BILINGUAL PUBLISHING CO.
Advances in Modern Oncology Research
doi: 10.30564/amor.v5i2.238

Article

Multiple Tumor Markers Detection for Correlation Diagnosis of Ovarian Cancer

Reubina Wadee[1*] **Safa I.H. Taha**[2]

1. The Medical Oncology Centre of Rosebank, Johannesburg, South Africa
2. Radiation Medicine Program, Stronach Regional Cancer Center, Newmarket, Canada

***Correspondence Author:** Reubina Wadee, The Medical Oncology Centre of Rosebank, Johannesburg, South Africa; Email: Wadee1987@gmail.com

Abstract: The contents of serum CA125, alpha-fetoprotein (AFP) and CA199 and their diagnostic value in ovarian cancer were analyzed in this study. Firstly, 80 patients with ovarian malignant tumors from June 2019 to June 2020 in our hospital were included in the study group, and 80 patients with benign ovarian tumors were included in the control group during the same period. Serum levels and positive rates of CA125, AFP and CA199 were detected in both study group and control group. The expression levels of CA125, AFP and CA199 in the study group were all higher than those in the control group ($P < 0.05$). The positive rate of AFP, CA199 and CA125 was 33.75%, 47.50% and 91.25% in study group, respectively. The joint detection positive rate was 92.50%. However, the positive rate of CA125, AFP and CA199 was 23.75%, 0% and 11.25% in control group, and the joint detection positive rate was 28.75%. The positive rates of all indexes and the positive rates of comprehensive detection in the study group were higher than that in the control group ($P < 0.05$). Therefore, serum CA125, AFP and CA199 can be used as important indicators for the diagnosis of ovarian cancer.

Keywords: Tumor markers; Joint diagnosis; Ovarian cancer

Received: 12 March 2019; ***Accepted:*** 22 March 2019; ***Published Online:*** 1 April 2019

1. Introduction

Ovarian cancer is a common malignant tumor with a high mortality rate in clinical gynecology. The incidence rate of ovarian cancer is second only to that of cervical cancer and uterine body cancer [1]. Ovarian cancer with a very high risk is prone to extensive metastasis of pelvic and abdominal cavity, which poses a serious threat to the life safety of patients [2]. In recent years, as the change of life style of people, the incidence of ovarian malignant tumor also shows the trend that rises year by year. Therefore, how to effectively prolong the survival period of patients and improve the quality of life of patients has become one of the important topics of gynecology [3]. Ovarian cancer has no obvious symptoms in its early stages, and more than 70 % of patients are diagnosed in an advanced stage. In recent years, with the development of medical technology, the development of new chemotherapy regimens, supportive therapies, tumor cell reduction and other methods has been able to effectively extend the average survival time of ovarian cancer patients, but the treatment effect of advanced ovarian cancer patients is still poor [4]. Therefore, the principles of early diagnosis and early treatment should be clarified in the clinical practice of patients with ovarian cancer, so as to provide basis for surgery and ensure the complete removal of the lesion.

Tumor markers refer to substances secreted by malignant tumors into human body fluids or tissues, which can accurately reflect the occurrence and development of

tumors in the human body [5]. The mechanism by which the high expression of tumor markers promotes the development of ovarian cancer is as follows [6]. Firstly, the high expression of tumor markers would increase the proportion of G1/S phase in the ovarian epithelial cell cycle, providing conditions for the proliferation of cancer cells [7]. Secondly, high expression of tumor indicators will enhance the invasion and degeneration ability of cancer cells, which may infiltrate into surrounding normal tissues [8]. Therefore, whether there are malignant tumor lesions in the body can be determined by observing whether the expression level of tumor marker is abnormal. Serum CA125 is a kind of macromolecular glycoprotein, which exists in colon cells during embryonic development [9]. It is commonly found in serum of patients with epithelial ovarian tumor (serous tumor), and its diagnosis is highly sensitive. It is used for disease detection and efficacy evaluation [10]. CA125 is currently the most widely used tumor marker in clinical application. In most ovarian cancer patients, significant increase in serum CA125 can be found in 4 months before the onset of clinical symptoms [11]. The level of serum CA125 is closely related to the stage of ovarian cancer. The higher the level of CA125 in general patients, the higher the stage of tumor [12]. However, CA125 has poor specificity in the diagnosis of ovarian cancer and is easily affected by a variety of factors, such as menstruation and pregnancy, etc., but it can be used as an indicator to evaluate the efficacy of chemotherapy and has certain application value [13]. CA199 belongs to oligosaccharide tumor-associated antigen. As a new tumor marker, CA199 is the glycolipids on the cell membrane, which is sensitive to many kinds of cancers [14]. It exists in the serum in the form of salivary mucin, and it is a tumor-associated antigen in the blood circulation. At present, medical studies have found that CA199 is the most sensitive in the diagnosis of pancreatic cancer, and can also be used as a tumor marker for colorectal cancer, stomach cancer, liver cancer, etc [15]. The serum level of CA199 in patients with gastrointestinal tumors would significantly increase, and it is also highly expressed in epithelial fine cells of ovarian cancer [16]. The expression of AFP is abnormally elevated in patients with ovarian cancer, which can be used as a good tumor marker to characterize the stage of tumorigenesis and development [17].

2. Materials and Methods

2.1 Materials

In this study, 80 patients with ovarian malignant tumors admitted to our hospital from June 2019 to June 2020 were selected as the study group, including 64 patients with serous ovarian cancer and 16 patients with mucous ovarian cancer, aged 24-76 years old, with an average age of (49.83±6.54) years old. Eighty patients with benign ovarian tumors treated in the same period were treated as the control group. In the control group, there were 48 uterine fibroids, 19 ovarian cysts and 13 other cases. The average age was (50.25±6.86) years. There was no significant difference in basic parameters between the two groups (P> 0.05).

2.2 Methods

4 mL fasting venous blood was extracted from all patients on the first day after admission. The serum levels of CA125, AFP and CA199 were detected and observed by a fully automated immune analyzer. The positive rates of CA125, AFP, CA199 and combined tests were observed. Positive definition criteria :CA125 > 35 U/mL; CA199 > 37 U/mL; AFP > 10 ng/mL.

2.3 Statistical Tests

SPSS22.0 statistical software was used for data sorting and analysis. Mean ± SE was used for measurement data, and independent sample of T test was used for comparison between the two groups. χ^2 test was used for comparison between the counter groups. $P < 0.05$ indicated that the difference was statistically significant.

3. Results and Discussion

Optimum of Materials

As shown in Table 1, the detection level of each tumor marker in the study group was higher than that in the control group (P<0.05). And the positive rate of each indicator in the study group and the combined detection was also higher than that in the control group (P<0.05) (Table 2). The results of the study showed that the positive rates of all indexes and combined tests in the study group were higher than those in the control group (P <0.05). Among them AFP is mainly in the early fetal liver glycoprotein synthesis. When the fetus is born, AFP synthesis would be rapidly suppressed, only in stem cells or embryonic cells when the proliferation of malignant lesions will be related to the gene activation. So the body can further synthesis of AFP, leading to the increase in the level of AFP in the blood. APF is similar to CEA to some extent, which has a positive rate in the general population. As a tumor marker, the specificity of AFP is relatively low, it cannot be used as a single indicator. So AFP needs to be combined with other indicators for comprehensive analysis.

Table 1. The comparison of serum indexes of each group ($\bar{x} \pm s$)

Group	Case number	CA125 (U/mL)	AFP(ng/mL)	CA199 (U/mL)
Study group	80	204.38±73.25	11.24±3.56	71.34±12.45
control group	80	31.16±9.16	6.23±2.85	26.47±10.47
t value	-	22.356	11.362	22.458
P value	-	<0.001	<0.001	<0.001

Table 2. The comparison of positive rates of each group ($\bar{x} \pm s$)

Group	Case number	CA125 (U/mL)	AFP(ng/mL)	CA199 (U/mL)	Joint detection
Study group	80	74(90.15)	27(34.18)	38(47.28)	75(91.34)
control group	80	19(23.54)	0	9(12.34)	22(25.28)
x^2value	-	74.648	32.174	24.523	68.3856
P value	-	<0.001	<0.001	<0.001	<0.001

In the study, monitoring the level of the three indexes (AFP, CA125 and CA199) can provide reference for postoperative efficacy evaluation and recurrence prediction. Overall, serum CA125, CA199 and AFP for the early diagnosis of ovarian cancer provide important clinical basis, CA125 was the highest sensitivity of tumor markers in the diagnosis of ovarian cancer, but its specificity was low. The combined detection of CA125, AFP and CA199 can effectively improve the sensitivity and accuracy of the clinical diagnosis of ovarian cancer, reducing the rate of misdiagnosis and misdiagnosis. The results provided reference for the early treatment of ovarian cancer, thus improving the prognosis and diagnosis rate of patients to ensure the quality of life of the patient. However, in clinical examination, it should be noted that combined examination can not only improve the sensitivity of ovarian cancer diagnosis, but also have a certain effect on its specificity, so the possibility of false positive should be considered. Therefore, in addition to the joint detection of tumor markers, comprehensive judgment and dynamic observation should also be conducted according to the imaging and histopathological characteristics of patients to ensure the accuracy of diagnosis.

4. Conclusion

In summary, the expression levels of CA125, AFP and CA199 in serum were important indicators for the diagnosis of ovarian cancer. Combined detection can effectively improve the detection rates, the study has clinical application value for the early prevention and diagnosis of ovarian cancer.

References

[1] Markman, M. Second-line treatment of ovarian cancer[J]. Oncologist, 2000, 5(1): 26-35.

[2] King M C, Marks J H, Mandell J B. Breast and Ovarian Cancer Risks Due to Inherited Mutations in BRCA1 and BRCA2[J]. ence, 2003, 302(5645): 643-646.

[3] A C M, A S W, B J B, et al. Stage at diagnosis and ovarian cancer survival: Evidence from the International Cancer Benchmarking Partnership[J]. Gynecologic Oncology, 2012, 127(1): 75-82.

[4] Armstrong D K, Bundy B, Wenzel L, et al. Intraperitoneal Cisplatin and Paclitaxel in Ovarian Cancer[J]. New England Journal of Medicine, 2006, 354(1): 34-43.

[5] Hasanbegovic L, Sljivo N. Determination of the Reference Values of the Tumor Marker HE4 in Female Population of Canton Sarajevo[J]. Materia Socio-Medica, 2018, 30(1): 15-19.

[6] Su H Y, Lai H C, Lin Y W, et al. An epigenetic marker panel for screening and prognostic prediction of ovarian cancer[J]. International Journal of Cancer, 2010, 124(2): 387-393.

[7] Xia B, Yang S, Liu T, et al. miR-211 suppresses epithelial ovarian cancer proliferation and cell-cycle progression by targeting Cyclin D1 and CDK6[J]. Molecular Cancer, 2015, 14(1): 1-13.

[8] Belisle J A, Arens J A, Migneault M, et al. The Role of the Ovarian Tumor Marker CA125 (MUC16) in the Suppression of Human Immune Responses[J]. Journla of Immunotherapy, 2005, 28(6): 635-636.

[9] Speeckaert M M, Speeckaert R, Delanghe J R. Human epididymis protein 4 in cancer diagnostics: a promising and reliable tumor marker[J]. Advances in Clinical Chemistry, 2013, 59: 1-21.

[10] Patankar M S, Jing Y, Morrison J C, et al. Potent suppression of natural killer cell response mediated by the ovarian tumor marker CA125[J]. Gynecologic Oncology, 2005, 99(3): 704-713.

[11] He Z, Gao N, Jin W. Determination of tumor marker CA125 by capillary electrophoretic enzyme immunoassay with electrochemical detection[J]. Analytica Chimica Acta, 2003, 497(1-2): 75-81.

[12] Hassan S O A. Monitoring Ovarian Cancer patients during chemoteraphy and follow-up with serum tumor marker CA125[J]. Danish Medical Journal, 2017, 65(4).

[13] Wang H Z, Wang H Y, Liang R Q, et al. Detection of Tumor Marker CA125 in Ovarian Carcinoma Using Quantum Dots[J]. Acta Biochim Biophys Sin, 2004, 36(010): 681-686.

[14] Yu H. Reference intervals for gastrointestinal tumor mark-

10.30564/amor.v5i2.238

ers (AFP, CEA, CA199 and CA724) in healthy adults of Han nationality in Chongqing by Roche ECLIA system[J]. Scandinavian Journal of Clinical and Laboratory Investigation, 2019: 1-7.

[15] Maximilian Schöniger-Hekele MD, Christian Müller MD. The combined elevation of tumor markers CA 19-9 and CA 125 in liver disease patients is highly specific for severe liver fibrosis[J]. Dig Dis, 2006, 51(2): 338-345.

[16] Huanbo C, Wei Z, Laboratory D O. CA724,CEA,CA242,-CA199 Tumor Markers Joint Inspection in Gastric Carcinoma Diagnosis Value of[J]. China & Forgn Medical Treatment, 2015.

[17] Kurman R J, Scardino P T, Mcintire K R, et al. Cellular localization of alpha‐fetoprotein and human chorionic gonadotropin in germ cell tumors of the testis using an indirect immunoperoxidase technique. A new approach to classification utilizing tumor markers[J]. Cancer, 2015, 40(5): 2136-2151.