

The Clinical Value of Leukocyte-Reduced Blood Component Transfusion in the Treatment of Elderly Cancer Patients

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Abstract: Objective: This study aims to evaluate the clinical value of leukocyte-reduced blood component transfusion in elderly cancer patients undergoing transfusion therapy.

Methods: A total of 80 elderly cancer patients who received transfusion therapy in our hospital between August 2022 and August 2023 were enrolled. Based on transfusion methods, patients were divided into a control group (n=40, conventional suspended red blood cell transfusion) and an experimental group (n=40, leukocyte-reduced component transfusion). Treatment efficacy, incidence of adverse reactions, postoperative infection rate, and surgical incision healing time were compared between the two groups.

Results: The experimental group showed significantly higher clinical efficacy, a lower incidence of adverse reactions and postoperative infections, and a shorter incision healing time compared to the control group. The differences were statistically significant ($P < 0.05$).

Conclusion: Leukocyte-reduced component transfusion meets the clinical needs of elderly cancer patients, significantly improves treatment efficacy, reduces adverse reactions and infections, and shortens incision healing time. It is therefore recommended for wider clinical adoption.

Keywords: Elderly cancer patients; Transfusion therapy; Leukocyte-reduced blood components; Clinical value

1. General Information and Methods

1.1 General Information

A total of 80 elderly cancer patients treated with transfusion therapy in our hospital from August 2022 to August 2023 were enrolled. They were randomly divided into a control group and an experimental group (n=40 each).

In the control group: 23 males and 17 females; age range 65–89 years, mean age (75.3 ± 5.1) years.

In the experimental group: 21 males and 19 females; age range 66–91 years, mean age (76.1 ± 4.8) years.

There were no statistically significant differences in gender, age, type of cancer, or type of surgery between the two groups ($P > 0.05$), ensuring comparability.

Inclusion criteria:

- (1) Patients aged ≥ 65 years with a confirmed cancer diagnosis;
- (2) Required blood transfusion;
- (3) Signed informed consent.

Exclusion criteria:

- (1) Age < 65 years;
- (2) Not requiring transfusion;
- (3) Inability to provide informed consent;
- (4) Severe comorbidities or unstable vital signs.

1.2 Methods

All patients underwent routine pre-transfusion evaluation, including assessment of disease status, blood type, transfusion history, and physical condition.

•Control group: Received conventional suspended red blood cells. Suspended RBCs were prepared by separating red cells from whole blood, followed by adding saline and nutrient solutions. Transfusion volume was calculated based on patient weight and clinical condition. Strict aseptic techniques and vital sign monitoring were implemented to detect adverse reactions.

•Experimental group: Received leukocyte-reduced blood component transfusions. Leukocytes were removed during blood processing to reduce immune and infection risks. Dosing, frequency, and blood component type were tailored individually. Medical staff closely monitored patient responses and performed follow-ups to evaluate outcomes and adverse effects.

Both groups adhered to strict aseptic protocols and were provided with transfusion-related education.

1.3 Observation Indicators

The following outcomes were compared:

- Treatment efficacy, categorized as significant improvement (symptoms disappeared), improvement (symptoms alleviated), or no effect (symptoms persisted or worsened).
- Adverse reactions, such as dizziness, nausea, and shock.
- Postoperative infections.
- Incision healing time, measured in days.

1.4 Statistical Analysis

Data were analyzed using SPSS 22.0. Measurement data were expressed as mean $\pm$ standard deviation ($\bar{x} \pm s$) and compared using t-tests. Categorical data were compared using the χ^2 test. $P < 0.05$ was considered statistically significant.

2. Results

2.1 Treatment Efficacy

The total effective rate was significantly higher in the experimental group

(95%) compared to the control group (70%) ($P < 0.05$).

Table 1. Comparison of Overall Treatment Efficacy Between the Two Groups

Group	Significantly Effective	Effective	Ineffective	Total Effective Rate
Control (n=40)	10	18	12	70.00%
Experimental (n=40)	15	23	2	95.00%
x2	/	/	/	7.875
P	/	/	/	0.001

2.2 Adverse Reactions

The incidence of adverse reactions was significantly lower in the experimental group (5%) than in the control group (20%) ($P < 0.05$).

Table 2. Comparison of the Incidence of Adverse Reactions Between the Two Groups

Group	Dizziness/Nausea	Shock	Others	Total Incidence
Control (n=40)	4	1	3	20.00%
Experimental (n=40)	1	0	1	5.00%
x2	/	/	/	10.75
P	/	/	/	0.001

2.3 Postoperative Infections

Postoperative infection rate was significantly lower in the experimental group (2.5%) than in the control group (15%) ($P < 0.05$).

Table 3. Postoperative Infection Rates in the Two Groups

Group	Infection Cases	Incidence
Control (n=40)	6	15.00%
Experimental (n=40)	1	2.50%
x2	/	9.43
P	/	0.001

2.4 Incision Healing Time

The mean healing time was significantly shorter in the experimental group (10.55 ± 3.09 days) than in the control group (14.23 ± 3.34 days) ($P < 0.05$).

Table 4. Surgical Incision Healing Time in the Two Groups

Group	Surgical Incision Healing Time(d)
Control (n=40)	14.23±3.34
Experimental (n=40)	10.55±3.09
t	1.11
P	0.01

3. Discussion

Elderly cancer patients present unique clinical challenges due to declining organ function and coexisting chronic diseases such as hypertension or diabetes. These conditions increase treatment complexity and risk. Postoperative blood transfusion can relieve anemia and improve tolerance to chemotherapy and radiotherapy. However, conventional transfusion carries risks such as immune reactions and infections.

This study confirms that leukocyte-reduced transfusion significantly reduces adverse events and improves overall treatment outcomes. The removal of leukocytes prevents immune overactivation and reduces infection risk while retaining essential blood components like RBCs and platelets. This aligns with prior findings in the literature.

Proper patient assessment and individualized treatment planning are crucial. Physicians must calculate accurate transfusion volumes and closely monitor patients during treatment. Adherence to aseptic handling and quality control is essential for successful outcomes.

4. Conclusion

Leukocyte-reduced component transfusion is highly effective in elderly cancer patients. When individualized and performed under strict clinical protocols, it improves treatment efficacy, safety, and recovery. It is therefore recommended for broader application in clinical settings.

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