Effect of propofol intravenous anesthesia on T lymphocyte subsets in the perioperative period in patients with primary liver cancer

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Objective: To observe the effect of propofol intravenous anesthesia on T lymphocyte subsets in the perioperative period in patients with primary liver cancer in order to search an anesthesia method with slight effect in the perioperative period. Methods: A total of 70 patients with primary liver cancer who were admitted in our hospital from January, 2014 to December, 2015 for operation were included in the study and divided into group A and group B with 35 cases in each group. The patients in group A were given sevoflurance inhalation anesthesia, while the patients in group B were given propofol intravenous anesthesia. The changes of T lymphocyte subsets in the perioperative period in the two groups were observed. Results: The peripheral blood CD3+, CD4+, and CD4+/CD8+ levels at T1 and T2 in the two groups were significantly lower than those at T0. The peripheral blood CD3+, CD4+, and CD4+/CD8+ levels at T1 and T2 in group B were significantly higher than those in group A. The plasma IL-4, IL-10, HMGB1, and VEGF-1 levels at T2 and T3 in group B were significantly higher than those in group A. The plasma IL-6 level at T1, T2, and T3 in group B was significantly higher than that in group A. Conclusions: Adoption of propofol intravenous anesthesia for patients with primary liver cancer can significantly reduce the effect on T lymphocyte subsets by operation; therefore, it should be preferred.

2. Materials and methods

Meanwhile, when the patients are suffered from operative wound, postoperative pain, and anesthetics, the immunological function will be further inhibited, which will greatly enhance the occurrence rate of postoperative complications and death rate[3,4]. Some scholars argue that different anesthesia methods during operation can produce different effects on the immunological function in the perioperative period[5]. Sevoflurance, isoflurance, and propofol are commonly involved in the anesthesia for the liver cancer radical resection in the clinic. Except for anesthesia, the above drugs can regulate the release of cytokines, and have a certain effect on the immunological function in the perioperative period. The study is aimed to observe the effect of propofol intravenous anesthesia on T lymphocyte subsets in the perioperative period in patients with primary liver cancer in order to search an anesthesia method with slight effect in the perioperative period.

1. Introduction

Liver cancer is a common and highly epidemic malignant tumor in our country, with mortality ranking the second[1]. Some researches demonstrate that operation is the most effective method in the treatment of early liver cancer in the clinic[2], but the selection of anesthesia methods during operation has a certain effect on the immunological function in the perioperative period. It is argued by the modern oncology researches that the immunological function is closely associated with the prognosis of malignant tumor. When the immunological function is low, the patients with tumors will have a higher morbidity, with poor prognosis, while the malignant tumor attack will inhibit the immunological function, and induce the changes of immunoglobulin contents and T lymphocyte subsets.
2.1. Clinical materials

A total of 70 patients with primary liver cancer who were admitted in our hospital from January, 2014 to December, 2015 for operation were included in the study, among which 42 were male, and 28 were female; aged from 35 to 70 years old, with an average age of 52 years old; tumor diameter from 2 to 6 cm, with single or multiple small liver cancer lesions; 62 had Child grading in group A, and 8 in group B. The standard of partial hepatectomy was referring to the criteria reported by Liu et al.[4], with ASA-II grade. Exclusion criteria: (1) those who had infection and fever 1 month before operation; (2) those who had accepted radiochemotherapy before operation; (3) those who had anemia, obvious obesity, and perioperative blood transfusion.

2.2. Methods

The patients were divided into group A and group B with 35 cases in each group. The patients in group A were given sevoflurane inhalation anesthesia, while the patients in group B were given propofol intravenous anesthesia. The patients in the two groups were given intramuscular injection of penehyclidine hydrochloride (0.01 mg/kg) and midazolam (0.1 mg/kg) before operation. Group A: 6%-8% sevoflurane + fentanyl (4-6 μg/kg) + vecuronium bromide (0.1 mg/kg) were used for anesthesia induction, while 1%-3% sevoflurane was used for anesthesia maintenance. Group B: propofol (2 mg/kg) + fentanyl (4-6 μg/kg) + vecuronium bromide (0.1 mg/kg) were used for anesthesia induction, while propofol and fentanyl (0.05-0.2 μg/kg/min) were used for anesthesia maintenance.

2.3. Observation indicators

The peripheral blood before anesthesia induction (T0), immediately after operation (T1), 24 h after operation (T2), and 48 h after operation (T3) in the two groups was collected. FCM was used to detect T lymphocyte subsets. ELISA was used to detect IL-4, IL-6, IL-10, MGB1, and VEGF-1.

2.4. Statistical analysis

SPSS 18.0 software was used for the statistical analysis. Data were expressed as mean ± SD. Q test was used for the comparison between the two groups, and ANOVA was adopted. \( p<0.05 \) was regarded as statistically significant.

3. Results

3.1. Comparison of T lymphocyte subsets in the perioperative period between the two groups

The peripheral blood CD3+, CD4+, and CD4+/CD8+ levels at T1 and T2 in the two groups were significantly lower than those at T0 \( (p<0.05) \). The peripheral blood CD3+, CD4+, and CD4+/CD8+ levels at T1 and T2 in group B were significantly higher than those in group A \( (p<0.05) \) (Table 1).

Table 1

Comparison of T lymphocyte subsets in the perioperative period between the two groups (%).

<table>
<thead>
<tr>
<th>Groups</th>
<th>n</th>
<th>CD3+</th>
<th>CD4+</th>
<th>CD8+</th>
<th>CD4+/CD8+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group A</td>
<td>35</td>
<td>60.6±5.34</td>
<td>39.15±4.96</td>
<td>26.30±3.58</td>
<td>1.48±0.45</td>
</tr>
<tr>
<td>Group B</td>
<td>35</td>
<td>51.78±4.66</td>
<td>34.83±4.42*</td>
<td>24.1±2.17</td>
<td>1.32±0.34*</td>
</tr>
</tbody>
</table>

\( ^* p<0.05, \) when compared with at T0; \( ^* p<0.05, \) when compared with group A.

Table 2

Comparison of the plasma cytokine levels in the perioperative period between the two groups (pg/mL).

<table>
<thead>
<tr>
<th>Groups</th>
<th>n</th>
<th>IL-4</th>
<th>IL-6</th>
<th>IL-10</th>
<th>HMGB1 (ng/mL)</th>
<th>VEGF-1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group A</td>
<td>35</td>
<td>12.5±2.3</td>
<td>214.1±40.8</td>
<td>5.4±0.8</td>
<td>22.1±3.9</td>
<td>48.6±5.3</td>
</tr>
<tr>
<td>Group B</td>
<td>35</td>
<td>15.3±3.1</td>
<td>282.2±42.3*</td>
<td>6.1±1.0</td>
<td>32.1±4.4</td>
<td>58.6±5.7</td>
</tr>
</tbody>
</table>

\( ^* p<0.05, \) when compared with group A.
3.2. Comparison of the plasma cytokine levels in the perioperative period between the two groups

The plasma IL-4, IL-10, HMGB1, and VEGF-1 levels at T2 and T3 in group B were significantly higher than those in group A (P<0.05). The plasma IL-6 level at T1, T2, and T3 in group B was significantly higher than that in group A (P<0.05) (Table 2).

4. Discussion

Liver cancer is a malignant tumor in the clinic. Due to the abnormal liver reservation function in patients with liver cancer, the expressions of immunity promoting factors are reduced, while the operative wound and anesthetics can affect the immunological function, and increase the risk of postoperative complications, which is not beneficial for the rehabilitation; therefore, various factors which can affect the immunological function in the perioperative period should receive attention. Some researches demonstrate that anesthesia methods and drugs can affect T lymphocyte levels, which can further affect the recovery of immunological function; therefore, how to select anesthesia methods and drugs with small effects on the immunological function is of great significance in improving the prognosis in patients with tumors.

Cytokines are mainly produced by the activated immune cells, whose release in the normal body presents a dynamic balance, and are involved in the immune response and inflammatory reaction[8]. After trauma, the neuroendocrine and immune system are activated, which can destroy the balance of cytokine release; therefore, it can be speculated that the imbalance of cytokine level is closely associated with the prognosis in patients with tumors[9]. IL-4, IL-6, and IL-10 are the proinflammatory cytokines with various biological effects, are also the important anti-inflammatory cytokines in the perioperative period, and can initiate the endogenous systemic inflammatory reaction, and inhibit the tumor immune response[10,12]. Due to the relative stress state in the perioperative period, the release of IL-4, IL-6, and IL-10 can be increased. Some scholars argue that[13,14] HMGB1 is involved in the inflammatory reaction, and cell proliferation, differentiation, and migration, and is an advanced inflammatory cytokine. VEGF-1 is an important cell regulatory cytokine, and can regulate the vascular endothelial cell proliferation, migration, and remodeling. Some researches demonstrate that HMGB1 and VEGF-1 are positively correlated in the expressions of liver cancer tissues, suggesting that both of them are associated with the micro-angiogenesis of liver cancer[15]. The results in the study showed that the plasma IL-4, IL-10, HMGB1, and VEGF-1 levels at T2 and T3 in group B were significantly higher than those in group A (P<0.05); the plasma IL-6 level at T1, T2, and T3 in group B was significantly higher than that in group A (P<0.05), indicating that propofol intravenous anesthesia can enhance the anti-inflammatory level in the perioperative period, strengthen the immunological function, inhibit the excessive production of HMGB1 and VEGF-1, and block the further generation of cancer tissues. T lymphocyte subsets are the important cell population of immune system, and are of great significance in maintaining the immunological function, whose abnormal levels can accurately reflect the immunological function and disease-resistant intensity[16]. The results in the study showed that the peripheral blood CD3+, CD4+, and CD4+/CD8+ levels at T1 and T2 in the two groups were significantly lower than those at T0 (P<0.05); the peripheral blood CD3+, CD4+, and CD4+/CD8+ levels at T1 and T2 in group B were significantly higher than those in group A (P<0.05), indicating that propofol intravenous anesthesia can alleviate the perioperative stress reaction in patients with liver cancer, which is beneficial for the rehabilitation.

In conclusion, adoption of propofol intravenous anesthesia for patients with primary liver cancer can significantly reduce the effect on T lymphocyte subsets by operation, and has slight effect in inhibiting T lymphocyte subsets; therefore, it should be preferred.

References