Effect of surgical treatment on the anti-tumor immune function in patients with gastric cancer

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ARTICLE INFO

Objective: To explore the effect of surgical treatment on the anti-tumor immune function in patients with gastric cancer. Methods: A total of 50 patients with gastric cancer who were admitted in our hospital from April, 2015 to April, 2016 were included in the study and served as the observation group, while 50 healthy individuals who came for physical examinations were served as the control group. The morning fasting venous blood before operation and 7 d after operation in the observation group and in the control group was collected. FCM was used to detect the levels of CD3+, CD4+, CD8+, CD4+/CD8+, and NK cells (CD16+, CD56+). The immunological function status at different pathological stages before operation and 7 d after operation was analyzed. Results: The expression levels of CD3+, CD4+, CD4+/CD8+, and NK cells in the observation group were significantly lower than those in the control group, while CD8+ level was significantly higher than that in the control group. The expression levels of CD3+, CD4+, CD4+/CD8+, and NK cells before operation were significantly lower than those 7 d after operation, while CD8+ level was significantly higher than that 7 d after operation. The expression levels of CD3+, CD4+, CD4+/CD8+, and NK cells before operation in patients at stage I and II were significantly lower than those in patients at stage III and IV, while CD8+ level was significantly higher than that in patients at stage III and IV. Conclusions: Detection of the expression levels of peripheral blood T cell subsets and NK cells in patients with gastric cancer in the clinic can be served as the important indicator to evaluate the immunological function status, and is of great significance in estimating the condition and assessing the prognosis.

1. Introduction

Gastric cancer is a common digestive system tumor, and has already been in the advanced stage when being confirmed, with an extremely high morbidity and mortality rate[1]. The immunological function in patients with gastric cancer is generally low in that the immune cells can not recognize, repel, and kill the tumor cells[2]. With the study on tumor immunology, it is argued that the cellular immunity is mainly involved in the anti-tumor immunity. The immune index can reflect the anti-tumor ability to a certain degree. T cell subset and NK cell expressions can reflect the anti-tumor immune ability[3,4]. The study is aimed to explore the effect of surgical treatment on the anti-tumor immune function in patients with gastric cancer in order to provide a theoretical evidence for the clinical treatment and the estimation of prognosis.

2. Materials and methods

2.1. General materials

A total of 50 patients with gastric cancer who were admitted in our hospital from April, 2015 to April, 2016 were included in the study and served as the observation group. All the patients were confirmed by the pathological biopsy under the gastroscope and were in accordance with the operation indications through the preoperative evaluation. In the observation group, 29 were male, and 21 were female; aged from 35 to 75 years old, with an average age of (57.2±4.3) years old; 42 had radical operation, and 8 had palliative operation; 29 in the gastric antrum, 12 in the gastric body, and 9 in the gastric fundus; 20 at stage I and II, and 30 at stage III and IV according to the pathological stages[5]. A total of 50 healthy individuals who came for physical examinations served as the control group.
individuals who came for physical examinations were served as the control group, among which 28 were male, and 22 were female; aged from 35 to 76 years old, with an average age of (56.8±5.2) years old. Those who had severe heart, liver, and kidney disease, diabetes, infectious disease, and immunodeficiency, and had received immunoagents were excluded from the study. The comparison of age and gender between the two groups was not statistically significant (P>0.05).

2.2. Methods

The morning fasting venous blood before operation and 7 d after operation in the observation group and in the control group was collected. FCM was used to detect the levels of CD3+, CD4+, CD8+, CD4+/CD8+, and NK cells (CD56+, CD16+). The immunological function status at different pathological stages before operation and 7d after operation was analyzed.

2.3. Statistical analysis

SPSS 18.0 software was used for the statistical analysis. The measurement data were expressed as mean±SD, and t test was used. Chi-square test was used for the enumeration data. P<0.05 was regarded as statistically significant.

3. Results

3.1. Expression levels of peripheral blood T lymphocyte subsets and NK cells

The expression levels of CD3+, CD4+, CD8+, CD4+/CD8+, and NK cells (CD56+, CD16+) in the observation group were significantly lower than those in the control group (P<0.05) (Table 1).

3.2. Expression levels of peripheral blood T lymphocyte subsets and NK cells before operation and 7 d after operation in the observation group

The expression levels of CD3+, CD4+, CD4+/CD8+, and NK cells before operation were significantly lower than those 7 d after operation, while CD8+ level was significantly higher than that 7 d after operation (P<0.05) (Table 2).

3.3. Expression levels of peripheral blood T lymphocyte subsets and NK cells before operation and 7 d after operation in the observation group at different pathological stages

The expression levels of CD3+, CD4+, CD4+/CD8+, and NK cells before operation in patients at stage I and II were significantly lower than those in patients at stage III and IV, while CD8+ level was significantly higher than that in patients at stage III and IV (P<0.05) (Table 3).

4. Discussion

Some researches demonstrate that the pathogenesis of tumors is associated with the immunological function, especially the decreased cell immune function. The strengthened immune system can inhibit the growth of tumor cells[6]. The immunity in patients with gastric cancer is low and in a inhibitory state. When there is an immune dysfunction, the immune cells can not effectively eliminate the tumor cells, which can further cause a certain effect on the immunological function[7,8].

T cell plays an important role in the regulation of immune response. T cell subsets are the most important lymphocytes in the immune system, and are of great significance in monitoring the immunological function in tumor patients. With the deep study on immunology, it is clear that the cellular immunity is mainly involved in the anti-tumor immunity. The change of peripheral blood T

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### Table 1

<table>
<thead>
<tr>
<th>Groups</th>
<th>n</th>
<th>CD3+ (%)</th>
<th>CD4+ (%)</th>
<th>CD8+ (%)</th>
<th>CD4+/CD8+ (%)</th>
<th>NK cells (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observation</td>
<td>50</td>
<td>63.42±6.55*</td>
<td>41.54±5.37*</td>
<td>21.36±3.71</td>
<td>2.05±0.35</td>
<td>8.26±0.43</td>
</tr>
<tr>
<td>Control</td>
<td>50</td>
<td>73.17±5.23</td>
<td>50.33±3.24</td>
<td>18.76±4.33</td>
<td>2.31±0.27</td>
<td>15.82±1.36</td>
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</tbody>
</table>

*P<0.05, when compared with the control group.

### Table 2

<table>
<thead>
<tr>
<th>Groups</th>
<th>n</th>
<th>CD3+ (%)</th>
<th>CD4+ (%)</th>
<th>CD8+ (%)</th>
<th>CD4+/CD8+ (%)</th>
<th>NK cells (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before operation</td>
<td>50</td>
<td>63.42±6.55</td>
<td>41.54±5.37</td>
<td>21.36±3.71</td>
<td>2.05±0.35</td>
<td>8.26±0.43</td>
</tr>
<tr>
<td>7d after operation</td>
<td>50</td>
<td>71.08±4.52</td>
<td>47.31±5.46</td>
<td>18.38±4.18</td>
<td>2.30±0.16</td>
<td>9.78±0.88</td>
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</table>

*P<0.05, when compared with 7d after operation.

### Table 3

<table>
<thead>
<tr>
<th>Groups</th>
<th>n</th>
<th>CD3+ (%)</th>
<th>CD4+ (%)</th>
<th>CD8+ (%)</th>
<th>CD4+/CD8+ (%)</th>
<th>NK cells (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I, II stage</td>
<td>20</td>
<td>68.17±5.35*</td>
<td>39.51±3.08*</td>
<td>17.58±6.43*</td>
<td>2.11±0.11*</td>
<td>7.84±0.47*</td>
</tr>
<tr>
<td>III, IV stage</td>
<td>30</td>
<td>61.25±4.43</td>
<td>36.45±3.47</td>
<td>25.16±4.52</td>
<td>1.58±0.21</td>
<td>5.86±0.71</td>
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</tbody>
</table>

*P<0.05, when compared with patients at stage III and IV.
lymphocytes can reflect the cell immune function\[9,10\]. T cell mainly includes CD4\(^+\) and CD8\(^-\). CD4\(^+\) can assist the cellular immunity and humoral immunity, help B cell to produce the antibody, and assist or induce T cell. CD8\(^+\) T cell can secrete various cytokines, expand and increase the cell immune process, and assist and induce immune cells to be involved in the anti-tumor effect\[11\]. CD4\(^+\); an inhibitory or killer T cell, can inhibit the synthesis and secretion of antibody and T cell proliferation, specifically recognize MHCI antigen on the cell surface to kill the target cells in order to inhibit the antigen presentation and the production of antibody\[12\]. CD4\(^+\) and CD8\(^+\) are in a balance state to maintain the immunological function balance and stability. It is argued that CD4\(^+\)/CD8\(^+\) can better reflect the immunological function\[13\]. CD3\(^+\) is the sum of CD4\(^+\) and CD8\(^+\) T cell, and can reflect the total immunological function status\[14\]. NK cell, also called natural killer cell, can produce a cytotoxic effect on the tumor cells, non-specifically and directly kill the tumor cells, is the first barrier of anti-tumor immunity, and plays an important role in anti-tumor. The reduction of NK cell amount can reduce the immunological function\[15\].

The results in the study showed that the expression levels of CD3\(^+\), CD4\(^+\), CD4\(^+\)/CD8\(^+\), and NK cells in the observation group were significantly lower than those in the control group, while CD8\(^+\) level was significantly higher than that in the control group (P<0.05); the expression levels of CD3\(^+\), CD4\(^+\), CD4\(^+\)/CD8\(^+\), and NK cells before operation were significantly lower than those 7 d after operation, while CD4\(^+\) level was significantly higher than that 7 d after operation (P<0.05), indicating that the immunological function in patients with gastric cancer is lower than that in the healthy individuals, and is enhanced after the lesions being removed. It is argued that for patients being confirmed with gastric cancer, the radical operation should be performed as early as possible to remove the immunosuppression, improve the cell immune function, and promote the recovery of immunological function\[13\].

In the early stage of malignant tumors, the local immune response is mainly involved with a small effect on the general immunity, and the immunological function maintains in a certain level. With a further progression of the disease, the specific and non-specific immunosuppression is gradually produced, finally resulting in the immunodeficiency\[16\]. The results in the study showed that the expression levels of CD3\(^+\), CD4\(^+\), CD4\(^+\)/CD8\(^+\), and NK cells before operation in patients at stage I and II were significantly lower than those in patients at stage III and IV, while CD8\(^+\) level was significantly higher than that in patients at stage III and IV (P<0.05), indicating that for patients with gastric cancer, the higher the pathological stage is, the more obvious the inhibition of T cell and NK cell differentiation and proliferation, the more serious the immunosuppression state is, and the later the condition is, finally leading to the constant deterioration of tumors\[17\].

In conclusion, detection of the expression levels of peripheral blood T cell subsets and NK cells in patients with gastric cancer in the clinic can be served as the important indicator to evaluate the immunological function status, and is of great significance in estimating the condition and assessing the prognosis.

References


\[5\] Yueyang X, Jianhua N, Ming Y. Control study on TNM staging in patients with gastric cancer by 64 slice spiral CT and histopathology. J Chin Pract Diagn Ther 2013; 27(9): 875-877.


\[13\] Wen Y, Shifu L, Aili N. Comparative analysis of expression levels of peripheral blood T cell subsets (CD4\(^+\), CD8\(^+\), CD4\(^+\)/CD8\(^+\)) and NK cells (CD8\(^+\), CD56\(^+\)) in patients with gastric cancer during the perioperative period. J Chin Rural Phys 2015; 30(36): 167-169.


