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Clinical Analysis of Adverse Reactions Associated with the Use of Anticancer Chemotherapy Drugs

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Abstract: Objective: To investigate the various adverse reactions observed in cancer patients undergoing chemotherapy and provide a basis for developing rational chemotherapy regimens. **Methods:** A retrospective study was conducted on 180 cancer patients treated between August 2014 and August 2016. All patients received chemotherapy, and the adverse reactions occurring during treatment were analyzed. **Results:** The types of adverse reactions in cancer patients after chemotherapy varied, but digestive system-related adverse reactions were more common, including nausea, hair loss, and diarrhea. In this study, the age distribution of the 180 cancer patients was analyzed. The results showed that 56 patients were aged 13–29 years, 72 patients aged 30–47 years, and 52 patients aged 48–67 years. **Conclusion:** Cancer patients undergoing chemotherapy have a high probability of experiencing adverse reactions, which can cause significant discomfort. In such cases, targeted interventions must be implemented to manage treatment-related adverse reactions and prevent their occurrence.

Keywords: Tumor Chemotherapy; Drug Application; Adverse Reaction

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Introduction

Cancer is a common disease with a high mortality rate. Currently, chemotherapy is the primary treatment method in clinical practice. Chemotherapy can exert its therapeutic effect by killing tumor cells in the patient's body. However, due to its lack of targeting, chemotherapy also damages healthy cells, leading to a series of adverse reactions and causing significant harm to the patient's body. To investigate the adverse reactions experienced by cancer patients following chemotherapy, this study focuses on patients with tumors admitted to our hospital. We analyze the adverse reactions that occur after the administration of chemotherapy drugs in clinical practice and explore specific intervention measures, as detailed below.

1.Materials and Methods

1.1 General Data

The study included 88 male patients and 92 female patients. The age range of the patients was 13–69 years, with an average age of 44.82 ± 3.82 years. Tumors were located in the breast in 32 patients, in the stomach in 38 patients, in the uterus in 20 patients, in the lungs and bronchi in 44 patients, and in other parts of the body in 46 patients.

1.2 Methods

Collected basic data from all 180 tumor patients, investigated and statistically analyzed chemotherapy-related data, including

patient age, gender, initial chemotherapy regimen, chemotherapy duration, chemotherapy drugs, and adverse reactions[1] . Summarized and calculated the above data, analyzed the adverse reactions of tumor chemotherapy drugs and their influencing factors, and adjusted the chemotherapy drug regimens accordingly[2] .

1.3 Observation indicators

Common adverse reactions observed during the use of anticancer chemotherapy drugs serve as observation indicators, including nausea, diarrhea, hair loss, neurotoxicity, and hand-foot syndrome, etc.[3] .

2.Results

2.1 Age Distribution

An age distribution analysis was conducted on the 180 tumor patients in this study. The results showed that 56 patients were aged 13–29 years, 72 patients were aged 30–47 years, and 52 patients were aged 48–69 years.

2.2 Analysis of Adverse Reaction Manifestations

This study conducted a systematic review and analysis of drug-related adverse reactions during treatment in 180 patients with malignant tumors. Through the integration of clinical data, peripheral neurotoxicity was found to have the highest incidence rate in this group, with a cumulative total of 86 cases, accounting for 47.78% of the total cases. This figure is significantly higher than the values reported in the literature for traditional chemotherapy regimens. This result may be associated with the use of platinum-based drugs, such as oxaliplatin, and other neurotoxic chemotherapy regimens in the treatment of these patients. This complication not only directly affects treatment adherence but may also have a persistent impact on long-term quality of life[4] .

The digestive system is one of the common sites of adverse reactions following chemotherapy in cancer patients. Research data indicate that 37.78% of 68 cases experienced vomiting as an adverse reaction, a pathological phenomenon associated with multiple pathophysiological processes such as 5-hydroxytryptamine receptor activation and blood-brain barrier permeability. Additionally, survey data indicate that the incidence of hand-foot syndrome has significantly increased, accounting for 36.67% of cases, involving 66 patients. This phenomenon is often attributed to the use of specific chemotherapy drugs such as anti-angiogenic targeted therapies and capecitabine, which can cause severe skin and mucosal damage, significantly increasing the risk of treatment interruption. There were 28 cases of diarrhea, accounting for 15.56%. Although hair loss is a typical side effect of cytotoxic drugs, only 8 cases were observed in this study, representing 4.44%, which is likely due to the limited use of taxane-based drugs in this patient population.The data are summarized in Table 1.

Table 1: Incidence rates of adverse reactions to chemotherapy in cancer patients (total number of patients: 180)

Type of adverse reaction	Number of Cases (Cases)	Incidence Rate
Nausea	6	37.78
Diarrhea	2	15.56
Hair loss	8	4.44
Hand-foot syndrome	66	36.67
Peripheral neurotoxicity	86	47.78

Chemotherapy, as one of the key modalities in comprehensive cancer treatment, has seen drug toxicity reactions emerge as critical factors constraining treatment efficacy and patient quality of life[5] . A systematic review of chemotherapy data from 180 cancer patients between August 2014 and August 2016 was conducted to comprehensively elucidate the diagnostic and therapeutic characteristics of various adverse reactions induced by major anticancer drugs.

In terms of toxic characteristics in the digestive system, there are significant differences among various drugs. Antimetabolite drugs exhibit a higher rate of gastrointestinal toxicity (n=117/180), with 79.3% of patients reporting persistent nausea, 34.6% experiencing vomiting of grade III or higher, and 42.7% experiencing diarrhea. This clearly indicates that the adverse effects of this class of drugs are associated with direct damage to the epithelial cells of the gastrointestinal mucosa. The platinum-based drug group (n=100/180) and the antimitotic drug group (n=99/180) had similar proportions and incidence rates. The incidence of oral mucositis in the platinum-based drug group, particularly the delayed-onset nausea symptoms it causes,

warrants clinical attention, with an incidence rate of 21.11%. This involved 180 cases of topoisomerase inhibitors (n=38), with a combined incidence of intestinal dysfunction reaching 63.2%, closely linked to the narrow therapeutic index of the drugs.

Cardiac toxicity signs showed a clear dose-dependent trend in anthracycline drugs. In the doxorubicin group, the rate of left ventricular ejection fraction reduction ≥10% was 23.7%. When the cumulative dose reached 400 mg/m² or higher, the risk of cardiac dysfunction sharply increased, with a confidence interval of 1.87–5.43 and a confidence level of 95%. After structural adjustment, doxorubicin remained unchanged, with a 12.9% incidence of subclinical ECG abnormalities, underscoring the need for rigorous cardiac monitoring of novel anthracycline-based drugs.

Analysis of liver toxicity test results showed that the rates of abnormal liver function indicators in the bleomycin group (n=68) and the camptothecin group (n=45) were 39.7% and 57.8%, respectively. Within the first 72 hours of administration, 84.6% of patients in the bleomycin group experienced elevated AST/ALT levels, while the carmopride group exhibited delayed increases in bilirubin levels, with a median time of 8 days. A dynamic liver function monitoring model was established, significantly enhancing clinical warning efficacy. In the mitomycin group (n=32), urinary system adverse reactions were concentrated, with microalbuminuria cases accounting for 70%, and 21.9% of patients progressed to nephrotic syndrome. The primary pathological manifestation of this toxicity is drug-induced tubular injury. After optimizing hydration therapy, the incidence of grade III or higher renal injury significantly decreased from 17.2% to 8.4% (P=0.033). The analysis of paclitaxel hypersensitivity reactions showed that pre-treatment with dexamethasone and histamine antagonists significantly reduced the incidence of severe hypersensitivity reactions, from 6.8% to 1.2% ($P < 0.01$). Delayed-type skin rashes occurred in 11.3% of cases, indicating the need for personalized immune regulation. The adverse reactions observed in all 108 tumor patients during treatment are shown in Table 2.

Table 2: Statistics and classification of adverse reactions associated with chemotherapy drugs in cancer patients (total number of patients: 180)

Drug Category	Adverse Reaction Type	Number of Cases (Examples)	Incidence Rate/Notes
Gastrointestinal System Adverse Reactions			
Platinum-based drugs	Gastrointestinal adverse reactions	10	55.56
Antimicrotubule drugs	Gastrointestinal adverse reactions	99	55.00
Topoisomerase inhibitors	Gastrointestinal adverse reactions	3	21.11
Antimetabolites	Gastrointestinal adverse reactions	1	65.00
Other systemic adverse reactions			
Doxorubicin/Epirubicin	Cardiac injury	-	-
Bleomycin/Carmestine	Liver injury	-	-
Mitomycin	Urinary system adverse reactions	-	-
Paclitaxel	Allergic reactions	-	-

3.Discussion

Chemotherapy has been increasingly used in the clinical treatment of cancer patients. It is characterized by rapid onset, high efficacy, high toxicity, and severe adverse reactions. On one hand, it effectively controls the progression of the disease; on the other hand, its poor targeting ability often damages normal tissues, leading to adverse reactions in patients. Therefore, it is essential to accelerate medical technological innovation and improve the standards of cancer chemotherapy to benefit patients more effectively. Additionally, chemotherapy can be combined with surgery to promote patient recovery, improve quality of life, and extend survival. During treatment, it is crucial to have a clear understanding of the adverse reactions caused by chemotherapy, select appropriate anticancer drugs rationally, and minimize toxicity while ensuring therapeutic efficacy.

When using chemotherapy, cancer patients should select the appropriate chemotherapy method based on the type of adverse reactions to alleviate the suffering caused by these reactions. By analyzing the factors causing adverse reactions, it was

found that, first, many anticancer drugs are Western medications, which have complex compositions and are difficult to effectively regulate in terms of quality. Second, many anticancer drugs are composite formulations containing antigens and haptens, which often trigger allergic reactions in patients. Finally, anticancer drugs contain a large number of microparticles that can cause damage when acting on patients, particularly in cases of liver failure, leading to reduced glomerular filtration rate, tubular secretion capacity, and renal blood flow, thereby affecting the absorption of anticancer drugs. If a cancer patient's liver function declines, the reduced blood flow to the liver will decrease the activity of liver enzymes and the liver's detoxification capacity, making it difficult to effectively eliminate the toxicity of anticancer drugs and ultimately leading to adverse reactions. During treatment, it is essential to strengthen the standardized management of reporting adverse reactions associated with the use of anticancer drugs to achieve the goal of effectively preventing and treating adverse reactions and treatment side effects. Additionally, collaborative mechanisms can be established to enhance communication among medical staff, patients, and clinical pharmacists, enabling real-time information exchange to discuss the current status of drug adverse reactions and develop corresponding strategies. In this process, clinical pharmacists play a crucial role in conducting regular surveys and analyses of adverse reactions occurring during the use of anticancer drugs, providing better guidance for subsequent chemotherapy implementation, and thereby improving the efficacy of anticancer chemotherapy.

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Conflict of Interests

The authors declare that there is no conflict of interest regarding the publication of this paper.

Reference

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