Study on the diagnostic value of risk score of gastric carcinoma onset for early gastric carcinoma in Ordos region

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Objective: To explore the diagnostic effect of risk score of gastric carcinoma onset on early gastric carcinoma in Ordos region.

Methods: Retrospective analysis was performed on 121 patients having suspected early gastric carcinoma who were admitted to our hospital of November 2021 and October 2022. To evaluate the diagnostic effectiveness of the gastric carcinoma risk rating in identifying early stomach carcinoma and the fundamental traits of various risk patients, the gastric carcinoma risk rating was applied for all patients, with the pathological diagnosis serving as the gold standard. The patients were separated into two groups based on the results of the pathological diagnosis: those with carcinoma and those without. Comparing the two groups' levels of laboratory test indications, and the levels of laboratory test indicators of early gastric carcinoma in different parts and different pathological types were compared.

Results: Spiral CT had a diagnostic accuracy, specificity, sensitivity, positive predictive value, and negative predictive value of 68.60%, 69.23%, 68.12%, 74.60%, and 62.07% for pulmonary ground-glass nodules, respectively. When compared to individuals at low risk, those at medium to high risk had a greater incidence of gastric carcinoma, and this

discrepancy was highly meaningful (P < 0.05). Low-risk individuals had lower percentages of age, male gender, Helicobacter pylori infection, smoking, and alcohol use than medium-risk individuals, and the variation was highly meaningful (P < 0.05). of the gastric carcinoma group and the non-gastric carcinoma group, there was no substantial variance in the test results for the indicators of serum pepsinogen I, serum pepsinogen II, and serum pepsinogen I / serum pepsinogen II (P > 0.05). Gastrin-17 test results were lower in the group with gastric carcinoma than in the group without gastric carcinoma, and this differences of the groups was clinically meaningful (P < 0.05). In patients suffering from early gastric carcinoma in the cardia, gastric body, gastric horn, and antrum, there was no discernible change in the test findings of serum pepsinogen I, serum pepsinogen II, serum pepsinogen I/serum pepsinogen II, and gastrin-17 (P > 0.05). The results of serum pepsinogen I, serum pepsinogen II and serum pepsinogen I/serum pepsinogen II were not markedly differing in patients suffering from high-grade intraepithelial tumour, highly differentiated adenocarcinoma, moderately differentiated adenocarcinoma and minimally differentiated adenocarcinoma (P > 0. 05), but there was a clear variation in gastrin-17, which gradually reduced (P < 0.05).

Conclusion: The risk score of gastric carcinoma onset has a higher diagnostic efficiency in the diagnosis of early gastric carcinoma patients in Ordos area, which can screen the disease by laboratory test indicators, but it cannot accurately identify the specific location of the tumor. It can be combined with other tests to improve the accuracy of the examination, which has a higher clinical application value.

Keywords: Ordos; Risk score of gastric carcinoma onset; Early gastric carcinoma; Diagnosis

INTRODUCTION

Gastric carcinoma is a common clinical malignant tumor, which is derived from gastric mucosal epithelial cells. The incidence of the disease is related to poor dietary habits, increased work and life pressure, Helicobacter pylori infection and other factors [1-2]. Currently, a tissue biopsy performed using a gastroscope is the benchmark for diagnosing stomach carcinoma, but the examination is invasive, and limited by facilities, equipment, and physician experience, so the clinical popularity is limited and cannot be applied to large-scale screening [3-4]. Gastric carcinoma risk score is an internationally popular screening method, which is mainly scored by the patient's age, gender, Helicobacter pylori infection and laboratory test indicators to obtain the screening results [5-6]. In China, there are clear geographical variations in the prevalence of carcinoma, with the incidence in the northwest and eastern coastal regions being noticeably higher [7-8]. Therefore, regular screening in Ordos can substantially increase the rate of early gastrointestinal carcinoma detection, and then the patients can be treated by the active and effective treatment to improve their prognosis and delay the survival time of patients [9-10]. A gastrointestinal disease rating was administered to patients with suspected carcinoma who consulted a hospital in this area in order to investigate the applicability value of the rating in the identification of early gastric carcinoma. The full text is as follows.

1 MATERIALS AND METHODES

1.1 Baseline data

This study retrospectively analyzed 121 patients, all of whom were suspected early gastric carcinoma patients in Ordos Region. The inclusion time was from November 2021 to October 2022, including 71 males and 40 females, ranging in age from 46 to 78 years, with an average of (62.13 ± 4.08) years.

1.2 Inclusion and exclusion criteria

1.2.1 Inclusion criteria

① Patients all had upper abdominal discomfort, belching, dyspepsia and other symptoms, and were initially clinically diagnosed as suspected early gastric carcinoma; ② Patients aged 45-80 years; ③ Vital signs were stable in patients; ④ The hospital's medical ethics board provided its approval, and the patients' and families' informed permission.

1.2.2 Exclusion criteria

① Patients with advanced gastric carcinoma, which had metastasized; ② Patients had undergone gastric carcinoma surgery, chemoradiotherapy and other treatments in the past; ③ Patients with the history of gastric surgery; ④ Patients with heart, liver and kidney dysfunction; ⑤ Patients suffering from severe primary illnesses such diabetes, blood system disorders, and endocrine disorders; ⑥ Patients who had taken drugs such as gastric acid inhibition, antibiotics, bismuth agents within 2 weeks before the study; ⑦ Patients who were confused and unable to cooperate well with the study.

1.3 Methods

The new gastric carcinoma screening rating method from China was utilized to rate each patient's chance of developing stomach carcinoma. Age, gender, Helicobacter pylori infection, the ratio of serum pepsinogen I to serum pepsinogen II, and gastrin-17 were all considered grading factors. The age of 40 and 49, 50 and 59, 60 and 69, 70 and older were given 0 points, 5 points, 6 points, and 10 points respectively, and male and female were given 4 points 0 points respectively according to the gender. For Helicobacter pylori infection, 0 points and 1 point were given for non-infection and infection respectively, and 0 points and 3 points were given for the ratio of serum pepsinogen I to serum pepsinogen II when the ratio was ≥ 3.89 or < 3.89, and 0 points, 3 points and 5 points were given for gastrin-17 < 1.50pmol/L, 1.50-5.70pmol/L and > 5.70pmol/L, respectively. Test method of laboratory: Before sampling, the patients should fast for more than 10h and the same group of nursing staff sampled 5ml of the patients' elbow vein blood as samples in the next morning. The test instrument was a Boke BK-400 automatic biochemical analyzer. The test method was enzyme-linked immunosorbent assay and the kit was a matching reagent. The test operation was strictly carried out according to the steps of the manual. The situation of Helicobacter pylori infection was detected by carbon 14 breath test. Before examination, patients should fast for 6-8h, and then take 1 carbon 14 urea capsules orally during examination, then waiting for 15-25min, exhaling against the collecting bottle until the liquid in the bottle changed from pink to colorless or patients had exhaled for 3min. Then the amount of carbon 14 in the liquid of the

bottle was detected to judge the infection of Helicobacter pylori.

1.4 Observation indicators

1.4.1 Observation of the diagnostic efficacy of the risk score of gastric carcinoma onset for early gastric carcinoma. Results of the pathological diagnosis were utilized as the benchmark. The findings of the pathological diagnosis were calculated and contrasted with the accuracy, sensitivity, specificity, positive predictive value, and negative predictive value of the risk rating of gastric carcinoma onset for early gastric carcinoma diagnosis. Accuracy = (true negative+ true positive) ÷ total × 100%, positive predictive value is equal to true positive minus (true positive + false positive) 100%, specificity is equal to true negative minus (true negative + false positive) 100%, and negative predictive value is equal to true negative minus (true negative + false negative) 100%. True positive meant that all diagnostic results were positive; false positive meant that the results of risk score of gastric carcinoma onset were positive, while results of gold standard diagnosis were negative; false negative was that the results of the risk score of gastric carcinoma were negative, while the results of gold standard diagnosis were positive; true negative meant that all diagnostic results were negative. Judgment basis: The scores of 11 were taken as the critical value, and patients suffering from early gastric carcinoma judged by the combination of the laboratory test results were recorded as positive.

1.4.2 Comparing of the incidence of gastric carcinoma of low-risk and medium-high-risk groups in the risk score of gastric carcinoma onset. The scores of 11 and 16 were taken as the critical values, and all of the study items were graded into

low-risk (0 – 11 points), medium-risk (12 – 16 points), and high-risk categories (17-23 points). Based on the pathological diagnosis results, the incidence of gastric carcinoma in different grades of the risk score of gastric carcinoma onset was counted, and the results obtained were compared.

1.4.3 Comparing of the basic characteristics of the low-risk and medium-high-risk groups in the risk score of gastric carcinoma onset. The basic characteristics of the low-risk and medium-high-risk groups such as age, gender, Helicobacter pylori infection, smoking, and drinking were observed, and the results obtained were analyzed.

1.4.4 Comparing of laboratory test indicators of gastric carcinoma group and non-gastric carcinoma group. According to the results of pathological diagnosis, the patients were separated into two groups: those without carcinoma (69 instances), and those with gastric carcinoma (52 instances). All patients underwent laboratory testing, which included the following test indicators: serum pepsinogen I, serum pepsinogen II, serum pepsinogen I / serum pepsinogen II, and gastrin-17. Patients with gastric carcinoma and patients without gastric carcinoma had their indicator levels evaluated.

1.4.5 Comparing of the laboratory test indicators of patients suffering from gastric carcinoma in different parts. Serum pepsinogen I, pepsinogen II, pepsinogen I/pepsinogen II, and gastrin-17 levels in patients having gastric carcinoma in the gastric cardia, gastric body, gastric horn, and gastric antrum in the gastric carcinoma group were counted respectively, and the results obtained were compared.

1.4.6 Comparing of the laboratory test indicators of patients with different

pathological types of gastric carcinoma. Patients suffering from advanced intraepithelial neoplasia, highly differentiated adenocarcinoma, moderately differentiated adenocarcinoma, and pleomorphic adenocarcinoma in the gastric carcinoma group had their levels of serum pepsinogen I, serum pepsinogen II, serum pepsinogen I/serum pepsinogen II, and gastrin-17 counted, and the results obtained were compared.

1.5 Statistical treatment

In this result, the measurement data were presented as ($\bar{x} \pm s$) and a t-test was utilized to analyze them. The X2 test was applied to the counting data, which were represented as [n;%]. Statistical software SPSS24.0 was used for processing, and when $P < 0.05$ considered that there was a significance difference.

2 RESULTS

2.1 The diagnostic efficacy of risk score of gastric carcinoma onset for early gastric carcinoma

The diagnostic accuracy, specificity, sensitivity, positive predictive value, and negative predictive value of the risk rating of gastric carcinoma onset for early gastric carcinoma were 68.60%, 69.23%, 68.12%, 74.60% and 62.07%, respectively, as shown in Table 1 and Figure 1 for details:

Table 1: The diagnostic efficacy of the risk score of gastric carcinoma onset for early gastric carcinoma [n]

Gold standard	n	Risk score of gastric carcinoma onset	
		positive	negative
positive	69	47	22
negative	52	16	36

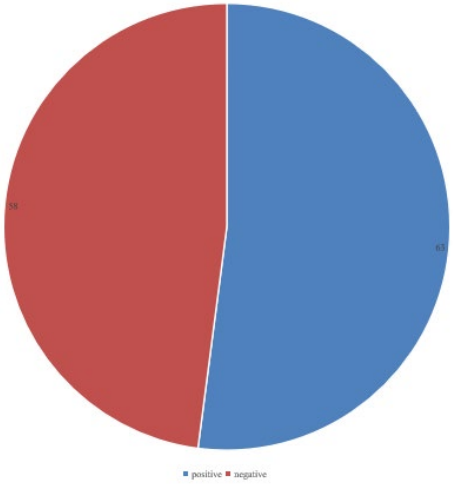

Figure 1 The diagnostic efficacy of the risk score of gastric carcinoma onset for early gastric carcinoma

2.2 Comparing of the incidence of gastric carcinoma of low-risk and medium-high-risk patients in the risk score of gastric carcinoma onset

As demonstrated in Table 2 and Figure 2, the occurrence of gastric carcinoma was greater in the medium-high-risk group than in the low-risk group, and the discrepancy was clinically meaningful ($x^2 = 8.760$, $P = 0.003$).

Table 2: Comparing of the occurrence of gastric carcinoma in patients having different grades of the risk rating of gastric carcinoma onset

Risk level	Total number of cases [n]	Number of cases [n]	Incidence [%]
Low risk	64	29	45.31
Medium risk	39	25	64.10
High risk	18	16	88.89

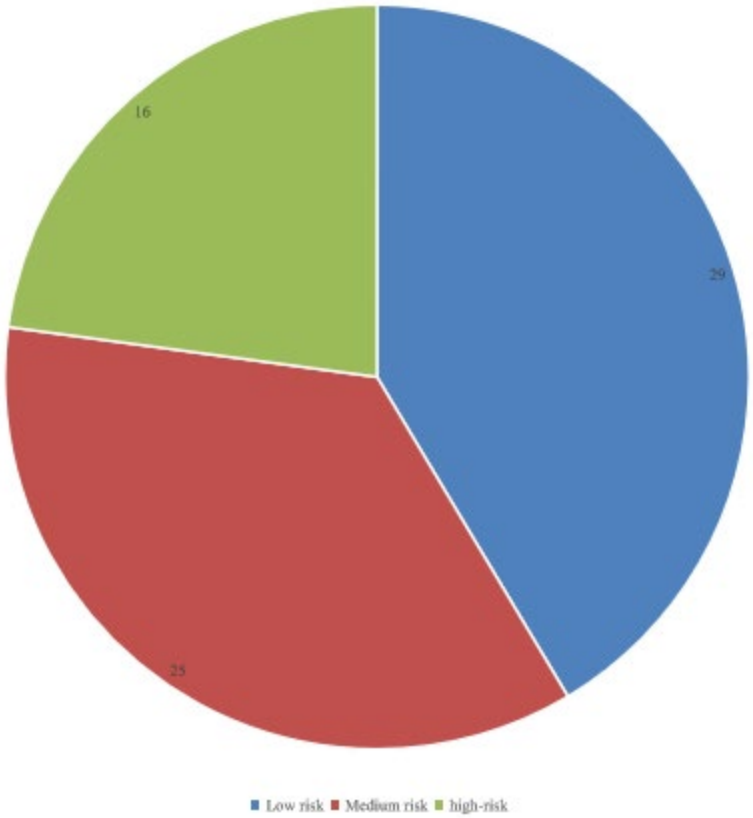

Figure 2 Comparing of the occurrence of gastric carcinoma onset in patients having different grades of the risk rating of gastric carcinoma onset

2.3 Comparing of the basic characteristics of low-risk and medium-high-risk groups in the risk rating of gastric carcinoma onset

The proportion of age, male, Helicobacter pylori infection, smoking and drinking of low-risk people was lower than that of medium-high-risk people, and the difference was statistically significant ($P < 0.05$), as shown in Table 3, Figure 3 and Figure 4 for details:

Table 3: Comparing of the basic characteristics of low-risk and medium-high-risk groups in the risk score of gastric carcinoma onset

Risk level	n	Age	Gender		helicobacter pylori infection		smoking		drinking	
			male	female	yes	no	yes	no	yes	no
Low risk	64	57.63 ± 3.92	22 (34.38)	42 (65.62)	15 (23.44)	49 (76.56)	17 (26.56)	47 (73.44)	20 (31.25)	44 (68.75)
Medium-high risk	57	66.18 ± 3.54	49 (85.96)	8 (14.04)	43 (75.44)	14 (24.56)	41 (71.93)	16 (28.07)	42 (73.68)	15 (26.32)
t/x^2	-	12.532	33.093		32.666		24.863		21.729	
P	-	0.000	0.000		0.000		0.000		0.000	

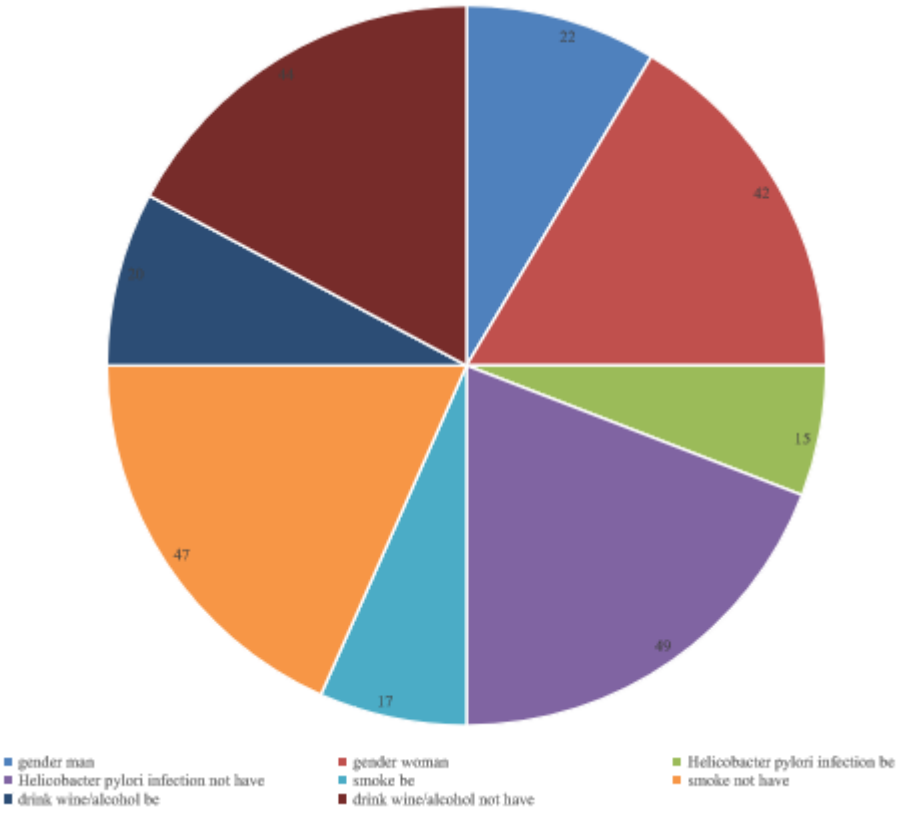

Figure 3 Comparing of the basic characteristics (gender, Helicobacter pylori infection, smoking, drinking) of low-risk and medium-high-risk groups in risk score of gastric carcinoma onset

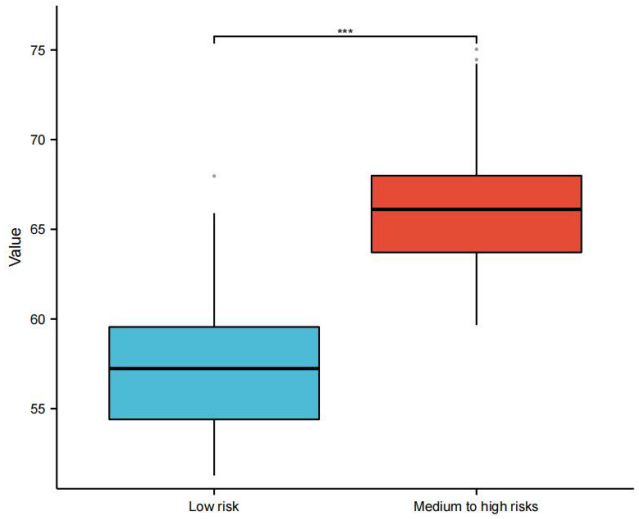

Figure 4 Comparing of the basic characteristics (age) of low-risk and medium-high-risk groups in the risk score of gastric carcinoma onset

2.4 Comparing of laboratory test indicators of gastric carcinoma and non-gastric carcinoma patients

The findings of the tests for serum pepsinogen I, serum pepsinogen II, and serum pepsinogen I/serum pepsinogen II of the groups with and without tumors were not significantly different (P > 0.05). As illustrated in Table 4 and Figure 5, the test result for gastrin-17 in the group with gastric carcinoma was lower contrasted to the group without gastric carcinoma, and the discrepancy between the groups was clinically meaningful (P< 0.05).

Table 4: Comparing of laboratory test indicators of gastric carcinoma and non-gastric carcinoma patients

group	n	Serum pepsinogen I[μ g/L]	Serum pepsinogen II[μ g/L]	Serum pepsinogen I / serum pepsinogen II	Gastrin-17[pmol/L]
Gastric carcinoma group	69	132.84 ± 11.06	11.79 ± 1.05	13.40 ± 1.12	5.33 ± 0.51
Non-gastric carcinoma group	52	133.16 ± 11.10	11.74 ± 1.03	13.47 ± 1.14	9.02 ± 0.87
T	-	0.157	0.261	0.338	29.216
P	-	0.875	0.794	0.736	0.000

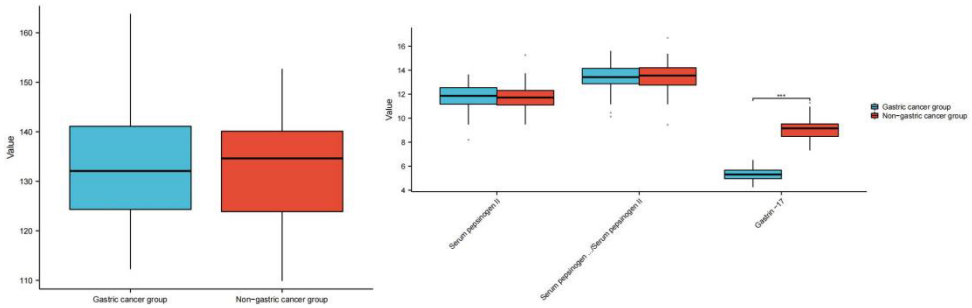

Figure 5 Comparing of laboratory test indicators of gastric carcinoma and non-gastric carcinoma patients

2.5 Comparing of laboratory test indicators of patients with gastric carcinoma in different parts

In patients with early gastric carcinoma in the cardia, gastric body, gastric horn, and gastric antrum, there was no discernible difference in the test results of serum pepsinogen I, serum pepsinogen II, serum pepsinogen I/serum pepsinogen II, and gastrin-17 ($P > 0.05$), as depicted in Table 5 and Figure 6 for more information.

Table 5: Comparing of laboratory test indicators of patients with gastric carcinoma at different sites

Part	N	Serum pepsinogen I[μ g/L]	Serum pepsinogen II[μ g/L]	Serum pepsinogen I / serum pepsinogen II	gastrin-17[pmol/L]
cardia	40	128.71±10.93	12.07±1.08	13.29±1.20	5.36±0.52
gastric body	6	136.76±11.42	10.98±1.00	12.72±1.17	6.72±0.65
gastric horn	11	138.23 ± 11.54	12.16 ± 1.12	13.38 ± 1.21	4.99 ± 0.50
gastric antrum	12	139.68 ± 11.61	10.92 ± 0.98	14.12 ± 1.29	4.76 ± 0.48
T	-	0.235	0.315	0.322	0.416
P	-	0.803	0.742	0.743	0.711

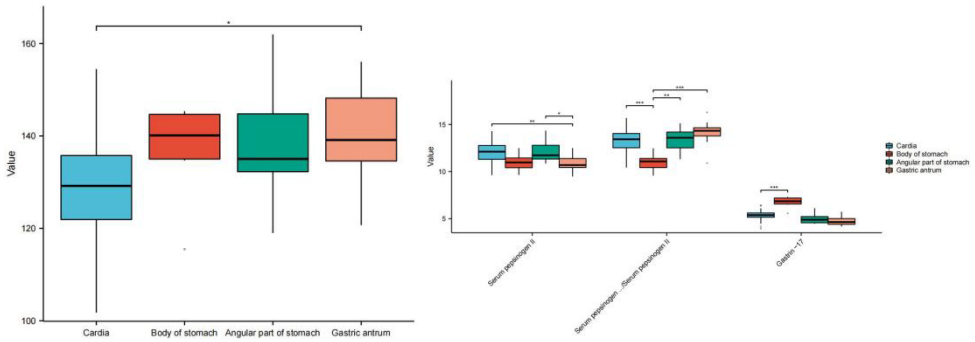

Figure 6 Comparing of laboratory test indicators of patients with gastric carcinoma at different sites

2.6 Comparing of laboratory test indicators of patients with different pathological types of gastric carcinoma

The results of serum pepsinogen I, serum pepsinogen II, and serum pepsinogen I/serum pepsinogen II were not markedly differing in patients having high-grade intraepithelial tumor, highly differentiated adenocarcinoma, moderately differentiated adenocarcinoma, and poorly differentiated adenocarcinoma (P>0. 05), but there were clear variations in gastrin-17, and in high-grade intraepithelial tumor, highly differentiated adenocarcinoma, moderately differentiated adenocarcinoma, and poorly differentiated adenocarcinoma gradually decreased in (P<0.05), as detailed in Table 6 and Figure 7.

Table 6: Comparing of laboratory test indicators of patients with different pathological types of gastric carcinoma

Pathological type	n	Serum pepsinogen I[μ g/L]	Serum pepsinogen II[μ g/L]	Serum pepsinogen I / serum pepsinogen II	Gastrin-17[pmol/L]
High grade intraepithelial neoplasia	14	126.78 ± 10.45	10.98 ± 1.01	13.08 ± 1.19	6.27 ± 0.59
Highly differentiated adenocarcinoma	22	131.95 ± 11.07	11.51 ± 1.03	13.17 ± 1.21	5.66 ± 0.54
Moderately differentiated adenocarcinoma	29	133.47 ± 12.21	12.29 ± 1.10	13.50 ± 1.23	4.80 ± 0.46
Poorly differentiated adenocarcinoma	4	154.38 ± 14.21	12.54 ± 1.12	14.12 ± 1.27	4.06 ± 0.38
T	-	0.251	0.321	0.354	21.057
P	-	0.786	0.739	0.726	0.000

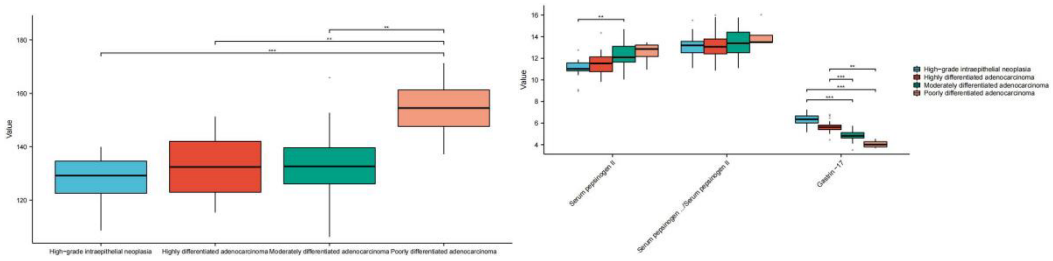

Figure 7 Comparing of laboratory test indicators of patients with different pathological types of gastric carcinoma

3 DISCUSSION

Gastric carcinoma ranks in the forefront of morbidity and mortality in China, and has become a public health problem threatening the safety of people's lives. The 5-year survival rate of early gastric carcinoma after surgical treatment can reach more than 90% in the early period [11-12]. However, it is generally asymptomatic in the early stage or shows atypical symptoms such as belching and epigastric discomfort, so it is easy to miss the best treatment opportunity, which will adversely affect its prognosis, Therefore, it is necessary to improve the detection rate of early gastric carcinoma in clinic [13-14].

Serum pepsin is an indicator of human gastric mucosal functional enzymes with high specificity [15-16], mainly including serum pepsinogen I and serum pepsinogen II, which can not only reflect the gastric mucosal function of patients, but also fully reflect the number of gastric mucosal cells and glands [17-18]. Therefore, there is a close correlation among serum pepsinogen I and serum pepsinogen II levels and atrophy of human gastric mucosa [19-20]. Gastrin-17 is generally secreted by antral G cells and enters the human blood circulation, mainly showing the function of G cells

[21-22]. Gastrin-17 can not only promote the proliferation of human gastric mucosal epithelial cells, but also regulate the secretion of gastric acid and pepsinogen [23-24]. There is a important diagnostic value by using serum pepsinogen and gastrin-17 to diagnose the early gastric carcinoma, which can provide a favorable basis for its later treatment [25-26]. This study showed that the diagnostic accuracy, specificity, sensitivity, positive predictive value and negative predictive value of the risk score of gastric carcinoma onset for early gastric carcinoma were 68.60%, 69.23%, 68.12%, 74.60% and 62.07%, respectively; and the incidence of gastric carcinoma in medium-high-risk patients was higher than that in low-risk patients ($P < 0.05$). It is suggested that the risk score of gastric carcinoma onset can be used to screen early gastric carcinoma in clinic, and it needs to be paid special attention to those at medium and high risk [27-28]. The laboratory test indicators in the score include pepsinogen and gastrin-17, of which pepsinogen is the inactive precursor of pepsin, mainly including serum pepsinogen I and serum pepsinogen II and the ratio of the two is generally used as a marker to judge gastric diseases in clinic. When the ratio is decreased, it indicates that there is atrophy in gastric mucosa [29-30]. Gastrin-17 is an amidated gastrin secreted by G cells of gastric antrum mucosa, which is clinically used to judge the secretion level of gastric acid and the state of gastric mucosa and if it is decreased, it indicates that there is atrophy in gastric mucosa. It is possible to test for early gastric carcinoma by checking the levels of serum pepsinogen I/serum pepsinogen II and gastrin-17 in a clinic setting since atrophic gastritis is a precarcinomous lesion of gastric carcinoma. The test results of the indicators of serum pepsinogen I, serum pepsinogen II, and

serum pepsinogen I / serum pepsinogen II were not clearly distinguishable between the gastric carcinoma group and the non-gastric carcinoma group ($P > 0.05$), and the test result of gastrin-17 in the gastric carcinoma group was lower compared to the non-gastric carcinoma group, and the diastolic blood pressure was also lower in the gastric carcinoma group($P < 0.05$). The reason for this result may be that the levels of serum pepsinogen I, serum pepsinogen II, and serum pepsinogen I / serum pepsinogen II in different types of atrophic gastritis may be increased or decreased, so there is no obvious difference in the statistical levels, which should be judged in combination with other examinations.

In conclusion, the risk score of gastric carcinoma onset has a higher diagnostic efficiency in the diagnosis of patients with early gastric carcinoma in Ordos Area, which can screen the disease by laboratory test indicators, but it cannot accurately identify the specific location of the tumor, so the accuracy of the examination can be improved by combing with other tests, which has a higher clinical application value.

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