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Value of combined detection of routine blood, biochemical indexes and tumor markers for screening of patients with gastric cancer.

Xiao Ying*, Cenjue Gao, Jianling Zheng, Zaihong Wang, Xiaoyu Xu

Quzhou Hospital of Traditional Chinese Medicine, Quzhou, Zhejiang, P. R. China

Abstract

Objective: To investigate the clinical value of combined detection of routine blood, biochemical markers and tumor markers for screening of patients with gastric cancer.

Methods: A total of 106 patients with gastric cancer treated in our hospital from February 2016 to September 2017 were selected as study group, with another 90 healthy subjects undergoing physical examination during the same period as control group. The changes in blood routine, biochemical markers in serum and tumor markers were comparatively analyzed between the 2 groups.

Results: Compared with the control group, the levels of white blood cell (WBC) and platelet (PLT) count in the blood routine were significantly improved in the study group, with the difference being statistically significant (P<0.05); while the level of hemoglobin (Hb) was decreased in the study group of no statistical significance(P>0.05); the levels of Total Cholesterol (TC), High-density lipoprotein cholesterol (HDL-C) and Low-density lipoprotein cholesterol (LDL-C) in biochemical indexes were significantly decreased in the study group, with the difference being statistically significant (P<0.05); and the levels of such tumor markers as carcinoembryonic antigen (CEA), carbohydrate antigen 125 (CA125) and carbohydrate antigen 199 (CA199) level were significantly increased in the study group of statistical significance (P<0.05).

Conclusion: The combined detection of blood routine, biochemical indexes and tumor markers is of important reference value for screening of patients with gastric cancer and can provide the basis for early treatment of the disease.

Keywords: Gastric cancer, Screening, Blood routine, Biochemical indexes, Tumor markers.

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Introduction

The occurrence of gastric cancer is a gradual process. It takes 3 ～5 years or even longer to be developed to gastric cancer from the initial gastritis and precancerous lesions but with no obvious symptoms in this course and the discovered disease is generally in the middle and late stage [1]. The early screening of gastric cancer is costly and opportunistic screening in outpatient service has been adopted all the way in our country, leading to early diagnosis rate lower than 10%. According to the difference in diagnosis and treatment stage, the postoperative 5-year survival rate is obviously varying, which is 90% in stage I, 66% in stage II, 51% in stage III and only 14% in late stage [2]. Therefore, the early screening of gastric cancer is more important than the later treatment and it has become a consensus of global gastric cancer researchers to rearrange common resources for diagnosis and treatment by applying more excellent medical resources to early screening of gastric cancer especially in the areas of high incidence so as to realize early diagnosis and treatment, reduce the incidence and improve the cure rate of the disease [3]. Gastric cancer is a result of multiple factors and the detection of a single marker is often of the contradiction between specificity and sensitivity, so the combined detection of multiple markers is of great significance for the screening and diagnosis of gastric cancer [4]. Blood testing is a widely accepted method in this regard and that the combined detection of multiple tumor markers in serum has been widely used for cancer diagnosis [5]. Therefore, this study explored and analyzed the clinical value of combined detection of blood routine, biochemical indexes and tumor markers in screening of gastric cancer patients so as to provide strong supports for accurate identification of gastric cancer prevalent population.

Subjects and Methods

Subjects

A total of 106 patients with gastric cancer treated in our hospital from February 2016 to September 2017 were selected as study group and among them there were 60 males and 46 females aged 53-75 with an average age of (64.6 ± 5.3) years, with the clinical stage (TNM) including stage I in 20 cases, stage II in 47 cases, stage III in 20 cases and stage IV in 19 cases. All of them were diagnosed with gastric cancer by pathological examination. Exclusion criteria: (1) patients with

history of gastric cancer; (2) patients with other types of tumors; (3) patients with serious diseases of important organs such as heart, liver or kidney; (4) patients with incomplete clinical data. Another 90 healthy subjects undergoing physical examination during the same period were selected as control group, including 50 males and 40 females aged 54 -74 with an average age of (64.3 ± 5.1) years. There was no significant difference between the 2 groups in sex ratio and average age (P>0.05), as shown in Table 1.

Table.1. *Comparison of general information in 2 groups.*

Group	n	Sex		
		Male	Female	
Study group	106	60	46	64.6 ± 5.3
Control group	90	50	40	64.3 ± 5.1
t		4.674		5.474
p		>0.05		>0.05

Methods

Test items

All subjects were extracted 5 ml fasting venous blood in the early morning and the blood was divided into two parts, one of which was used for routine blood test and the other was centrifuged at 3000 r/min for 10 min after a standstill time of 20 min-30min at room temperature followed by separation of the upper serum for biochemical and tumor markers detection [6]. The indexes of routine blood test include blood white blood cell count (WBC), hemoglobin (Hb) and platelet count (PLT); the biochemical indexes include total cholesterol (TC), high density lipoprotein (HDL-C) and low density lipoprotein (LDL-C); and the indexes of tumor marker detection include carcinoembryonic antigen (CEA), carbohydrate antigen 125 (CA125) and carbohydrate antigen 199 (CA199).

Evaluation index

The levels of WBC, Hb and PLT in routine blood test, the levels of TC, HDL-C and LDL-C as well as the changes of CEA, CA125 and CA199 levels were compared and analyzed in the 2 groups.

Statistical processing

SPSS 21 software was used for statistical analysis and processing, in which the measurement data were assessed by t test and the enumeration data chi square test. P<0.05 suggested that there was statistically significant difference.

Results

Comparison of blood routine test between the groups

Compared with the control group, the levels of WBC and PLT count in the blood routine were significantly improved in the study group, with the difference being statistically significant (P<0.05); while the level of Hb was decreased in the study group of no statistical significance (P>0.05), as shown in Table 2.

Table 2. *Comparison of blood routine test between the groups*

Group	Casen	WBC(x10^9/L)	Hb (g/L)	PLT (x10^9/L)
Study group	106	7.74 ± 1.92	136.43 ± 21.87	234.06 ± 32.39
Control group	90	6.06 ± 1.51	139.65 ± 23.21	176.03 ± 27.44
t		7.83	1.24	6.12
P		<0.05	>0.05	<0.05

Comparison of biochemical index in serum between the 2 groups

Compared with the control group, the levels of TC, HDL-C and LDL-C in biochemical indexes were significantly decreased in the study group, with the difference being statistically significant (P<0.05), as shown in Table 3.

Table 3. *Comparison of biochemical index in serum between the 2 groups.*

Group	Case(n)	TC (mmol/L)	HDL-C(mmol/L)	LDL-C (mmol/L)
Study group	106	3.72 ± 1.43	2.69 ± 0.87	1.58 ± 0.54
Control group	90	4.96 ± 1.55	3.34 ± 1.13	2.42 ± 1.39
t		6.31	5.08	6.26
P		<0.05	<0.05	<0.05

Comparison of tumor marker levels between the 2 groups

Compared with the control group, the levels of such tumor markers as carcinoembryonic antigen (CEA), carbohydrate antigen 125 (CA125) and carbohydrate antigen 199 (CA199) level were significantly increased in the study group of statistical significance (P<0.05), as shown in Table 4.

Group	Case n	CEA(ng/ml)	CA199 (ng/ml)	CA125 (IU/Ml)
Study group	106	25.74 ± 8.57	47.69 ± 11.03	62.68 ± 5.15

Control group	90	7.01 ± 1.67	18.22 ± 5.74	18.94 ± 6.02
t		29.06	19.33	24.28
P		<0.01	<0.01	<0.01

Table 4. Comparison of tumor marker levels between the 2 groups ($\bar{x}$+S).

Summary: Compared with the control group, the levels of WBC and PLT count in the blood routine were significantly improved in the study group, with the difference being statistically significant (P<0.05); while the level of Hb was decreased in the study group of no statistical significance(P>0.05); the levels of TC, HDL-C and LDL-C in biochemical indexes were significantly decreased in the study group, with the difference being statistically significant (P<0.05); and the levels of such tumor markers as CEA, CA125 and CA199 levels were significantly increased in the study group of statistical significance (P<0.05). These results suggest that the combined detection of blood routine, biochemical indexes and tumor markers is of important reference value for screening of patients with gastric cancer and can provide the basis for early treatment of the disease.

Discussion

Tumor marker is a class of substances released by tumor cells in the course of it growth and development or produced by the interaction between tumor and host cells [6,7]. It can be seen in body fluids, cells or tissues, its detection can determine the presence of cancer, and its level changes can reflect tumor growth status as well as cell differentiation of vital significance for the diagnosis, treatment and prognosis of cancer [8,9]. At present, more than 100 tumor markers of high sensitivity and specificity have been found, among which CEA, CA125 and CA199 are the main tumor markers associated with gastric cancer [10]. CEA is of glycoprotein structure and located on the membrane of cancer cells. There may be a trace amount of CEA in serum of the normal population, while in patients with gastric cancer, CEA will be of higher concentration because it will gradually fall off from the cell membrane and enter body fluids with the occurrence and growth of tumor cells, from which clinical researchers attempt to detect CEA in serum for diagnose of tumors like esophageal cancer, gastric cancer, colorectal cancer and other gastrointestinal tumor [11]. CA125 is the most sensitive marker in patients with epithelial ovarian cancer and has moderately high positive detection rate in gastric cancer sufferers. A large number of studies have shown [12-14] that the changes in the level of CA125 reflect the invasion of the tumor to the body. CA199, a mucin tumor marker, is an important component of the lipid on the membrane of the cell. The synthesis of CA199 can be found in normal fetal epithelial cancers like pancreas, intestines and stomach, in colon, pancreas and bile duct cells of the normal population as well as in endometrium of women [15,16]. In this study, the tumor markers of CEA, CA125 and CA199 were significantly increased in the study group compared with the control group (P<0.05), suggesting that the levels of serum CEA, CA125 and CA199 were higher in patients with gastric cancer than in healthy subjects.

We also found that compared with the control group the levels of blood white cell count and platelet count were significantly increased, and the levels of serum total cholesterol, HDL and LDL significantly decreased in the study group with the differences being statistically significant (P<0.05). The reason may be: WBC is one of inflammatory cells, so the WBC in peripheral blood of cancer patients often increases under pathological conditions, simultaneously leading to the activation of various inflammatory reactions and changes in parts of physiological function [17]. Cancer patients, due to tumor invasion and blood loss plus with malnutrition, are much prone to disordered Hb synthesis, resulting in a great reduction in the number of Hb generation. Because PLT can release transcription factors as well as PLT-derived growth factors with aggregation and degranulation in tumor microvessel, thereby stimulating the growth of tumor cells, so it tends to be increasingly high in cancer patients. Cholesterol, a main component of cell membrane [18], may be involved in the occurrence and development of gastric cancer through direct or indirect mechanism and particularly the cholesterol demand is expected to increase in the mitosis of tumor cells which is uncontrolled by the body, thus resulting in a great reduction of cholesterol content, a decreasing trend of TC level and a significant increase trend of LDL-C and HDL-C.

To sum up, the combined detection of blood routine, biochemical indexes and tumor markers is of important reference value for screening of patients with gastric cancer and can provide the basis for early treatment of the disease.

References

1. Li Q, Li G, Palmer JD, Zhang Z. Lymph Node Burden as a Predictive Factor for Selective Chemoradiotherapy in Patients With Locally Advanced Gastric Cancer After a D2 Dissection: A Retrospective Study. Am J Clin Oncol 2017; 40: 375-380.
2. Makuuchi H, Kise Y, Shimada H. Endoscopic mucosal resection for early gastric cancer. Semin Surg Oncol 2015; 17:108-116.
3. Jatzko GR, Lisborg PH, Denk H, Klimpfinger M, Stettner HM. A 10-year experience with Japanese-type radical lymph node dissection for gastric cancer outside of Japan. Cancer 1995; 76: 1302-1312.
4. Bo LI, Hui C, Kang ZC. Association of proximal,distal resection margin distances in R0gastrectomy with prognosis of gastric cancer. Acad J Second Military Medical University 2015; 36: 276-282.
5. Li J, Li L. Effect of inhalation anesthetics on expression of pro-inflammatory cytokine in rats. Chongqing Med 2013; 42:778-780.
6. Park J, Lee H, Kim YK, Kim KH, Lee W, Lee KY, Park YJ, Kahng J, Kwon HJ, Kim Y, Oh EJ, Lim J, Kim M, Han K.

Automated screening for tuberculosis by multiparametric analysis of data obtained during routine complete blood count. Int J Lab Hematol, 2014; 36:156-164.

7. Zhang F, Zhang ZL. The Diagnostic Value of Transvaginal Sonograph (TVS), Color Doppler, and Serum Tumor Marker CA125, CEA, and AFP in Ovarian Cancer. Cell Biochem Biophys 2015; 72: 353-357.
8. Tzitzikos G, Saridi M, Filippopoulou T, Makri A, Goulioti A, Stavropoulos T, Stamatiou K. Measurement of tumor markers in chronic hemodialysis patients. Saudi J Kidney Dis Transpl 2010; 21: 50-53.
9. Tsukushi S, Katagiri H, Kataoka T, Nishida Y, Ishiguro N. Serum Tumor Markers in Skeletal Metastasis. Jpn J Clin Oncol 2006; 36: 439-444.
10. Wang HJ, He XJ, Ma YY, Jiang XT, Xia YJ, Ye ZY, Zhao ZS, Tao HQ. Expressions of Neutrophil Gelatinase-Associated Lipocalin in Gastric Cancer: A Potential Biomarker for Prognosis and an Ancillary Diagnostic Test. Anat Rec (Hoboken) 2010; 293:1855-1863.
11. Gu YL, Lan C, Pei H, Yang SN, Liu YF, Xiao LL. Applicative Value of Serum CA199, CEA, CA125 and CA242 in Diagnosis and Prognosis for Patients with Pancreatic Cancer Treated by Concurrent Chemoradiotherapy. Asian Pac J Cancer Prev 2015; 16: 6569-6573.
12. Kui Wong N, Easton RL, Panico M, Sutton-Smith M, Morrison JC, Lattanzio FA, Morris HR, Clark GF, Dell A, Patankar MS. Characterization of the oligosaccharides associated with the human ovarian tumor marker CA125. J Biol Chem 2003; 278: 28619-28634.
13. Jacob F, Meier M, Caduff R, Goldstein D, Pochechueva T, Hacker N, Fink D, Heinzelmann-Schwarz V. No benefit from combining HE4 and CA125 as ovarian tumor markers in a clinical setting. Gynecologic Oncology 2011; 121: 487-491.
14. Zhang Y, Jiang L, Song L. Meta-analysis of diagnostic value of serum Carbohydrate antigen 199 (CA199) in pancreatic cancer. Minerva Medica 2016; 107: 62-69.
15. Huang YW, Huang H, Li YJ. Significance of the Detection of Serum CA50 Combined with CA199 in Diagnosis of Pancreatic Cancer. Med Pharmaceutical J Chinese Peoples Liberation Army 2013; 60: 546-552.
16. Zhou G, Niu L, Chiu D, He L, Xu K. Changes in the expression of serum markers CA242, CA199, CA125, CEA, TNF-a and TSGF after cryosurgery in pancreatic cancer patients. Biotechnology Lett 2012; 34: 1235-1241.
17. Trujillo-Santos J, Di Micco P, Iannuzzo M, Lecumberri R, Guijarro R, Madridano O, Monreal M; RIETE Investigators. Elevated white blood cell count and outcome in cancer patients with venous thromboembolism. Findings from the RIETE Registry. Thromb Haemost 2008; 100: 905-911.
18. Ivankin A, Kuzmenko I, Gidalevitz D. Cholesterol mediates membrane curvature during fusion events. Phys Rev Lett 2012; 108: 238103.

*Correspondence to

Xiao Ying

Quzhou Hospital of Traditional Chinese Medicine

Quzhou, Zhejiang

P. R. China