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Assessment of the immune function of aged patients before and after immunotherapy in severe sepsis

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Abstract

Objective: To assessment of the immune function of aged patients before and after immunotherapy in severe sepsis.

Methods: A retrospective analysis was made on 60 elderly patients with sepsis who were treated in our intensive care unit from January 2016 to December 2018. Thirty patients who received thymosin alpha 1 intervention for two weeks were treated as observation group, and 30 patients who did not receive thymosin alpha 1 intervention as control group. Firstly, the influence of thymosin alpha 1 on the immune function of patients was analyzed by comparing the changes of general clinical data and the detection indexes before and after treatment between the two groups.

Results: After treatment, the levels of monocytes, CD4+/CD8+ and HLADR/CD14 were significantly higher than those before treatment ($P < 0.05$).

Conclusion: Thymosin alpha 1 can improve the immune function of elderly patients with sepsis.

Introduction

Because of the decline of immune function, it is often difficult for the elderly to recover from the attack of sepsis. Against the background of the aggravation of population aging and the increasing incidence of sepsis in the future, treatment measures for imbalance of immunity and metabolism after sepsis attack, such as TNF-alpha, should be taken. Antibody, recombinant human activating protein C or enhanced amino acid supplementation have not been an ideal effect in various studies. Thymosin alpha-1, as an immunoregulatory polypeptide, has been widely used in many pathophysiological conditions, such as infection, cancer, immunodeficiency and aging. It has great potential therapeutic value for elderly patients with post-sepsis immune imbalance [1,2]. This study analyzed the effect of thymosin alpha 1 intervention on immune function of these patients, so as to provide reference for their clinical application.

Materials and methods

General data of 60 elderly patients with sepsis treated in ICU of our hospital from January 2016 to December 2018 were retrospectively analyzed. Thirty elderly patients who received thymosin alpha 1 intervention for 2 weeks were treated as observation group and 30 patients who did not receive thymosin alpha 1 intervention as control group.

Inclusion criteria: (1) The criteria for diagnosis of sepsis in accordance with the International Guidelines for the Treatment of Sepsis and Septic Shock;

Exclusion criteria: (1) lack of clinical data and detection indicators; (2) malignant tumors or other immune and metabolic diseases; (3) long-term or pre-and post-admission immunosuppressive interventions. Among the 60 patients, there were 36 males and 24 females, ranging in age from 65 to 96, with an average of (84.5±8.8) years.

The control group was given routine comprehensive treatment, including early anti-infection, fluid resuscitation, treatment of primary diseases, correction of water and electrolyte, acid-base balance, nutritional support, intubation, mechanical ventilation or deep vein indwelling when necessary. On this basis, the observation group was given Thymosin alpha 1 1.6 mg/time, subcutaneous injection. Once a day for 2 weeks.

Data collection: (1) General clinical data: age, sex, APACHE II score, SOFA score, chronic underlying diseases, infection site, special treatment and survival time after admission; (2) Routine and biochemical parameters of peripheral blood: white blood cells, neutrophils, lymphocytes, monocytes, CRP, albumin, prealbumin and transferrin; (3) Peripheral blood flow cytology Detection indicators: T cells, Th, suppressive T cells (Treg), B cells, CD4/CD8 and HLA-DR/CD14. The time points of the indicators collected in this retrospective study were at the beginning of treatment on the 11th day of admission and 2 weeks after treatment.

Research methods: By comparing the changes of general clinical data and detection indexes before and after treatment between the two groups, the effects of thymosin alpha 1 on immune function of patients were analyzed.

SPSS 21.0 was used for statistical analysis. Measuring data were expressed by X±s and t-test or Mann-Whitney U-test, counting data by (n/%) and X^2 test. The difference of paired data before and after parallel control was tested by t-test. $P < 0.05$ was statistically significant.

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Results

There were no significant differences in age, sex, APACHE II score, SOFA score, chronic underlying diseases, infection site and special treatment between the two groups (P > 0.05). There is no significant difference in the basic conditions between the two groups. There were significant differences in the changes of monocytes, CD4/CD8 and HLADR/CD14 between the two groups before and after treatment(0.47 ±0.12)% *vs*(0.62 ± 0.18)× 10^9 /L,(1.87 ± 0.35)*vs*(2.56 ± 0.46), (50.20 ± 5.94)% *vs*(58.22 ±0.74)%. There were significant differences (P<0.05). That is to say, thymosin alpha 1 intervention significantly increased monocytes, CD4/CD8 and HLADR/CD14.

Discussion

Immune imbalance and metabolic disorder often occur in sepsis patients. Immunosuppression leads to increased susceptibility to pathogens. Catabolism disorder not only caused serious protein loss, but also accelerated the development of immune imbalance, making the condition of elderly sepsis patients more complex. Many studies have shown that thymosin alpha 1 can inhibit apoptosis of neutrophils, promote proliferation, differentiation and maturation of lymphocytes, enhance the activity of antigen presenting cells and immune response, and effectively enhance the innate and adaptive immune functions, thereby improving the immune status of the body [3-5]. The decrease of CD4+/CD8+ is closely related to immunosuppression and adverse prognosis. LEKKOU and VOLK found that HLA DR / CD14 < 30% was an important indicator of immunosuppression and prognosis after sepsis. Our team found that the levels of monocytes, CD4/CD8 and HLADR/CD14 in elderly sepsis patients increased significantly after thymosin alpha 1 intervention, which fully confirmed the value of thymosin alpha 1 in immunoregulation. We have not observed that thymosin alpha 1 promotes the proliferation of neutrophils and lymphocyte subsets. The improvement of thymosin alpha 1 on overall immune paralysis needs further study.

We noticed changes in metabolic function in elderly sepsis patients more than a decade ago. Persistent catabolism of sepsis can lead to continuous decline of albumin, prealbumin and transferrin, resulting in muscle loss, ventilator dependence and wound healing difficulties [6-8]. After two weeks of continuous intervention with thymosin alpha 1, serum albumin, prealbumin and transferrin in elderly patients with sepsis have improved, and more metabolic indicators are being evaluated. Thymosin alpha 1 may play a direct or indirect role in regulating the body's catabolic state.

Metabolic imbalance and decomposition immunity interact and promote each other, which is the key to the deterioration of sepsis. Our team has been studying the inflammatory state, immune response and the evaluation of erythrocyte glycometabolism and liver metabolism in elderly patients with sepsis for a long time. In conclusion, thymosin alpha 1 intervention therapy can improve the immune function of elderly patients with sepsis, but its effect on immune function and metabolic function remains to be further studied.

Authors' contributions and competing interests

CH and ZL conceived of and designed the study. HC and ZL analysed and interpreted the data. Others contributed the materials. CH wrote the manuscript. All authors read and approved the final manuscript. All authors declare that they have no conflicts of interest.

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