormann type and stage, 181(8.83%) cases were of early stage and 1,868(91.17%) were advanced gastric cancer. Most cases were Bormann type III 1167(57.00%). The rest were type I 194(9.47%), type II 468(22.84%) and type IV 220(10.74%). Early stage patients with gastric cancer 0 + primary + secondary stages accounted for a total of 557(27.18%) cases. The majority of the patients were in stage III and IV, with a total of 1492(72.82%) cases. According to the age groups, in TNM staging the <45 age group had more cases in earlier stages than in other age groups (p=0.008).

There were 922(45%) cases that were poorly differentiated adenocarcinoma, followed by 566(27.62%) moderately differentiated adenocarcinoma and mucinous adenocarcinoma 220(10.74%), while well-differentiated adenocarcinoma numbered the least 125(6.10%). Other tissue types of cancer were 50(2.44%), including squamous cell carcinoma, adenosquamous cell carcinoma, carcinoid cell carcinoma and hepatoid cell carcinoma. The differences of gastric cancer tissue types in different age groups were significant (p=0.001). Poorly-differentiated and signet ring cell carcinoma showed a decreasing trend with increase age (p=0.013 and p=0.001). The proportion of high and medium differentiated adenocarcinoma increased with age (p=0.001 and p=0.007) (Table-2). Overall, the 5-year cumulative survival rate of patients with early gastric cancer was 90.4%, and that of patients with advanced gastric cancer was 35.7% (Figure-2). Among the 2049 cases, there were 130(12.39%) Mongolian cases; 106(81.54%) males and 24(18.46%) females. The mean age of the patients was 61.25±11.38 years (range: 33-91 years). This was similar to that of the Han patients (p=0.754). The most common site of gastric cancer in Mongolian patients was oesophago-gastric junction 55(42.31%), followed by gastric antrum, which was significantly different from that of the Han patients (p=0.033). Also, 71(54.62%) cases were that of poorly-differentiated adenocarcinoma. The composition ratio of highly-differentiated adenocarcinoma with lower malignant degree was different from that of Han patients (p=0.001) (Table-3).

Discussion

The western region of Inner Mongolia is an area with high incidence of gastric cancer in China. Different regions in China have different incidence rates of gastric cancer, but the average incidence age of gastric cancer has been 55.70-64.89 years, and the current study showed results similar to the national data.[7-9] The largest number of patients were

aged 61-75 years, and this may be because it takes a long time for the malignant change to happen and carcinogen cells to form tumours, and because of the elderlies' declining ability to get the mutations removed owing to impairment in their immune surveillance function.[10] However, in recent years, the incidence of gastric cancer has presented a younger trend year by year. It is reported that[11] in the last 40 years, the incidence rate of gastric cancer among young patients aged 19-35 has increased from 1.7% to 3.3%. Studies in Jiangsu, Henan, Hunan, Beijing, Guangdong and other regions in China have shown that the male-female ratio of gastric cancer patients is about 1.84-3.04:1, which is close to the WHO's ratio of 2.32-1 for the incidence of gastric cancer in men and women worldwide.[12] However, the proportion of male patients in this study was slightly higher than that in the above regions at 3.77:1. The results of this study were more similar to those in Xinjiang and Shanxi where the male-female ratios were 3.36:1 and 3.86:1 respectively.[13,14] By comparing the lifestyle habits and regional characteristics, it is believed that the high proportion of male patients may be related to higher rate of smoking and drinking in the region. Eating too fast and too hot, greater life pressure in social roles, and physiological differences between men and women are also contributing factors in men being more likely to suffer from gastric cancer than women.[15,16]

In this study, the proportion of male and female patients aged <45 years was lower than that of middle-aged and elderly patients. With the increase in age, the gender ratio of male and female increased, with the highest at age ranging 61-75 years, and then decreased slightly. The incidence of gastric cancer among young women may be related to metabolism of oestrogen.[17,18] However, the relationship between androgen receptor and gastric cancer is controversial. Some scholars believe that androgen receptor has a moderate anti-cancer effect, while others believe that it is a promoter of gastric cancer.[19] The relationship between androgen receptor and gastric cancer needs to be reviewed in more basic studies.

Gastric cancer mainly occurs in gastric antrum, followed by oesophago-gastric junction. However, in recent years, both domestic and foreign studies reported[12] that the incidence of distal gastric cancer had decreased year by year, while oesophageal and gastric junction cancer had increased and become the major location. According to a study,[20] distal gastric cancer is closely associated with dietary and helicobacter pylori (HP) infection and other factors. In recent years, the prevalence of HP treatment has reduced the incidence of gastric antrum cancer,[21,22] while the incidence of oesophago-gastric binding cancer has relatively increased. A large number of studies in China have shown that the common sites of gastric cancer are different in different regions, and the oesophago-gastric junction and gastric antrum are currently the most common sites of gastric cancer in China.[23] Through the analysis of the data of gastric cancer patients in this study, it can be seen that gastric cancer in the region still occurred mostly in the distal stomach, accounting for 40.51% of the cases, followed by the proximal stomach 30.41%. The incidence site of gastric cancer among young people is lower than that among middle-aged and elderly people. With the increase in age, the incidence sites tended to move to the proximal stomach, which is consistent with earlier results.[24]

At present, the detection rate of early gastric cancer in China is about 9.6% - 13.2%,[17] which has a large gap from that of South Korea, Japan and other countries.[25] In Japan, the proportion of early gastric cancer in gastric cancer has exceeded 50%.[26] The proportion of early gastric cancer in this study was 8.83%, which is at a low level in China. Most cases in this study were of advanced gastric cancer. The 5-year survival rate of advanced gastric cancer after surgical treatment is less than 20%, while the 5-year survival rate of early gastric cancer after treatment is over 90%, and they can even be completely cured.[27] Therefore, early diagnosis and timely treatment of gastric cancer are key to improving the quality of life of patients.

The histopathological types of the cases in this study were mostly low-differentiated adenocarcinoma, which is consistent with earlier results.[8] Gastric cancer tissue classification among young patients was poorer. The possible reasons for the young patients may be because of certain genetic susceptibility, as its incidence is related to the mutation of calcium mucins CDH1 gene encoding epithelial type embryo.[13]

The incidence of gastric cancer is different in different races and ethnic groups. A study[28] showed that the incidence of gastric cancer was different in different ethnic groups living in England. Reports in China have shown that gastric cancer incidence characteristics are different in different ethnic groups. Among Uygur and Kazak patients, gastric cancer is more likely to occur in the proximal stomach, and the stage is later than that of Han patients.[29] The differences observed in the current study related to Mongolian and Han patients need to be examined in more detailed basic studies.

The current study has certain limitations. The time span of the study was short. Besides, the sample size of Mongolian patients was small, and the long-term survival of patients was not included, which needs to be supplemented by further research. It is necessary to conduct long-term multicenter randomised controlled studies with larger sample sizes.

Conclusion

The diagnostic rate of gastric cancer in western Inner Mongolia was relatively low. The incidence of gastric cancer among both Mongolian and Han patients was higher in elderly men. The incidence of gastric antrum was dominant in Han patients, followed by oesophago-gastric junction, while the reverse was true of Mongolian patients. Clinicopathological characteristics of gastric cancer in the region need to be explored further to provide reference for formulating the next step of creating a prevention and treatment plan for gastric cancer, aiming at improving the early detection rate of gastric cancer, increasing the level of clinical specific treatment, reducing the case mortality rate and improving the quality of life of patients.

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