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Comparison of the Clinical Efficacy of Gemcitabine and Pirarubicin in the Treatment of Bladder Cancer after Electroresection

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Abstract: *Objective:* This paper aims to compare the effects of gemcitabine and pirarubicin in treating bladder cancer after electroresection. *Methods:* Bladder cancer patients who underwent bladder cancer resection in our hospital from January 2018 to January 2022 were selected as research subjects. According to the computer grouping method, 60 patients were divided into Group A (pirarubicin) and Group B (gemcitabine), and the therapeutic effects of the two groups of patients were compared. *Results:* The statistical significance of the tumor markers and related factor levels of patients in Group A and Group B before treatment was not established ($P > 0.05$). The levels of tumor markers and related factors of patients in Group B after treatment were lower than those of Group A ($P < 0.05$). There was no difference in the quality of life scores of patients in Group A and Group B before treatment ($P > 0.05$). After treatment, the quality of life scores of patients in Group B was higher than those in Group A ($P < 0.05$). The incidence rates of dysuria, hematuria, cystitis, and rash in Group B patients were less than those in group A ($P < 0.05$). The recurrence rate of patients in Group B was higher than in group A ($P < 0.05$). *Conclusion:* Both gemcitabine and pirarubicin are commonly used chemotherapy drugs after electroresection for bladder cancer. Compared with pirarubicin, gemcitabine is more effective and can improve the quality of life of bladder cancer patients.

Keywords: Gemcitabine; Pirarubicin; Electroresection; Bladder cancer

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1. Introduction

According to surveys, the incidence rate of bladder cancer has shown an increasing trend year by year. It is a malignant tumor disease that occurs in the human bladder mucosa. The characteristics of this disease include poor prognosis and high mortality [1]. Most bladder cancer patients have superficial tumors, which are limited to the mucosa and submucosa, and do not invade the muscle layer [2]. Middle-aged and older people have a high incidence of bladder cancer. The disease's main symptom is hematuria, and some patients also have symptoms such as dysuria. The everyday life and work of the patients have been greatly affected by this disease [3]. The current clinical treatment of bladder cancer is mainly surgical method. Resection of tumor tissue can reduce infiltration and metastasis. In order to reduce the postoperative recurrence rate, adjuvant chemotherapy is used

after surgery, which can effectively inhibit the growth of tumor cells and prolong survival time [4]. Among anti-tumor drugs, pirarubicin inhibits deoxyribonucleic acid (DNA) polymerase thus blocking nucleic acid synthesis, while gemcitabine incorporates DNA into cells and causes cell apoptosis. Both drugs have sound anti-tumor effects [5]. This study mainly explores the clinical efficacy of gemcitabine and pirarubicin in the treatment of bladder cancer after electroresection.

2. Clinical information and methods

2.1. Clinical information

The study began in January 2018 and ended in January 2022. The research subjects were bladder cancer patients who underwent bladder cancer resection. Based on the computer grouping method, sixty patients were divided into groups A and B. Inclusion criteria included patients that were diagnosed with bladder cancer through pathological examination, patients that meet the indications for electroresection surgery, patients and their families agree to participate in this study, and tumor diameter is less than 3cm. Exclusion criteria were patients with other tumor diseases, patients whose expected survival time is less than half a year, patients with systemic infection, and patients with coagulation dysfunction. In group A, there were 18 and 12 male and female patients, respectively. The age range was from 52 to 75 years old, with an average of 63.50 ± 5.77 years old. The pathological grades were G1, G2, and G3, with 5 cases, 12 cases, and 13 cases, respectively. In group B, there were 19 and 11 male and female patients, respectively. The age range was from 52 to 74 years old, with an average age of 63.00 ± 5.74 years. The pathological grades were G1, G2, and G3, with 6 cases, 10 cases, and 14 cases, respectively. The above data information was entered into statistical software for comparison, and the results showed no difference ($P > 0.05$).

2.2. Method

Both groups of patients underwent electroresection for bladder cancer. The postoperative drug for patients in group A was pirarubicin (Badai Factory of Japan Melox Co., Ltd., approval number X199990339). Pirarubicin was mixed with glucose solution (Anhui Changjiang Pharmaceutical Co., Ltd., National Drug Approval No. H34021808) at doses of 30mg and 40ml, respectively, and intravesical instillation was carried out. The positions were changed every 15 minutes, and the medication was administered once a week. The drug used by patients in group B was gemcitabine (Hainan Jinrui Pharmaceutical Co., Ltd., National Drug Approval No. H20163172), gemcitabine and 0.9% sodium chloride solution were mixed (Huaren Pharmaceutical Co., Ltd., National Drug Approval No. H20093777), the doses are 1000mg and 40ml respectively, and they were instilled into the bladder, position changing was done every 15 minutes, medication was taken once a week. Patients in both groups were treated for one year.

2.3. Evaluation indicators

The levels of tumor markers and related factors such as vascular endothelial growth factor (VEGF), recombinant human Dickkopf-related protein 1 (DKK-1), soluble vascular cell adhesion molecule-1 (sVCAM-1), soluble intercellular adhesion molecule-1 (sICAM-1) levels were measured and compared. The quality of life was evaluated using the Health Survey Scale (SF-36) [6]. The scale has four dimensions: physical function, emotional function, mental health, and social function, with scores ranging from 0 to 100, with higher scores indicating better quality of life. The incidence of complications and recurrence rate were compared between the groups.

2.4. Statistical processing

The data obtained from the study were put into the χ^2 and t calculator of SPSS22.0 statistical software for

comparison. When the test P value is lower than 0.05, it means that the statistical significance is established.

3. Results

3.1. Comparison of tumor markers and related factor levels

Based on **Table 1**, the statistical significance of the tumor markers and related factor levels of patients in Group A and Group B before treatment is not established ($P > 0.05$). The levels of tumor markers and related factors of patients in Group B after treatment are lower than those of Group A ($P < 0.05$).

Table 1. Comparison of tumor markers and related factor levels (mean ± standard deviation, ng/L)

Group	VEGF		DKK-1		sVCAM-1		sICAM-1	
	Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment
Group A	198.80 ± 9.81	74.81 ± 8.08	69.30 ± 7.70	34.90 ± 6.04	273.83 ± 13.11	73.13 ± 7.96	201.60 ± 11.06	44.14 ± 6.97
Group B	198.79 ± 9.78	62.23 ± 7.35	69.32 ± 7.73	25.71 ± 4.36	273.85 ± 13.14	64.30 ± 7.50	201.58 ± 11.03	35.55 ± 6.24
t	0.004	6.308	0.010	6.757	0.006	4.422	0.007	5.029
P	> 0.05	< 0.05	> 0.05	< 0.05	> 0.05	< 0.05	> 0.05	< 0.05

3.2. Comparison of quality of life scores

The statistical significance was not established between the quality of life scores of patients in Group A and Group B before treatment ($P > 0.05$). The quality of life scores of patients in Group B after treatment was higher than those of Group A ($P < 0.05$). The results are shown in **Table 2**.

Table 2. Comparison of quality of life scores (mean ± standard deviation, points)

Group	Physical health		Emotional function		Mental health		Social function	
	Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment
Group A	52.36 ± 5.33	70.68 ± 7.01	52.23 ± 5.23	71.20 ± 7.54	53.27 ± 5.64	71.08 ± 7.39	52.11 ± 52.14	70.87 ± 7.22
Group B	52.38 ± 5.35	84.34 ± 8.60	52.20 ± 5.20	84.34 ± 8.66	53.24 ± 5.61	84.41 ± 8.73	52.09 ± 52.11	84.78 ± 8.93
t	0.015	6.743	0.022	6.268	0.021	6.383	0.001	6.635
P	> 0.05	< 0.05	> 0.05	< 0.05	> 0.05	< 0.05	> 0.05	< 0.05

3.3. Comparison of the incidence and recurrence rates of complications

It can be seen from **Table 3** that the incidence rates of dysuria, hematuria, cystitis, and rash in patients in group B are less than those in group A ($P < 0.05$), and the recurrence rate of patients in group B is higher than that in group A ($P < 0.05$).

Table 3. Comparison of complication rates and recurrence rates [n (%)]

Group	Dysuria	Hematuria	Cystitis	Rash	Relapse
Group A	6 (20.00)	5 (16.67)	4 (13.33)	7 (23.33)	1 (3.33)
Group B	1 (3.33)	0 (0.00)	0 (0.00)	1 (3.33)	6 (20.00)
χ^2	4.043	5.454	4.285	5.192	4.043
P	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

4. Discussion

Bladder cancer is closely related to genetic, environmental, and other factors and significantly impacts the quality of life after the onset [7]. Surgery is the preferred method to treat bladder cancer. Since bladder cancer has the characteristics of multiple lesions and multicentric growth, it has a high recurrence rate after surgery. In order to reduce the recurrence rate after surgery, adjuvant chemotherapy will be used to improve the treatment effect [8]. Commonly used drugs for bladder cancer chemotherapy include pirarubicin, gemcitabine, and neomycin C. The ideal drug has a specific killing effect, especially on bladder cancer cells, allowing it to act on the cells and exert its effect quickly. It has the characteristics of low systemic absorption and high effective drug concentration [9].

Pirarubicin, as a semi-synthetic anthracycline anti-tumor drug, can be directly embedded into the DNA double-strand, inhibiting the activity of DNA polymerase, preventing the synthesis of nucleic acids, gradually leading to the death of tumor cells, and the disease is under control. Pirarubicin can stay long in the body and continue to exert its medicinal effect [10]. Normal cells will not absorb pirarubicin, and most of the drug solution will enter the tumor tissue, thus the tumor targeting is excellent [11]. It is worth noting that although pirarubicin is effective, it has more complications [12]. As a cytosine nucleoside derivative, gemcitabine and cytarabine are activated by deoxycytosine kinase after entering the body and then metabolized by cytosine nucleoside deaminase. Its mechanism of action is similar to that of cytarabine. After entering the body, it can be converted into nucleoside diphosphates and nucleoside triphosphates, which play a role in the G1/S phase of tumor cells. It can promote cell death after being incorporated into DNA. It can also inhibit nucleic acid reductase and reduce DNA synthesis in tumor cells [13]. The difference is that gemcitabine is incorporated into DNA and can inhibit ribonucleotide reductase, and reduce intracellular deoxynucleoside triphosphates. Another aspect different from cytarabine is that it can inhibit the reduction of deoxycytosine deaminase. The explanation of intracellular metabolites has a self-augmenting effect [14].

This study compared pirarubicin (group A) and gemcitabine (group B) for bladder cancer treatment after electroresection. The results showed VEGF, DKK-1, sVCAM-1, sICAM-1 levels in group B patients were lower than that of group A, the quality of life score of patients in group B is higher than that of group A, the incidence of dysuria, hematuria, cystitis, and rash of patients in group B is less than that of group A, and the recurrence rate of patients in group B is higher than that of group A. Instilling anti-tumor liquid into the bladder can increase the drug concentration at the lesion, increase the amount of drug absorbed and enhance the therapeutic effect. Both pirarubicin and gemcitabine have significant anti-tumor effects. In comparison, gemcitabine has fewer complications but a higher recurrence rate. As a cell growth factor, VEGF can increase vascular permeability and vascular endothelial cell migration. DKK-1 is a secreted protein that inhibits the WNT signaling pathway. Both VEGF and DKK-1 can reflect the degree of tumor progression. sVCAM-1 and sICAM-1 are the adhesion molecule immunoglobulin, which regulate the normal physiological functions of the human body and play a significant role in the development of tumors. It can reflect the activity of tumor cells. After gemcitabine treatment, the above indicators have improved, thus gemcitabine treatment has a better effect with higher safety [15].

In summary, gemcitabine and pirarubicin are commonly used chemotherapy drugs after electroresection for bladder cancer. Compared with pirarubicin, gemcitabine is more effective and can improve the quality of life of bladder cancer patients.

Disclosure statement

The authors declare no conflict of interest.

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